

**SMART WEIGHING SOLUTIONS**



**rinstrum**

**400 Series**

**(K481)**

**Summing Indicator  
Reference Manual**

RI00-617-100

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# 1. Introduction

## 1.1. Overview

This precision digital summing indicator can sum up to nine slave indicators from either the R300 or R400 range. These can be connected together on a multi-drop serial RS485 bus or RS232 ring network. The summing indicator polls each of the slave units summing all of the weight readings, and displays the resulting total weight. The setpointing, printing facilities and accessory modules are all driven from the total weight. The summing indicator will show an error message (-----) if any of the slave weights are negative or if there is a mix of gross and net weights, as defined by Technical Schedule S1/O/A. If all slave units are showing net weight the summing indicator will show a net total. Facilities are provided to view and use individual slave weights, and sub totals of a subset of the slave weights.

The setup of the instrument is digital, with a non-volatile security store for all setup parameters. It may be operated from either a DC power source (12VDC to 24VDC) 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 are fitted standard and allows for a temporary isolated communications link to be established with a PC. Software upgrades and the use of computerised setup can then be done using a PC. Refer to Optical Communications on page 13 for more information.



**Figure 1: Weight Indicator**

The instrument provides zero, tare and gross/net on the fixed function keys and supports special functions (eg. Toggle slave weights and blanking), via three (3) user definable function keys and external inputs. Operator functions (clock, view, 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. CLOCK) are retained when power is removed.

The RS-232 communications port is typically used for communicating with the slave indicators. It can also be used for printer driving, connection to a remote display or PC when an optional serial module is used for the slave communications. 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. This manual covers the K481 summing indicator. Please refer to the relevant manual for the slave indicators.

## 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.

<b>Bold Text</b>	Bold text denotes words and phrases to note.
<b>&lt;Key&gt;</b>	<b>&lt;Key&gt;</b> denotes a Keypad key. <b>Note:</b> In the Specifications section the < symbol means <b>less than</b> and the > symbol means <b>greater than</b> .
<b>^</b>	This symbol denotes one space when describing serial output formats.
<b>⊗</b>	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

<b>Performance</b>		
Operating Environment	Temperature: -10 to +50°C ambient Humidity: <90% non-condensing Storage: -20 to +50°C ambient IP55 when panel mounted or with rear boot (otherwise IP40)	
Case Materials	ABS, Silicon Rubber, Nylon, Acrylic (no halogen used)	
Packing Weights	Basic Indicator: 0.6kg	
<b>Digital</b>		
Display	LCD with 4 alpha-numeric displays and LED backlighting: <ul style="list-style-type: none"> <li>• Primary display: 6 x 28.4mm high digits with units and annunciators</li> <li>• 2<sup>nd</sup> display: 9 x 17.6 mm digits with units</li> <li>• 3<sup>rd</sup> display: 8 x 6. 1mm digits</li> <li>• 4<sup>th</sup> display: 4 x 7.6 mm digits</li> </ul>	
Setup	Full digital with visual prompting in plain messages	
<b>Power Input</b>		
Standard Power	12 to 24VDC (15 VA max) - ON/OFF key with memory feature	
Variants	AC M4101	Input: 110/240VAC 50/60Hz Output: 12VDC 15VA
	Battery M4102	Rechargeable NiMH battery, 12V, 2.5Ah
<b>Features</b>		
Optical Data Communications	Magnetically attached optical communications support. Optional conversion cable connects directly to a standard RS-232 or USB port.	
Serial Communications	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	
3 assignable function keys	Printing, slave weights, and totalising	
Battery Backed Clock Calendar	Battery life 10 years minimum	
Approvals	FCC, CE, C-tick Check trade approvals	

Software	V1	V2
Summing Slaves	9	9
Summing Subtotals	4	4
Input/Outputs	32	32
Setpoints	8	8
External Keys	8	8
Assignable Functions	8	8
Analogue Output	1	1
Communication 1xRS232 Duplex and 1xRS485 TX only	✓	✓
Additional Communications Modules	✓	✓
Products	10	250
Automatic Output	2	2
Automatic Output – Custom format	✓	✓
Single Automatic Output	✓	✓
Printouts	2	2
Custom Printouts	✓	✓
Report Printing	✓	✓

**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 slave indicator serial connections, power and auxiliary cables as required.
- 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 section page 39 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.
- 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.

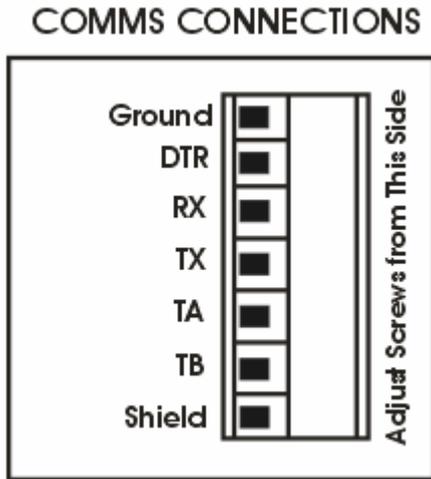


Figure 2: Cable Connections

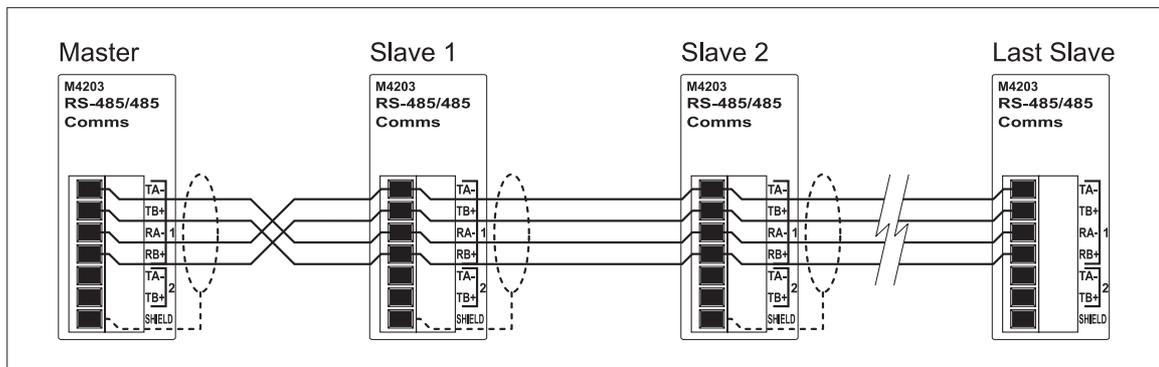
### 3.7. DC Power (DC PWR + , DC PWR –)

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 it.

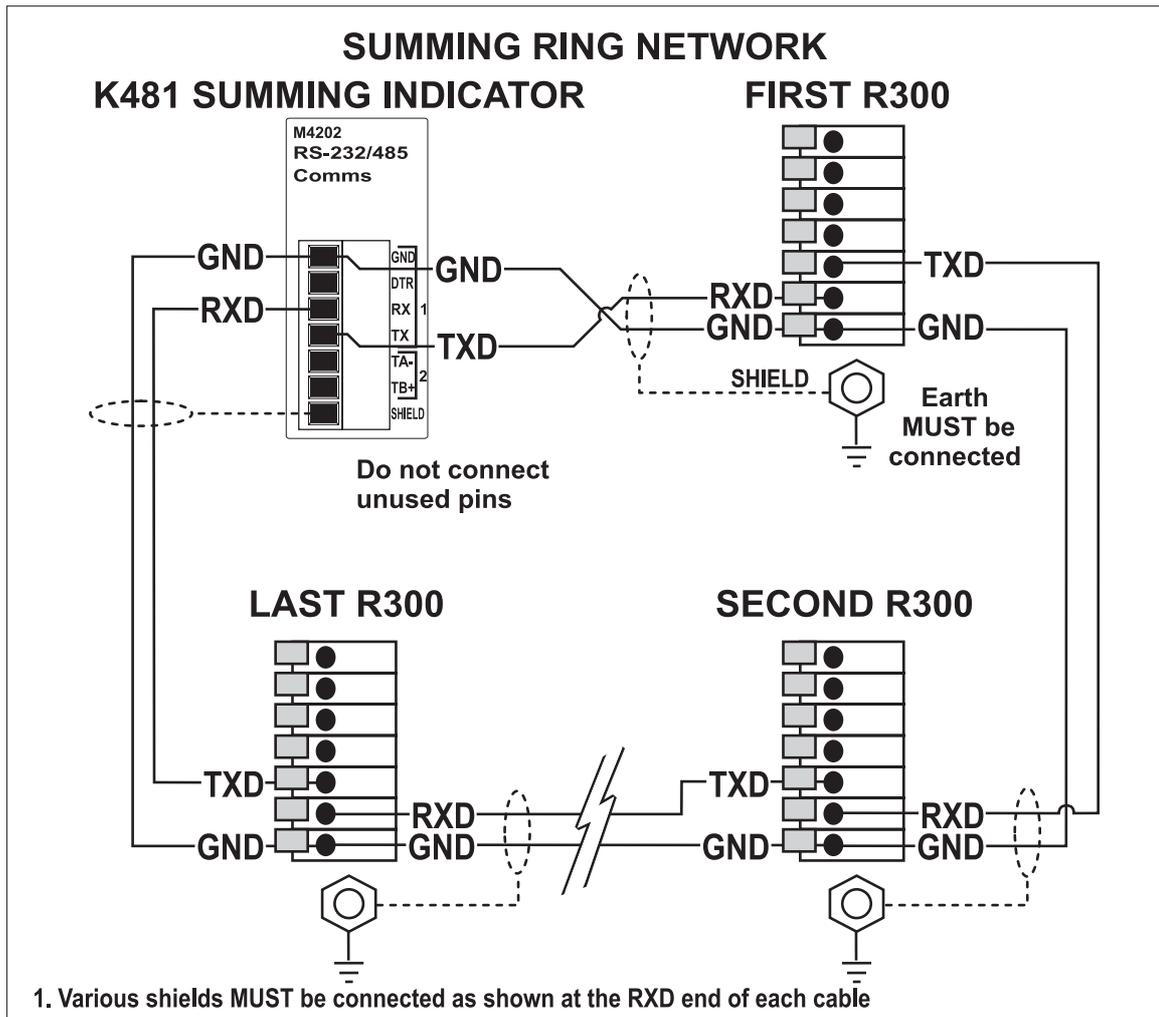
### 3.8. Summing Slave Serial Connection

#### ◆ Summing R420 Indicators using RS485

When summing using this configuration, a M4203 module is required for the master and each slave.



◆ Summing R320 Indicators using RS232 Ring Network



**3.9. Load Cell Connection**

As this is a summing indicator, the loadcell connection is not required and should not be connected.

**3.10. Auxiliary Connections**

This section provides diagrams to illustrate the communication connections.

3.10.1. RS-232 Serial

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

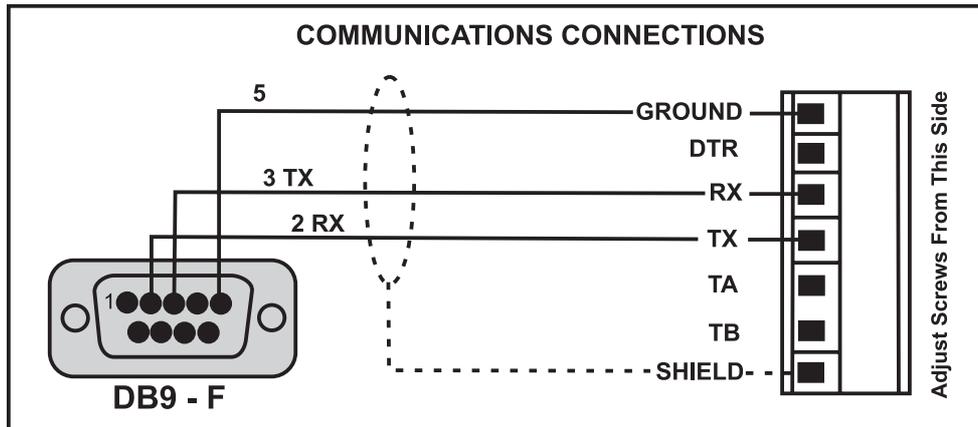


Figure 3: RS-232 - Instrument to PC using COM Port (DB9)

◆ Printer Connections (TX, DTR and GND)

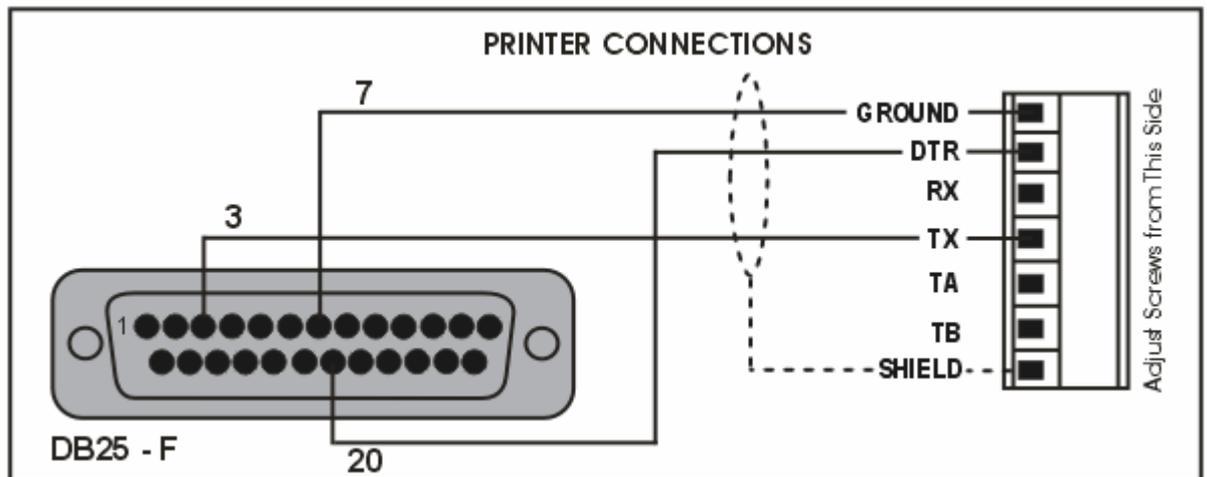


Figure 4: RS-232 – Instrument to Printer (DB25)

◆ 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.

3.10.2. 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.

### 3.11. 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 information from a PC or to download software upgrades.

The PC end of the cable is a standard female DB9 RS232 connector or a USB 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.)

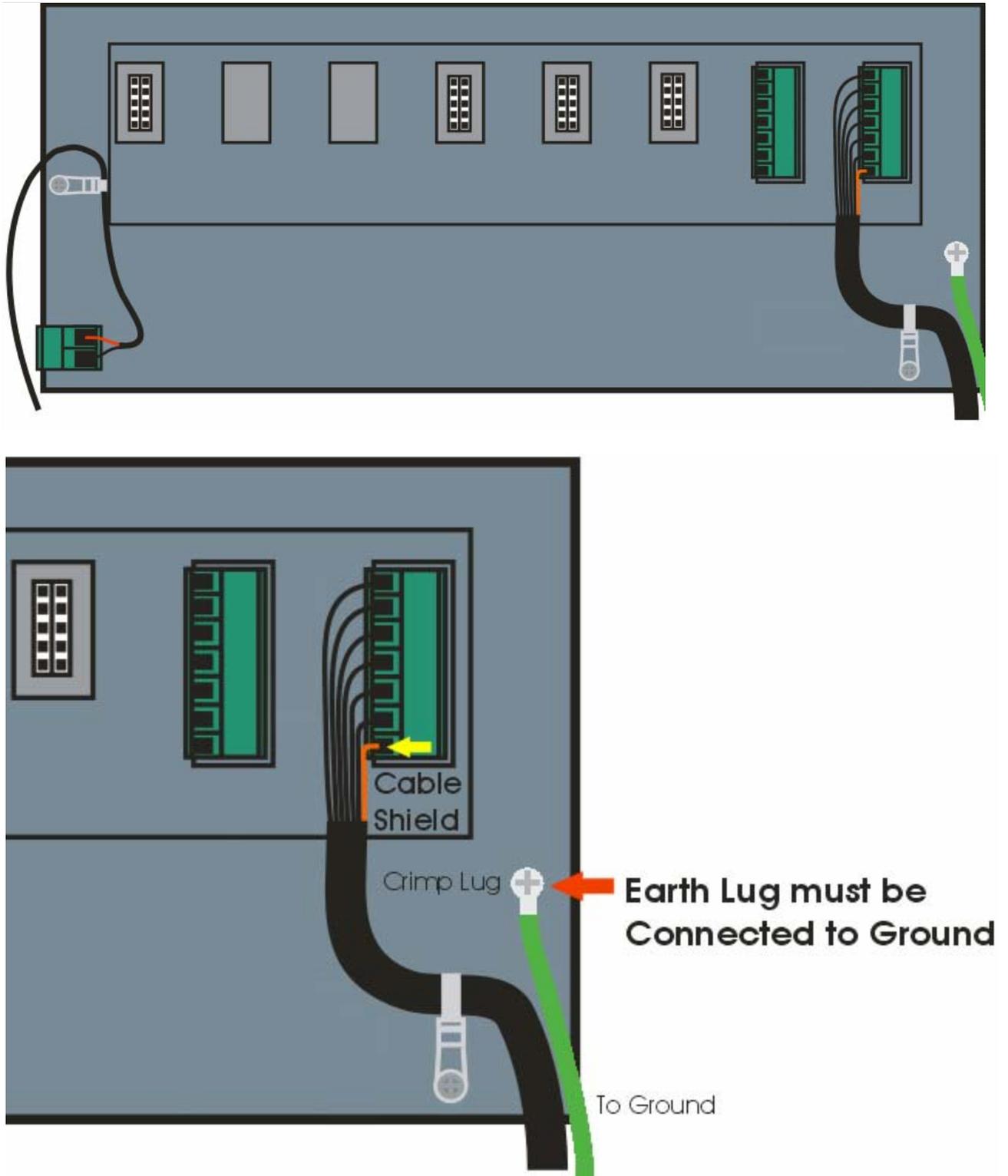


Figure 5: Optical Communications attachment

### 3.12. Connecting Shields

**To obtain full EMC or for RFI immunity, cable shields MUST be connected and the earth lug on the rear of the instrument must be grounded.**

Figure 6 illustrates an example of possible connections. Also shown are the connecting cables restrained using cable ties fastened by screws into the rear of the unit.



**Figure 6: Cable Shield Connection**

### 3.12.1. 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.

### 3.13. 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 Legal Sealing page 79 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. RS485 networking
- analog outputs, e.g. 4-20mA or 0-10V
- digital inputs and digital outputs, e.g. external buttons or setpoint outputs
- expanded memory, e.g. DSD functionality.

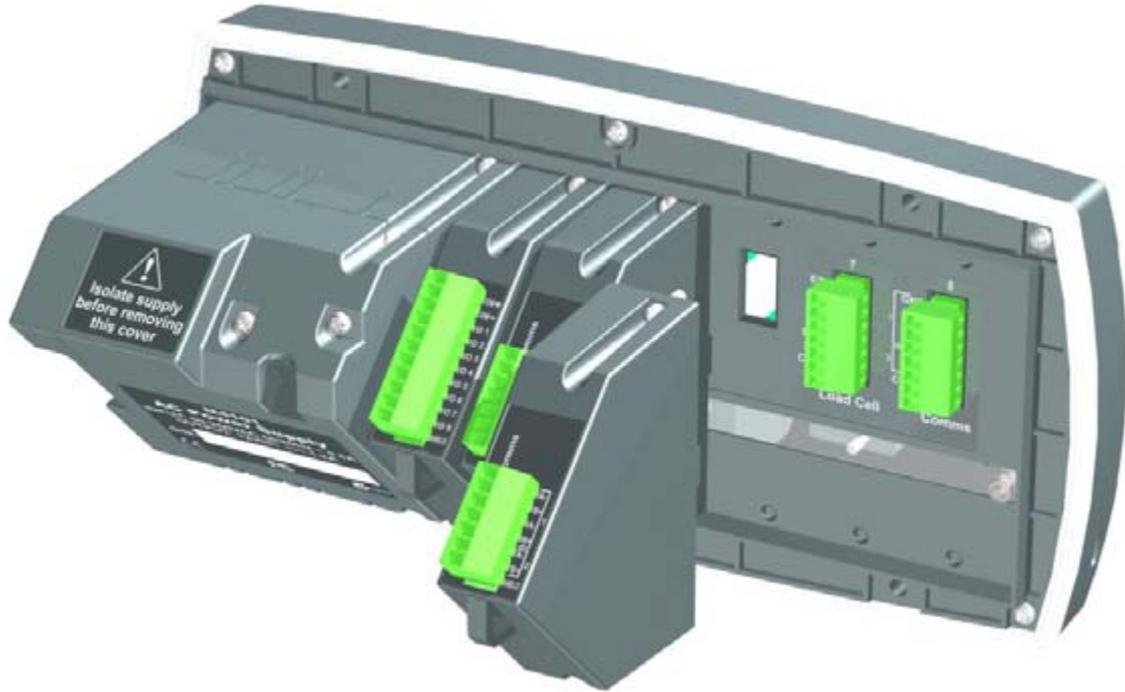
**Caution:** Instrument should be switched off before connecting or disconnecting accessory modules.

