
WARNING

Product Improvement Policy

Ian Fellows Ltd operates a continuous product improvement policy. We are proud of the quality of our products and recognise that improvement is always possible. In our striving for perfection we reserve the right to implement changes to hardware, software and specifications.

For these reasons the contents of this manual are subject to change without notice.

All efforts have been made to ensure the accuracy of this manual. However, should any errors be detected, Ian Fellows Ltd. would greatly appreciate being informed of them.

The above notwithstanding, Ian Fellows Ltd. can assume no responsibility for any errors in this manual or their consequences.

Statement on Conformity

In 'Trade' mode, CPI configured with appropriate components, is able to conform to the Harmonised European Standard EN 45501. This standard is based on a worldwide accepted OIML Recommendation R76 ~ Non Automatic Weighing Instruments. CPI type approval number is UK2677. In addition, it is built according to a strict ISO9001 Quality Assurance System and complies with EN55022 (Emissions), EN45501 Annex B (Immunity), and both SI2328:1994 and SI3260:1994 Electrical Safety directives.

Manual Revision B Issue 008 20/08/2006
Series PO6000 Software. (PO6_035/135 ⇒)
© Ian Fellows Ltd.
The Old Tannery.
Lower Keyford.
Frome.
Somerset.
BA11 4AR.
www.ianfellows.co.uk



This Manual aims to describe normal, or default, operation. The actual functionality of the installed instrument may differ dependent on the parameters modified by the installation and set-up engineers. If in doubt consult supplier about specific functionality.

**For Manuals, Application notes, Approval Certificates and Declarations of Conformity
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Software Version History

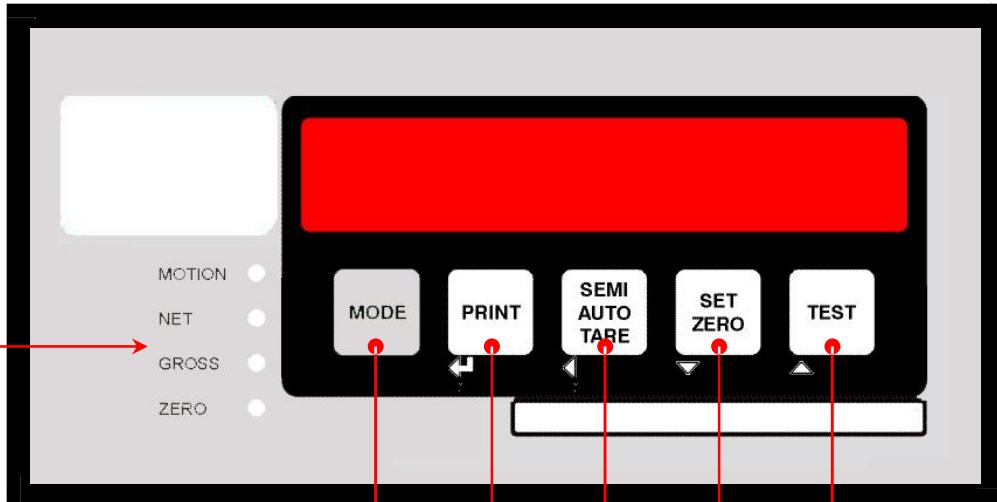
Software Version	Changes	Known Issues (may also apply in earlier versions)
PO6_024		Remote Tare could prevent subsequent cancel tare
Alternative program compilations derived Baseboards 1155 rev C use PO6_02n Baseboards 1155 rev D on use PO6_12n		
PO6_025/125	<ul style="list-style-type: none"> - Remote tare operation fixed - EX serial response made single digit (0/1/2) to be Lucid compatible 	Use of ? chr for comms help, limits use in text strings
PO6_026/126	<ul style="list-style-type: none"> - 126 prepared for 'Flash ETR' options - modified handling of ? chr in serial comms - Help dump changed from ?? to ?* - DEAD acquire without clearing linearity adjust 	<ul style="list-style-type: none"> - Flash ETR s/w not finished - RX bug for serial parity check (CP01/02) - Print bug when 'LinE'=1 (continuous 1st line print) - Analogue gain only adjusts when 'nEt'=0
PO6_027/127	<ul style="list-style-type: none"> - Programmable Mode Functions (FU) Introduced - Flash ETR implementation complete (PO6.127) - Fixed parity bug - Fixed Print bug for 'LinE'=1 - Fixed Analogue gain adjust if 'nEt'=1 - CTRF/HF default now 0 was 0C (Form Feed) - Serial FK response reverts to single digit - Changes to tare printing, SAT value now printed - New PM command for last printed SAT value 	<ul style="list-style-type: none"> - Calibration routine can generate minor span error on systems using large deadweight with high resolution. - Slave display mode (ER80) no Print function available
PO6.028/128	<ul style="list-style-type: none"> - Flash implementation revised - see application note (now Lucid compatible only for operation in gross) - Fixed calibration inaccuracy possible with high deadweight + resolution - ENGCFG:DLTR [DB] added for future factory use - Slave display mode, Print function restored - Suppressed late/spurious responses issued if serial commands sent when in menu or function modes - PW command now echoes (if EE=1) as other commands - previous always suppressed echo. - Status of simple trip o/ps can be reflected as bars on left digit of display 	<ul style="list-style-type: none"> - Once enabled, flash on this version can only be disabled at factory.
PO6.029/129	<ul style="list-style-type: none"> - Flash disable at level 2 by menu item FLSH - Revisions made to increase protection against corruption during power disruption 	
PO6.030/130	<ul style="list-style-type: none"> - Support for checkweigher lightbar (CM models). New parameter STEP[SP] enables & adjusts lightbar. - New [ME] serial command gives display 'Message' facility. - Revisions to setpoint entry (via menu or mode function), by default x10 res digit not now shown. SETD[SM] settings extended to permit previous method. - Tidied o/p states under menu/error modes. (Mainly SM 3 use) - Revised loopback self test routine. (Mainly factory use) and extended I/O test provision to cover future optional I/O 	<ul style="list-style-type: none"> - Revised setpoint entry only applied for trade mode
PO6.031/131	<ul style="list-style-type: none"> - Revised setpoint entry applied for trade and non trade modes 	<ul style="list-style-type: none"> - Remote display RMDS(ER) mode 20 could cause error loop at power on (Press TEST to skip)
PO6.032/132	<ul style="list-style-type: none"> - Fixed ER20 power up error - Changed Print Baud (PV) settings PV1 now 19200 baud (previous PV1 for print disable can now be set by PV10) 	<ul style="list-style-type: none"> - Access level 2 (calibration etc.) only accessible by passcode not internal pushbutton - Parameter dump (XC1) leaves display blank until power off/on (or send serial ME cmd)
PO6.033/133	<ul style="list-style-type: none"> - Fix to permit level 2 access by pushbutton. Also reinstated SW cmd for serial read of pushbutton. - New parameter in SERIAL menu - LDGZ allows leading zeros in place of spaces in weight string. - New parameter in ENGCFG menu - UNPO permits selection of uni/bi polar display. Was previously unipolar (restricted negative range) now default is bipolar and can be restricted if required. - Fix parameter dump to complete cleanly. 	<ul style="list-style-type: none"> - At power on always loads setpoint values for product code 1 regardless of last code. (Any Menu or Mode function updated)
PO6.035/135	<ul style="list-style-type: none"> At power on now always loads setpoints for last product code used. Revised ETR enable routines to better suit latest devices. 	

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1. GETTING STARTED

1.1 Panel Functions



MODE
 - May action one of several selectable functions. See section 4
 - Press and hold for 1 second to access SET-UP MENUS. See Section 3

PRINT
 - Print or Store Weight
 (Subject to valid print conditions)

SEMI AUTO TARE
 - Tares to net zero (unless a Preset Tare is active)
 Press and hold for 1 second to **CLEAR** Semi Auto Tare.
 If Preset Tare is active, GROSS displays while pressed

SET ZERO
 - Resets gross zero. Weight must be in gross mode, stable and within permitted Zero Setting Range

TEST
 - **Ten Times** Normal Scale Resolution.
 (Only displays x10 while held pressed in Trade Mode. Toggles between x10 and x1 if in Non-Trade mode).

NET	R	Semi-Auto or Preset TARE IN OPERATION. (FLASHING, Display shows Net Totalised Weight).	Both Flashing: - Stored Weight Value (eg in Preset Tare register) - Total Number of Weighments. All flashing: Displaying message from remote PC [ME] command
GROSS	R	GROSS WEIGHT Displayed. (FLASHING, Display shows Gross Totalised Wt).	
ZERO	R	GROSS WEIGHT IS WITHIN 0.25 division ('e') OF ZERO.	
MOTION	R	WEIGHT SIGNAL IS NOT STABLE (Functions requiring stability are disabled). (FLASHING (Menu Mode) – ASCII control character entry mode).	

The **NET Wt.** display is the **GROSS Wt.** - minus - the sum of any **Preset Tare** or **Semi-Auto Tare**.

For more information on **Preset Tares** see section 4

The pushbuttons also have secondary functions **ENTER** **↵** **↩** used when displaying and editing parameters.

Display status indicators

The normal weighing units of measurement are legended on the front panel.

During normal operation - some status functions may be indicated by a flashing character in the left digit ~

C	=	Count mode
r	=	Rate mode
U	=	Converted mode, converted Units.
.	=	Command pending ~ awaiting stable weight
N	=	Peak mode max value
u	=	Peak mode min value
-	=	Negative Sign (could over-ride status byte)

The following only display if enabled by parameter IN_OUT STAT = 1

F	=	Fail (Setpoint Mode SETD = 00)
H	=	High (Setpoint Mode SETD = 02/04/05)
p	=	Pass (Setpoint Mode SETD = 00/02/04/05)
L	=	Low (Setpoint Mode SETD = 02/04/05)
E	=	Empty/Discharge (Batching mode SETD = 01)
d	=	Dribble (Batching mode SETD = 01)
b	=	Bulk (Batching mode SETD = 01)
M	=	Horizontal bars reflecting status of simple trip o/ps (SETD = 07)

GROSS and **NET** indicators flash to indicate displayed Totals, Preset Tares and 'Flash Alibi' weights.

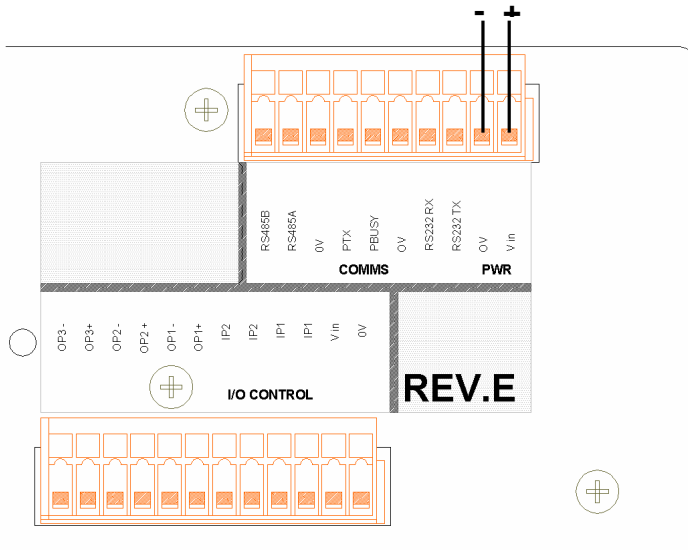
ALL indicators flash if a remote PC has placed a 'message' on the display (using ME command, introduced at version PO6.030/130).