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 8.2 page 42. 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 8.2.1 page 42.

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 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 35 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 legal for trade 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 35 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 Menus. 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 35 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 35 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><b>Method 1:</b> Press and hold both the <b>&lt;POWER&gt;</b> and <b>&lt;F3&gt;</b> keys together for two seconds.</p>
---

<p><b>Method 2:</b> Press and hold both the <b>&lt;POWER&gt;</b> and <b>&lt;ZERO&gt;</b> keys together for two seconds.</p>
---

<p><b>Method 3:</b> Press the <b>&lt;ZERO&gt;</b> key repeatedly. When <b>End</b> displays press <b>&lt;TARE&gt;</b>.</p>
---

<p><b>Method 4:</b> Press the <b>&lt;POWER&gt;</b> 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 35 for more information)

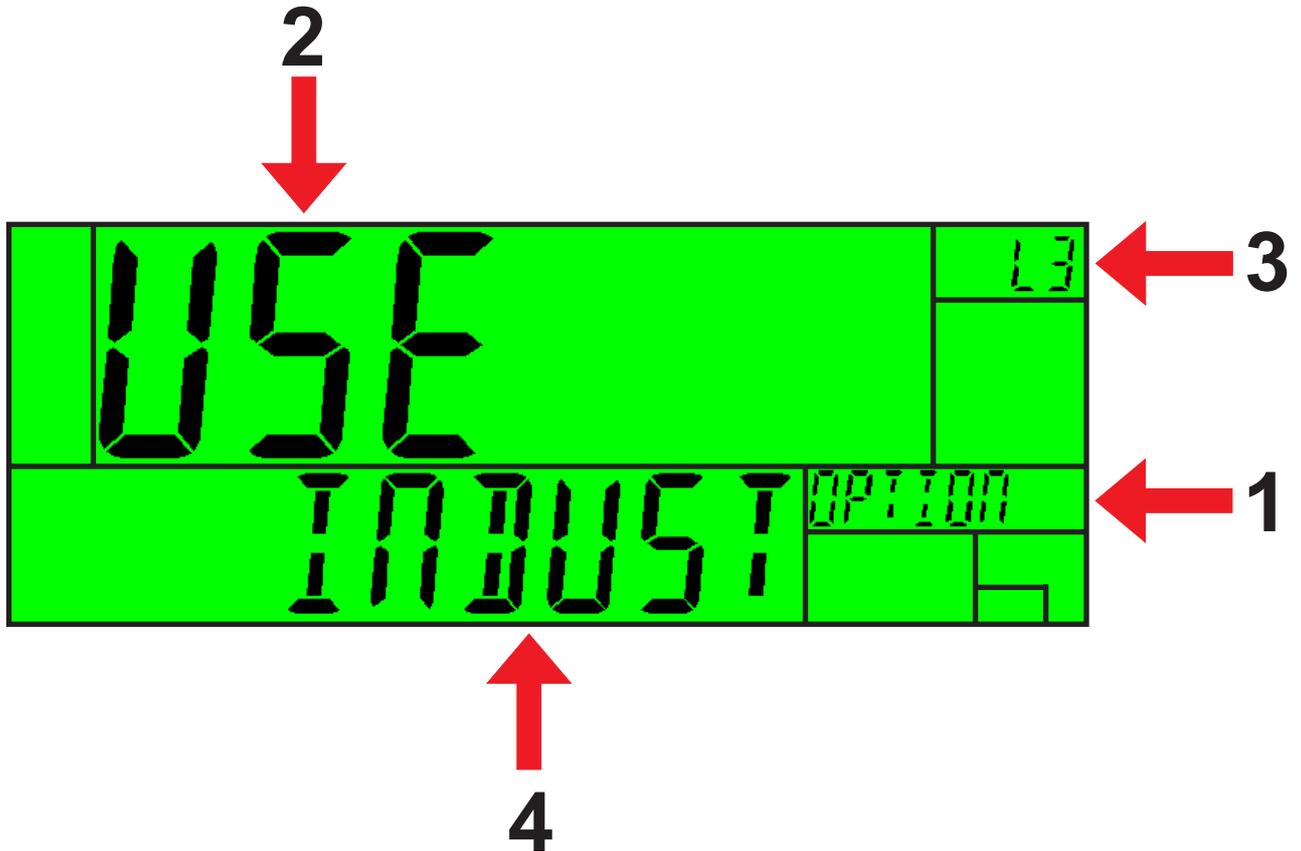
**Warning:** If the power is interrupted while in setup (i.e. by disconnecting the power cable), unsaved settings will be lost.

### 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 Gen.Opt:PCode:Safe.PC.

Press <ZERO> repeatedly to display the <b>GEN.OPT</b> menu.
Press <TARE> repeatedly to display the <b>PCODE</b> menu.
Press <GROSS/NET> repeatedly to display the <b>SAFE.PC</b> item and the current setting (eg. 0).
Enter the new safe passcode 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 Gen.Opt:Date.F.

Press <b>&lt;ZERO&gt;</b> repeatedly to display the <b>GEN.OPT</b> menu.
Press <b>&lt;TARE&gt;</b> repeatedly to display the <b>DATE.F</b> menu and the current setting (eg DD.MM.YY).
Use the <b>↑</b> and <b>↓</b> keys to select the desired option from the list.
Press <b>&lt;OK&gt;</b>

## 4.7. Strings

There are 3 different methods of editing strings:

- Normal string editing (auxiliary display: STR)
- Literal string using character position (auxiliary display: S.LIT)
- 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. Literal String Editing

Literal string editing is useful where strings are small, contain no lowercase or unprintable characters and string position is important. 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

### 4.7.3. 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

## 5. Basic Operation

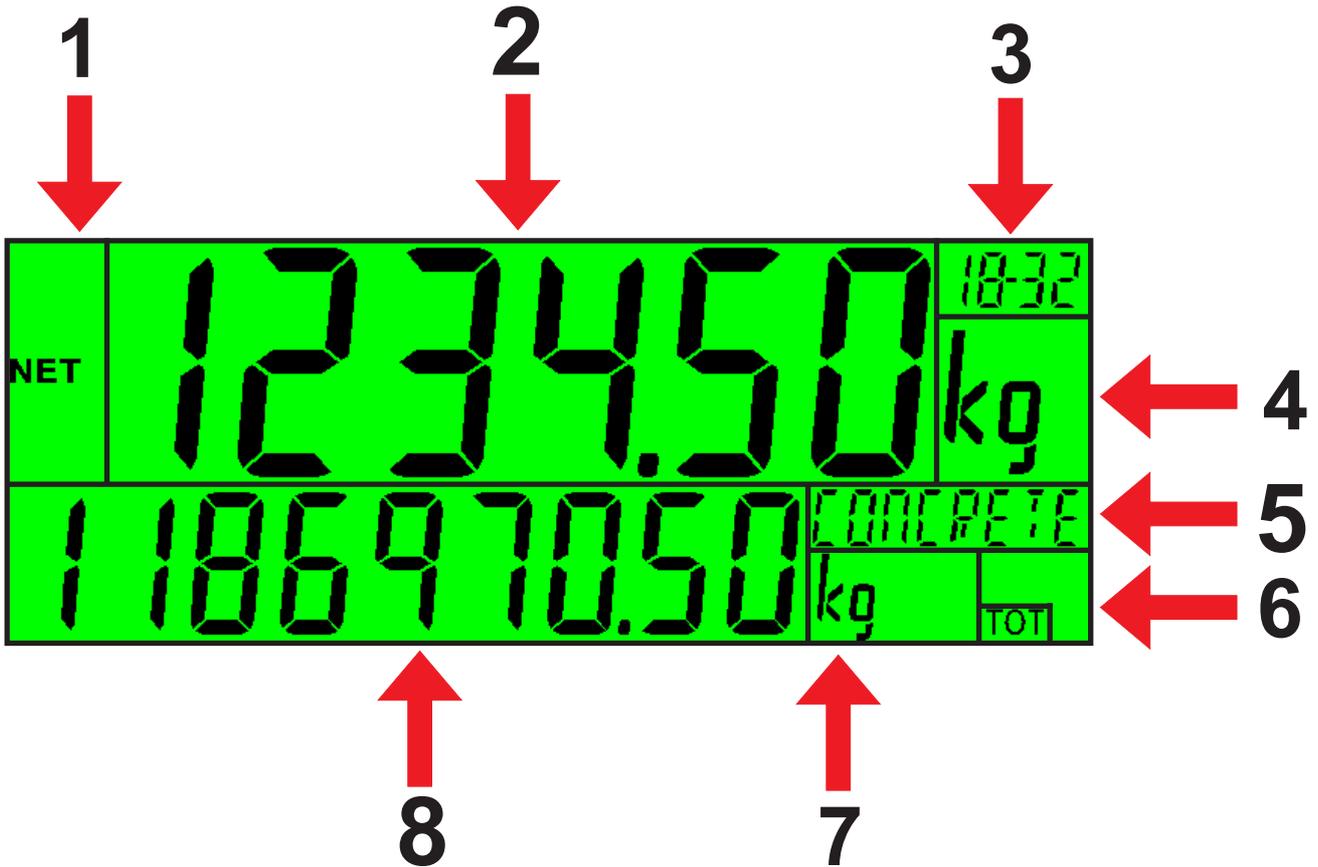
### 5.1. User Interface Display and Controls

#### 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

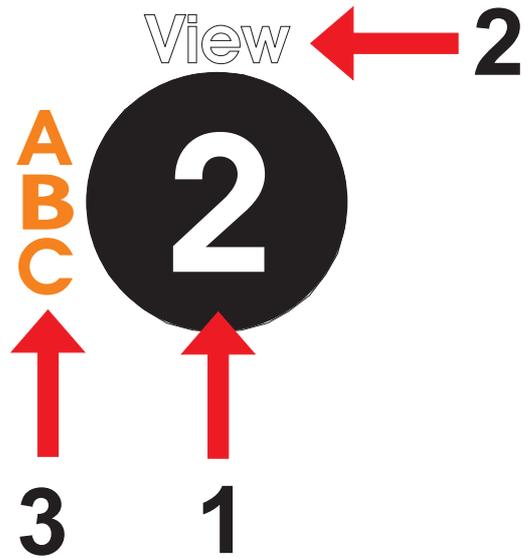


Code	Description
1	Primary Annunciators
2	<b>Primary Display</b>
3	Auxiliary Display
4	Primary Units
5	<b>Secondary ID</b> Eg Product Name = CONCRETE in example above.
6	Miscellaneous Annunciators
7	Secondary Units
8	<b>Secondary Display</b>

## 5.1.3. Primary Annunciators

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

5.1.4. Keypad



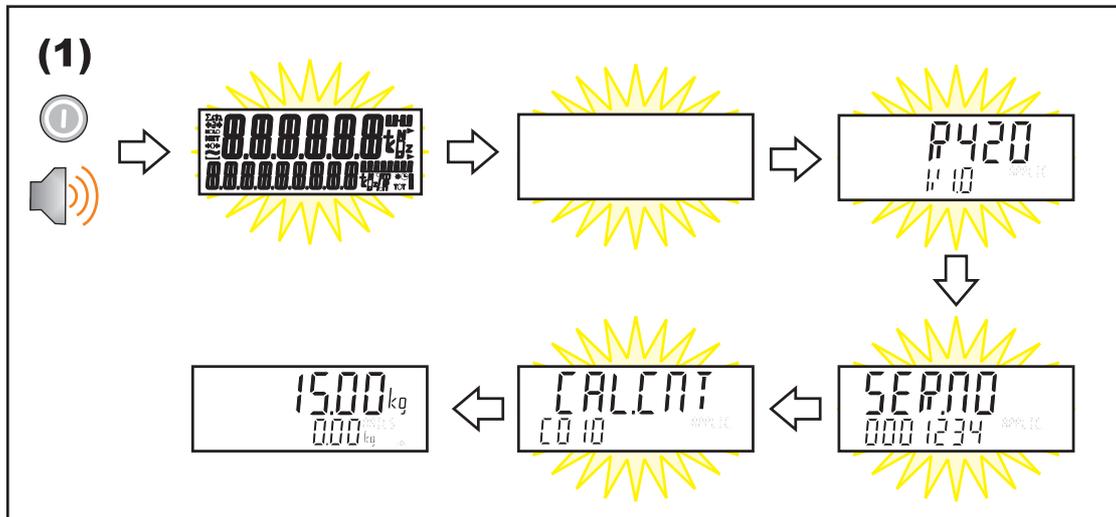
Code	Description	
1	Numeric Button	0-9
2	White Characters	Hold 2 seconds
3	Orange Characters	(Alpha and Symbols)
	Cancel	Undo last command; step backwards (including in setup menus).
	Up	Move cursor backwards; previous option
	Down	Move cursor forwards; next option
	OK	Accept this choice
	Decimal Point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

## 5.2. Operation Keys

### 5.2.1. Power Key

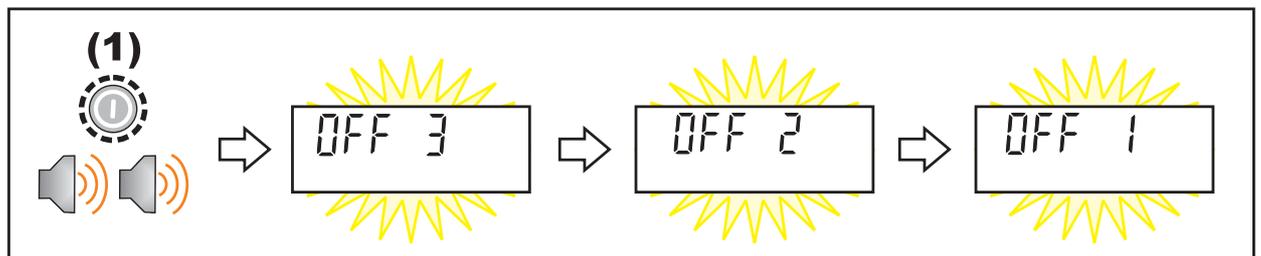
#### ◆ ON Instrument

(1) Short press <Power>.



#### ◆ OFF Instrument

(1) Long press <Power>.

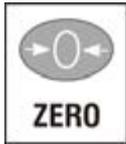


#### ◆ Additional Information

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

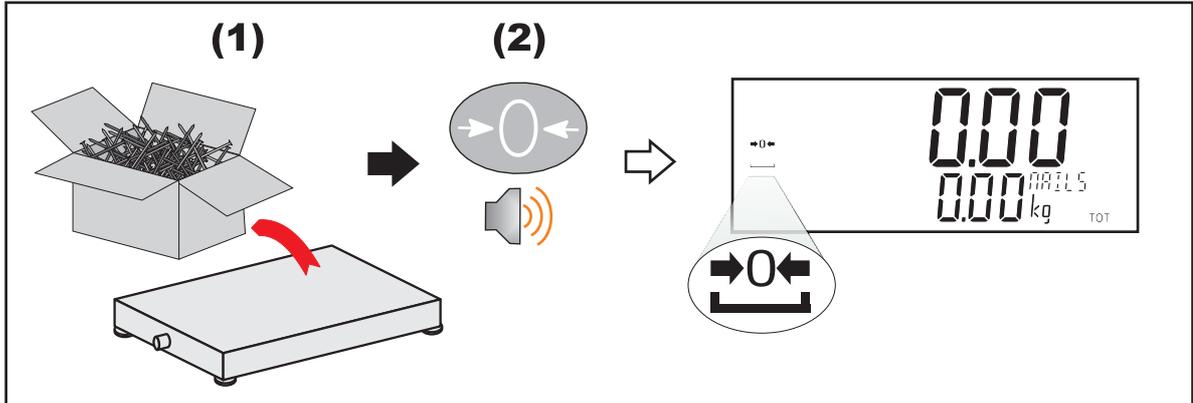
**Automatic Operation:** Instrument will operate whenever external power is available and will not need to be manually turned on again if the power is interrupted.

### 5.2.2. 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. When pressed the summing indicator sends a command to each slave to force the zeroing to occur.

◆ **Short Press**



### 5.2.3. Tare Key

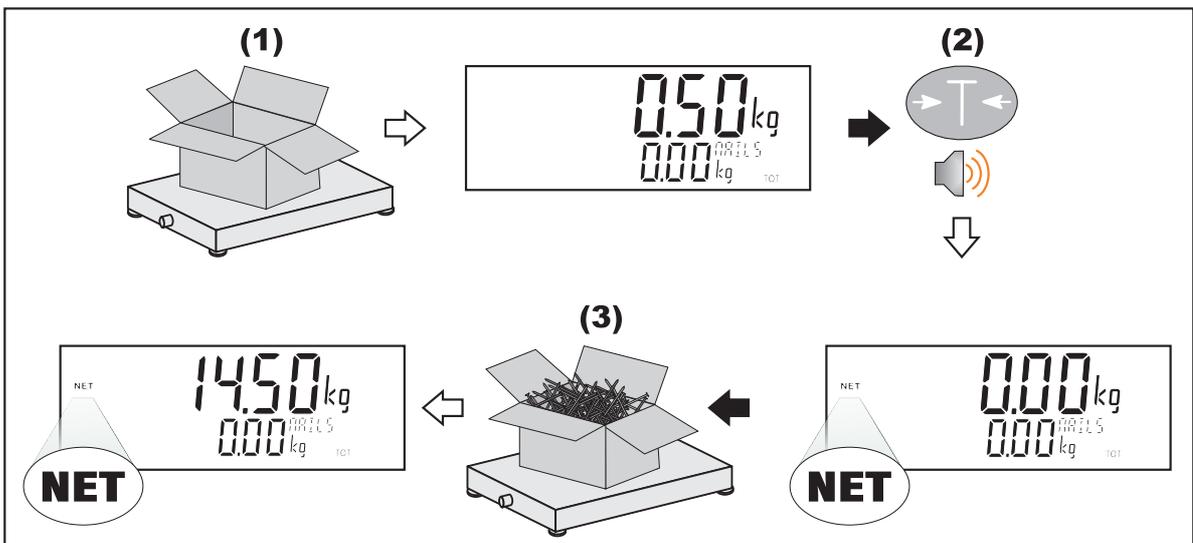


This key is used to temporarily set the scale to zero (such as cancelling the weight of a carton before performing a filling operation). The display will show the Net weight and the NET annunciator will be lit. When pressed the summing indicator sends a command to each slave to force the tare to occur.

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

**Preset Tare:** As there is no way to properly distribute a preset tare among the slaves, the summing indicator does not have a preset tare function.