1.2 Installation in control panels

Recommended practice for installation in control panels/enclosures

1. Use a metal enclosure for improved EMC protection.
2. Incoming mains supply and control signal cables should be screened or wire armoured.
3. Screen/armouring must be terminated (and stopped) on entry to the metal enclosure using an 'EMC screen' gland which physically connects the screen/armour to the enclosure.
4. The glands should be located as close as possible to the internal connection terminals (DIN rail), so there is a minimum of 'unscreened' cabling within the enclosure.
5. The incoming mains earth should connect to a 'central earthing point', usually the DIN rail.
6. If a non-conducting (eg glassfibre) enclosure must be used, all glands must be 'bonded' together, and to the central earthing point with minimum 4 sq mm copper conductor routed directly between points.
7. The power supply providing DC to the indicator must also connect 0V to the central earthing point.
8. Preferably use screened multicore cable between the indicator connectors and the I/O terminal rail and the power supply.
9. Multicore cable screens (except load cell cable – see below) should be connected to the central earthing point at the terminal rail end only. The screens should not be connected at the indicator end.
10. Screened load cell cable should be routed well clear of all other cables. It should not share trunking with any other cables except transducers. If it needs to pass near other cables, it should not travel parallel to them, and should cross them at 90 degrees. Its screen should be continuous right up to the terminals on the rear of the indicator, but not connected at that point. The screen should be connected to the enclosure only at its entry gland (must be an 'EMC' type), with the screen then continuing, unbroken, on inside the enclosure.
11. The load cell cable should go, preferably unbroken, directly to the indicator. (If it really must have intermediate terminals on a DIN rail, such terminals must be positioned as far from the other terminals as possible. The cable screens must connect via an insulated terminal; NOT grounding to the DIN rail. The unscreened tails must be as short as possible and the screen conductor tail must not be allowed to touch any metalwork inside the enclosure.)
12. Serial communication and printer cables must be screened. In this case, it is usually acceptable to bring the incoming cable screen direct to the central earth point (usually at the DIN rail). A screened cable must be run up to the indicator from the DIN rail, with the screen connected to earth at the DIN rail using an earthed terminal (screen not connected at the indicator).

1.3 Power Connection



Power Connection

Connect **12-28V DC** to terminals +Vin & 0V on P3

(Note - These terminals are internally linked to corresponding terminals on P4.)

The external supply should be fused at 3A. (Antisurge)

Internal protection is provided by a 750mA resettable 'poly' fuse.

(Resets when disconnected from supply and allowed to cool)

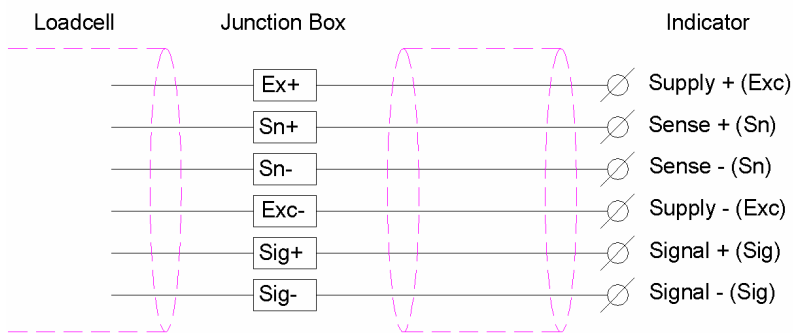
1.4 Loadcell Connection

See section 1.2 for installation practice. Connection is made to P1 using 6-wire screened multi-core cable.

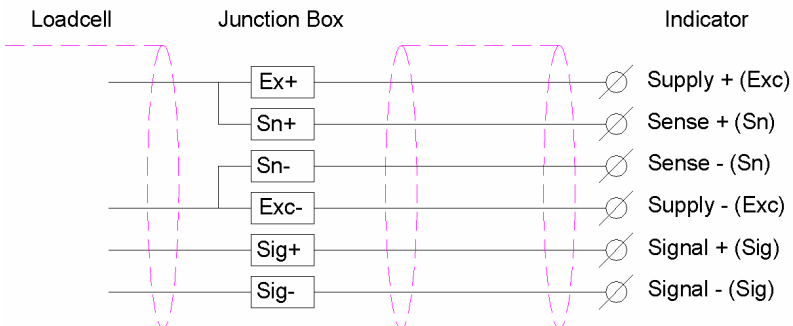
Maximum cable length between the indicator and loadcell junction box depends on the cross sectional area of the sense wires. Max length = 150m/mm²

It is essential that the 'sense' inputs are connected. When using 4 wire loadcells, each 'sense' input must be linked to its corresponding 'excitation' wire at some convenient point.

6-wire Loadcell Cable Connection Schematic



4-wire Loadcell Cable Connection Schematic



1.5 Control Outputs and Inputs

The I/O interface was revised at Baseboard Rev E - Connection details for the different board versions are described below.

Refer also to

- Section 1.2 – installation practice
- Section 9 at rear of the manual - Connection layouts for both Rev C and Rev E versions
- Section 4 - operation of I/O

OUTPUTS 1, 2, 3 - REV C Baseboard

The indicator operates from an external DC supply; in most cases this will also be the supply for control I/O. The 0V and Vin terminals on connector P3 are internally linked to terminals 0V and Vin on P4 for convenience.

The outputs consist of uncommitted darlington opto-isolators, capable of 'sinking' up to 60mA with a 'drop' of <1.5v when 'on', and will stand up to 30v without significant leakage when 'off'. (Note - Terminals marked for outputs 4 and 5 are never used)

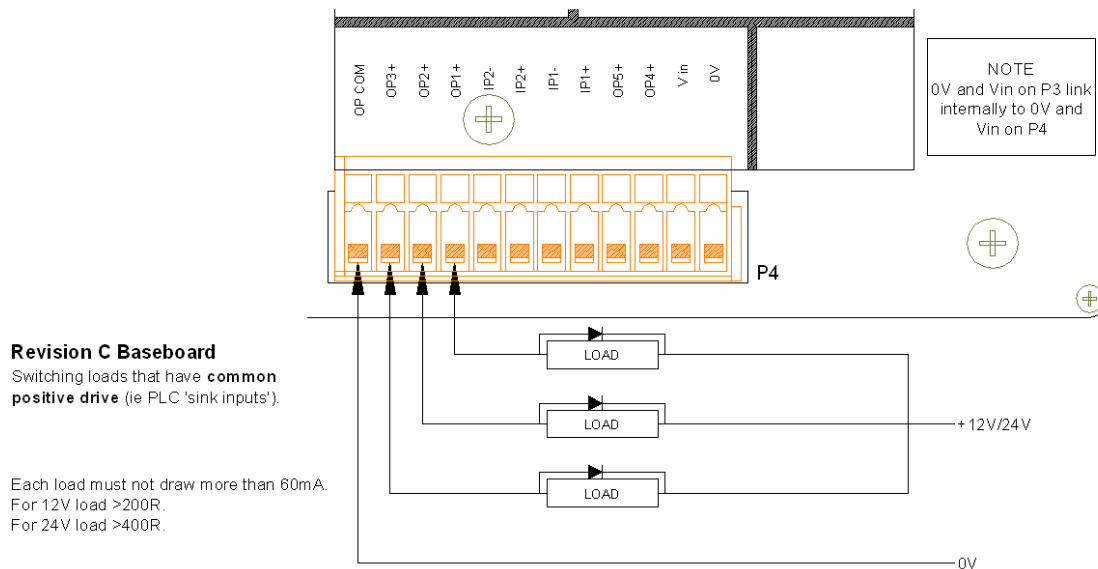
They are strictly DC, and the 'OPn+' must not go negative of 'OP-COM', or damage to the output device will occur.

Each output load may draw up to 60mA (Load resistance >200Ω for 12v; >400Ω for 24v).

Be sure to fit 'commutation' diodes across any inductive load such as a relay coil. Without it the indicator's opto-isolator transistor may be destroyed.

If an output fails to switch, check the external wiring carefully, and the user programming of, for example 'OPAL', to be sure they are *supposed* to be operating.

Connection - Common Positive Drive only



For driving LED's, small relays, etc. the indicator supply can be picked up at terminals Vin & 0V on P4. (Diodes required as shown for inductive loads). When interfacing with PLC inputs, avoid ground loops by bringing supply from PLC and run separate lines for each - do not connect to supplies at P3/P4.

OUTPUTS 1, 2, 3 - REV E Baseboard

The indicator operates from an external DC supply; in most cases this will also be the supply for control I/O. The 0V and Vin terminals on connector P3 are internally linked to terminals 0V and Vin on P4 for convenience.

On the rev E board the three outputs are fully separated, permitting positive or negative switching. Each is an uncommitted darlington opto-isolator, capable of 'sinking' up to 60mA with a 'drop' of <1.5v when 'on', and will stand up to 30v without significant leakage when 'off'.

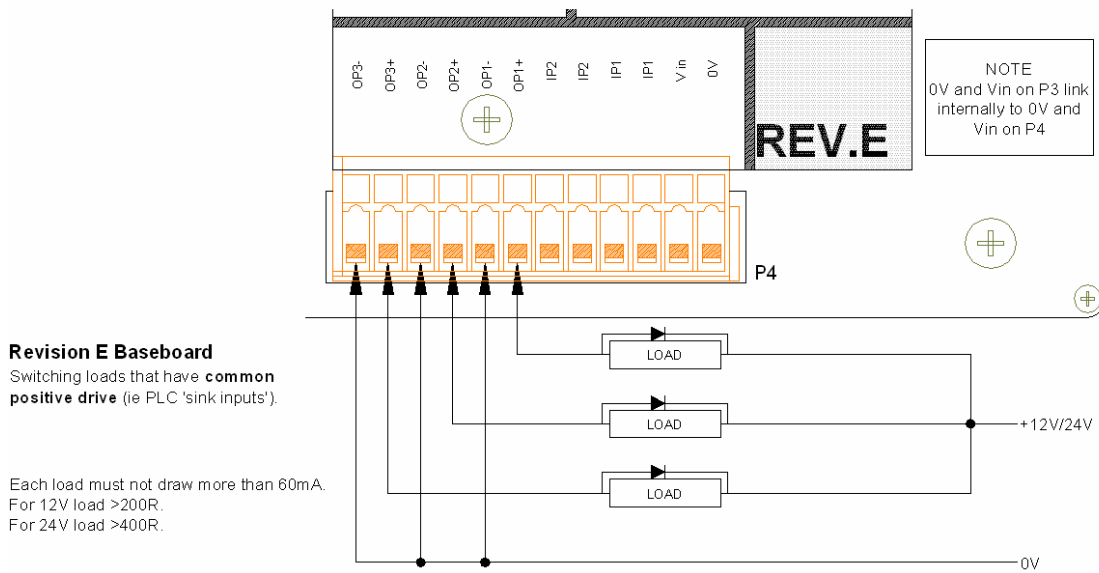
They are strictly DC, and the 'OPn+' must not go negative of 'OPn-', or damage to the output device will occur.

Each output load may draw up to 60mA (Load resistance >200Ω for 12v; >400Ω for 24v). Each output incorporates a 100mA poly resettable fuse to provide protection (reset by power off and leave to cool).

Be sure to fit 'commutation' diodes across any inductive load such as a relay coil. Without it the indicator's opto-isolator transistor may be destroyed.

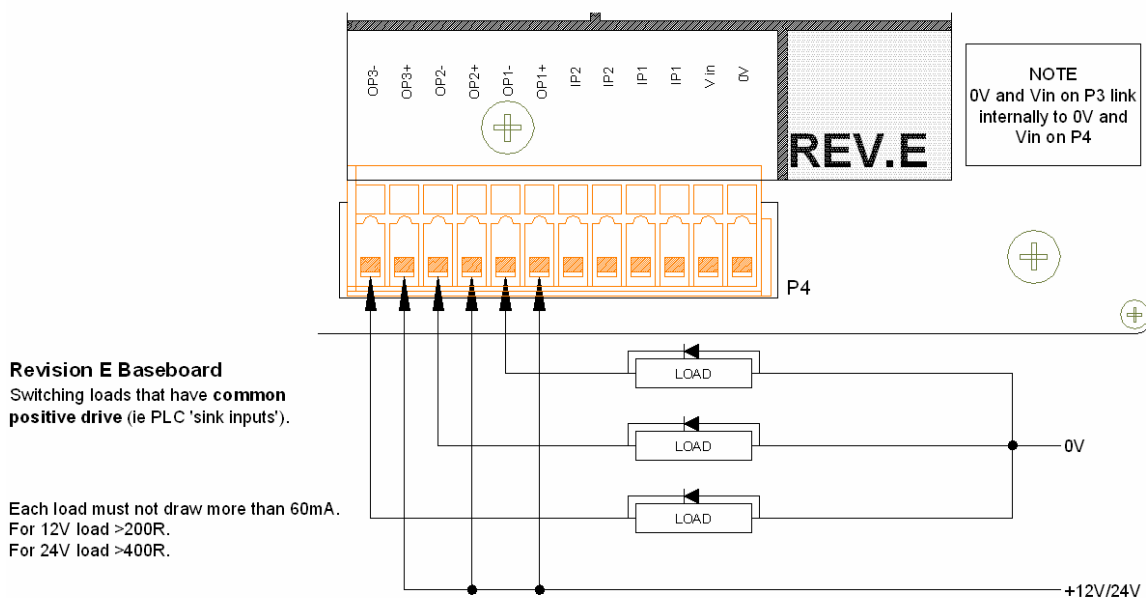
If an output fails to switch, check the external wiring carefully, and the user programming of, for example 'OPAL', to be sure they are supposed to be operating.