◆ **Short Press**

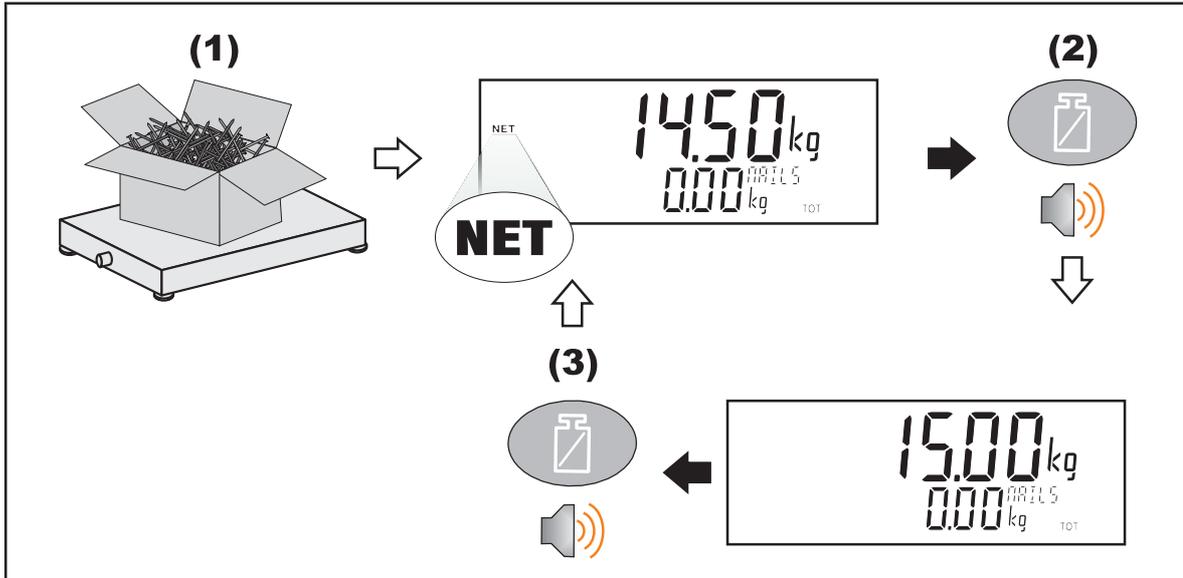


### 5.2.4. Gross/Net Key



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). When pressed the summing indicator sends a command to each slave to force the indicator to show either gross or net weight.

#### ◆ Short Press



### 5.2.5. Function Keys

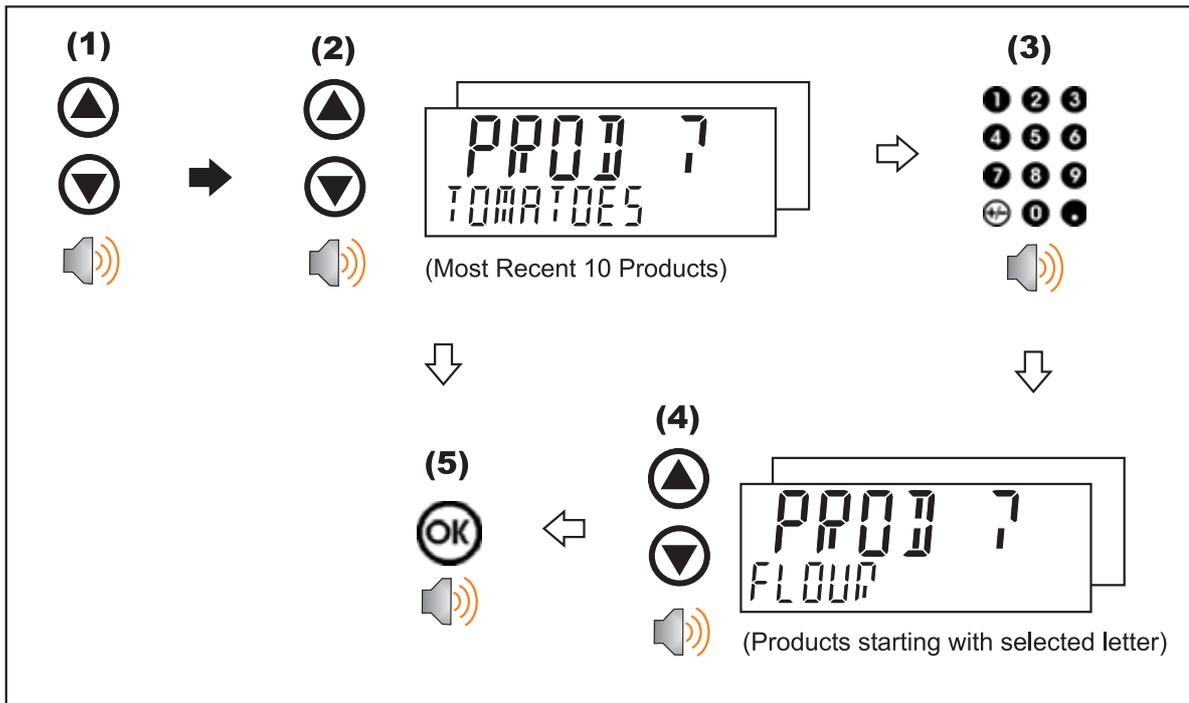
			<ul style="list-style-type: none"> <li>• Functions are set in the FUNC menu.</li> <li>• Function key labels are attached below the key.</li> <li>• See Special Functions section 12 for a description of operation.</li> </ul>

### 5.2.6. Up, Down, OK keys: Products

These keys are used to control the products. A short press of <UP> and <DOWN> keys is used to select products. A long press of the <UP> key will add new products. A long press of the <DOWN> key will delete products. A long press of the <OK> key will edit the name of the current product.

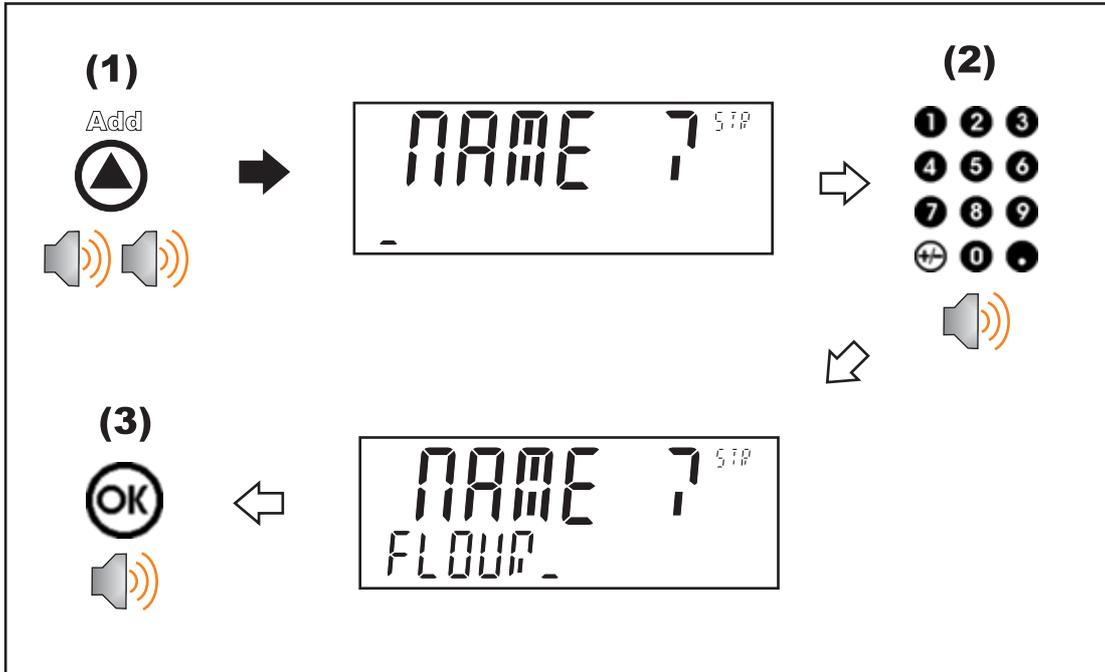
#### ◆ Short Press of Up and Down keys

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



◆ **Long Press of the Up Key (Add)**

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



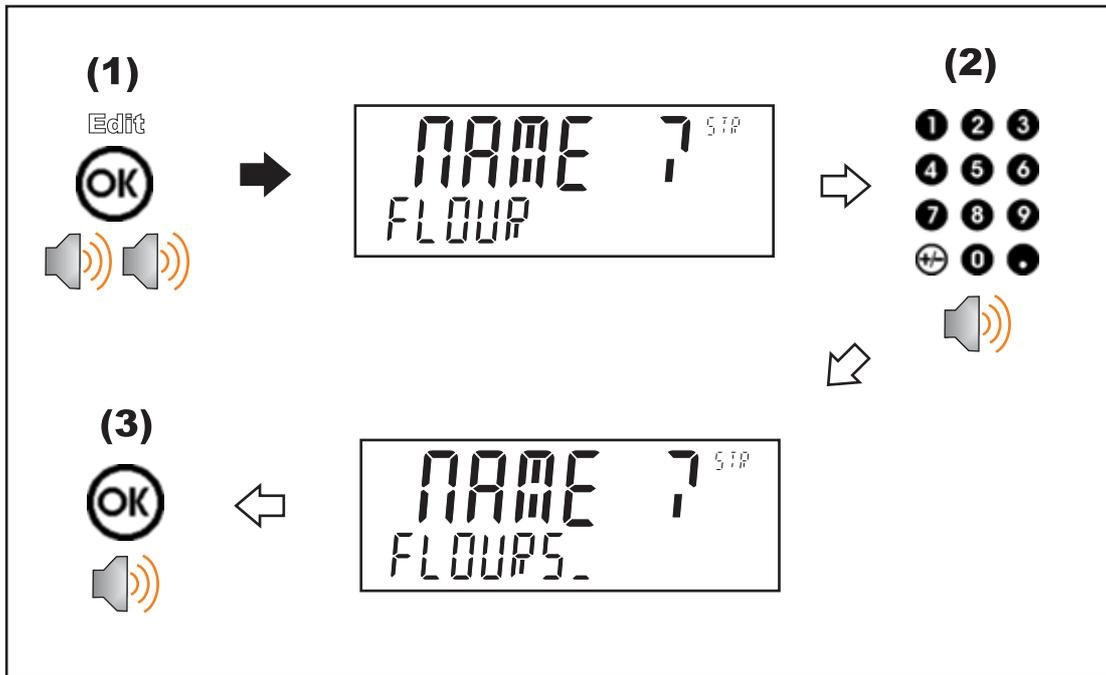
◆ **Long Press of the Down Key (Del)**

A long press of this key allows the user to delete a new product. Products can only be deleted if the total weight is 0. Product totals are cleared using a long press of the 4 key (Total).



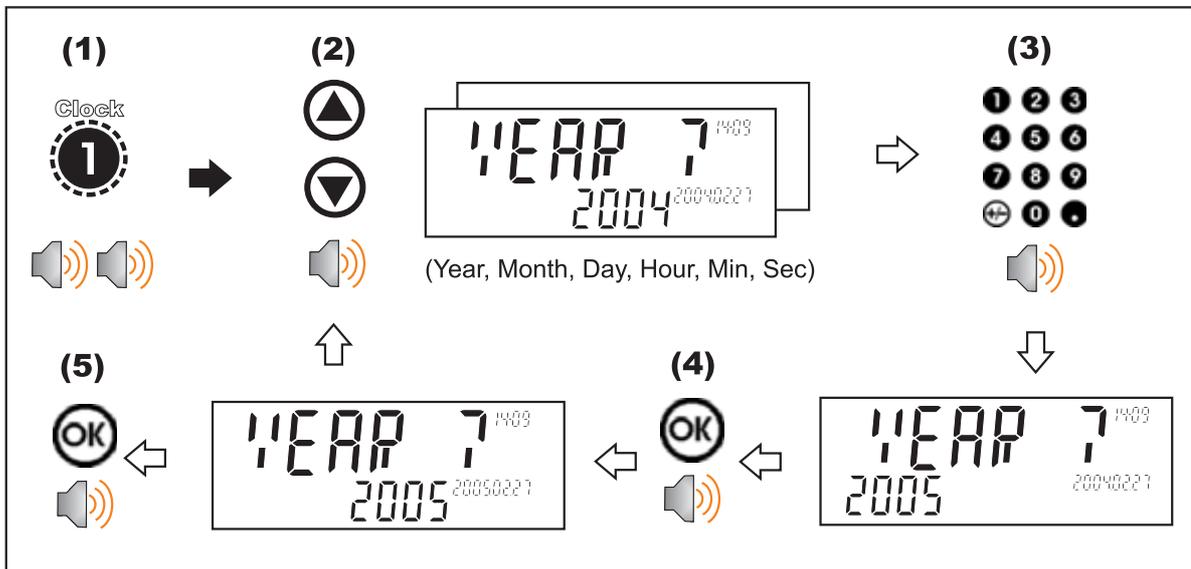
◆ Long Press of the OK Key (Edit)

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



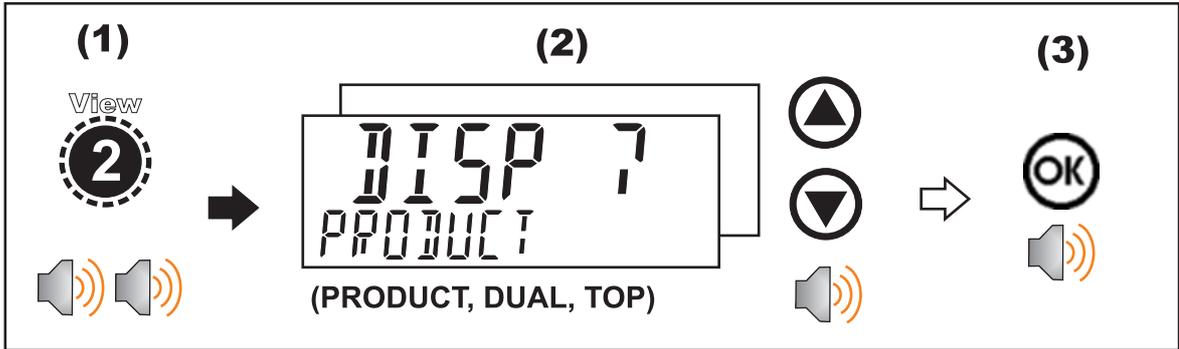
5.2.7. Clock

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



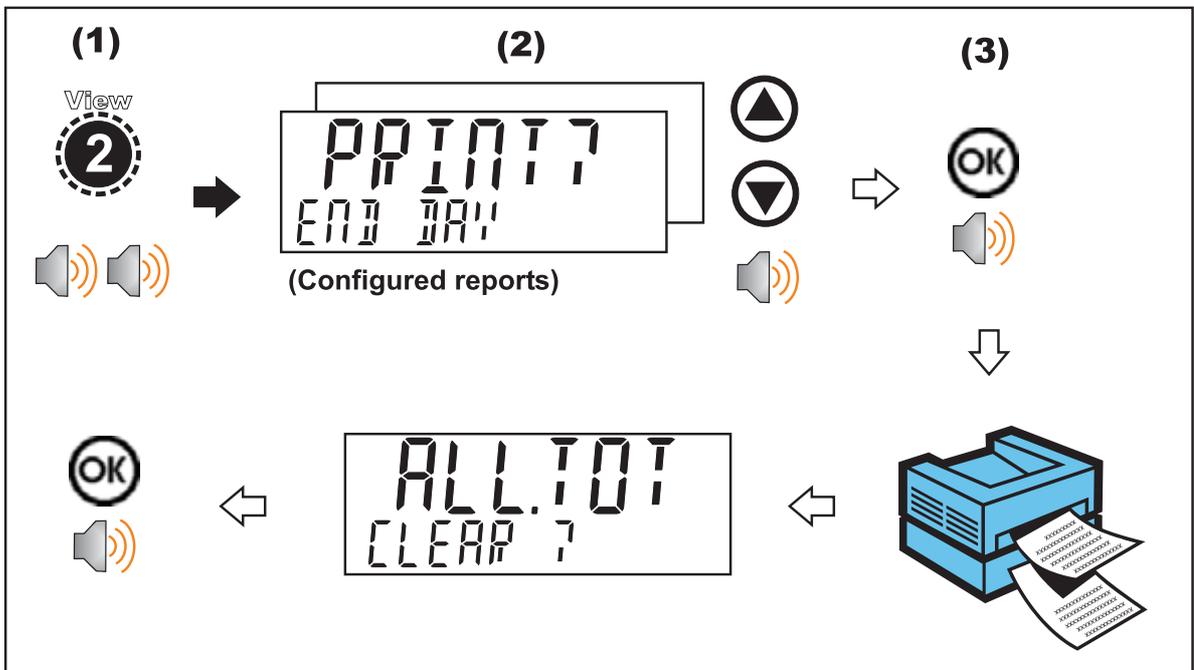
### 5.2.8. View

A long press of the 2 key (View) allows the display function to be changed.



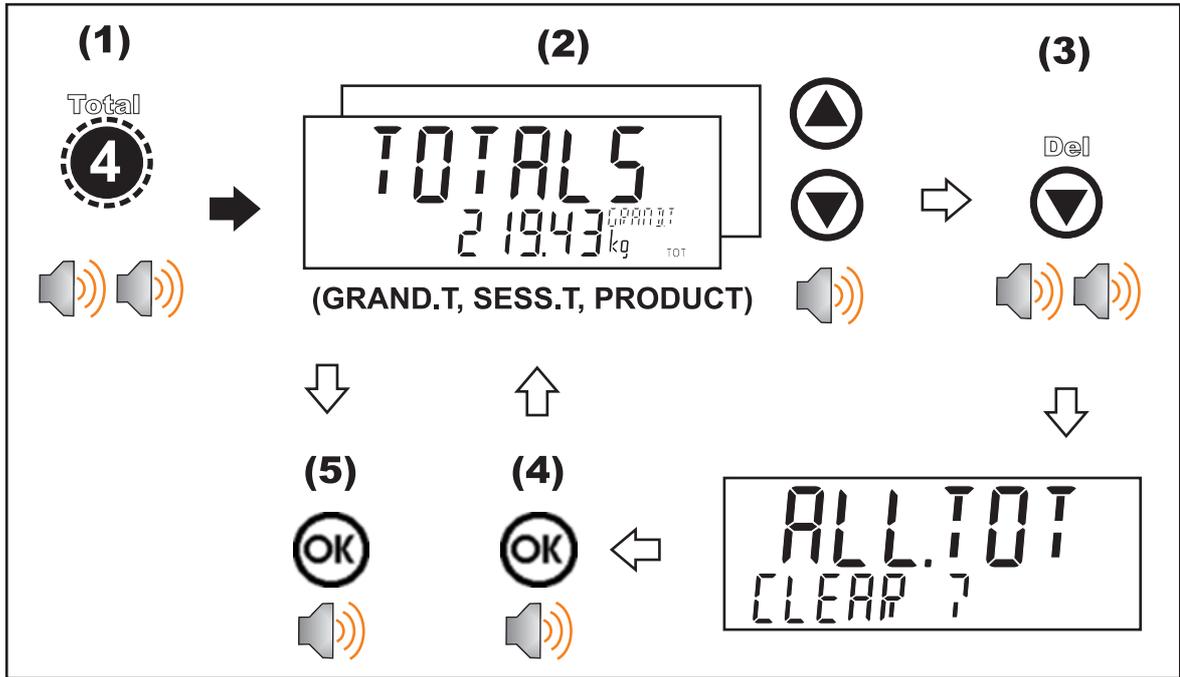
### 5.2.9. Report

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



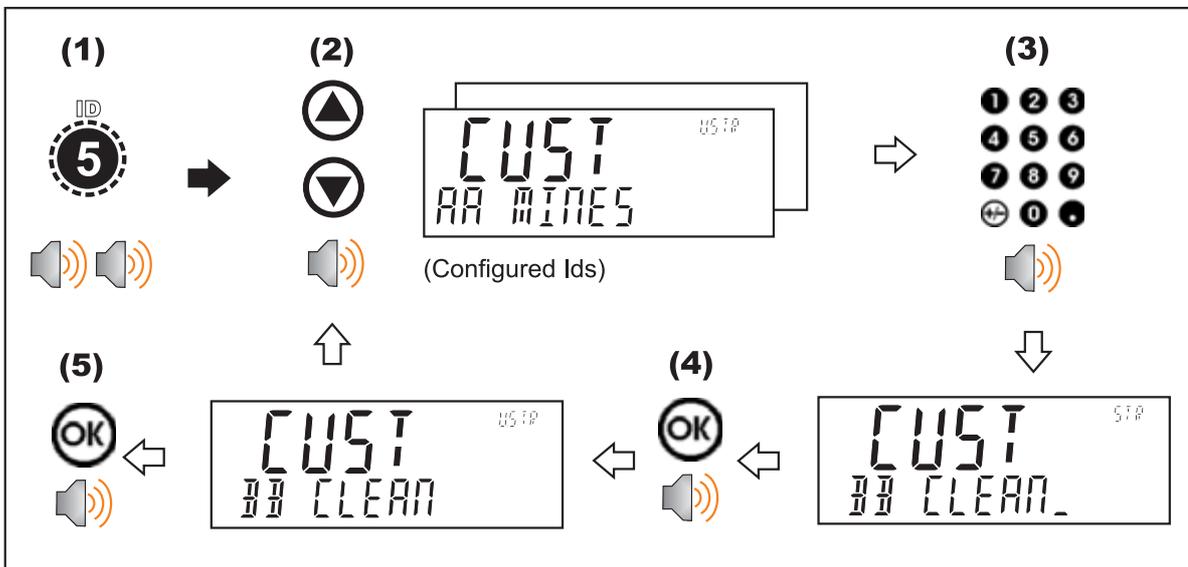
5.2.10. Total

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



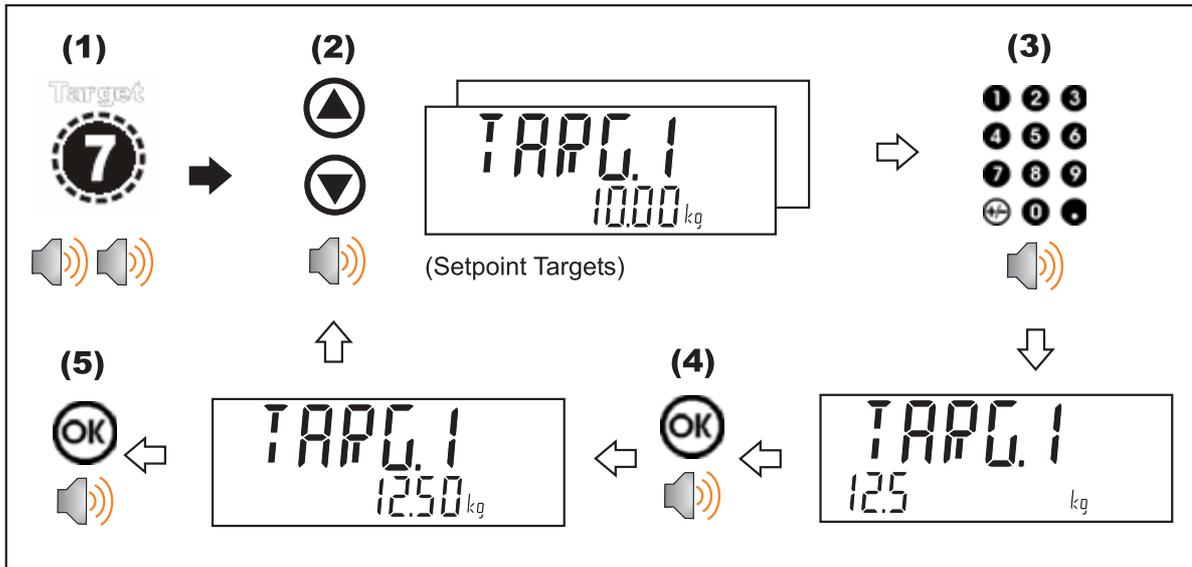
5.2.11. User ID

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 68.