Connection - Common Positive Drive



For driving LED's, small relays, etc. the indicator supply can be picked up at terminals Vin & 0V on P4. (Diodes required as shown for inductive loads). When interfacing with PLC inputs, avoid ground loops by bringing supply from PLC and run separate lines for each - do not connect to supplies at P3/P4.

Connection Common Ground Drive



For driving LED's, small relays, etc. the indicator supply can be picked up at terminals Vin & 0V on P4. (Diodes required as shown for inductive loads). When interfacing with PLC inputs, avoid ground loops by bringing supply from PLC and run separate lines for each - do not connect to supplies at P3/P4.

INPUTS 1 and 2 - Rev C and Rev E Baseboard

Important Note: - On Rev C baseboards Inputs are polarity dependent.
On Rev E baseboards Inputs are not polarity dependent

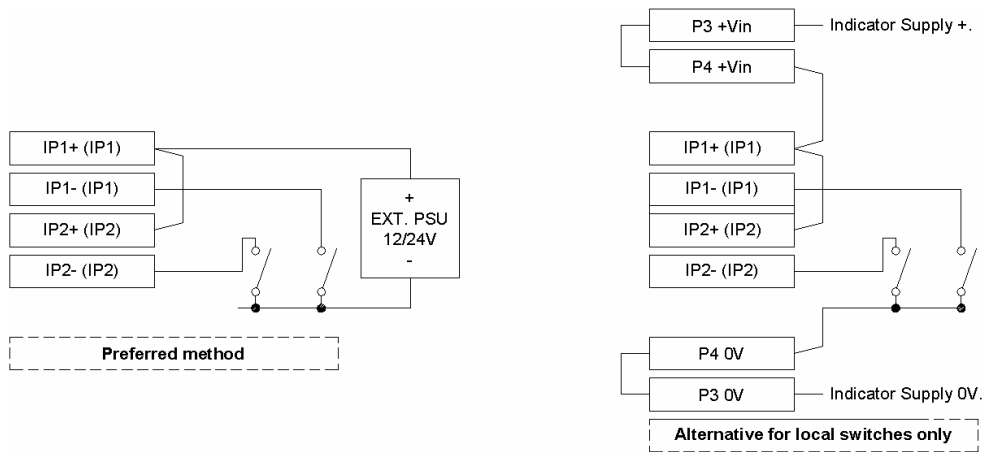
The control input pairs can be activated with a voltage 12-24V DC, via the controlling contact or transistor. The switching current is 5-12mA.

The contact or transistor may be in series with either input (observe correct polarity for the switching transistor if solid-state output, as well as the indicator input if Rev C board).

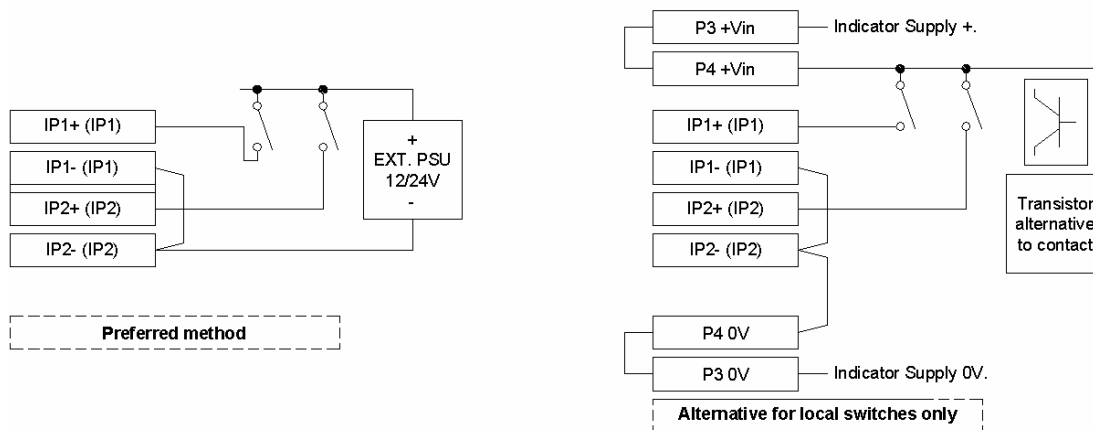
Each input is fully isolated. They may be commoned to positive where the external switching elements are commoned to ground (typically open collector NPN outputs) - or to negative (eg open collector PNP outputs – like the example below).

The use of good quality, gold plated contacts is advised, especially if 12V is used.

Connections – Switching to negative



Connections – Switching to positive



1.5 Printer & Comms Connections

See section 9 at rear of manual to identify terminal locations and designation. Further operational information is in section 5. Connections for most common PC and printer use will be as below

Indicator to Printer

CPI	Printer Function	9 Way 'D'	25 Way 'D'
P3 0V (ground)	Comms Ground	5	7
P3 PTX (transmit)	Receive (RX)	3	3
P3 PBUSY (busy)	Busy (DTR)	6	20

Indicator to PC

CPI	PC Function	9 Way 'D'	25 Way 'D'
P3 0V (ground)	Comms Ground	5	7
P3 RS232 TX (transmit)	Receive (RX)	2	3
P3 RS232 RX (receive)	Transmit (TX)	3	2

1.6 Switching On

At switch-on, a display segment test is followed by:

- q Software Version number display e.g. PO6_O22 (give this number in event of a query).
- q Traceable Access Number display e.g. tAn O21
(This number increments when changes are made to calibration – Requiring Access Level 2)
- q Self testing of internal electronics; prom, eeprom, ram, a-d etc. will occur.
Diagnostics indicate failures (see Section 6).
- q The system should then show a live weight display ready for use.

A display of --20%-- or --4%-- indicates the weight signal is outside currently permitted zero limits. In this case remove weight from platform until within limits and an auto-zero takes place, or press **SET ZERO** for display referenced from last stored zero position.

Zero conditions at power on depend on current configuration.

Parameter ENG_CFG PONZ [EP] determines if the system applies zero conditions at power on.

- 0= checks for weight within zero conditions and then performs auto-zero
- 1= no restriction, powers on with weight displayed

Zero limits are determined by

ENG_CFG CERT [EX] Trade Mode

- 0= Non Trade Mode – zero limits at power-on are +/-10% band around calibrated zero point
SET ZERO function then operates over +/- 10% band around the zero position set at power on
- 1/2= Trade Mode – zero limits at power-on are +/-10% band around calibrated zero point
SET ZERO function then operates over +/- 2% band around the zero position set at power on

Parameter CONFIG z2pc [Z2] can modify the power-on zero range

- 0= +/- 10% range at power-on as above
- 1= +/- 2% range restriction at power on

TIP – A scale inadvertently loaded at power on, might auto-zero within the +/-10% range and when the weight is removed, drop below zero by more than the +/- 2% now permitted by the **SET ZERO** function. Powering on/off with the scale unloaded will rectify this situation, or it is also possible to press & hold **SET ZERO** and then at the same time press **MODE**

2. CALIBRATION & ADJUSTMENT

If unfamiliar with general routines for accessing menus and editing parameters read section 3 first.

The calibration facility allows full re-calibration from the front panel, checking of calibration validity without disturbing existing parameters, or is a valuable diagnostic tool for initial set-up and subsequent fault-finding.

Before initial calibration, decide what the scale range (**Max/TOP**) and increment (**e/DISP**) are to be. Selection is dependent on many factors and should be determined by experienced personnel. This is particularly critical for Trade Approved installations where compliance with Type Approval requirements is essential.

e/DISP must be a sub-multiple of 1, 2 or 5, anywhere between 0.001 and 50.

2.1 Calibration Sequence

The calibration menu differs from other menus in that as each stage completes, it automatically steps to the next stage/item in the menu. A full calibration sequence would start at the first menu item (**DISP**) and progress through the sequence. However, if appropriate, stages can be skipped by simply using **↵** keys to step through the menu.

From weight display mode

<p>q Press MODE for 1 second to display PASS.</p> <p>Obtain required Access Level using Passcode or pushbutton and proceed to MAIN MENU USER ___</p> <p>Then ↵↵ to select CALIbn_.</p>	<p>If Access Level is already 1 or 2 pass will not be displayed. At pass pressing internal pushbutton gains Access Level 2 Passcode 1 ↵ ENTER gains access level 1 Passcode 900 ↵ ↵ ENTER gains access level 2 if permitted</p> <p>These are default passcodes and may be altered by installer Level 2 Passcode access is permitted when ENG_CFG CERT = 0/1</p>
<p>q Press MODE again to enter the calibration menu.</p>	<p>Unless the SECURITY ACCESS LEVEL is already 2, the message pass (or PSHbUt) will be displayed. This is a further request to key in the LEVEL 2 Password or press the calibration button on the main board If adjustment is not intended; press MODE to skip this step. Items within the calibration menu can then be examined but not changed.</p>

dISP ~ Display Increment and Decimal Point ('e')

<p>q Press MODE to show 'increment' (scale interval) together with decimal point position, if applicable.</p>	<p>Press ↵ or ↵ to step increment in sequence 1, 2, 5, 10, 20, 50, 1 ... etc. Press ↵ to step decimal point left (max 3 dp) In Non Trade Mode extended 0 is shown in the LSD representing the resolution available with the x10 'TEST' function</p>
<p>q Press ENTER to set selection and move on ...</p>	

tOP ~ Maximum Display Capacity ('max')

<p>q Press MODE to show current value for MAX CAPACITY.</p>	<p>Edit using the ↵ ↵ keys</p> <p>Note: The display will be maintained for 9 divisions (e) beyond this value. Having changed this value, full calibration MUST be carried out.</p>
<p>q Then press ENTER to set selection and move on...</p>	

FILt ~ Filter Band Parameter

<p>q Shows current Filter Band Setting 00 - 05 or 10</p>	<p>Press MODE to Edit using the ↵ ↵ keys If set to '00' then the band will be automatically selected during calibration. Alternatively may be set to '01' light filter through '05' heavy filter and will NOT be changed after Cal. A setting of '10' shows that the filter has been manually optimised using the filter coefficient set by the FILtC parameter in the ConFIg_ Menu</p>
<p>q Press ENTER to set edited selection or ↵ to step past and move on....</p>	

Fast ~ Fast Track Parameter

<p>q Fast Track feature modifies how the weighing filter is applied. See further information on Filtering later in this section. Press MODE to Edit using the ↵ keys</p>	<p>0 = OFF, Filter is always applied at a uniform rate 01= ON, Filter effect reduces when weight is 'in motion' Other settings 2+ reserved for future Note: Filling mode automatically handles the way in which the filter applies during fill, FAST setting will affect the behaviour before and after fill.</p>
<p>q Press ENTER to set edited selection or ↵ to step past and move on....</p>	

Frez ~ Display Freeze Parameter

<p>q Freeze feature latches on stable readings to prevent flicker. See further information on Filtering later in this section. Press MODE to Edit using the ↵ keys</p>	<p>0 = OFF, display tracks weight changes immediately 1 = ON, stable readings will latch for up to ~ 0.5s</p>
<p>q Press ENTER to set edited selection or ↵ to step past and move on....</p>	

dead ~ Deadload Offset Calibrate

<p>q Press MODE to show approx millivolt per volt output from loadcell(s).</p>	<p>Excitation is approx. 5 Volts Ensure weigh platform is empty and stable, and the mV/V reading is as might be expected.</p>
<p>q Press ENTER to initiate automatic DEADLOAD acquisition. This will take several seconds.</p>	<p>Zero Track and Set Zero are disabled until full calibration is completed Deadload may be re-acquired without the need to re-acquire the span - exit via TEST to store the new value, for Verified Systems treat as re-calibration, unit will have to be re-verified.</p>
<p>q Display will eventually show... or press ↵ to skip Deadload Calibration and reach ...</p>	

CALAt ~ Enter Span Calibration Weight

<p>q Press MODE to display currently defined Span Calibration Weight value. Press MODE to Edit using the ↵ keys</p>	<p>For non-trade applications see also below "virtual calibration" Calibration weight may be between 12.5% (6.25 % when non-trade) and 100% of the MAX (TOP)</p>
<p>q Press ENTER to set selection and move on ...</p>	

CAL ~ Span Calibrate

<p>q Press MODE to show approx millivolt per volt output from loadcell(s) less the deadload offset</p>	<p>This is active output; i.e. 0mV/V is displayed if no calibration weight is loaded. Ensure weigh platform is loaded with the previously selected CALAt calibration weight value, it is stable, and the mV/V reading is as might be expected</p>
<p>q Press ENTER to initiate automatic SPAN acquisition. This will take several seconds.</p>	<p>For Trade mode, the loadcell signal must be $\geq 1\mu\text{V}$ for each division (e).</p>
<p>q Display will eventually show.... Or press ↵ to skip span Calibration...</p>	<p>CAL may be skipped if it is only desired to re-acquire DEADLOAD on a previously calibrated system.</p>

TIP - It is important that the millivolt/volt readings are close to expected values.