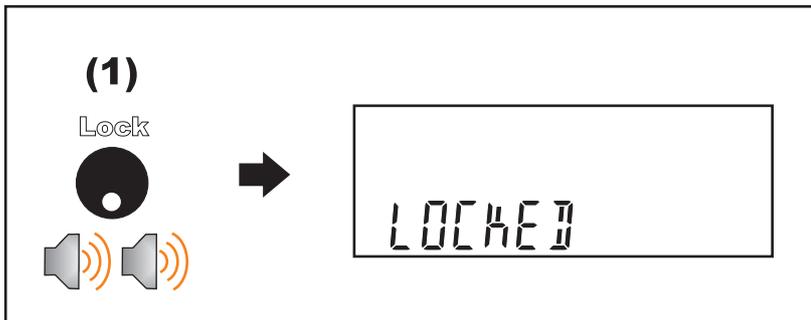
### 5.2.12. Target

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



### 5.2.13. 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.

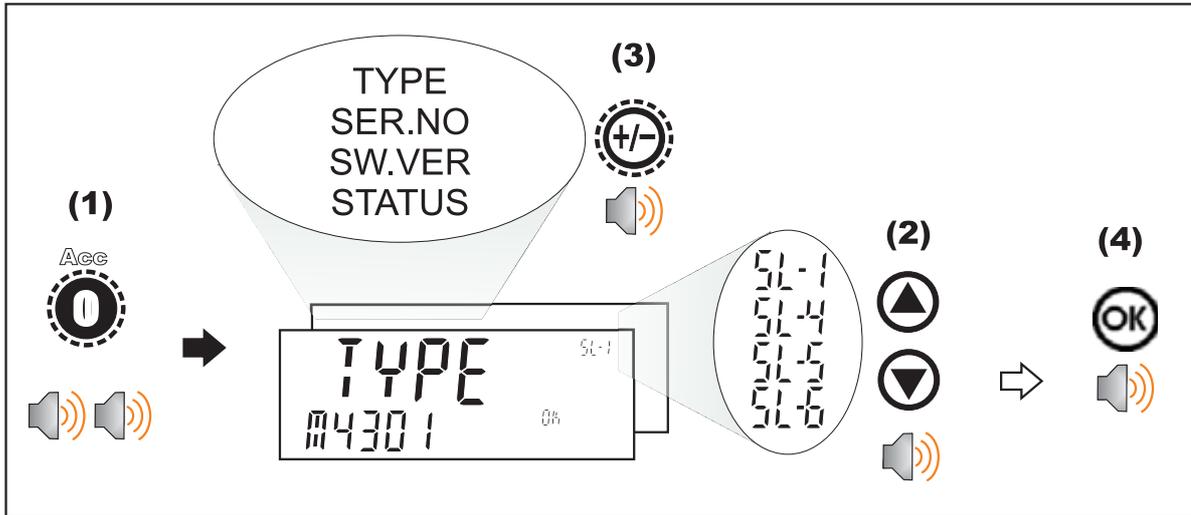


**5.2.14. Alibi**

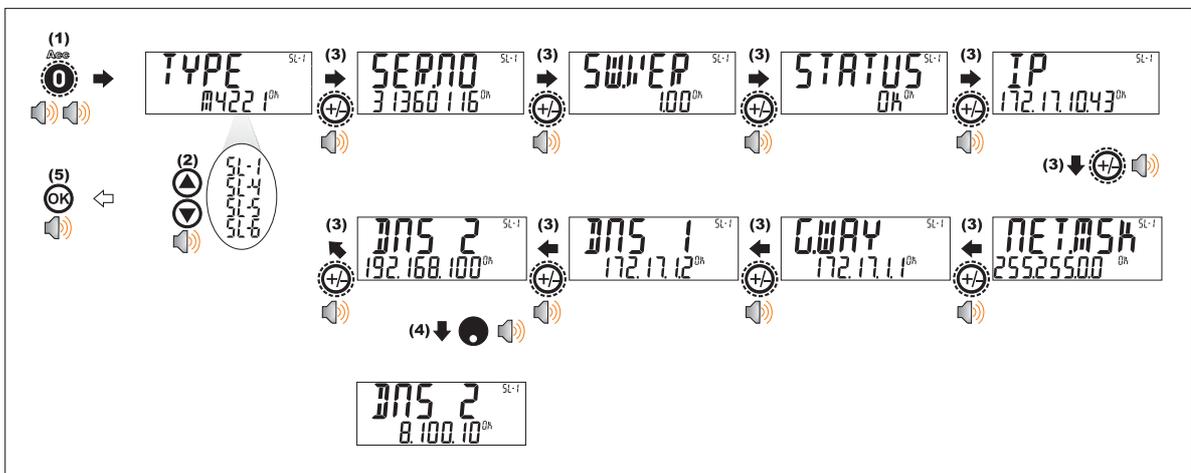
Alibi mode is not present in the K481. A long press of the +/- key (Alibi) will display an error message, and return to normal weighing.

**5.2.15. 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.



**5.2.16. 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.

## 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 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. Calibration Counter

Within Setup there are a number of critical steps that can affect the 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.

### 6.3. 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.

#### 6.3.1. Full Setup Passcode

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

#### 6.3.2. 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 8.1.4 KEY.LOC (Key Function Access Control) on page 40 for more information.

### 6.3.3. Operator Passcode

The operator passcode is used to protect access to instrument functions available from the front panel keypad. Refer to 8.1.4 KEY.LOC (Key Function Access Control) on page 40 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).

### 6.3.4. 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. Summing Setup

### 7.1. Wiring Diagram

Please refer to Section 3.8 for the wiring between the summing indicator and the slaves.

### 7.2. Configuring the Slave R300 or R400 Indicators

The slave units must be configured to communicate correctly with summing indicator. The K481 can only sum one type of indicator. All slaves must be R300 or R400, not a mix. Each slave must be given a unique address between 1 and the number of slaves to be summed. The K481 can sum a maximum of 9 slaves.

#### 7.2.1. Slave Calibration

Calibrate each slave as per the manuals for the indicator. Each slave must have the same units (eg all Kg). The decimal point position may vary among the slaves.

#### 7.2.2. R320 Slave Configuration

R320 slaves must be running version 3.83 or greater. The following items must be configured in each R300 slave:

- Set SERIAL:TYPE to NET
- Set SERIAL:BAUD to the same baud rate as the summing indicator
- Set SERIAL:BITS to "N81-"
- Set SERIAL:ADDRESS to a unique address between 1 and the number of slaves configured in the summing indicator

#### 7.2.3. R420 Slave Configuration

The slaves must be one of the following:

- K401 Version 1.41 or greater
- K402 Version 1.41 or greater
- K481 Version 1.10 or greater
- K491 Version 1.11 or greater

Summing of K411 indicators is not supported.

The following items must be configured in each R420 slave:

- Set H.WARE:SERx.HW:BAUD to the same baud rate as the summing indicator for the appropriate serial port
- Set H.WARE:SERx.HW:PARITY to NONE for the appropriate serial port
- Set H.WARE:SERx.HW:DATA to 8 for the appropriate serial port
- Set H.WARE:SERx.HW:STOP to 1 for the appropriate serial port
- Set H.WARE:SERx.HW:DTR to OFF for the appropriate serial port
- Set H.WARE:SERx.HW:TERM to ON for the last slave, and off for all other slaves, for the appropriate serial port

- Set SER.NET:TYPE to PROTOCOL.B
- Set SER.NET:SERIAL to the serial port the slave will communicate with the master on
- Set SER.NET:ADDRESS to a unique address between 1 and the number of slaves configured in the summing indicator

### 7.3. Basic Configuration of the K481 Summing Indicator

The following items must be configured in the K481 summing indicator:

- Set H.WARE:SERx.HW:BAUD to the same baud rate as all the slaves for the appropriate serial port
- Set H.WARE:SERx.HW:PARITY to NONE for the appropriate serial port
- Set H.WARE:SERx.HW:DATA to 8 for the appropriate serial port
- Set H.WARE:SERx.HW:STOP to 1 for the appropriate serial port
- Set H.WARE:SERx.HW:DTR to OFF for the appropriate serial port
- Set H.WARE:SERx.HW:TERM to ON for the appropriate serial port
- Set SER.SUM:SERIAL to the serial port the slave will communicate with the master on
- Set SER.SUM:PROTO to RING when summing R300 indicators via the RS232 ring network, or NORMAL when summing R400 indicators via the RS485 network.
- Set SER.SUM:SLAVES to the number of slaves to be summed.

### 7.4. Slave Name Configuration of the K481 Summing Indicator

Each slave can optionally be named. This name is used on the display when displaying slave weights, and can be used in printouts. The name can be set via the SER.SUM:SLAV.n:NAME menu item. If left blank, the text "SLAVE n" will be used.

### 7.5. Subtotal Configuration of the K481 Summing Indicator

The K481 provides the ability to calculate up to four subtotals from the slave weights. The number of subtotals is set by the SER.SUM:SUB.NUM menu item.

Each subtotal has a name, a list of slaves to add to it, and a list of slaves to subtract from it. The name is configured via SER.SUM:S.TOT.n:NAME menu item. If left blank, the text "S.TOT n" will be used. The SER.SUM:S.TOT.n:SLV.ADD menu item configures the slaves that should be added to the sub total. For example setting it to 12 will add slaves 1 and 2 to the subtotal. The SER.SUM:S.TOT.n:SLV.SUB menu item configures the slaves that should be subtracted from the sub total. For example setting it to 34 will subtract slaves 3 and 4 to the subtotal.

## 8. Setup Menus

### 8.1. GEN.OPT (General options)

#### 8.1.1. LANG (Operator language)

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

#### 8.1.2. DATE.F (Date format)

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

#### 8.1.3. PCODE (Security passcodes)

Path	Description
GEN.OPT L PCODE L SAFE.PC L FULL.PC (*) L OP.PC  (* Available in FULL SETUP only)	Sets the instrument passcodes. The 3 levels of passcode are: <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• Operator passcode (OP.PC): Controls access to various operator functions.</li> </ul>
<b>PCODE Values</b> <NUM>	
0 .. 999999 Default: 0	
<b>NB:</b> A passcode value of 0 deactivates the passcode.	

8.1.4. 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 VIEW 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').
<b>KEY.LOC Values &lt;OPT&gt;</b>	
<ul style="list-style-type: none"> <li>• AVAIL (Default)</li> <li>• OPER.PC</li> <li>• SAFE.PC</li> <li>• LOCKED</li> </ul> (*) AVAIL & LOCKED only are available for POWER.	

8.1.5. DISP (Display options)

Path	Description
GEN.OPT L DISP L B.LIGHT L FREQ L VIEW	These settings control the operation of the display.  <b>B.LIGHT</b> (Backlight operation) can be set on or off.  <b>FREQ</b> sets the update frequency of the display.  <b>VIEW</b> (Display Layout) selects the default VIEW when the instrument powers up. The operator can select alternative views by pressing the '2' key for 2 seconds (function 'View'). Options: PRODUCT: display product information TOP: only the primary display is shown. The secondary display is used to show operator prompts received from the comms. DUAL: Primary and Secondary displays are used for scale information.
<b>B.LIGHT Values &lt;OPT&gt;</b>	
ON (Default), OFF	
<b>FREQ Values &lt;OPT&gt;</b>	
1Hz, 2Hz, 3.3Hz, 5Hz, 10Hz (Default)	
<b>VIEW Values &lt;OPT&gt;</b>	
PRODUCT (Default), TOP, DUAL	

8.1.6. USR.STR (User Defined Strings)

Path	Description
GEN.OPT L ID.NAME L <b>NAME.1</b> L <b>NAME.2</b> L <b>NAME.3</b>	There are three User Strings available to the operator when the '5' key is pressed for 2 seconds (function 'ID').  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.  (E.g. to allow the operator to enter a customer ID, NAME.1 could be set to 'CUST'.)  To remove a User String from the operator menu give it an empty name.
<b>Values &lt;STR&gt;</b>	
<i>Maximum 6 characters.</i>	

8.1.7. POWER (Power options)

Path	Description						
GEN.OPT L POWER L <b>AUT.OFF</b> L <b>START</b>	<b>AUT.OFF</b> (Auto-off delay)  Sets the automatic power off setting. The instrument will switch off after set minutes of inactivity. NEVER disables the auto power off feature.						
<b>AUT.OFF Values &lt;OPT&gt;</b>							
<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	<b>START</b> (Pause at Start-up)  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.
• NEVER (Default)	• 5 min						
• 1 min	• 10 min						
	• 60 min						
<b>START Values &lt;OPT&gt;</b>							
OFF (Default), ON							

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

Path	Description
GEN.OPT L USER.DEF	Sets all general instrument settings to defaults.
<b>Values</b>	
DEFAULT? <OK> CONFIRM? <OK>	

## 8.2. H.WARE (Hardware Configuration & Test)

### 8.2.1. ALLOC (Allocation Report)

Path	Description
H.WARE └ 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><b>Errors:</b> 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>

8.2.2. SER1.HW, SER2.HW

Path	Description
H.WARE	<b>BAUD</b> (Baud Rate)
L SER1.HW	Sets the baud rate for the port.
L BAUD	
L PARITY	<b>PARITY</b>
L DATA	Sets the parity for the port.
L STOP	
L DTR	<b>DATA</b> (Data bits)
L TERM	Sets the number of data bits for the port.
L SER2.HW	<b>STOP</b> (Stop bits)
L BAUD	Sets the number of stop bits for the port.
L PARITY	
L DATA	<b>DTR</b> (DTR usage)
L STOP	Use the DTR line with RS232 printing.
L DTR	
L TERM	<b>TERM</b> (Termination Resistors)
L RING	Use termination resistors with RS485.
<b>BAUD Values</b> <OPT>	<b>RING</b> (Ring network)
_1200_, _2400_, _4800_, _9600_ (Default), _19200_, _57600	Enable ring network. Only available on SER2 and required M42xx software version 1.01+.
<b>PARITY Values</b> <OPT>	
NONE (Default), EVEN, ODD	
<b>DATA Values</b> <OPT>	
_8_ (Default), _7_	
<b>STOP Values</b> <OPT>	
_1_ (Default), _2_	
<b>DTR Values</b> <OPT>	
OFF (Default), ON	
<b>TERM Values</b> <OPT>	
OFF (Default), ON	
<b>RING Values</b> <OPT>	
OFF (Default), ON	

8.2.3. 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><b>FRC.OUT</b> (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><b>TST.IN</b> (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><b>DBNC</b> (Debounce)</p> <p>This sets the amount of debouncing for inputs. It is set in milliseconds [ms].</p>
<b>DBNC Values</b> <NUM>	
1..250 ms Default: 20 ms	

8.2.4. ANL.HW

Path	Description
H.WARE L ANL.HW L TYPE L CLIP L FRC.OUT L ANL.CAL L ADJ.LO L ADJ.HI	<p><b>TYPE</b> (Analog Output Type)</p> <p>Sets the analog output to current (4-20mA) or voltage (0-10V) mode.</p> <p><b>CLIP</b> (Analog Output Clip Enable)</p> <p>When clipping is on, the output is restricted to 4-20mA or 0-10V. When clipping is off, the output can go at least 3mA or 0.5V beyond these limits.</p> <p><b>FRC.OUT</b> (Force Analog Output)</p> <p>Sets the number of data bits for the port.</p> <p><b>ADJ.LO</b>(Calibrate Analog Output)</p> <p>Calibrate 4mA or 0V analog output. Use the UP and DOWN keys to adjust the calibration.</p> <p><b>ADJ.HI</b> (Calibrate Analog Output)</p> <p>Adjust 20mA or 10V analog output. Use the UP and DOWN keys to adjust the calibration.</p>
<b>TYPE Values</b> <OPT>	
Current <sup>(Default)</sup> , Volt	
<b>CLIP Values</b> <OPT>	
NO <sup>(Default)</sup> , YES	

8.2.5. 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><b>DHCP</b> (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><b>IP</b> (Internet Protocol Address)</p> <p>Sets the IP address for the M4221 Ethernet module.</p> <p><b>NET.MSK</b> (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><b>G.WAY</b> (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><b>DNS.1</b> (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><b>DNS.2</b> (Secondary Domain Name Server)</p> <p>Sets the secondary domain name server for the M4221. If not required use 0.0.0.0.</p>
<b>DHCP Values</b> <OPT>	
ON <sup>(Default)</sup> , OFF	
Note: IP, NET.MSK, G.WAY, DNS.1, DNS.2 settings are not available when DHCP is ON.	

8.2.6. 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>
<b>Values</b>	
DEFAULT? <OK> CONFIRM? <OK>	

## 8.2.7. DSD.HW

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

## 8.3. SCALE (scale setup options)

## 8.3.1. OPTION (Scale options)

Path	Description
SCALE L OPTION L <b>Z.BAND</b> (⊗)	<b>Z.BAND</b> (Zero Deadband): Sets the weight range around zero which will be considered zero for application purposes.
<b>Z.BAND Values</b> (⊗) <NUM>	
0 – fullscale <i>Default: 0</i>	⊗: This item is trade critical and will affect the calibration counter(s) if changed.