A fault on the 'SENSE' signals from the loadcell may result in a millivolt reading 2~4 times higher than expected but give an otherwise, apparently 'normal' calibration. The result of setting up with a faulty 'SENSE' signal would be drifting and general instability of the weight reading.

$$\text{Millivolt/volt reading} = \frac{\text{'CAL' weight}}{\text{Loadcell Capacity}} \times \frac{\text{Loadcell Sensitivity(output)}}{\text{No. of loadcells in weigher}}$$

Load cell capacity(rating) and sensitivity(output) can be obtained from the loadcell manufacturers specifications/certificate.

E.G. Single 20kg, 2mV/V loadcell used in platform with 8kg 'CAL' weight.

$$\text{Millivolt reading} = \frac{8}{20} \times \frac{2}{1} = 0.8\text{mV/V.}$$

tEst ~ Display Wt x10 (Fine Trim)

<p>q Pressing MODE puts into x10 weight display mode with a flashing t in the display MSD, then~</p>	<p>i Enters a 'SPAN TRIM' mode (only if level 2), indicated by flashing t in MSD (with decimal point.).</p> <p>n Nudges span calibration factor up by one tenth of a division.</p> <p>o Nudges span calibration factor down.</p> <p>Each 'nudge' moves the indicated weight, wherever nudging is done. Thus if scale is calibrated and nudged at 33% of capacity then each nudge will represent a change of three tenths of a division at full scale.</p> <p>The limit of 12.5% of capacity applies so nudging is inhibited below this weight.</p>
<p>q ENTER or MODE ends the span trim procedure.</p>	<p>Unless at ACCESS LEVEL 2, it is not possible to 'fix' any values obtained above.</p> <p>If in Trade mode, i or ENTER (except in tEst) will abort calibration at any stage, restoring previous values (with the exception of linearity parameters – see above). The display will show Abor t? and pressing either again will cleanly abort leaving the old values intact. Pressing any other key will return operation to the calibration function just exited.</p> <p>In non trade mode – pressing the ENTER key will bring up the SURE? message and a second press of ENTER will store the new values. Pressing i instead of ENTER will bring up the Abor t? Message. A further press of the ENTER key or the i key will restore the old values.</p> <p>See Section 7.3 for details of recording established calibration values for future use if service is required and calibration transfer has to be implemented.</p> <p>After calibration the Display interval can be altered without the need for full re-calibration. dISP located in the CALIBn_ menu can set a "pseudo" Display interval value - with the constraints that the decimal point cannot be moved.</p>

Once back at the **calibn_** menu heading, other menus may then be accessed, or the weight indication resumed by pressing **ENTER** (closing access level) or **i** keeping the access level active for subsequent return to menus.

2.2 Linearity adjustment

In the **ENGCFG_** menu a 5 slope 6 point linearity adjust can be made at 20% **LiN2**, 40% **LiN4**, 60% **LiN6** and 80% **LiN8** of capacity.

To adjust take reading at 20/40/60/80 of capacity and note error in weight (e/10). If error was +8.2kg then at **LRN2** enter -8.2kg to adjust.

Note: adjustment only affected between previous and next breakpoint e.g. in stated example between 0 and 40%

2.3 Virtual Calibration

Pressing **o** when showing **tEst** in non trade mode enables Calibration via entry of the cell **mV/V** rating as an alternative to conventional calibration. Displays **SPAn** and the value can be entered in units of 0.001mV/V.

If an accurate estimation of the active loadcell output in mV/V is available, this can be entered as a **SPAn** parameter.

A deadload step (without a subsequent **CAL** step) must have been performed previously; an **Error** display or serial '**?F**' error will be generated otherwise.

The calculation is relatively straightforward.

$$\text{SPAn value} = \frac{\text{Loadcell sensitivity} \times \text{System Maximum Capacity}}{\text{No. of Loadcells} \times \text{Individual Loadcell Capacity}}$$

Loadcell Sensitivity is in Millivolts per volt (mV/V).

The System Maximum Capacity is the gross weight it is designed to weigh, deadload is ignored.

If a single 2mV/V 100kg cell is used in the bottomworks of a 60kg system, the active output of the cell (for maximum capacity) will be:

$$\frac{2 \times 60}{100} = 1.2 \text{ mV/V. Enter } \mathbf{1.200} \text{ to set the span.}$$

Rather than using the loadcell manufacturers catalogue quoted nominal sensitivity, it is best to use the exact figures provided by the individual test certificate. In multiple cell applications, average the sensitivities of the cells.

The limitations of this technique are: -

q	The indicator's ADC internal gain varies slightly from device to device. An average millivolt conversion factor (determined from factory production test figures) is pre-programmed into the indicator. A worst case error might be around a quarter of a percent of full scale
q	The loadcell manufacturer's sensitivity figure may be wrong or may be affected by other cell summing/cornering devices.
q	Because no proper test weighing takes place, obvious bottomworks problems such as binding are not exposed ~ the full load may not be reaching the loadcell.

An Error display means the sensitivity is too low.

Performing a normal CAL test weighing forces the SPAN parameter to 0. It is not possible to read back a meaningful value if a conventional span calibration is performed.

2.4 Weight Filtering

(See also Live ANIMAL WEIGHING (4.9))

CPI provides five powerful features for optimising weighing performance and display appearance to suit individual applications.

Filter – see FILT & FLTC – adjusts the level of damping applied to the weight signal

Fast Track – see Fast – enables fast track of large weight changes

Display Freeze – see FREZ – holds a stable reading from unnecessary flicker

Motion Band – see MBND – affects the system conditions required for STABLE weight

Motion Delay – see MDLY – delays action pending multiple stable integrations

Display Update – see UPDT – alters how often the display is refreshed

FILT & FLTC parameters found in the CONFIG Menu adjust the level of damping applied to the load cell signal. Inevitably more damping makes for slower reaction time to change in weight.

From the CONFIG menu these parameters can be altered at Level 1 Access. The Filter Band (FILT) is also in the calibration menu where level 2 Access is required to affect any change.

FILT can be set from 01 for light damping to 05 for extremely heavy damping. A setting of 02 is likely to suit most applications.

Normally only FILT (The Filter Band) will need to be altered, this automatically sets a value for FLTC (The Filter Coefficient) as shown in the table below:

Filter Band FILT	01	02	03	04	05
Filter Coefficient FLTC	80	40	20	10	08

A Filter Band setting of 10 indicates a non-standard setting of the Filter Coefficient. A setting of 00 might be used during calibration, to allow the filter to self-adjust.

Fast parameter, found in the CONFIG (level 1 Access) and CALIBN (Level 2 Access) menus can be used to speed up large changes in weight.

The Fast Track setting reduces damping while the signal is in motion, allowing faster weight change, then applies the current filter setting once weight has stabilised.

Fast Track must be set to suit the particular application or the way in which the scale is to be used.

0 = OFF, Filter is always applied at a uniform rate
01 = ON, Filter effect reduces when weight is 'in motion'
Other settings 2+ are reserved for future development

FREZ parameter is used to turn on the Display Freeze feature. When the Display Freeze is active, a stable reading will be frozen to prevent unnecessary flicker. The Freeze is released after motion persists for ~ 0.5 sec.

Any application that requires instant response to weight change will need the freeze turned off by setting FREZ to 0.

Typical Fast/Freeze combinations

FAST	FreeZ	TYPICAL APPLICATIONS
1= Fast Track ON	1= Display Freeze ON 0 = Display Freeze OFF	Catch Weight, Parcel Weighing Load then adjust into tolerance, May also suit heavily damped scales such as weighbridges
0 = Fast Track OFF	1-8 = Display Freeze ON 0 = Display Freeze OFF	Manual Dosing & Filling.

Note: CPI Filling mode (SETD 01) automatically handles the way in which the filter is applied during fill. However FAST & FreeZ settings will affect the behaviour before and after fill. For example if weight might need manual top up after fill set FAST =0 (Off)

mbnd parameter, found in the CONFIG menu (level 2 Access) can be used to relax the conditions defining stability.
By default mbnd = 0 and can only be changed at Level 2 Access. This is designed to ensure that the weight signal is truly stable before operations such as Print or Tare are performed.
Less stringent conditions may suit some applications. Increasing Mbnd (range 1-7) relaxes the conditions for stability such that dependent functions will act quicker though the weight might still be changing. Thus a Print could occur before the final weight is reached. A Legal for Trade application would use mbnd = 0.

mdly parameter, found in the CONFIG menu (level 2 Access) can be used to further condition actions that depend on stability.

mdly	
0	Tare/Print operations perform regardless of motion
1	Default - Tare/Print operations will perform on seeing a single stable weight integration as determined by motion band and filter settings
2-9	Motion will continue to be flagged until 1-9 successive ADC stable cycles have been recorded (each cycle is 20ms) TIP – helps prevent premature tare/print especially when using heavy filters or when motion band is not zero

UPDT parameter, found in the CONFIG menu (level 1 Access) sets the rate at which the display (and serial interface transmission) is refreshed. It does not otherwise affect the speed of operation (ie setpoints, printing etc.)

UPDT	00	01	02	03	04	05	06	07	08	09	10
Update rate (S)	0.02	0.1	0.04	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0

The display rate should be chosen for the application. Most platform and bench scales would use the default 03 whereas a weighbridge may suit a slower rate such as 06. Manual dosing applications benefit from faster rate (01). Very fast rates (00 & 02) demand a lot of processing time and should be avoided except for diagnostic purposes.

q Once an access level is obtained it remains effective so long as the system remains in menu mode.

q Return to weighing mode using the **i** key, keeps the access level effective.

This allows the effect of changes to be investigated before returning into the menus without having to re-apply passcode/pushbutton. After 4 minutes in weighing mode, without operation of any function or at power of f, access will reset to level 0 automatically.

q Return to weighing mode using the **ENTER** key immediately resets access to level 0

3.3 Selecting Menus and Accessing Parameters

q On initial entry to the menus the first menu title USER ____ is displayed

q Step up or down through the available menu titles using the **on** keys.

q At access level 0, only a subset of the available menus are displayed.

q At access level 1 and above the full menu set becomes available.

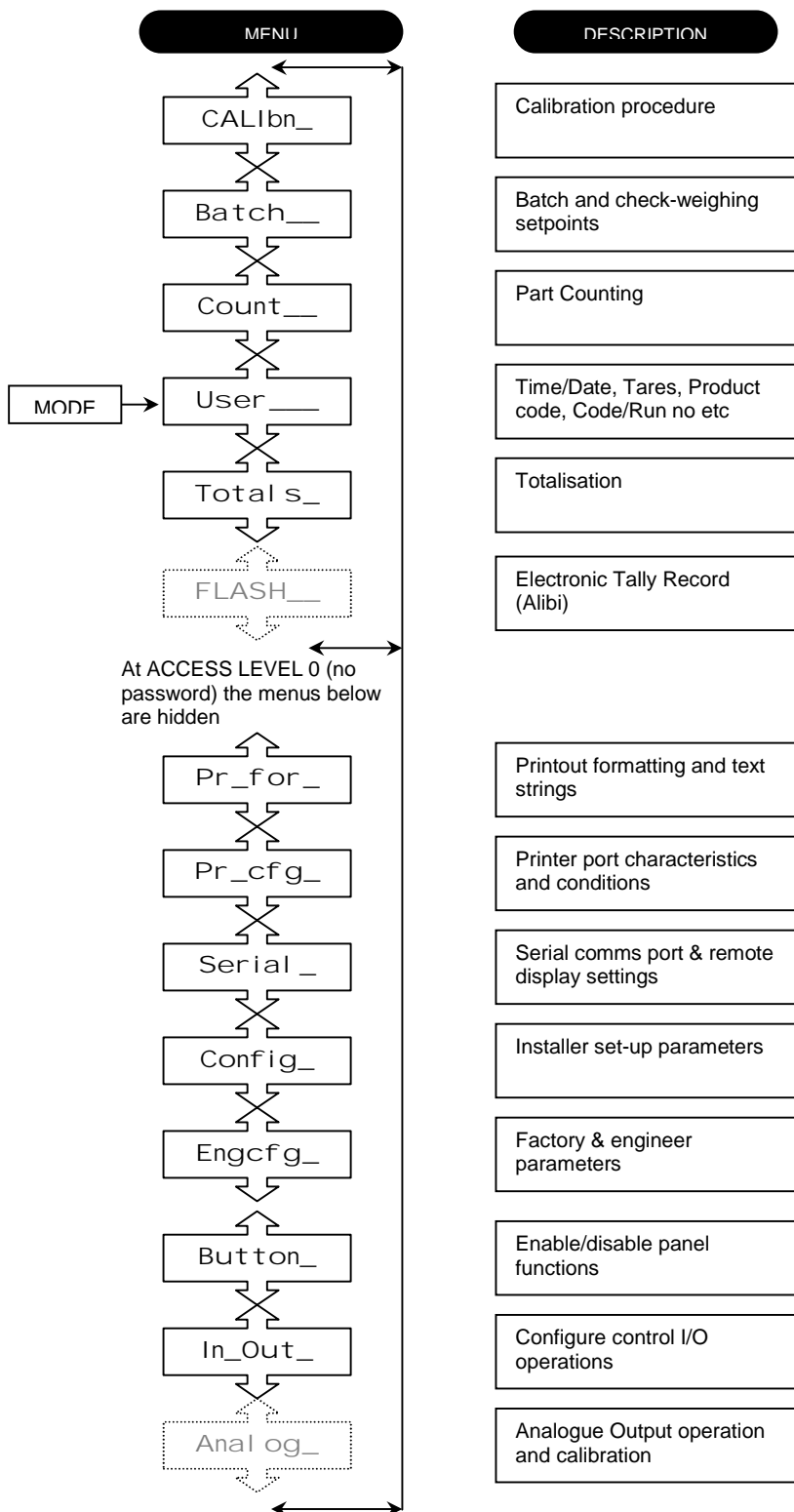
q Two special menus ANALOG_ and FLASH_ only appear when these options have been enabled.

q The figure opposite gives a brief explanation of the features found in each menu. Full details of the parameters within each menu will be found in the diagrams at the back of this manual.

q With the desired menu group selected, press **MODE** to access the parameters in the menu. (Depending on current access level, pass/pshbut may also be prompted at entry to the CALi bn_ and engcfg_ menus.)

q The parameters within a menu are stepped through with **on** keys.

q The parameter name may be displayed, along with a one or two digit value. If its value is more than two digits long, **MODE** must be pressed to display & edit it.



3.4 Editing Parameters

After selecting the parameter required, press **MODE** to edit.

- q If the value is already shown then one digit will flash to show that it may be edited using the **↔** keys.
- q If only the parameter name is displayed, then pressing **MODE** will reveal the value with one digit flashing ready to edit.
- q If the **↔** or **↔** key is held depressed, an auto-increment mode begins after a short wait.
- q **↔** steps to the digit which flashes for editing (steps back to start when end reached).
- q If **↔** key is held depressed for 2 seconds, the displayed value is cleared to zeroes.
- q **ENTER** sets the new value. A **noPASS** or other diagnostic message may be displayed if entry is not permitted or unsuitable.
- q **MODE** toggles out of edit mode, but does not store the value. (Changes will be lost if stepped to another parameter)
- q Some parameters requiring a simple ON/OFF setting or command to action, use a single digit ON/GO (1) or OFF/STOP (0). When in EDIT mode, **↔** or **↔** will 'flip' a 0 to a 1 or back.

Summary of Menu Navigation

AT MAIN MENU TITLES	<p>↔ step through the choice of MENUS ENTER or ↔ return to WEIGHING MODE</p> <p>Having selected the required menu, pressing MODE steps to the first parameter in that menu or in some cases may first prompt for passcode or pushbutton operation.</p>
AT PARAMETER DISPLAY	<p>↔ step through the PARAMETERS ENTER returns to MAIN MENU title, ↔ returns to WEIGHING MODE</p> <p>Having selected the Parameter of interest, pressing MODE allows the display of any parameter value longer than 2 characters, and editing, if permitted. Edit mode is indicated by a flashing character.</p>
EDITING PARAMETERS	<p>MODE permits display/edit of parameter ↔ ↔ modify the value ENTER 'fixes' <u>new</u> displayed value (if allowed) MODE toggles between display/edit but does not 'fix' the value. Always finish EDIT with ENTER to store value</p>

3.5 Permanent Parameter Storage

Most updated parameters are written to a non-volatile parameter store (EEPROM) on pressing **ENTER** after editing (message: **StorEd** will briefly appear). The calibration parameters are written 'en bloc' on successful completion of the **CALIBRATION** procedure. Once written, they are unaffected by loss of power.

On some versions serial comms baud rate changes (**SERIAL BAUD [EV]**) are not permanently stored until forced to store by change of additional items. If no 'stored' message seen, then force store by changing another parameter.


Change to **SERIAL NET [EM]** multidrop parameter is not permanently stored until forced to store by change of additional items. After changing **NET**, force store by changing another parameter confirmed by 'stored' message.

3.6 Special Editing Procedures

Negative Number Entry

Occasionally a parameter requires a negative value entry (eg Inflight and some engineering parameters). To set the negative sign, step to the most significant digit (left most character). This digit only, steps through the numbers and then the '-' sign, allowing this to be set. N.B. Setpoints cannot be entered in negative format.




Hexa-decimal data

'Hexa-decimal' characters are simply an extension of the normal 0-9 numbering system giving 16 options, rather than 10 and go from **0-through-9, then A, B, C, D, E & F**. Entry is as for normal numbers; the software automatically recognises when the selected parameter is in hex format and allows the  keys to step through all 16 'digits'.










Hexa-decimal data is used mainly for Print Formatting and the ADC Configuration parameters found in the EngCFg_ Menu.

Alpha-numeric data entry

Where a parameter requires an alpha-numeric entry the procedure is slightly modified ~




- q To make entry easier, text strings are entered from the left instead of from the right as with numeric and hexa-decimal values.
- q If the  key is held pressed for 2 secs, alpha strings clear to spaces.
- q The increment/decrement  sequence is 0-9, A-Z using UP, or a-z going DOWN, 'Esc' (1Bh), 'EOS' code (1Fh), 'space' code (20h).
- q Alpha characters are represented by a 'stylised' 7 segment character set (see note below).
- q Lower case characters are indicated by the presence of a steady '.' (decimal point). To enter a lower case 'a' use the up arrow 11 times (to step to 'B') then step back using the down arrow key to 'A'. Approaching any letter from above makes it lower case, going up to a letter makes it upper case. Watch the d.p. turning ON and OFF.
- q Non-printing control characters (special entry routine; see below) are displayed as ' - '.
- q The 'EOS' code (ascii 1Fh ~ looks like '  ') is an optional 'end-of-string' terminator (any following characters, including any in 'Stxb' if 'EOS' appears in 'StxA', will not be printed).

NOTE: The 7-segment display uses a stylised alphabet. Most letters are obvious but the following are cryptic:

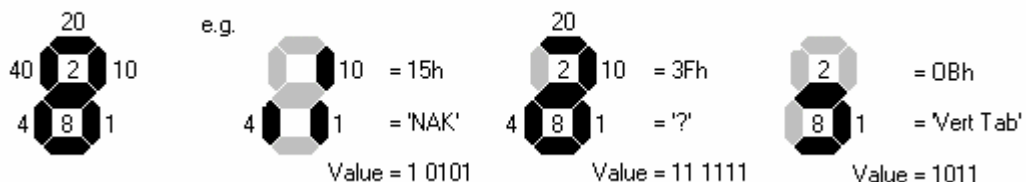
 = J  = k  = M  = t  = U and V  = W  = X  = 'Esc'  = 'EOS'

Printer control character entry

It is possible to include printer control characters in the ascii text strings. They are selected, either via the serial link or, by using this special entry mode from the front panel buttons ~

- q Select the appropriate text string ('StxA/b' etc.) in the Pr_For_ menu.
- q Select PARAMETER EDIT MODE. Any previously selected control characters will appear as ' - '.
- q Use the  key to select the character to be edited.
- q Press both  and  keys at the same time.
- q The MOTION indicator will flash to indicate special entry mode and the character will appear in a 'cryptic' binary display format.
- q The special entry mode will remain on until the next character is selected.
- q The value of the control character is worked out as follows ~

Each segment has the 'hexa-decimal value' shown below, left. By adding the lit segment values, the control character value in hex is given. A table of ASCII codes will give values for each control character. An understanding of binary and hexadecimal notation is assumed in order to use this facility. The factory can give specific help, if required. (Avoid entering value 0Dh; this is 'carriage return').



3.7 Setting The Real Time Clock - Time & Date

CPI contains a Real Time Clock - time and date can be adjusted by using parameters in the USER__ Menu

tInn Format is HHMMSS – Use arrow keys to select the digits to change and to alter the display.
Clock will start running on pressing **ENTER**.

DAte Format is ddmmyy – Adjust as needed, press **ENTER**.

3.8 Special PLU Parameter – Product Code

Some parameters in a menu may have different values depending on the Product Code (PLU) currently selected.

Totalisation Registers, Printout Text Strings, Setpoints, and Parts Counting weights are maintained for each of 12 different PRODUCT CODES. Whenever one of these parameters is altered or updated, it only affects the value for the currently selected product.

The parameter Product Code resides in the following menu groups. Changing Code parameter in any menu, also changes Code in the other menus and changes all associated parameters to values corresponding to the new Product.

USER__	Provides a convenient place for operator to select Code from 01-12
totalS_	Code is provided in this menu to permit print (Ptot), print & clear (CLrt), or display (grOS / nEt / no) for each code. If Code 99 is selected, printing, or printing & clear, will perform for all 12 products.
Pr_For_	Here Code assists programming of 'text strings' associated with each product. The text strings are stored in four 7-character parameters St 1A / St 1b / St 2A / St 2b Select Code required, then program the 4 parameters. Repeat for all required Code numbers. See Print Formatting information for details of how to include strings within the print out. When a printout is requested, text printed is determined by the Code selected at that time. Code 99 permits programming of a set of text strings that print regardless of current Code)
bAtCH__	Code permits store and recall of sets of setpoints and where applicable inflight and print tolerance values.
CoUnt__	The part weight value (PAR t) can be programmed differently for each of the 12 Code's.

3.9 MODE FUNCTIONS - Selecting a Function for the MODE button

(From software versions PO6.027/PO6.127 only)

Whilst the set up menus can be used for operator functions and adjustments, it is possible to allocate one of various functions to the **MODE** button.

MODE can be configured using the Conf ig_ menu, FUNC parameter, to perform one of these functions:

- 0 - No function (default)
- 1 - Preset Tare
- 2 - Memory Tare
- 3 - Product Code (PLU)
- 4 - Target Weight
- 5 - High/Low, Target/Tolerance, Target/Dribble, Setpoint3/Setpoint2
- 6 - Cancel Tare
- 7 - Print & Clear Total
- 8 - Toggle net/gross display
- 9 - Toggle net/tare/gross display

A short press on the button activates the function.

In all cases a long press provides access to the SET UP MENUS as normal.

If the MODE button is 'disabled' (using the BUTTON menu) - menu access is inhibited, but any programmed function still operates.