8.4. SER.SUM (Serial summing configuration)

8.4.1. SERIAL (Summing serial port)

Path	Description
SER.SUM L SERIAL	The serial port for the summing indicator to use when communicating with the slaves. Only bi-directional serial ports may be selected. This serial port cannot have other simultaneous uses, and will generate a clash in the hardware allocation report described in section 8.2.1.
<b>Values</b> <OPT> SER1A <sup>(Default)</sup> , SER2A	

8.4.2. PROTO (Summing serial protocol)

Path	Description
SER.SUM L PROTO	This setting controls the protocol used to communicate with the slaves.  RING network uses a ring configuration where the transmitter of each device is connected to the receiver of next device. Refer to Section 3.8.  NORMAL protocol requires a RS485 network where the summing indicator sends a command and expects a response from each slave before progressing to the next device. Refer to Section 3.8.
<b>Values</b> <OPT> RING <sup>(Default)</sup> , NORMAL	

8.4.3. SLAVES (Number of slaves to sum)

Path	Description
SER.SUM L SLAVES	Sets the number of slaves to sum. Each slave must be addressed uniquely from 1 to the number of slaves.
<b>Values</b> <NUM> 1 <sup>(Default)</sup> .. 9	

8.4.4. NAME (Naming for individual slaves)

Path	Description
SER.SUM L SLAV.1..SLAV.n L NAME	Provides a name for each slave to be displayed and printed. If left blank, "SLAVE n" will be used.
<b>Values</b> <STR> <i>Maximum 6 characters.</i>	

## 8.4.5. SUB.NUM (Number of subtotals)

Path	Description
SER.SUM L SUB.NUM	Sets the number of subtotals to be calculated.
<b>Values</b> <NUM>	
0 <sup>(Default)</sup> .. 4	

## 8.4.6. S.TOT.x (Subtotal settings)

Path	Description
SER.SUM L S.TOT.1..S.TOT.4 L NAME L SLV.ADD L SLV.SUB	<p><b>NAME:</b> Provides a name for each subtotal to be displayed and printed. If left blank, "S.TOT n" will be used.</p> <p><b>SLV.ADD:</b> Sets which slaves to add to the subtotal. Eg 12 will add slave weights 1 &amp; 2 to the subtotal.</p> <p><b>SLV.SUB:</b> Sets which slaves to subtract from the subtotal. Eg 34 will subtract slave weights 3 &amp; 4 from the subtotal.</p>
<b>NAME Values</b> <STR>	
<i>Maximum 6 characters.</i>	
<b>SLV.ADD Values</b> <NUM>	
0..123456789 <i>Default: 0</i>	
<b>SLV.SUB Values</b> <NUM>	
0..123456789 <i>Default: 0</i>	

## 8.5. 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.

## 8.5.1. NUM (Number of special functions)

Path	Description
FUNC L NUM	Sets the number of special functions.
<b>NUM Values</b> <OPT>	
-1 <sup>(Default)</sup> .. -8-	

8.5.2. SFn: TYPE (Function Types)

Path	Description
FUNC L SFn LTYPE	Sets the function type.  Options are: <ul style="list-style-type: none"> <li>• <b>PRINT</b>: Trigger a weight printout</li> <li>• <b>SINGLE</b>: Trigger a single serial weight transmission</li> <li>• <b>TEST</b>: Display test</li> <li>• <b>PRD.SEL</b>: Product Select</li> <li>• <b>REM.KEY</b>: Remote Key operation</li> <li>• <b>BLANK</b>: Blanking input</li> <li>• <b>THUMB</b>: Thumb-wheel Product Selection</li> <li>• <b>REPORT</b>: Print a report</li> <li>• <b>SLAVE</b>: Toggle through slave and subtotal weights on the lower display.</li> <li>• <b>SC.EXIT</b>: Trigger scale exit setpoint</li> </ul>
<b>TYPE Values &lt;OPT&gt;</b>	
<ul style="list-style-type: none"> <li>• NONE (Default)</li> <li>• PRINT</li> <li>• SINGLE</li> <li>• TEST</li> <li>• PRD.SEL</li> <li>• REM.KEY</li> <li>• BLANK</li> <li>• THUMB</li> <li>• REPORT</li> <li>• SLAVE</li> <li>• SC.EXIT</li> </ul>	

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

Path	Description
FUNC L SFn LKEY	Select front panel key or external input to trigger the special function. All functions that respond to input events have a KEY setting.
<b>KEY Values &lt;OPT&gt;</b>	Functions like THUMB (Thumbwheel) require multiple inputs to function and have an equivalent setting to specify these inputs.
None (Default), F1 .. F3 IO1.. IO32	

8.5.4. 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.  <b>KEY:</b> Select PRINT key using front function key or external input.  <b>PRT.OUT (PRINT OUT):</b> Selects the printout to print. Printouts are configured in the PRINT menu.  <b>TOTAL:</b> Sets whether the print key affects the product totals.  Options are: <ul style="list-style-type: none"> <li>• ADD: Add to totals</li> <li>• UNDO: Undo last add to totals</li> <li>• CLR.ALL: Clear all totals</li> <li>• CLR.SESS: Clear session total</li> </ul>						
<b>KEY Values &lt;OPT&gt;</b>							
None <sup>(Default)</sup> , F1 .. F3, IO1.. IO32							
<b>PRT.OUT Values &lt;OPT&gt;</b>							
None <sup>(Default)</sup> , PRINT.1 .. PRINT.3							
<b>TOTAL Values &lt;OPT&gt;</b>							
<table border="1"> <tr> <td>NONE <sup>(Default)</sup></td> <td>UNDO</td> </tr> <tr> <td>ADD</td> <td>CLR.ALL</td> </tr> <tr> <td></td> <td>CLR.SESS</td> </tr> </table>	NONE <sup>(Default)</sup>	UNDO	ADD	CLR.ALL		CLR.SESS	<b>CLR.ASK (Prompt for Clear):</b> Sets whether the operator is prompted to confirm the totals clear.  <b>AUTO (Automatic printing):</b> Sets whether printing occurs automatically.  <b>IL.TYPE (Interlock Type):</b> Sets the type of printing interlock to be used. Options are: <ul style="list-style-type: none"> <li>• MOTION: Printing is enabled every time the scale becomes stable.</li> <li>• I.LOCK: Printing is enabled when the weight is stable after a weight movement larger than the interlock weight.</li> <li>• RET.Z: Printing is enabled after the scale has returned to zero and is stable at a reading other than zero.</li> </ul>
NONE <sup>(Default)</sup>	UNDO						
ADD	CLR.ALL						
	CLR.SESS						
<b>CLR.ASK Values &lt;OPT&gt;</b>							
NO <sup>(Default)</sup> , YES							
<b>AUTO Values &lt;OPT&gt;</b>							
NO <sup>(Default)</sup> , YES							
<b>IL.TYPE Values &lt;OPT&gt;</b>							
<table border="1"> <tr> <td>NONE <sup>(Default)</sup></td> <td>MOTION</td> </tr> <tr> <td></td> <td>I.LOCK</td> </tr> <tr> <td></td> <td>RET.Z</td> </tr> </table>	NONE <sup>(Default)</sup>	MOTION		I.LOCK		RET.Z	<b>I.LOCK (Interlock):</b> Sets the interlock weight.
NONE <sup>(Default)</sup>	MOTION						
	I.LOCK						
	RET.Z						
<b>I.LOCK Values &lt;NUM&gt;</b>							
0 .. Fullscale							

8.5.5. SFn: SINGLE (Single Serial Output Functions)

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

8.5.6. SFn: BLANK (Blanking Functions)

Path	Description
FUNC L SFn LTYPE : 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.  <b>KEY:</b> External input to use.
<b>KEY Values &lt;OPT&gt;</b>	<b>BLANK:</b> Set display blanking style. Options are: <ul style="list-style-type: none"> <li>DASH: Fill instrument display with '-' characters.</li> <li>BLANK: completely blank instrument display.</li> </ul>

8.5.7. SFn: PRD.SEL (Product Select)

Path	Description
FUNC L SFn LTYPE : PRD.SEL L KEY	The product select key/input will cycle through the available totals information for the current product and allows the current product to be selected by number rather than name.
<b>KEY Values &lt;OPT&gt;</b>	<b>KEY:</b> Select key or external input to use.
None <sup>(Default)</sup> , F1 .. F3, IO1 .. IO32	

8.5.8. SFn: THUMB (Thumbwheel Product Selection)

Path	Description
FUNC L SFn L TYPE : THUMB L IO.BAND	The Thumbwheel function supports the use of an external thumbwheel to select the current product using the product number.  A selection of '0' on the thumbwheel enables keyboard selection of the current product.
<b>IO.BAND Values &lt;OPT&gt;</b>	
IO1-4 <sup>(Default)</sup> , IO17-20, IO5-8, IO21-24, IO9-12, IO25-28, IO13-16, IO29-32	<b>IO.BAND:</b> Select which four remote inputs are used for the thumbwheel function.

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

Path	Description
FUNC L SFn L TYPE : REM.KEY L KEY L BLANK	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.
<b>KEY Values &lt;OPT&gt;</b>	<b>KEY:</b> External input to use.
None <sup>(Default)</sup> , IO1 .. IO32	<b>BLANK:</b> Choose display while blanked.
<b>BLANK Values &lt;OPT&gt;</b>	
DASH <sup>(Default)</sup> , BLANK	

8.5.10. 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.  <b>KEY:</b> Select PRINT key using front function key or external input.  <b>PRT.OUT (PRINT OUT):</b> Selects the printout to print. Printouts are configured in the PRINT menu.  <b>CLR.TOTAL:</b> Sets whether the print key affects the product totals.
<b>KEY Values &lt;OPT&gt;</b>	Options are:
None <sup>(Default)</sup> , F1 .. F3, IO1 .. IO32	<ul style="list-style-type: none"> <li>• NO: Add to totals</li> <li>• ASK: Undo last add to totals</li> <li>• CLEAR: Clear all totals</li> </ul>
<b>PRT.OUT Values &lt;OPT&gt;</b>	
None <sup>(Default)</sup> , PRINT.1 .. PRINT.2	
<b>CLR.TOTAL Values &lt;OPT&gt;</b>	
NO <sup>(Default)</sup> , ASK, CLEAR	

## 8.5.11. 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.  <b>KEY:</b> Select key or external input to use.
<b>KEY Values &lt;OPT&gt;</b>	
None <sup>(Default)</sup> , F1 .. F3, IO1 .. IO32	

## 8.5.12. SFn: SLAVE (Display slave and subtotal weights)

Path	Description
FUNC L SF $n$ LTYPE : SLAVE L KEY	Key/input to toggle through the slave and subtotal weights on the lower display.  <b>KEY:</b> Select key or external input to use.
<b>KEY Values &lt;OPT&gt;</b>	
None <sup>(Default)</sup> , F1 .. F3, IO1 .. IO32	

## 8.6. SER.NET (Network communications)

Path	Description
FUNC L SER.NET L TYPE L SERIAL L ADDR	Configure the serial networking support.  <b>TYPE:</b> Type of Network Protocol: <ul style="list-style-type: none"> <li>• NONE: Disable networking</li> <li>• Protocol B: See Network Communications page 62.</li> </ul>
<b>TYPE Values</b> <OPT>	<b>SERIAL:</b> Serial Port to use.
NONE (Default), PROTOCOL.B	<b>ADDR (Address):</b> Address of instrument (1..31).
<b>SERIAL Values</b> <OPT>	
SER1A (Default),  SER2A	
<b>ADDR Values</b> <NUM>	
1..31	

8.7. SER.AUT (Automatic transmit)

8.7.1. NUM (Number of Automatic Transmissions)

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

8.7.2. AUTO.n (Automatic Output Configuration)

Path	Description	
SER.AUT L AUTO.n L TYPE L SERIAL L FORMAT L EV.AUTO(*)	<p>These settings are the same for AUTO.1 and AUTO.2</p> <p><b>TYPE:</b> Sets the transmission rate. Options are:</p> <ul style="list-style-type: none"> <li>• SINGLE: A SINGLE function key is used to trigger a single transmission. Rate is determined by external input.</li> <li>• AUTO.LO: Transmit at 10Hz</li> <li>• AUTO.HI: Transmit at 25Hz frequency</li> </ul> <p><b>SERIAL:</b> Select Serial port to use.</p> <p><b>FORMAT:</b> Set data format. See 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.</p> <p>Auto Weight Format String page 67.</p> <p><b>EV.AUTO:</b> Token string to define data format for CUSTOM transmissions.</p>	
<b>TYPE Values &lt;OPT&gt;</b>		
NONE (Default)  SINGLE		AUTO.LO AUTO.HI
<b>SERIAL Values &lt;OPT&gt;</b>		
SER1A (Default), SER1B, SER2A, SER2B		
<b>FORMAT Values &lt;OPT&gt;</b>		
FMT.A (Default) FMT.B FMT.C		FMT.D FMT.E FMT.REG CUSTOM
<b>EV.AUTO Values &lt;STR&gt;</b>		
Token String (* ) Only used with CUSTOM format.		

8.8. PRINT (Printouts)

8.8.1. NUM (Number of printouts)

Path	Description
PRINT L NUM	Sets the number of printouts.
<b>Values &lt;OPT&gt;</b>	
_1_ (Default) .. _2_	

8.8.2. HEADER (Print header)

Path	Description
PRINT L HEADER	Sets the print docket header.
<b>Values &lt;STR&gt;</b>	
String	

8.8.3. FOOTER (Print footer)

Path	Description
PRINT L FOOTER	Sets the print docket footer.
<b>Values &lt;STR&gt;</b>	
String	

8.8.4. 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.
<b>WIDTH Values &lt;NUM&gt;</b>	<b>WIDTH:</b> Sets the page width. A setting of zero disables page width checking.
0 .. 250 Default: 0	<b>HEIGHT:</b> Sets the page height. A setting of zero disables page height checking.
<b>HEIGHT Values &lt;NUM&gt;</b>	<b>PG.END (Page End String):</b> 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	
<b>PG.END Values &lt;STR&gt;</b>	
Token String	

## 8.8.5. 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.  <b>TOP:</b> Sets the number of blank lines to add at the top of each page.
<b>Values</b> <NUM>	<b>LEFT:</b> Sets the number of spaces to add at the beginning of each line.
0 .. 10 <i>Default: 0</i>	<b>BOTTOM:</b> Sets the number of blank lines to add to the bottom of each page.

8.8.6. PRINT.n ... (Printout options)

Path	Description
<pre> PRINT   L PRINT.n     L TYPE     L FORMAT     L NAME     L CUSTOM (*)       L REC.PRN         or       L DOC.PRN       L EV.D.NEW       L EV.D.END       L EV.P.NEW       L EV.P.END         or       L REP.ST       L REP.PR       L REP.END           </pre>	<p>Each printout has its own format settings.</p> <p><b>TYPE:</b> Sets the printout type. Options are:</p> <ul style="list-style-type: none"> <li>• NONE (default)</li> <li>• RECORD</li> <li>• DOCKET</li> <li>• REPORT</li> </ul> <p><b>FORMAT:</b> Sets the printout format.</p> <p><b>SERIAL:</b> Sets the serial port for this printout</p> <p><b>NAME</b> (Printout Name): Report printouts are available by name to the operator.</p> <p><b>CUSTOM:</b> For custom printing, each type of printout uses event strings as follows:</p> <p><b>RECORD:</b> REC.PRN (Record Print): defines entire printout.</p> <p><b>DOCKET:</b> 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. EV.P.NEW (Event Product New) defines what is printed when a new product is selected. EV.P.END (Event Product End) defines what is printed just before a new product is made active.</p> <p><b>REPORT:</b> 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.</p>
<b>TYPE Values</b> <OPT>	
<ul style="list-style-type: none"> <li>• NONE (Default)</li> <li>• RECORD</li> <li>• DOCKET</li> <li>• REPORT</li> </ul>	
<b>FORMAT Values</b> <OPT>	
FMT.A (Default), FMT.B CUSTOM	
<b>NAME Values</b> <STR>	
6 character String	
<b>CUSTOM Values</b> <STR>	
Token string	
(*) Active token strings depend on the TYPE setting	

## 8.9. SETP (Setpoints)

### 8.9.1. NUM (Number of setpoints)

Path	Description
SETP └ NUM	Sets the number of special setpoints
<b>Values &lt;OPT&gt;</b>	
<u>1</u> ... <u>8</u> (Default)	

### 8.9.2. SETP1 ... SETP8 (Setpoint options)

Path	Description
SETP └ SETP <sub>n</sub> └ TYPE └ OUTPUT └ LOGIC └ ALARM └ SCOPE <sup>(**)</sup> └ HYS <sup>(**)</sup> └ MASK <sup>(***)</sup> └ RDY.TIM <sup>(****)</sup>	Configure the operation of each setpoint.  <b>TYPE</b> determines the function of the setpoint. Options are:
<b>TYPE Values &lt;OPT&gt;</b>	<ul style="list-style-type: none"> <li>• NONE : Always inactive</li> <li>• ON: Always active</li> <li>• OVER: active if weight over target</li> <li>• UNDER: active of weight under target</li> <li>• COZ: active if Centre of Zero</li> <li>• ZERO: active if weight is zero</li> <li>• NET: active if net weight selected</li> <li>• MOTION: active if weight unstable</li> <li>• ERROR: active if error conditions detected</li> <li>• LGC.AND: active if inputs match the bits set in the mask exactly</li> <li>• LGC.OR: active if any inputs match the bits set in the mask</li> <li>• LGC.XOR: active if only one input matches the bits set in the mask</li> <li>• SC.REDY: active when scale is stable and in the zero band for more than the time set in RDY.TIM</li> <li>• SC.EXIT: active when outside of zero band and a print has occurred, or can be triggered by SC.EXIT special function</li> </ul>
<b>OUTPUT Values &lt;OPT&gt;</b>	<b>OUTPUT</b> specifies which IO to use or the setpoint output.
<ul style="list-style-type: none"> <li>• NONE, IO1 .. IO32 (Default)</li> </ul>	
<b>LOGIC Values &lt;OPT&gt;</b>	<b>LOGIC:</b> Logic HIGH forces the output to follow the setpoint activity. Logic LOW forces the output to the reverse of the setpoint activity.
HIGH (Default), LOW	
<b>ALARM Values &lt;OPT&gt;</b>	<b>ALARM:</b> Alarms are triggered when the setpoint is active. Options are:
NONE (Default)    DOUBLE SINGLE                FLASH	NONE: no alarm
<b>SCOPE Values &lt;OPT&gt;</b>	
<ul style="list-style-type: none"> <li>• GLOBAL (Default)</li> <li>• PROD</li> </ul>	

<p>(**) <b>NB:</b> Only for OVER, and UNDER setpoints.</p>	<p>SINGLE: single BEEP DOUBLE: double BEEP FLASH: flash display</p>
<p><b>HYS Values</b> &lt;NUM&gt;</p>	
<p>0 to 999999 <i>Default: 0</i></p>	<p><b>SCOPE:</b> The setpoint target can be set to be identical for all products (GLOBAL) or different for each product (PROD).</p>
<p>(**) <b>NB:</b> Only for OVER, and UNDER setpoints.</p>	<p><b>HYS:</b> Hysteresis defines the amount of weight required for an active setpoint to become inactive again.</p>
<p><b>MASK Values</b> &lt;NUM&gt;</p>	
<p>0 to 16777215 <i>Default 0</i> (**) <b>NB:</b> Only for LGC.AND, LGC.OR and LGC.XOR setpoints</p>	<p>A value of 0 still allows for 0.5 graduations of hysteresis.</p>
<p><b>RDY.TIM Values</b> &lt;NUM&gt;</p>	<p><b>MASK:</b> a 24 bit number that is used by the logic setpoints to match IO1..IO24</p>
<p>0.000 to 60.000 s <i>Default: 0.000</i> (****) <b>NB:</b> Only for SC.REDY setpoints.</p>	<p><b>RDY.TIM:</b> the time that the scale must be in the zero band and stable before the SC.REDY setpoint will become active</p>

## 8.10. ANL.OUT (Analogue Output)

Path	Description
ANL.OUT L <b>ABS</b> L <b>RANGE</b> L <b>WGT.LO</b> L <b>WGT.HI</b>	<p>Configures the operation of the analogue transmission.</p> <p><b>ABS</b> (Absolute Weight): Transmit negative weight values the same as positive weight values.</p> <p><b>RANGE</b>: Set the weight range. Options are:  FULLSCALE: 0 to fullscale  CUSTOM: Use WGT.LO and WGT.HI</p> <p><b>WGT.LO</b> (Weight Low): Weight corresponding to the lower analogue limit. (e.g. 0 volts or 4 mA)</p> <p><b>WGT.HI</b> (Weight High): Weight corresponding to the higher analogue limit. (e.g. 10Volts or 20 mA)</p>
<b>ABS Values</b> <OPT>	
NO <sup>(Default)</sup> , YES	
<b>RANGE Values</b> <OPT>	
FULLSCALE <sup>(Default)</sup> , CUSTOM	
<b>WGT Values</b> <NUM>	
-999999 .. 999999	

## 8.11. End (Save and exit)

## 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

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:

<b>ADDR</b>	<b>CMD</b>	<b>REG</b>	<b>:DATA</b>	↵
-------------	------------	------------	--------------	---

#### ADDR

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

ADDR	Field Name	Description
80 <sub>H</sub>	Response	'0' for messages sent from the master (POLL). '1' for messages received from an instrument (RESPONSE)
40 <sub>H</sub>	Error	Set to indicate that the data in this message is an error code and not a normal response.
20 <sub>H</sub>	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 <sub>H</sub> .. 1F <sub>H</sub>	Indicator Address	Valid instrument addresses are 01 <sub>H</sub> to 1F <sub>H</sub> (1 .. 31). 00 <sub>H</sub> 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:

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

<b>REG</b>	is a four character hexadecimal field that defines the address of the Register specified in the message. See Appendix 3: Communications Registers page 88 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.
<b>: DATA</b>	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<sub>H</sub> (80<sub>H</sub> + 40<sub>H</sub> + 05<sub>H</sub>).