OPERATING PROCEDURES FOR THE DIFFERENT MODE FUNCTIONS

FUNC FU = 0 - NO FUNCTION

MODE is used only to access menus (if not disabled)

FUNC FU = 1 - PRESET TARE

Simple Preset Tare entry - Press **MODE** Display prompts **TARF**

EITHER Press **SET ZERO** to **CANCEL PRESET TARE**

OR Press **ANY OTHER** button to display the **PRESET TARE** value

Edit the displayed value using the arrow buttons

Press **ENTER** or **MODE** to set the tare and return to weight display

Tip - Remember a Semi Auto Tare cannot be applied after a Preset Tare has been set

FUNC FU = 2 - MEMORY TARE CODE

Quick select of memory tare code - Press **MODE** Display prompts **TARE 00**

Edit the displayed code 00-12 using the arrow buttons

Press **ENTER** or **MODE** to set the tare and return to weight display

The tare value is displayed while **ENTER** or **MODE** are held pressed

To clear tare, select Tare Code 00

Tip - Holding side arrow while editing clears to 00 -Edit memory tares from the user menu

FUNC FU = 3 - PRODUCT CODE (PLU)

Quick select of product codes - Press **MODE** Display prompts **code 00**

Edit the displayed code 00-12 using the arrow buttons

Press **ENTER** or **MODE** to set the code and return to weight display

Tip - Product codes recall and set stored descriptions and setpoints

FUNC FU = 4 - TARGET WEIGHT

Quick entry of Target Weight - Press **MODE** Display prompts **tARg**

Press **ANY BUTTON** and display shows current target (Setpoint 3) weight value

Edit the displayed value using the arrow buttons

Press **ENTER** or **MODE** to set the value and return to weight display

Tip - Can be used to set 'setpoint 3' in any setpoint mode but always prompts 'tArg'

FUNC FU = 5- HIGH/LOW or TARGET/TOL

Quick entry of two setpoints - Prompts depend on the setpoint mode (SETD) configured in the In_ouT menu.

In each case Press **MODE** then press **ANY BUTTON** and edit using the arrow buttons

Press **ENTER** or **MODE** to set the value then repeat for the second item prompted

SETD 00/02 prompts HIGH Then LOU
SETD 01 prompts TARG Then DRIB
SETD 04/05/06 prompts TARG Then TOL
SETD 07 prompts SPT3 Then SPT2

FUNC FU = 6 - CANCEL TARE

Cancel Semi-Auto Tare function - If a Semi-Auto Tare is active (display in NET mode) – Press **MODE** to clear the tare.

If a preset/memory tare is active, then display shows Gross for approx 5s then returns to Net without altering tare.

Tip - the standard method to cancel semi auto tare (press and hold the SEMI AUTO TARE button) also remains available.

FUNC FU = 7- PRINT & CLEAR TOTAL

Total Print and Clear function - Press **MODE** Display prompts **SURE?**

If **ENTER** is pressed - the system performs total print for the current Product Code and resets the total.

If **ANY OTHER** button pressed, or no button within 5s, returns to weight display without printing or clearing the total.

FUNC FU = 8 - DISPLAY TOGGLE NET/GROSS

MODE toggles display between NET and GROSS display

- Status LEDs identify if display is net or gross
- Tare is retained while gross displayed, system continues to monitor net for printing and outputs
- Any functions performed while displaying gross will return system to net display

FUNC FU = 9 - DISPLAY TOGGLE NET/TARE/GROSS

MODE toggles display between NET - TARE - GROSS displays

- Status LEDs identify if display is net or gross (tare = all LEDs off)
- Tare is the internally stored semi auto tare value (rounded)
- Tare is retained while gross displayed, system continues to monitor net for printing and outputs
- Any functions performed will return system to net display

Tip - this setting must be used for peak weight mode, in this case it toggles NET/TARE/GROSS/MAX/MIN (Just GROSS/MAX/MIN if no tare active)

OTHER SPECIAL USES OF MODE BUTTON

PARTS COUNTING - If the system is placed in 'COUNT' mode then the **MODE** button operates always for count functions as described, regardless of which FUNC FU is set.

PEAK - For PEAK weight detection (CONFIG PEAK [MA] = 1) then FUNC [FU] must be set to 9)

WARNING – Operation of MODE functions (as with menus) will temporarily inhibit other weighing and communication functions. Any analogue output will assume its error state.

4. ADVANCED FEATURES

4.1 Using Tares (Net Weighing)

There are two types of tare function.

'Semi-Automatic Tare' - tares the current weight to zero by simply pressing the **SEMI AUTO TARE** front panel button.

'Preset/Memory Tares - apply an entered value as the tare weight.

Provided no Preset Tare is active, and the weight is stable, the **SEMI-AUTO TARE** button will tare the display to show NET ZERO. Additive weighing can be performed by repeated load and tare operations.

To cancel tare, **PRESS & HOLD** the **SEMI-AUTO TARE** key, for 1 second. The display returns to GROSS mode.

See previous section for configuration of additional facilities. For example the **MODE** button can be used as a CANCEL TARE function or perhaps to toggle the display between GROSS/NET modes without cancelling (losing) the tare.

Note - Preset tares may be selected 'on top' of an existing semi-auto tare, but a semi-auto tare cannot be selected (or cancelled) once a Preset tare is in operation. Pressing **SEMI-AUTO TARE** while a preset tare is active will temporarily show GROSS weight then revert to NET display.

PRESET TARES

A PRESET TARE can be set either by simple entry of the value required or by recalling one of 12 previously stored memory tares.

PROGRAMMING MEMORY TARES - USER____ tArE

There are 12 Preset Tare weight registers - tArE 01-12 (tArE 00 = no preset tare set). Once these registers have values stored in them, a tare can be applied by selecting the tare code required.

- q In the USER____ MENU, select tArE ~ the currently selected 'register address' is shown.
- q Press **MODE** and use arrow keys to select a tare code between **01** and **12** then press **ENTER**
- q The stored tare for this code is now displayed (**NET** and **GROSS** LEDs flash).
- q At this stage, you may browse other tare codes using **↔** keys
- q To modify the value of any tare, press **MODE** and edit using the arrow keys then press **ENTER**
- q Exit with **ENTER** or **○**

The last selected code is set on return to weight display mode. If no Preset Tare is required, set tArE 00

OPERATION

Whilst the USER menu can be used to select and adjust preset tares, it is much simpler to configure the **MODE** button to provide the preferred operation.

The **MODE** button can be arranged as a function to permit selection of tare codes or to allow simple entry of a Preset tare weight as required.

Simple Preset Tare entry **FUNC FU = 1**

Memory tare code entry **FUNC FU = 2**

See **MODE FUNCTIONS**, section 3.9 for operating instructions

OTHER TARE OPERATIONS

Automatic Tare Cancellation The Auto Zero Setting option, Config Zset = 1, will automatically cancel any tare if the display returns to a negative value within zero-setting range and remains stable for 5 seconds –after tares are cancelled, an automatic SET ZERO function is attempted.

Remote Tare Functions Semi Auto and Cancel Tare can be applied using remote inputs, see later in this section.

Autotare On Start An autotare can be applied at the start of a filling sequence – See section 4.5

4.2 Setpoint Operations - overview

Several modes of operation can exploit the use of setpoints and the control outputs for checkweighing, level control and filling operations.

The mode is set by the parameter `SEt d` in the `In_Out_ MENU`.

`Set d = 07` (Default) provides 3 simple trip outputs.

`Set d = 03` permits control of outputs only via serial commands (O11/O10, O21/O20, O31/O30)

`Set d = 00/02/04/05/06` provide various arrangements for Pass/Fail or Low/Pass/High checkweighing

`Set d = 01` provides a sophisticated filling program

Setpoint values are defined by parameters in the `bAtCH_ MENU`.

The setpoint prompts alter according to the setpoint mode (`SEt d`) in operation.

Setpoint Mode	'Setpoint 1'	'Setpoint 2'	'Setpoint 3'
Setd 03, 07	Spt1	Spt2	Spt3
Setd 00, 02	Spt1	Louu	High
Setd 04, 05, 06	Spt1	tol	targ
Setd 01	Spt1	Drib	targ

Sets of values can be stored and recalled for each of the 12 PRODUCT CODES.

q Select `CoDE` parameter and set PRODUCT CODE (01 - 12)

q Select and set each setpoint parameter in turn

The **MODE** button can be arranged as a function to permit easy selection of Product Code or direct entry of some of the setpoints – see section 3.9

Versions up to PO6.029/129 prompted many of the setpoints for entry to include the extended (x10 resolution) digit, regardless of whether the display was being operated in x10 mode. From PO6.030/130, setpoints are prompted in the current display mode - ie. usually without the extended digit. It is possible to configure operation as before by changing the `SETD` parameter from 0x to 1x.

4.3 Simple Trip Mode - Setpoint Mode 07 (Default)

`IN_OUT SEt d 07 -- Simple 3 trip mode --- (Default)`

In this mode, each output independently relates to its individual setpoint

If Weight > Spt3 then OP3 is ON **If Weight ≤ Spt3 then OP3 is OFF**
If Weight > Spt2 then OP2 is ON **If Weight ≤ Spt2 then OP2 is OFF**
If Weight > Spt1 then OP1 is ON **If Weight ≤ Spt1 then OP1 is OFF**

4.4 Checkweighing Modes - Setpoint Mode 00, 02, 04, 05, 06

Status characters L/P/H or F/P/F can be shown in the left display digit, if enabled by parameter `IN_OUT STAT = 1`

The following tables illustrate the output states for the various checkweighing modes.

The states shown are the default operation. Changing parameter `IN_OUT O3EN` (default =1) to 0 modifies the output states to mimic the operation of LUCID/LUCI PM weight indicators using only two outputs. Normal operation might be further altered by use of the `OPAL` parameter, see later.

`SEt d 00 --Pass/Fail checkweighing` - High and Louu limits are individually set as required

Weight	OP1	OP2	OP3	Status Byte	Display Status	Meaning
=/> High	ON	OFF	Not Used	F	F	Out of Tolerance/Fail
> Louu	OFF	ON	Not Used	P	P	In Tolerance/Pass
> Spt 1	ON	OFF	Not Used	F	F	Out of Tolerance/Fail
Zero	OFF	OFF	Not Used	Z		Near Zero

SEtd 02 --Low/Pass/High checkweighing - High and Low limits are individually set as required

Weight	OP1	OP2	OP3	Status Byte	Display Status	Meaning
=/> High	OFF	OFF	ON	H	H	Out of Tolerance/High
> Low	OFF	ON	OFF	P	P	In Tolerance/Pass
> Spt 1	ON	OFF	OFF	L	L	Out of Tolerance/Low
Zero	OFF	OFF	OFF	Z		Near Zero

SEtd 04 -- Comparator mode with tolerance Lo/Pass/Hi---

targ (Setpoint 3) defines centre of pass band

tol (Setpoint 2) is the +/- tolerance weight for the pass band (entered as a weight value)

Weight	OP1	OP2	OP3	Status Byte	Display Status	Meaning
=/> Targ + Tol	OFF	OFF	ON	H	H	Out of Tolerance/High
> Targ - Tol	OFF	ON	OFF	P	P	In Tolerance/Pass
> Spt 1	ON	OFF	OFF	L	L	Out of Tolerance/Low
Zero	OFF	OFF	OFF	Z		Near Zero

SEtd 05 -- Comparator mode % tolerance Lo/Pass/Hi---

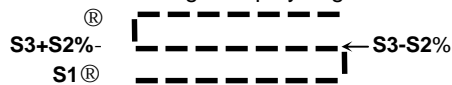
targ (Setpoint 3) defines centre of pass band

tol (Setpoint 2) is a +/- % tolerance for the pass band (entered as a % value)

Weight	OP1	OP2	OP3	Status Byte	Display Status	Meaning
=/> Targ + Tol % of targ	OFF	OFF	ON	H	H	Out of Tolerance/High
> Targ - Tol % of targ	OFF	ON	OFF	P	P	In Tolerance/Pass
> Spt 1	ON	OFF	OFF	L	L	Out of Tolerance/Low
Zero	OFF	OFF	OFF	Z		Near Zero

SEtd 06 - Snake Mode (Analogue Display Mode)

Operation is as MODE 5 but with weight display segments used as an 'analogue' Filling guide.



Between zero weight and Setpoint 1 (Status 'Z'), the display is blank.

Between Setpoint 1 and the lower 'PASS' limit (**S3-S2%**) (Status 'L'), the bottom row of 7 horizontal segments and the lower right hand vertical segment progressively illuminate from the left as weight increases (so if the left 4 segments are lit, the weight is half way between **S1** and **S3-S2%**).

Within the 'PASS' range (Status 'P'), **S3-S2%** to **S3+S2%**, the 7 centre horizontal segments gradually illuminate from right to left with increasing weight (so 4 centre segments lit represents exact target).

The whole display flashes whilst the weight is in the 'PASS' region. Above the upper 'PASS' limit (Status 'H'), the upper left most vertical segment and the top 7 horizontal segments progressively illuminate towards the right as the weight increases to scale 'max'.

Pressing **TEST** forces display to digital weight reading mode, temporarily (if in trade mode).

4.5 Batchweighing - Setpoint Mode 01

In_oUt SETd 01 ~ Batching Control

SEtd 01 is selected in the In_oUt_ MENU. Setpoints are defined in the bAtCH_ MENU as is the InFt and the PtOL Print Tolerance parameter which determines the acceptable limits for printing about the target. These five parameters are set individually for each of the 12 PRODUCT CODES.

START & STOP FUNCTIONS

Batch control will in most case require use of the remote inputs configured as **Start (+autotare)** and **Stop** commands.

These remote Start and Stop functions are configured by setting IN_OUt IPAL =01
This allocates I/P1 as START and I/P2 as STOP(Abort)
See section 4.6 for alternative IPAL settings

IMPORTANT

The 'STOP' Input is configured to be 'FAILSAFE'; it **MUST** be present before the 'START' signal will be recognised. ie I/P2 must be arranged to be normally ON for batch to run.

The 'STOP' Input should not be relied on as a 'SAFETY STOP' such isolation should be provided elsewhere

Basic Configuration Parameters - IN_Out menu

Setd =01 batching mode
IPAL =01 I/P1 = Start, I/P2 = Stop
Atst =1 for Autotare on start if required
AinF =01 for Automatic In-Flight-Compensation if required.

These are the basic settings required for simple 2 speed fill control. After setting Target/Dribble/Inflight and Setpoint 1 in the batch menu, the system is ready to run. Additional facilities can then be applied as required.

By default
Output 1 = Bulk (fast) feed
Output 2 = Dribble (slow) feed
Output 3 can be configured using the OPAL parameter (Sec 4.7) and might typically be used as a complete output

Batching Parameters - Batch menu

Code selects Material PRODUCT CODE (01 - 12).
The following are stored separately for each code.
tArg (Setpoint 3) desired Final TARGET Weight.
drIb (Setpoint 2) the DRIBBLE (fine) FEED Quantity (amount before target)
SPt1 (Setpoint 1) LOWER ENABLE LIMIT - dispalyed weight must be within this band about zero to permit start of batch. Can be used for auto start of next fill when the weight drops below this figure & start i/p active.
InFt (In-flight Compensation) the 'IN-FLIGHT' WEIGHT VALUE.
PtOL (Print Tolerance) limits for printing (Requires use of Pr_CFG TOLP Auto etc - see later)
Jogt (Jog Time) On Period for Jog mS (Requires use of Pr_CFG TOLP Auto etc - see later)
ofil Overfill offset for cut off and inflight calculations – (range 0-255e)

SamP (Sample final achieved weight every nn) For all other batches, skips checks/print etc at batch end.

Batch with Printing

The details below outline the key parameters governing use of printing for batching operations.

bAtCH_ Menu

PtoL Determines pass/fail criteria for batching. Sets the limits for Autoprinting in conjunction with **tOLP** and **poSt**. Can be set for up to 14 batch product codes.

Samp Enables some weighments to be immediately discharged on cut-off without tolerance checks, printing or auto inflight compensation. The **samp** number, 1 to 99, is the interval after which a check is initiated. Values of 00 & 01 mean checks are made for all weighments.

Pr_CFG_ Menu

ToLP Print In Tolerance parameter may either be ON (1) or OFF (0). If OFF tolerance checking will not be done, even if **PtoL** is active, if ON then operation depends on the Setpoint Mode selected. If **Setd 01** or **07** then tolerance check will be +/- the **PtoL** value of the **tArg** (Setpoint 3) i.e the 'Ready to Print' flag will be set when in these bounds (Printing will occur when other conditions all correct).

If **Setd 00, 02, 04, 05** or **06** then the 'Ready to Print' flag will be set when the weight is within the "PASS" Band as set by the three setpoints and this will over-ride any **PtoL** value that may be set.

PosT Print in Positive Tolerance parameter may also either be ON (1) or OFF(0) and enables positive only tolerance checking. If OFF then tolerance checking will be exactly as defined in **tOLP**. If ON then the tolerance check will be + **PtoL** of **targ**. This restricts the scope of **PtoL** such that the 'Ready to Print' flag will only be set when within the positive tolerance. Note that **tol p** must be ON for this to be effective.

Auto 0 Autoprint disabled, print must be manually requested.

Auto 1 Autoprint enabled, a printout will occur as soon as conditions for printing are met (see below and 5.5). With default settings, this would mean a print occurring at the first stable weight above 'Min' but prohibited until Batch programme is run.

In_oUt_ Menu

oPAL Used to modify O/P functionality see Section 4.7.

Discharge and Print Parameters

In_oUt_
DSCH

The Bulk Output can be allocated as a Discharge Output. The Discharge mode parameter can be used to force the discharge at the end of the 'batching' program regardless of achieved weight. May either be ON (1) or OFF (0). If OFF, the default setting, then at the end of the 'batching' program the MSD will display an **E** indicating the end. No discharge will occur. If ON then at the end of the program, Output 1 (Bulk O/P) will turn ON again indicating a discharge is required. This Output will remain On until the weight drops below the value entered to setpoint one.

DSPr Discharge on Print parameter can be used to inhibit the discharge if a successful print has not occurred. May either be ON (1) or OFF (0) and if OFF, the default value, then discharge will be dependent solely on the state of **dSCH** as above. If ON then discharge will only occur after a successful print function has completed. If not automatic, or out of tolerance, then manual adjustments can be made prior to printing and then discharging. Note that **dSCH** must be ON for this parameter to be effective.

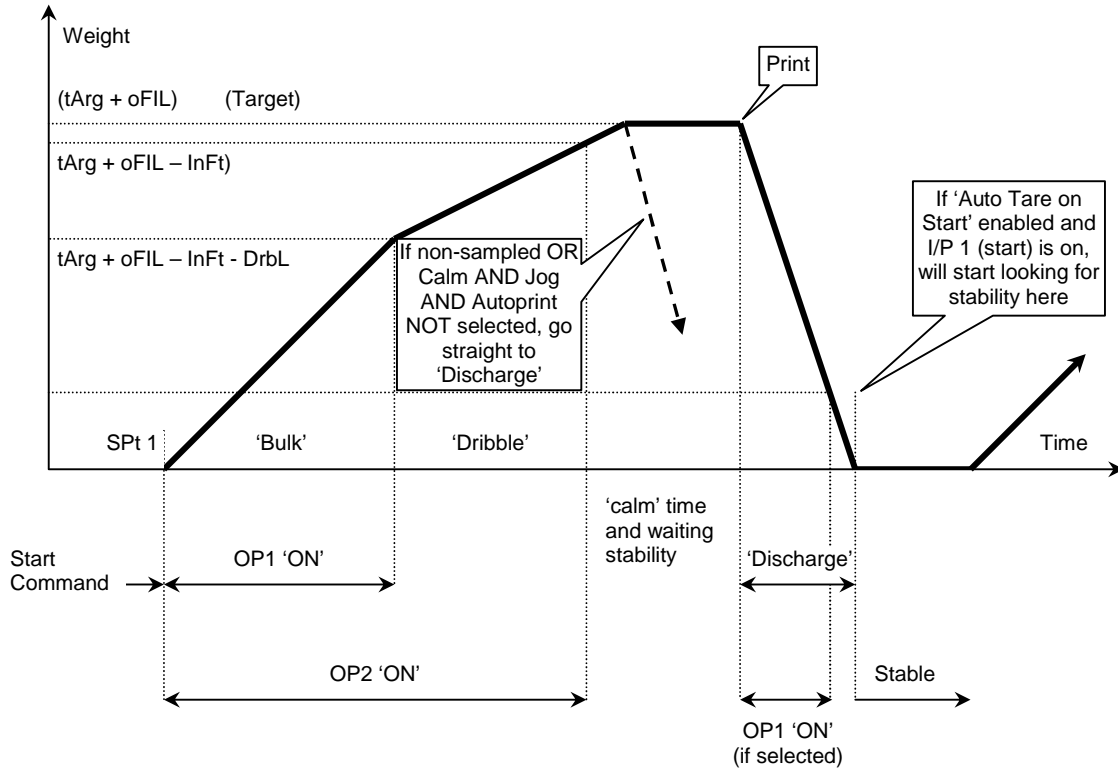
Calm Timer and Jogging.

In_oUt_
CALm

The Batch Calm Timer may be set to run at the end of a batch to allow filling to complete. Can be set from 00 (default) to 99 and determines the length of time the system waits in 0.1 second increments. I.e. 40 = 4 seconds and this will be the interval after the dribble output has turned OFF before the weight will be checked and the batch "program" can proceed. Also sets the interval (plus motion criteria) between jogs, see next.

Jogt Determines whether jogging is active (01 to 5119) or turned OFF (00 the default value). If the batch weight achieved is below the minimum tolerance set by **ptol /tol p/post**, and jogging is active, then up to three jogs may occur to bring the weight within required limits. The value entered will be used to determine the JOG ON interval in milliseconds. The value entered will round down to the next 20mS i.e. an entry of 5119 will round down to 5100mS; an entry of 21-39 will give a jog ON period of 20mS.

Typical Batching Cycle



START SIGNAL (Note: stop input is 'failsafe', hence must be energised).

- q Provided that the displayed weight is stable, Motion Lamp is OFF, and the displayed weight is below the value entered to the parameter `spt 1` then: -
 - Either, Signal to `ip1`; which must be selected for "Start" - `IPAL0x`
 - AUTO-TARE TO NET ZERO adjustment will occur if `Atst 1`
 - or, Set `Strt 1` in `bAtCH__` menu,
 - or send 'ST1' command from serial port.
 - In above two cases ; Feed starts immediately if weight is less than the high limit

Note: - Start will continue to attempt to activate as long as the start signal is active, i.e. would wait for a stable condition and then start. Signal should be removed once a valid start has occurred.

- q **BULK FEED** Output 1 (Bulk) and Output 2 (Dribble) operate (b status character)
 - Output remains on until the the weight exceeds the bulk feed cut-off point~
 - BULK FEED CUT-OFF = {TARGET - DRIBBLE - INFLIGHT}.
 At this point Output 1 releases, leaving Output 2 to complete dribble feed. O/P 1 is NOT latched and would turn ON again if the weight dropped back below this Cut-Off Value.

- q **DRIBBLE FEED** Output 2 Remains operated (d status character)
 - Output 2 remains on until final cut-off point~
 - FINAL CUT-OFF = {TARGET - INFLIGHT}.
 At this point Output 2 Releases. O/P's 1 & 2 now latch OFF pending any further conditions.

- q **CUT-OFF** – occurs (display MSD blank)
 - If a Non-Sampled weighment go to Batch Complete below.
 - If CALm timeout is awaited `bUSY` displays.
 - If Automatic In-flight Compensation Adjustment is selected `AI nF 1` and a stable weight within +/-12.5% of the capacity is detected, an adjustment of the currently selected `InFt` value by 25% of any error is carried out subject to total restrictions.
 - If `jog t` is active and final weight is below the minimum tolerance set then the system may jog the product three times to try to achieve an in-tolerance weight. The System will turn ON the Dribble Feed Output 2 for a period as set to this parameter and then OFF for the period entered in `CALm` plus the period required for weight stabilisation and weight check.
 - If AUTOPRINT mode is NOT selected (`Auto 0` in `Pr_Cfg_`), the cycle stops until the operator removes/discharges the batch. A printout may be obtained prior to discharge by pressing **PRINT** or requesting 'PR' via the Serial Interface (E status character)
 - If AUTOPRINT mode IS selected,
 - If stable weight is within tolerance an auto-print of the selected data will occur.

Digits 2, 4, 6 Modify how outputs operate in **Setpoint Mode '07'**

In this mode, each output has its own 'definition' digit, each as described above, rather than all being forced to the same function as defined by digit 2. Thus, one output might be modified to operate only on no-motion, for example.

- q **Output 3**, if fitted (factory option), is only available for **Setpoint Mode in Mode 07**. In other modes it may therefore be used to indicate a particular Status condition; according to the table below.

Digits 3, 5, 7 If not at zero (default), the Output (1, 2, 3) corresponding to the digit (3, 5, 7) is forced into a Status Mode (regardless of Setpoint Mode selected) and operates on the status conditions as listed below. Thus a digit other than zero overrides the normal Comparator operation as described in Setpoint Modes for the particular output.