### 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**

<b>SOH</b>	ASCII 01
<b>CRC</b>	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.
<b>EOT</b>	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 <sub>H</sub>	Error is of unknown type
Not Implemented Error	A000 <sub>H</sub>	Feature not implemented on this device
Access Denied	9000 <sub>H</sub>	Passcode required to access this register
Data Under Range	8800 <sub>H</sub>	Data too low for this register
Data Over Range	8400 <sub>H</sub>	Data too high for this register
Illegal Value	8200 <sub>H</sub>	Data not compatible with this register
Illegal Operation	8100 <sub>H</sub>	CMD field unknown
Bad parameter	8040 <sub>H</sub>	Parameter not valid for this execute register
Menu in Use	8020 <sub>H</sub>	Cannot modify register values while SETUP menus are active
Viewer Mode required	8010 <sub>H</sub>	Advanced operation chosen which requires the instrument to be in viewer mode.
Checksum required	8008 <sub>H</sub>	A checksum is required for the chosen command.

**Table 3: 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. Examples

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

<b>Trigger Zero Button Press (Write Final)</b>	<b>Description</b>
<p>COMMAND A: 21120008:0B↵ RESPONSE A: 81120008:0000↵</p> <p>COMMAND B: 21120008:8E↵ 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><b>Streaming (Write Final, Read Final, Execute)</b></p> <p>COMMAND A: 21120042:06↵ RESPONSE A: 81120042:0000↵</p> <p>COMMAND B: 21120043:11↵ RESPONSE B: 81120043:0000↵</p> <p>COMMAND C: 21110040↵ RESPONSE C: 81110040:000005DB000 00009↵</p> <p>COMMAND D: 21120041:03↵ RESPONSE D: 81120041:0000↵</p> <p>COMMAND E: 21100040:1↵ RESPONSE E: 81100040:00000000↵ 81110040:000005DB000 00009↵ 81110040:000005DB000 00009↵</p> <p>COMMAND G: 21100040:0↵ 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.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.
- **‘ADDR CMD REG : DATA’**: This is the same format as the response from a READ FINAL network command.
- **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 three (3) types of printout:

- **RECORD:** Record printouts are essentially a single printout generated by a single print event.
- **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 fixed formats 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. Record printouts

Format	Example
<b>FMT.A</b>	001234 01/01/2003 11:30 100.4 kg G TOMATOES
<b>FMT.B</b>	Joe's Fruit & Veg 30 Yarmouth Pde Tamworth NSW 2040 01/01/2003 11:30 ID: 001234 TOMATOES T: 5.0 kg G: 100.4 kg N: 95.4 kg Thank You!
<b>CUSTOM</b>	Format defined by REC.PRN token string.

### 11.4. Docket printouts

Format	Example
<b>FMT.A</b>	Joe's Fruit & Veg 30 Yarmouth Pde Tamworth NSW 2040 13/03/03 11:09:27

	Onions 4.06 kg, 5.04 kg, 3.15 kg, Apples 5.02 kg, 4.48 kg, 6.15 kg, Total 27.90 kg Thank You!
<b>FMT.B</b>	Joe's Fruit & Veg 30 Yarmouth Pde Tamworth NSW 2040 13/03/03 11:09:27  Onions 4.06 kg 5.04 kg 3.15 kg Sub 12.25 kg  Apples 5.02 kg 4.48 kg 6.15 kg Sub 15.65 kg  Total 27.90 kg Thank You!
<b>CUSTOM</b>	EV.D.NEW (Event Docket New) controls the first part of the docket that is printed along with the first transaction.  DOC.PRN (Event Print) controls the format of each transaction on the docket.  EV.D.END (Event Docket End) controls the format of the end of the docket including printing sub-totals etc.  EV.P.NEW (Event Product New) used when a new product is selected.  EV.P.END (Event Product End) used when a product is no longer active.

11.5. Report printouts

Format	Example
<b>FMT.A</b>	13/03/2003 11:09:27 Grand Total Apples 5.65 kg Onions 2.25 kg Total 7.90 kg
<b>FMT.B</b>	13/03/2003 11:09:27 Grand Total Apples 5.65 kg, Onions 2.25 kg Total 7.90 kg
<b>CUSTOM</b>	REP.ST (Report Start) defines the start of the report. REP.PR (Report Product) defines what is printed for each product REP.END (Report End) defines the end of the report.

## 12. Special Functions

### 12.1. Introduction



The instrument has 3 special function keys on the front panel. The function of these keys can be configured to any of the key functions detailed below.



<FUNCTION> keys have no primary function pre-programmed. 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. Key Functions

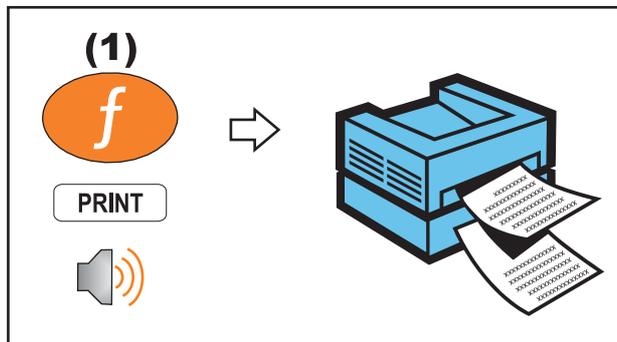
#### 12.2.1. NONE

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

#### 12.2.2. PRINT

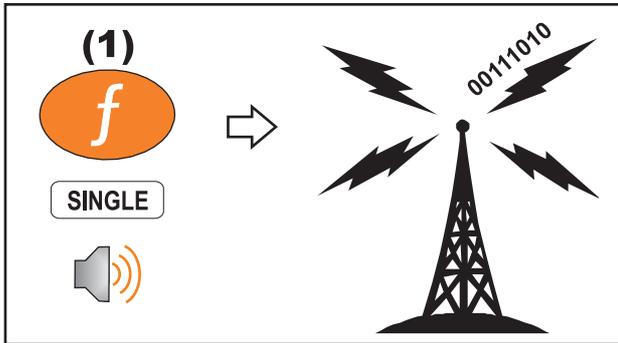
A print key can be used to trigger any of the configured printouts. It can also add to totals or undo the last add. When docket printing, a long press ends the docket.

##### ◆ Short press



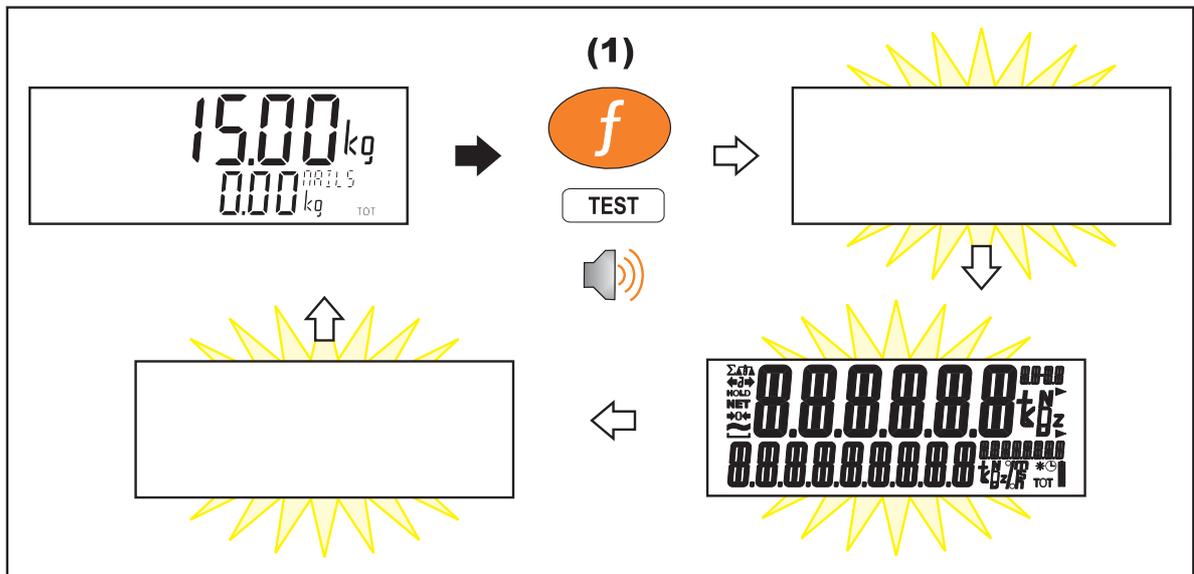
**12.2.3. SINGLE**

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.



**12.2.4. TEST**

A test key is used to start a display test.

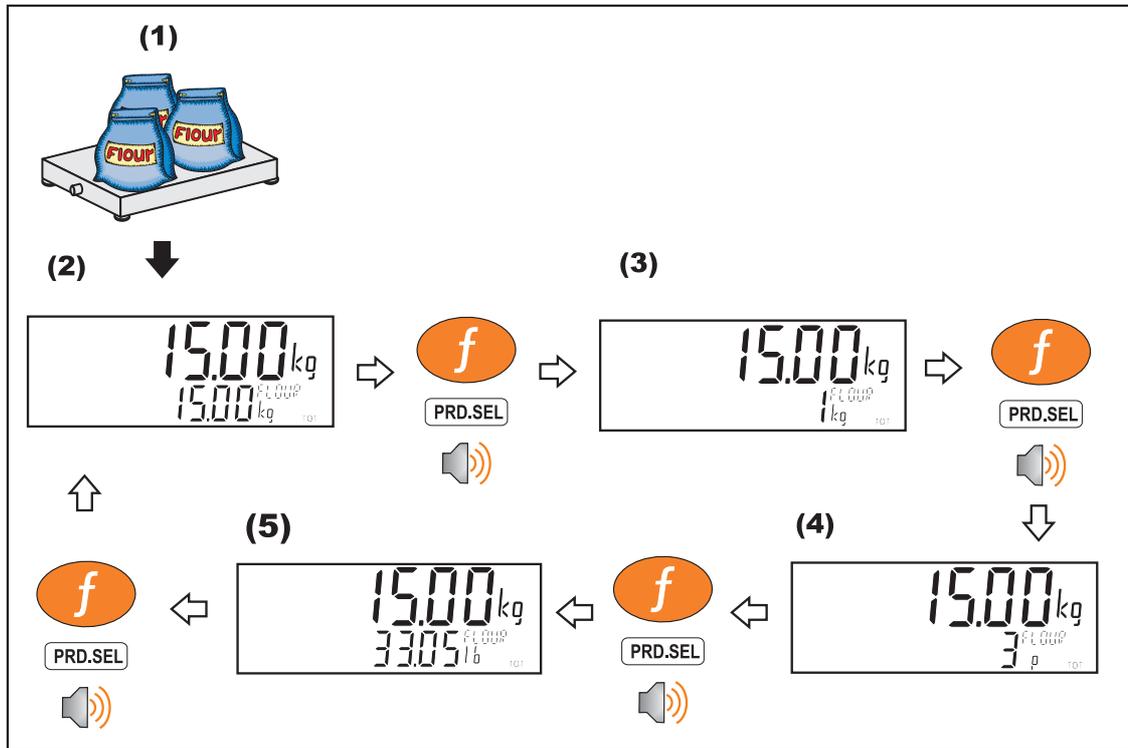


12.2.5. PRD.SEL

A short press of the product select button will cycle the total display (for the current product) through the available totals information. A long press allows the current product to be selected by number rather than name.

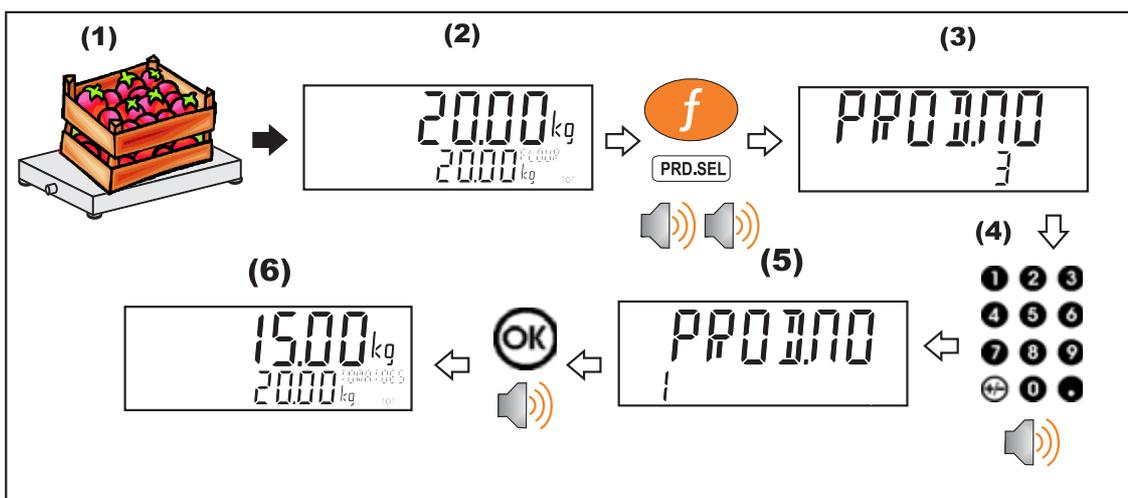
◆ Short press

Cycles the display of totals information.



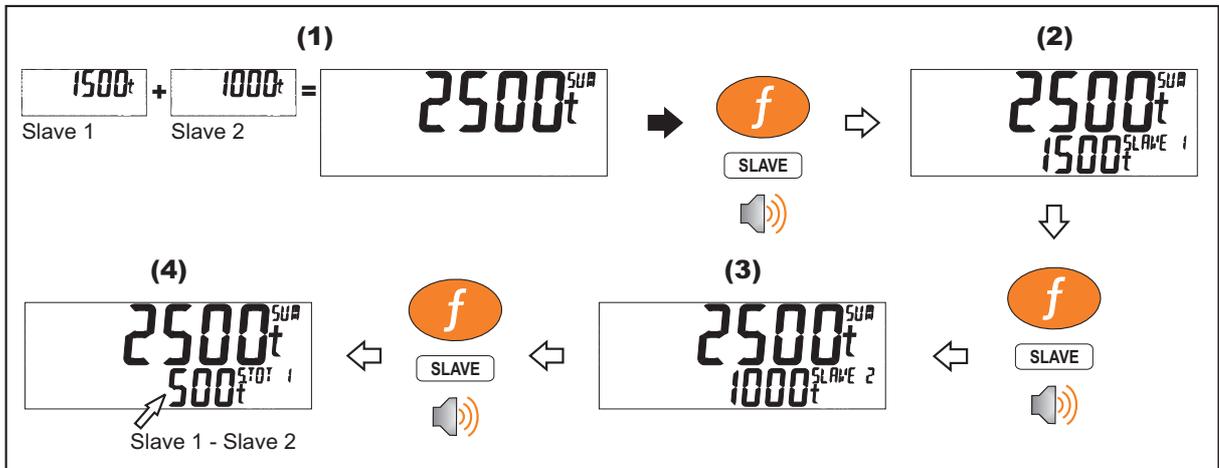
◆ Long press

Select product by number.



**12.2.6. SLAVE**

A short press of the slave key will cycle through each slave weight followed by each sub total on the lower display. The name of the slave or sub total will be shown in the lower right display.



**12.2.7. 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 K481 software supports up to 8 separate setpoints. Each setpoint is independently configured for a particular function and can be associated with a particular Output Driver. The setpoint can be configured to flash the instrument display or sound a buzzer as well as driving a physical output.

NOTE: As the summing indicator retrieves it's weight data via serial communications, delays are introduced. Hence it is not advisable to drive process control from outputs from the K481 in situations where high speed control is required.

### 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:

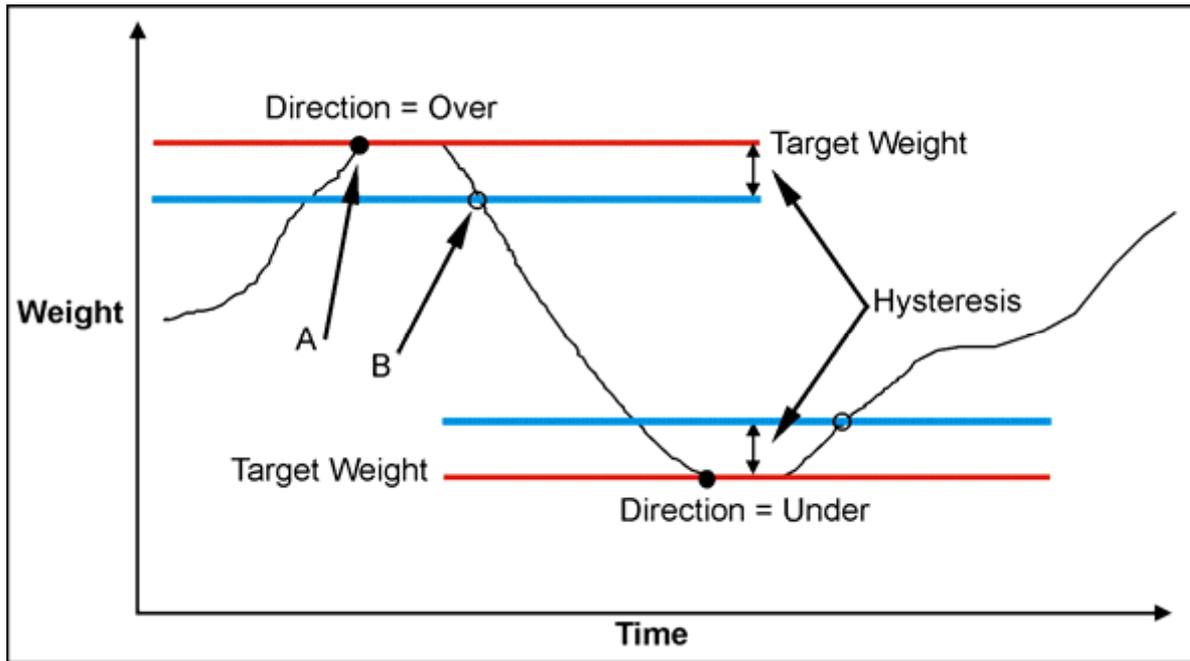
- **OUTPUT:** Select which IO control point to use. Options are NONE, IO1..IO32. NONE is useful if the setpoint is only being used trigger an alarm.
- **LOGIC:** This setting determines whether the output is normally on or normally off. Logic HIGH means the output follows the activity of the setpoint 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 7: 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

- **SCOPE:** GLOBAL means that the same targets are used for every product. PROD lets each product have its own target values for the setpoint.
- **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.
- **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.

### 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. Analogue Output

### 14.1. Overview

The K481 software supports a single analogue output used for analogue weight transmission. Setting up a system is a two stage process:

- First install the analogue output hardware and configure, calibrate and test the accessory module using the options in the H.WARE:ANL.HW menu.
- Second, configure the parameters of the information to be sent to the analogue output from the ANL.OUT menu.

### 14.2. Configuration of Hardware

#### 14.2.1. Configuration

**TYPE:** Set the TYPE to VOLTAGE (0..10V) or CURRENT (4..20mA). The analogue accessory will light an LED to indicate which output type is active.

**CLIP:** The CLIP setting determines if the analogue output is allowed to extend past the nominal limits. If CLIP is ON, the output will not go below 0V or above 10V for voltage outputs. For current output the limits are 4mA and 20mA. If CLIP is OFF the voltage can extend an extra 0.5 Volts or so past the limits and the current can extend from 0mA to 24mA.

#### 14.2.2. Calibration

Calibrate the lower and upper values of the analogue output using the CAL.LO and CAL.HI functions. Use the UP and DOWN arrows to adjust the output to the external system.

#### 14.2.3. Testing

The analogue output can be driven to any value using the FRC.OUT function. Use the UP and DOWN arrows to move the output up and down to test that the values shown on the instrument display match the readings taken externally.

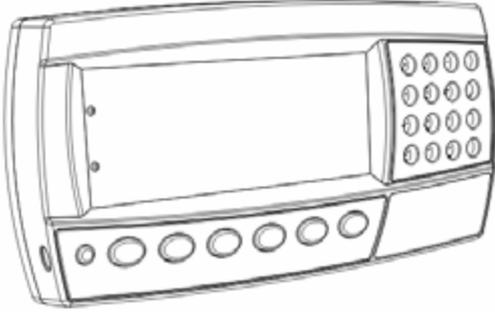
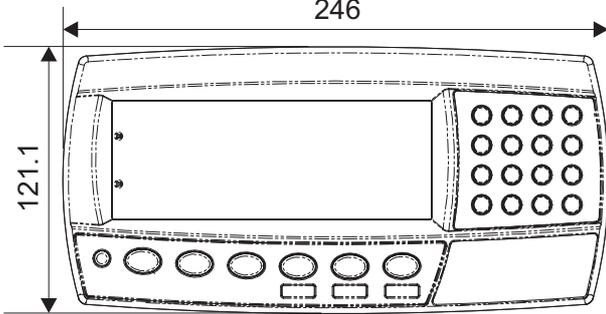
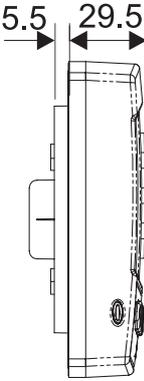
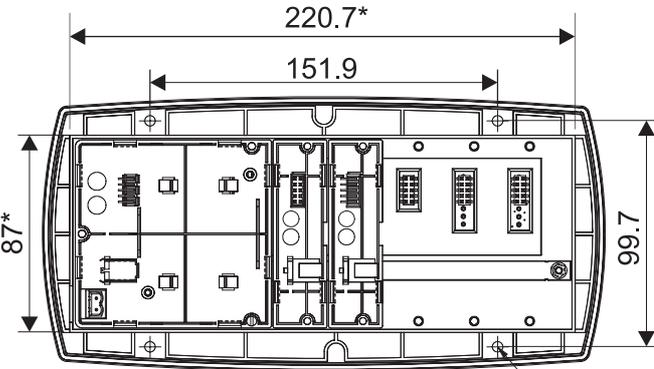
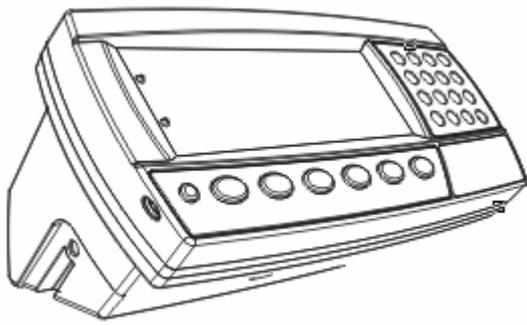
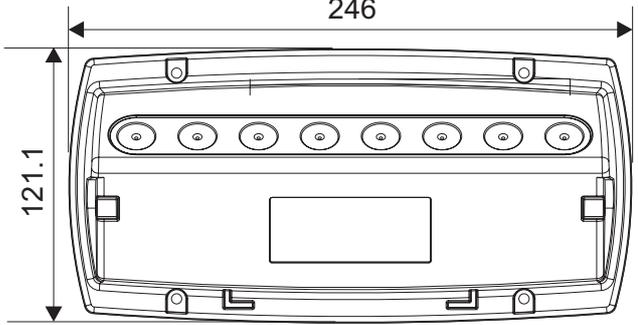
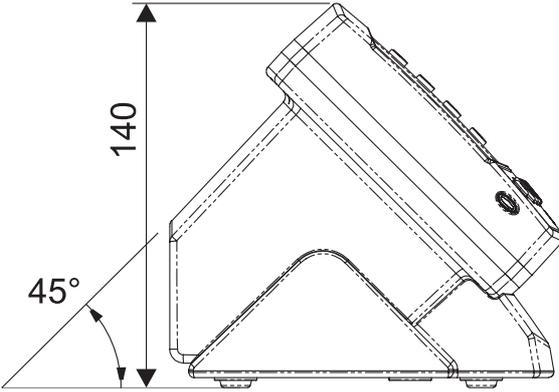
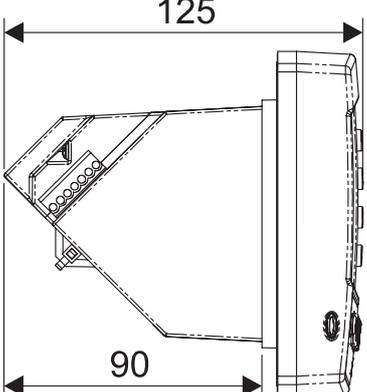
### 14.3. Analogue Weight Transmission

**ABS** (Absolute): This setting allows negative weight readings to be treated as positive values for the purposes of the analogue output transmission. This is especially useful when transmitting negative net readings in WEIGH-OUT applications.

**WGT.LO** (Weight Low) and **WGT.HI** (Weight High) settings specify the weight range that corresponds to the analogue output range. For example, it is possible to set the instrument up to send a 0..10V signal between 10.0 kg and 20.0kg even though the scale is calibrated to measure weight from 0.0kg to 50.0kg. This effectively increases the resolution of the analogue output over the weight range of interest.

# 15. Appendix 1: Dimensions

## 15.1. Dimensions

Weight Indicator		Dimensions in mm (1 inch = 25.4 mm)	
<b>3D View</b> 	<b>Front View</b> 	<b>Side View</b> 	<b>Back View</b>  <p>*Cut out Dimensions: 223mm x 89mm To suit M4 Screw</p>
Weight Indicator (With Rear Enclosure)		Dimensions in mm (1 inch = 25.4 mm)	
<b>3D View</b> 	<b>Back View</b> 	<b>Side View With Boot and Stand</b> 	<b>Side View</b> 

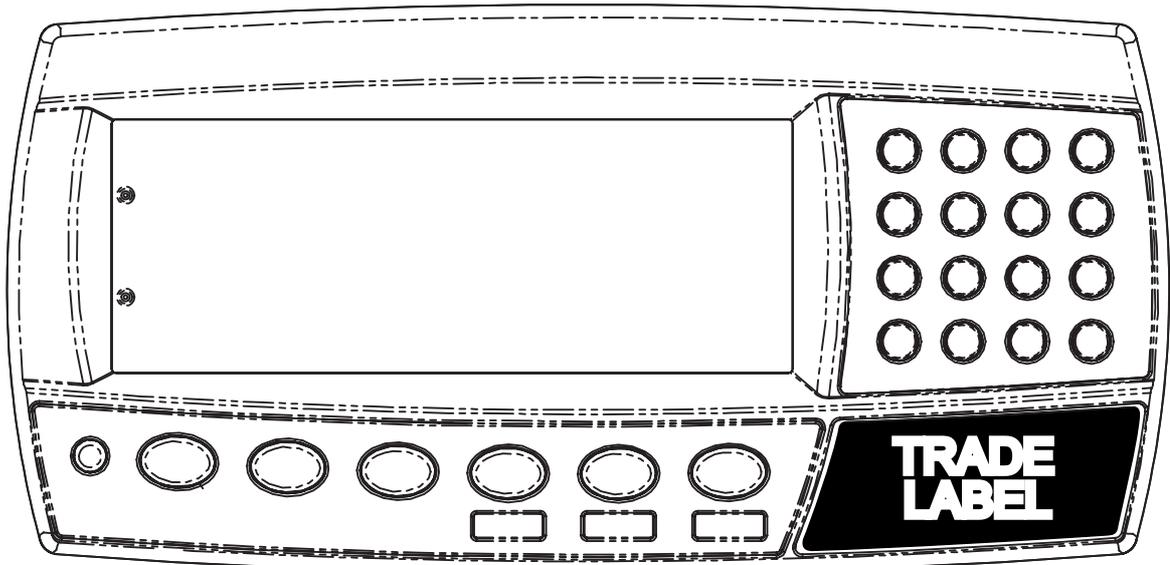
**Table 4: Dimensions**

**15.2. Legal Sealing Details**

There are several methods of legally sealing the instrument. The method chosen will depend on local regulations.

**15.2.1. Trade Label**

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



**Figure 8: Trade label position.**

### 15.2.2. Lead Seals

There are 2 methods of sealing the instrument with lead and wire seals:

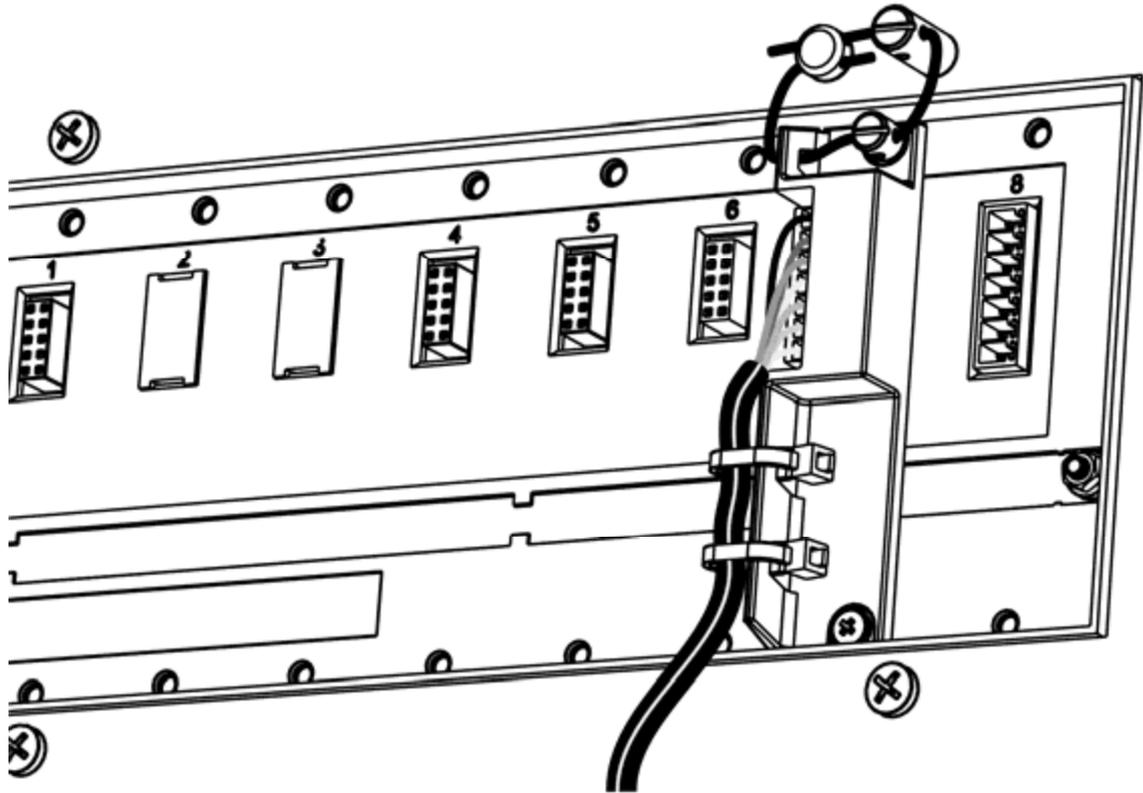


Figure 9: Lead seal on rear of instrument.

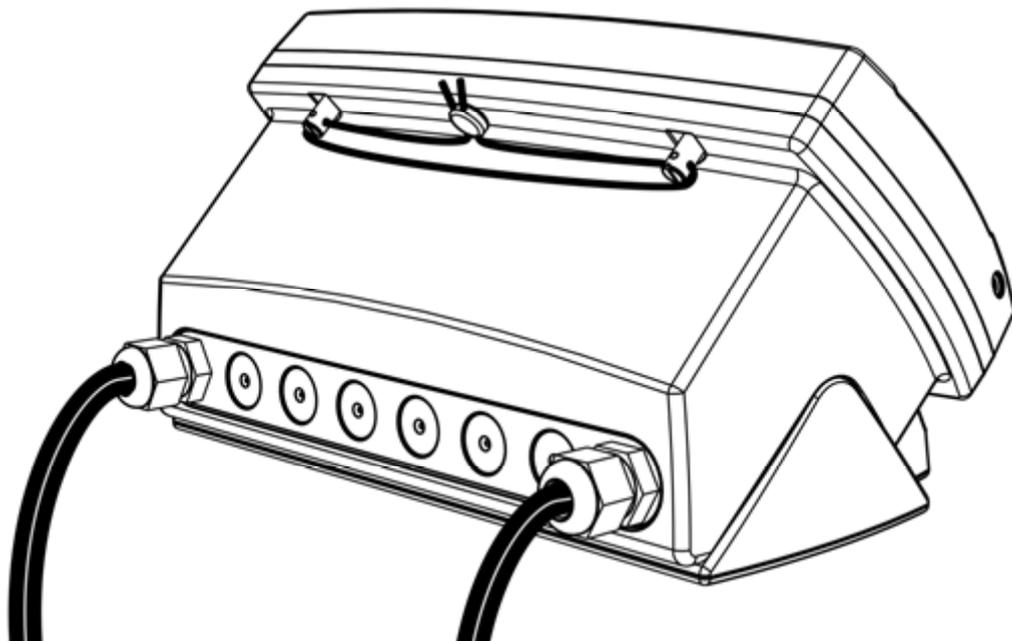


Figure 10: Lead seal on boot.

### 15.2.3. Destructible Sticker Seals

There are 2 methods of sealing with destructible stickers:

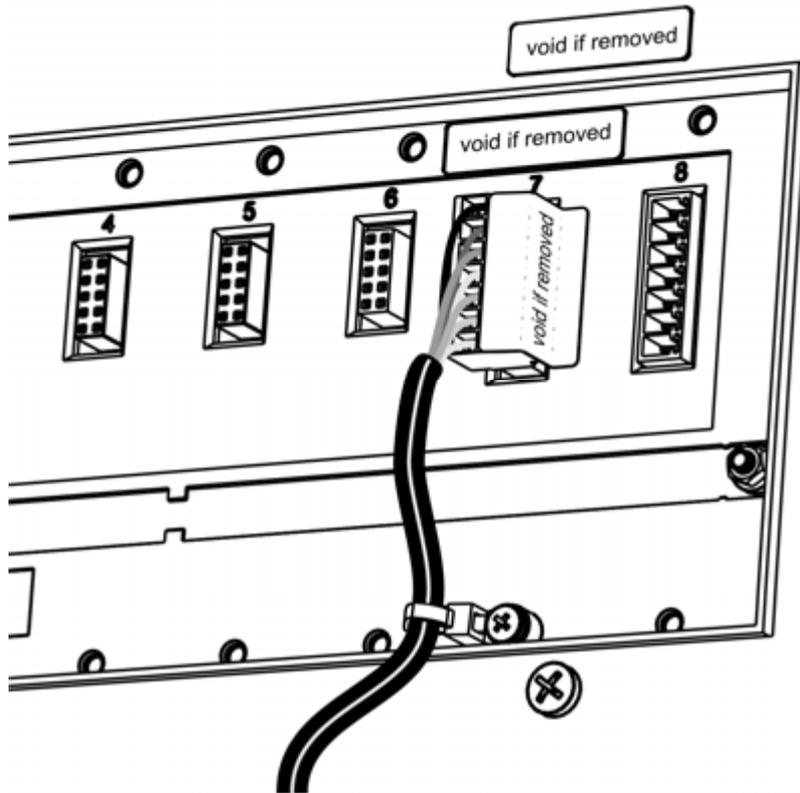


Figure 11: Destructible sticker seal on rear of instrument.

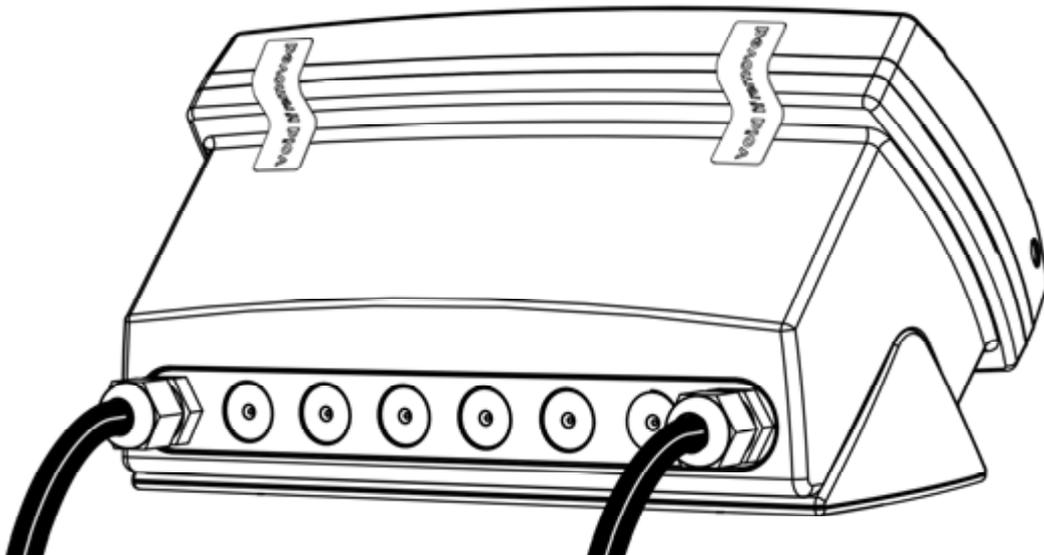


Figure 12: Destructible sticker seal on boot.

### 15.2.4. Electronic Seal

The value of the calibration counter should be written on the scale certification/sealing sticker. See page 35 for as description of the calibration counter.

## 16. Appendix 2: Print and Automatic Transmission Tokens

### 16.1. ASCII codes

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

**Table 5: 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.

## 16.2. 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.

### 16.2.1. Non-paged generic tokens

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

**Table 6: Print tokens: generic**

### 16.2.2. 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 <sub>H</sub> )	Page 0: Current Weight
189 (BD <sub>H</sub> )	Page 1: Held Weight
188 (BC <sub>H</sub> )	Page 2: Held or Current Weight
187 (BB <sub>H</sub> )	Page 3: Traceable Weight
186 (BA <sub>H</sub> )	Page 4: Current Product
185 (B9 <sub>H</sub> )	Page 5: Session Total
184 (B8 <sub>H</sub> )	Page 6: Grand Total
183 (B7 <sub>H</sub> )	Page 7: Register Data
182 (B6 <sub>H</sub> )	Page 8: Miscellaneous Data
181 (B5 <sub>H</sub> )	Page 9: Summing Data

**Table 7: Print tokens: pages**

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

Table 8: Print tokens: weight information

**16.2.4. Page 4, 5, 6 tokens: Product Information**

These pages hold product information where:

Code	Token
215 (D7 <sub>H</sub> )	Product name
216 (D8 <sub>H</sub> )	Barcode
217 (D9 <sub>H</sub> )	Total weight
218 (DA <sub>H</sub> )	Total alternative weight
219 (DB <sub>H</sub> )	Total pieces
220 (DC <sub>H</sub> )	Number of adds
221 (DD <sub>H</sub> )	Total docket weight
222 (DE <sub>H</sub> )	Total docket alternative weight
223 (DF <sub>H</sub> )	Total docket pieces
224 (E0 <sub>H</sub> )	Number of docket adds
225 (E1 <sub>H</sub> )	Preset tare
226 (E2 <sub>H</sub> )	Counting sample weight
227 (E3 <sub>H</sub> )	Counting sample pieces
228 (E4 <sub>H</sub> )	Counting piece weight
229 (E5 <sub>H</sub> )	Alternative weight conversion
233 (E9 <sub>H</sub> )	Last weight added
234 (EA <sub>H</sub> )	Last alternative weight added
235 (EB <sub>H</sub> )	Last pieces added
236 (EC <sub>H</sub> )	Clear docket totals
237 (ED <sub>H</sub> )	Reset last product add
238 (EE <sub>H</sub> )	Clear totals on all products

**Table 9: Print tokens: product information**

**16.2.5. Page 8 tokens: Miscellaneous weight data**

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

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

**Table 10: Print tokens: weight information**

## 16.2.6. Format tokens

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

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

**Table 11: Print tokens: formatting**

Printouts have default format tokens of:

- Weight
  - 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
- Time
  - Date separator is '/'
  - Time separator is ':'
  - Date format is the format configured in the setup menu
  - Time is 24 hour
- Line and page tracking are enabled

**16.2.7. Page 9 Tokens: Summing Information**

These pages hold summing information where:

<b>Code</b>	<b>Token</b>
215 (D7 <sub>H</sub> )	Slave 1 Weight
216 (D8 <sub>H</sub> )	Slave 2 Weight
217 (D9 <sub>H</sub> )	Slave 3 Weight
218 (DA <sub>H</sub> )	Slave 4 Weight
219 (DB <sub>H</sub> )	Slave 5 Weight
220 (DC <sub>H</sub> )	Slave 6 Weight
221 (DD <sub>H</sub> )	Slave 7 Weight
222 (DE <sub>H</sub> )	Slave 8 Weight
223 (DF <sub>H</sub> )	Slave 9 Weight
224 (E0 <sub>H</sub> )	Sub Total 1 Weight
225 (E1 <sub>H</sub> )	Sub Total 2 Weight
226 (E2 <sub>H</sub> )	Sub Total 3 Weight
227 (E3 <sub>H</sub> )	Sub Total 4 Weight
228 (E4 <sub>H</sub> )	Slave 1 Name
229 (E5 <sub>H</sub> )	Slave 2 Name
230 (E6 <sub>H</sub> )	Slave 3 Name
231 (E7 <sub>H</sub> )	Slave 4 Name
232 (E8 <sub>H</sub> )	Slave 5 Name
233 (E9 <sub>H</sub> )	Slave 6 Name
234 (EA <sub>H</sub> )	Slave 7 Name
235 (EB <sub>H</sub> )	Slave 8 Name
236 (EC <sub>H</sub> )	Slave 9 Name
237 (ED <sub>H</sub> )	Sub Total 1 Name
238 (EE <sub>H</sub> )	Sub Total 2 Name
239 (EF <sub>H</sub> )	Sub Total 3 Name
240 (F0 <sub>H</sub> )	Sub Total 4 Name

**Table 12: Print Tokens: Summing Information**

## 17. Appendix 3: Communications Registers

Name	Address	Type	Description																					
Software Model	0003 <sub>H</sub>	String	Returns software loaded (eg K402)																					
Software Version	0004 <sub>H</sub>	String	Returns software version (eg V1.0)																					
Serial Number	0005 <sub>H</sub>	Number	Returns instrument serial number																					
Key buffer entry	0008 <sub>H</sub>	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="margin-left: 20px; border: none;"> <tr> <td>00<sub>H</sub>: 0</td> <td>0E<sub>H</sub>: F1</td> <td>15<sub>H</sub>: DOWN</td> </tr> <tr> <td>:</td> <td>0F<sub>H</sub>: F2</td> <td>16<sub>H</sub>: OK</td> </tr> <tr> <td>09<sub>H</sub>: 9</td> <td>10<sub>H</sub>: F3</td> <td>17<sub>H</sub>: SETUP</td> </tr> <tr> <td>0A<sub>H</sub>: Power</td> <td>11<sub>H</sub>: +/-</td> <td>20<sub>H</sub>: IO1</td> </tr> <tr> <td>0B<sub>H</sub>: Zero</td> <td>12<sub>H</sub>: DP</td> <td>:</td> </tr> <tr> <td>0C<sub>H</sub>: Tare</td> <td>13<sub>H</sub>: CANCEL</td> <td>3F<sub>H</sub>: IO32</td> </tr> <tr> <td>0D<sub>H</sub>: G/N</td> <td>14<sub>H</sub>: UP</td> <td></td> </tr> </table>	00 <sub>H</sub> : 0	0E <sub>H</sub> : F1	15 <sub>H</sub> : DOWN	:	0F <sub>H</sub> : F2	16 <sub>H</sub> : OK	09 <sub>H</sub> : 9	10 <sub>H</sub> : F3	17 <sub>H</sub> : SETUP	0A <sub>H</sub> : Power	11 <sub>H</sub> : +/-	20 <sub>H</sub> : IO1	0B <sub>H</sub> : Zero	12 <sub>H</sub> : DP	:	0C <sub>H</sub> : Tare	13 <sub>H</sub> : CANCEL	3F <sub>H</sub> : IO32	0D <sub>H</sub> : G/N	14 <sub>H</sub> : UP	
00 <sub>H</sub> : 0	0E <sub>H</sub> : F1	15 <sub>H</sub> : DOWN																						
:	0F <sub>H</sub> : F2	16 <sub>H</sub> : OK																						
09 <sub>H</sub> : 9	10 <sub>H</sub> : F3	17 <sub>H</sub> : SETUP																						
0A <sub>H</sub> : Power	11 <sub>H</sub> : +/-	20 <sub>H</sub> : IO1																						
0B <sub>H</sub> : Zero	12 <sub>H</sub> : DP	:																						
0C <sub>H</sub> : Tare	13 <sub>H</sub> : CANCEL	3F <sub>H</sub> : IO32																						
0D <sub>H</sub> : G/N	14 <sub>H</sub> : UP																							
Secondary Display Left	000E <sub>H</sub>	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 <sub>H</sub>	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 <sub>H</sub>	Execute	Execute function with no parameters saves any FULL or SAFE setup changes. Operator changes are saved automatically																					
Enter Full Passcode	0019 <sub>H</sub>	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 <sub>H</sub>	Number	Write a Passcode to this register to unlock settings protected by a SAFE Passcode																					
ADC Sample Number	0020 <sub>H</sub>	Number	Read current sample number since last power on. (32 bit)																					
System Status *	0021 <sub>H</sub>	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<sub>H</sub>: Overload 00010000<sub>H</sub>: Underload 00008000<sub>H</sub>: Error (see System Error) 00004000<sub>H</sub>: SETUP menus active</p>																					

Name	Address	Type	Description	
			00002000 <sub>H</sub> : Calibration in progress 00001000 <sub>H</sub> : Motion 00000800 <sub>H</sub> : Centre of Zero 00000400 <sub>H</sub> : Zero 00000200 <sub>H</sub> : Net For calibration, bit 13 (00002000 <sub>H</sub> ) 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 <sub>H</sub>	Number	Diagnostic Errors	
Absolute mV/V	0023 <sub>H</sub>	Number	Absolute mV/V reading where 10000 = 1.0mV/V	
Unused	0024 <sub>H</sub>	Number		
Gross/Net Weight	0025 <sub>H</sub>	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 <sub>H</sub>	Number		
Net Weight	0027 <sub>H</sub>	Number		
Tare Weight	0028 <sub>H</sub>	Number		
Peak Hold	0029 <sub>H</sub>	Number		
Manual Hold	002A <sub>H</sub>	Number		
Grand Total	002B <sub>H</sub>	Number		
Alternate Units Gross	002C <sub>H</sub>	Number		
Raw ADC counts	002D <sub>H</sub>	Number		2,560,000 = 1.0mV/V
Alternate Units Net	002E <sub>H</sub>	Number		as above
System Fullscale	002F <sub>H</sub>	Number	Fullscale weight of the instrument.	
Traceable weight available flag	0030 <sub>H</sub>	Number	0: No traceable weights since start up 1: Traceable weight data is valid	
Traceable ID	0031 <sub>H</sub>	Number	The unique ID for the traceable weight.	
Traceable weight	0032 <sub>H</sub>	Number	Traceable weight in primary units	
Traceable weight (alt)	0033 <sub>H</sub>	Number	Traceable weight in alternate units	
Traceable weight (p)	0034 <sub>H</sub>	Number	Traceable weight in pieces	
Traceable tare weight	0035 <sub>H</sub>	Number	Tare weight valid during traceable weight.	
Traceable PT flag	0036 <sub>H</sub>	Number	0: no preset tare 1: preset tare	
Traceable date: year	0037 <sub>H</sub>	Number	Date and time that the traceable was acquired.	
Traceable date: month	0038 <sub>H</sub>	Number		
Traceable date: day	0039 <sub>H</sub>	Number		
Traceable date: hour	003A <sub>H</sub>	Number		
Traceable date: minute	003B <sub>H</sub>	Number		

Name	Address	Type	Description
Traceable date: second	003C <sub>H</sub>	Number	
Stream Data	0040 <sub>H</sub>	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 <sub>H</sub>	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 <sub>H</sub> .. 0046 <sub>H</sub>	Option	1..16 selects registers from ADC Sample (0020 <sub>H</sub> ) to System Fullscale (002F <sub>H</sub> ). 17 is IO Status (0051 <sub>H</sub> )
Print Token String	004C <sub>H</sub>	String	Sends a string to the configured printer port. The string can contain print tokens.
Reply Token String	004D <sub>H</sub>	String	Same as 004C <sub>H</sub> except that the completed string is returned to the sender.
Reply registers	004E <sub>H</sub>	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 <sub>H</sub>		Same as register 004E <sub>H</sub> except that stream IDs are used. Example: To get the first 3 items of stream data, send "2012004F:010203;".
IO Status	0051 <sub>H</sub>	Number	32 bits of IO status sent as 8 hex chars
Piece Weight	0053 <sub>H</sub>	Number	The current weight in pieces
Settable Consecutive Print ID	007A <sub>H</sub>	Number	The settable consecutive print ID.
User ID strings 1 .. 3	0090 <sub>H</sub> .. 0092 <sub>H</sub>	String	These strings are also accessed via the ID function on the keypad.
Current Time/Date	0150 <sub>H</sub>	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 <sub>H</sub>	Option	Write 0 for MMDDYYYY or 1 for DDMMYYYY
Day	0152 <sub>H</sub>	Number	Read/Write current day (1..31)
Month	0153 <sub>H</sub>	Number	Read/Write current month(1..12)
Year	0154 <sub>H</sub>	Number	Read/Write current year (2000..2099)

Name	Address	Type	Description
Hour	0155 <sub>H</sub>	Number	Read/Write current hour (0..23)
Minute	0156 <sub>H</sub>	Number	Read/Write current minute (0..59)
Second	0157 <sub>H</sub>	Number	Read/Write current second (0..59)
Session Total Weight	0210 <sub>H</sub>	Number	Session total information
Session Total Alt Wgt	0211 <sub>H</sub>		
Session Total Pieces	0212 <sub>H</sub>		
Session Total Num	0213 <sub>H</sub>		
Grand Total Weight	0220 <sub>H</sub>	Number	Grand total information
Grand Total Alt Wgt	0221 <sub>H</sub>		
Grand Total Pieces	0222 <sub>H</sub>		
Grand Total Num	0223 <sub>H</sub>		
<b>The following registers relate to the DSD.</b>			
Auto clear DSD	8290 <sub>H</sub>	Option	Auto write over oldest records when full (0..1)
Read DSD Record	8291 <sub>H</sub>	Execute	Reads requested DSD record
Read Next DSD Record	8292 <sub>H</sub>	Execute	Reads next DSD record
Read Prev. DSD Record	8293 <sub>H</sub>	Execute	Reads Previous DSD record
Read Oldest Record	8294 <sub>H</sub>	Execute	Reads Oldest DSD record
Read Newest Record	8295 <sub>H</sub>	Execute	Reads Newest DSD record
Clear DSD	8296 <sub>H</sub>	Execute	Clears all records on DSD
Summing Serial Port	A600 <sub>H</sub>	Option	The serial port used to communicate with the slaves
Summing Protocol	A601 <sub>H</sub>	Option	RS232 ring or normal RS485 network
Number of slaves	A602 <sub>H</sub>	Number	The number of slaves to sum (1..9)
Number of subtotals	A603 <sub>H</sub>	Number	The number of subtotals to calculate (0..4)
Slave name	A610 <sub>H</sub> .. A618 <sub>H</sub>	String	6 character name for each slave
Sub total name	A620 <sub>H</sub> .. A628 <sub>H</sub> .. A630 <sub>H</sub> .. A638 <sub>H</sub> ..	String	6 character name for each subtotal
Sub total add slaves	A621 <sub>H</sub> .. A629 <sub>H</sub> .. A631 <sub>H</sub> .. A639 <sub>H</sub> ..	Number	Number containing the slaves to add to the subtotal (eg 12 will add slave weights 1 & 2 to the sub total)
Sub total subtract slaves	A622 <sub>H</sub> .. A62A <sub>H</sub> .. A632 <sub>H</sub> .. A63A <sub>H</sub> ..	Number	Number containing the slaves to subtract from the subtotal (eg 34 will subtract slave weights 3 & 4 to the sub total)
Slave weights	A650 <sub>H</sub> .. A658 <sub>H</sub> ..	Number	The individual slave weights
Sub total weights	A660 <sub>H</sub> .. A663 <sub>H</sub> ..	Number	The individual sub total weights

Name	Address	Type	Description
<b>The Active Product is the product shown on the instrument display. It is the product which is currently active in the instrument.</b>			
Change Active Product using Product number	B000 <sub>H</sub>	Number	Write number to change the active product. Read to find out active product number.
Clear all Totals	B002 <sub>H</sub>	Execute	Execute to clear All Totals
Clear Session Totals	B003 <sub>H</sub>	Execute	Execute to clear Session Totals only
Clear Docket Totals	B004 <sub>H</sub>	Execute	Execute to clear printing Docket Totals only
Change Active Product using Product Name	B006 <sub>H</sub>	String	Write name to change the active product. Read to find out name of active product.
<b>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.</b>			
Select product by name	B00F <sub>H</sub>	String	Write name to select product, read to find out selected product name.
Select product by number	B010 <sub>H</sub>	Number	Write number to select product, read to find out selected product number.
<b>The following registers all work with the Selected Product.</b>			
Delete	B011 <sub>H</sub>	Execute	Execute with no parameters to delete the selected product. This can be done only if the product total is zero.
Re-name	B012 <sub>H</sub>	String	Write to change name of selected product.
Name	B013 <sub>H</sub>	String	Read selected product name.
Preset Tare	B015 <sub>H</sub>	Number	Read/Write Preset Tare
Sample Size	B016 <sub>H</sub>	Number	Read/Write Sample Size
Sample Weight	B017 <sub>H</sub>	Number	Read/Write Sample Weight
Piece Weight	B018 <sub>H</sub>	Number	Read/Write Piece Weight
Alternate Unit Conversion Factor	B019 <sub>H</sub>	Number	Read/Write Conversion Factor. 1000000 = 1.0
Target 1 .. Target 8	B080 <sub>H</sub> .. B087 <sub>H</sub>	Number	Setpoint targets for the Selected Product
Total Weight Total Alternate Wgt Total Pieces Total Num	B102 <sub>H</sub> .. B105 <sub>H</sub>	Number	Product total information
Total Docket Weight Total Docket Alt Wgt Total Docket Pieces Total Docket Num	B180 <sub>H</sub> .. B183 <sub>H</sub>	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.

## 18. 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, DISP etc			Operator Functions
	DISP	B.LIGHT			Backlight operation
		FREQ			Display update frequency
		VIEW			Default View
	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	
	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, etc		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
	ANL.HW	TYPE			Voltage or current selection
		CLIP			Output clip enable
		FRC.OUT			Force analog output test
		ANL.CAL	ADJ.LO		Adjust lo output (4mA or 0V)
			ADJ.HI		Adjust hi output (20mA or 10V)
	DSD.HW	AUTO.C			Automatically overwrite the oldest records when DSD full
		DSD.STR			Custom string to store with DSD records
	SCALE	OPTION	Z.BAND		Band of Zero
FUNC	NUM			Number of special functions	
	SF1 – SF8	TYPE			Type
		KEY			Key assignment (Not for Thumbwheel)
		PRT.OUT			Print: printout
		TOTAL			Print: totalising
		CLR.ASK			Print: Confirm clear
		AUTO			Print: Automatic
		IL.TYPE			Print: Interlock type
		I.LOCK			Print: Interlock
		SCOPE			Counting, Units: Scope
		MODE			Units: Mode
		UNIT			Units: Alternative unit
		U.STR			Units: Alternative unit string
		AUT.OUT			Single: Auto Output to use
		BLANK			Blank: Blanking function
		IO.BAND			Thumb: Inputs connected to thumbwheel
FUNC			Remote Key: Function to trigger		
SER.SUM	SERIAL			Serial port for summing	
	PROTO			Network protocol for summing	
	SLAVES			Number of slaves to sum	
	SLAV.1.. SLAV.9	NAME		Name of each slave	
	SUB.NUM			Number of sub totals	
	S.TOT.1.. S.TOT.4	NAME			Name of subtotal
		SLV.ADD			Slaves to add to subtotal
SLV.SUB			Slaves to subtract from subtotal		
SER.NET	TYPE			Protocol type	
	SERIAL			Serial port	
	ADDR			Network address	
SER.AUT	NUM			Number of Serial outputs	
	AUTO.1..	TYPE		Frequency	

L1	L2	L3	L4	Item	
	AUTO.2	SERIAL		Serial port	
		FORMAT		Format	
		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 to print to
		NAME			Printout Name
		CUSTOM	REC.PRN		
DOC.PRN					Custom string for docket printout
EV.D.NEW					Custom string for new docket
EV.D.END					Custom string for end of docket
EV.P.NEW					Custom string for new product
EV.P.END					Custom string for end of product
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	
		SCOPE		Product or global targets	
		HYS		Hysteresis	
		MASK		Logic setpoint mask	
RDY.TIM		Scale ready setpoint wait time			
ANL.OUT	ABS			Use absolute weight	
	RANGE			Weight range	
	WGT.LO			Weight for low transmission	
	WGT.HI			Weight for high transmission	
End	End			Save and Close	

Table 13: Menus

## 19. Appendix 5: Error Messages

### 19.1. 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.

### 19.2. 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.
(-----)	The summed weight could not be calculated.	Check that all units are displaying positive weight, and all are displaying either gross or net (not a mismatch). If an error code is displayed on the bottom display, refer to the table below.

**Table 14: Errors: Weighing**

If the top display is blanked, an error may be displayed on the bottom display. This table describes each error.

Error	Description
No Resp	One or more slaves are not responding. Slave will be shown in the bottom right display.
Hdr Adr	The address in the command header is bad (ie can't be parsed)
Hdr Cmd	The command in the command header is bad (ie can't be parsed)
Hdr Reg	The register in the command header is bad (ie can't be parsed)
Hdr Dlm	The delimiter in the command header is bad (ie can't be parsed)
Bad Adr	The address in the command header is incorrect (ie different to what was requested)
Bad Rply	The reply was not the expected reply
Not Rply	The response was not a reply
Err Rply	The slave replied with an error
Bad Cmd	The command in the command header is incorrect (ie different to what was requested)
Bad Reg	The register in the command header is incorrect (ie different to what was requested)

Bad Data	The payload could not be parsed
Data Rng	The data in the payload was outside the allowable range
No Slaves	No slaves replied on the ring network
Bad Setup	The summing indicator setup is bad (ie bad number of slaves or subtotals)
Setup Chg	The setup of one of the slaves has changed
Reg Error	One of the slaves is reporting an error when reading a register
Unit.Match	There is a mismatch in the units reported by the slaves (for example mix of kg and t)
Model Err	There is a mix of R300 and R400 indicators on the bus (only the same type of unit can be summed)

Table 15: Errors: Summing

### 19.3. Setup Errors

These messages show status messages or errors that may occur during the instrument setup.

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 16: Errors: Setup

### 19.4. 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
(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
(E4000)	The runtime information has been lost.	Check Zero and tare settings.

Table 17: 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)

## 20. Glossary

### 20.1. 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
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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## Notes

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