0	(Default) Output operates in normal Setpoint Mode (as 4.3 / 4.4 and modified as above)
1	Output operates on Net mode (follows NET indicator).
2	Output operates on Motion (follows MOTION indicator).
3	Output <u>releases</u> (i.e. failsafe) on Alarm condition*.
4	Output operates when Negative and in Net mode.
5	Output operates on Negative Gross .
6	Output <u>releases</u> (i.e. failsafe) when weight Out of Range .
7	Output operates on Gross Zero (follows ZERO indicator).
8	Output operates on Net Zero .
9	Output operates on Gross mode (follows GROSS indicator).
A	Output operates when ' Printed ' Flag set (i.e. after successful print) ⁺ .
C	Output operates at Batch Complete .
D	Output operates by Serial Commands Only.

* **Alarm** condition is any non-weighing mode; such as parameter entry mode, calibration, out of range, or any detected error condition.

+ If '**A**' is selected, the appropriate output is reset when a new print is allowed (after return to zero or sufficient weight change; as programmed).

Examples of Output Allocation Parameter

oPAL

00 00 0C	OP's 1 and 2 operate as normal. OP3 operates as 'Batch Complete' signal (SETD 01 only).
00 00 0A	OP's 1 and 2 operate as normal. OP3 operates when print successful.
10 08 20	Using SETD 07, this arrangement might be used for filling and discharging a vessel OP 1 monitors Gross weight (ie contents high level) O/P2 net zero status (confirms successful tare to zero) O/P3 monitors negative net (amount removed after tare)
20 00 0C	Using SETD 01 OPs 1 and 2 operate negative for 'weighing out'. OP3 is batch complete
80 00 00	Using SETD 00, 02, 04, 05, 06 - OPs operate only when stable. Hence the appropriate low/pass/high signal will not be given until weight stabilises.
00 00 04	OP 3 comes on when weight is negative and net. Such an output might be wired to (say) input 2 to automatically CANCEL TARE when load removed.

4.8 Part Counting

Several methods of simplified Part Counting are described below where the **MODE** key operates as a Sample button.

Count mode has to be enabled with CnEn in CoUnt__ menu set ON (1). Display will show live count with flashing C in leftmost digit position. (Count mode over-rides any MODE Function set with FUNC parameter)

Sample Weighing

- q With the weighpan empty, ensure the 'ZERO' light is on ~ press **SET ZERO** if not.
- q Add the required sample number (1-99) to the weighpan ~ press **MODE**
- q Display will show Add nn
The sample size on the pan can now be entered as follows
The **↵** when pressed increments the units, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 but does NOT carry over.
The **⇨** key increments the tens similarly, 10, 20, 30 etc.
E.g. to enter 32 press **⇨⇨⇨⇨↵**
Press **ENTER**. A new part weight will be calculated; part weight must be greater than e/10 otherwise the display will change to show Add --
↵ clears sample showing Add OO a second press will toggle the display to show Add --.
Pressing **ENTER** whilst displaying Add OO returns to weighing but leaves Count mode re-enterable.
Pressing **ENTER** whilst displaying ADD -- uses previous part weight as sample size.
- Part weight is calculated and internally stored in units of e/1000
- q Count mode can be exited by setting the CnEn parameter to zero.
- q Whilst in the count mode, pressing **TEST** will display the live weight

Changing to a Different Part (or to Cancel Mode)

- q Ensure COUNT mode is enabled as Sample Weighing above
- q With the weighpan empty, ensure the **ZERO** light is on ~ press **SET ZERO** if not
- q Press **MODE** ~ display will indicate 'Add 10' (or **01 - 99**, as previously set)
- q Select a new sample size, if required, as below ~
Pressing **↵** increments the 'units' sample number digit
Pressing **⇨** increments the 'tens' sample number digit
Pressing **↵** clears both digits to zero
- q Add the selected/requested sample number to the weighpan (none if cancelling mode)
- q Press **ENTER**
- q Display will show live count with flashing C in leftmost digit position
- q NOTE: Pressing **ENTER** with Add OO displayed cancels Part Count Mode

Counting with known Part(s) Weight

- q From the CoUnt__ MENU, select Part
- q Enter EDIT mode and key in the part(s) weight
- q Press **ENTER, ENTER, ENTER** to return to live display
- q Display will show live count with flashing C in leftmost digit position

Counting with Part Weight stored against Code

- q Each time a sample is weighed, or a part weight edited, it's value is written into the currently active 'PRODUCT' CODE memory (CodE xx). Thus up to 14 pre-set items can be counted without having to do the above sample weighing.
- q Select CoUnt__ (or USEr____) menu, Select appropriate CodE
- q Press **ENTER, ENTER, ENTER** to return to direct part counting of the selected item.
- q Use any of the above routines to programme alternative weight into the selected '**Code**' location.
- q Preferably use 01 as a 'scratchpad' for general part counting, using 02 - 14 for specific products. Leave 01 selected when not using pre-set items to avoid accidental corruption.

Exit COUNT mode

- q Press **MODE** then **↵** to show Add OO then **ENTER**.
- q Alternatively, select CnEn OO from the CoUnt__ menu.

Note: Setpoints are always relative to weight regardless of count mode.

4.9 LIVE Animal Weighing

Many animal weighing applications will be readily satisfied by simply setting a higher filter (Filter Band) parameter in CALIBn_ or conf ig_ Menus.

Where a print is required, optimum performance might be gained by using this LIVE parameter in Pr_CFG_ and setting this to '1'. If set this will force the Motion Time-out tOUT in ConFIg_ to 30 seconds. On initiating a printout, the system will look for a stable value by progressively increasing the FILT setting until a 'no motion' condition is found. TOUt is used as a time limiter - if stability is reached before it expires a print occurs. If it expires the print command is aborted.

The FILT returns to its original value on completion.

Note: Any calibration adjustment sets Live to OFF = 0. Live must be reset to ON = 1 if required.

4.10 Conversion Mode

A conversion factor may be applied to the current weight value and the converted value displayed and printed. Enter the conversion factor in FACT in the CoUnt_ MENU. It may be in the range 0.1000 to 10.0000.

- q To enable conversion mode, select ConS 1 in CoUnt_ MENU.
- q Conversion mode is indicated by flashing 'U' in display most significant digit.
- q Exit Conversion Mode by setting ConS 0.

Note: Setpoints are always relative to weight regardless of any conversion.

4.11 Analogue Output (Option)

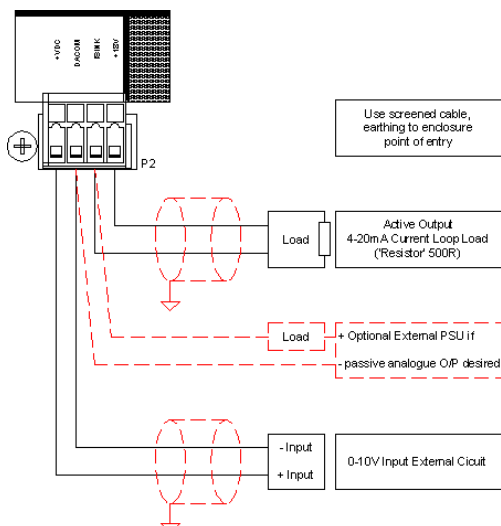
Baseboards Rev C may have an integral analogue output fitted. Rev D onward use an optional plug in module.

The DAC is designed to an ultimate resolution of about 1 part in 50,000 over full range output. However, its overall performance is optimised for medium accuracy instrumentation purposes. Typical system accuracy is in the order of 0.1% full scale over 10°C temperature range.

If analogue output is fitted, EngCFg_ AnEn must be set to '1' to enable the AnALog_ menu.

The output can be 4-20mA (up to 500Ω) or 0-10V by setting parameter 4-2O to 1 or 0 in the AnALog_ menu. Only current loop or voltage output may be selected at one time, there must be no electrical connection between the two external circuits. Current Output is recommended. If a Voltage Output is to be used consult Application Notes at www.ianfellows.co.uk

Connection



The Analogue Output is calibrated using the AnALog_ menu.

To calibrate Zero output, select ZAdj press **MODE** then use **↔** to nudge up or down whilst monitoring the output on a meter. If a large adjustment is needed, then it can be quicker to manually edit the ZERo parameter.

Similarly to calibrate the gain, select gadj and nudge as above this time checking the meter for the reading required at the CALA value (usually = TOP) Again large adjustments can be made by editing the gAI n parameter .

A 'false' full scale can be programmed with the CALA weight value parameter. (After any change to CALA it is necessary to access the main CALIBN menu and then exit to ensure the new reading is stored.)

The Output can be set to correspond with NET or GROSS using the nEt parameter.

The output can be set to increase with loss of weight with the nEgn parameter.

If flow rate mode is enabled, the output can be set to reflect flow rate by setting the r a t e parameter.

The error condition output (eg when out of range or when menus and functions are being operated) can be forced to the lowest or highest electrical limit depending on the Err parameter. Note: The output may pass beyond the normal range, before switching to an error condition.

4.12 Flow Rate Display/Output

A RATE display and/or output signal, in which the 'change of weight' against time ('dW/dt') is produced, may be enabled in non-trade mode by setting `r_en` in `engcfg_` to 1. Output is set in calibrated weight units per second and is displayed by a single short press of the **MODE** key.

The rate value may be output as an analogue signal if an Analogue Output Module is installed (0 -10V or 4-20mA ~ see 4.11).

Select `rate_1` in the `anal og_` menu to enable.
Set to 0 to disable.

Note the flow rate feature computes 'instantaneous' flow from changes in the immediate weighing integrations. As such it is generally not useful for slow rates of flow where the change from one integration to the next is insignificant.

5. SERIAL INTERFACING AND PRINTING

5.1 Serial/Printer Installation

Comms Connection - Refer to diagram at rear of manual for position of connections.

5.2 Serial Comms ~ SERIAL_ Parameter Menu

- q The serial port is designed to connect to a host computer for remote control, production of logs and as an input for applications requiring weight data. **For Trade Approved applications a legal weight Alibi may be required – refer to Application Notes (Flash Electronic Tally Record).**
- q In it's simplest application, a string of status and current weight information might be transmitted (without handshake) every time the display is updated (default; every 300ms).
- q At a more sophisticated level there is a powerful suite of commands that enables the host to become the 'operator interface' without use of the indicator panel. The 'host' computer applications programmer must write software to 'talk' to CPI.
- q All of the parameters available on the CPI are available via the Serial Interface.
- q A multi-drop (network) mode is also available for multi-weigher systems (see 5.4).

Serial Port Configuration

In the Serial _ Menu, use the following parameters: -

bAUd	Baud rate (01=19200Bd, 02=2400Bd, 04=4800Bd, 09=9600Bd-Default)
Prty	Parity/bits (00 = 8+none (Default), 01 = 7+odd, 02 = 7+even, 09 = 8+odd, 0A = 8+even)
h232 (rev C)	1=RS232, 0=RS485 ; RS485 for use on Multi-drop networks.
485E (rev D+)	0=RS232, 1=RS485 ; RS485 for use on Multi-drop networks.

Note - On some versions baud rate changes are not permanently stored until forced to store by change of additional items. If no 'stored' message seen, then force store by changing another parameter.

Weight Data Format control parameters

CrLF	1	appends a line feed to a carriage return (default 1, on : Cr = CrLf).
ECHO	1	echoes received characters (default '1')(Multi-drop mode forces Echo 0 off).
nodP	1	removes embedded dec. point from weight data (default '0' d.p. embedded).
CHSU	1	appends a checksum byte to data (default '0' gives no checksum).
noSt	1	removes status bytes from weight data (default '0' embeds status bytes).
Ldgz (from PO6_x33)	1	spaces in weight string bytes are replaced by zeros (default '0' = spaces).
Strg	1	sets serial string format (SG1 or O – see 5.3).
Sing	1	weight data transmitted on request only (default '0' gives continuous output).
Ctrl		Allows up to 4 Hex Control Bytes to prefix the standard weight data string. (Default Ctrl = 0 0 0 0 sends no prefix characters, 00 – 'Nulls' are ignored. The first 'byte' is only 1 digit long and, thus, can only be a control character 01h - 0Fh).

Serial Commands

The menus at rear of manual show the serial command corresponding to each parameter. Commands must be sent terminated with CR and the indicator allowed to complete its response before sending further commands. Below are a selection of useful commands not covered by the menu system ~

WT	Request Weight	RA	Request current Access Level
PR	Request print	PW	Send Password ie PW1, PW900
AT	Acquire new semi-auto tare	AZ	Set zero
CT	Cancel semi-auto tare		
NT	Tare Code	FT	Preset Tare value

Changes to Tare code, command NTxx, receive response giving current value of preset tare for that code.

FT cannot be set when NT=00

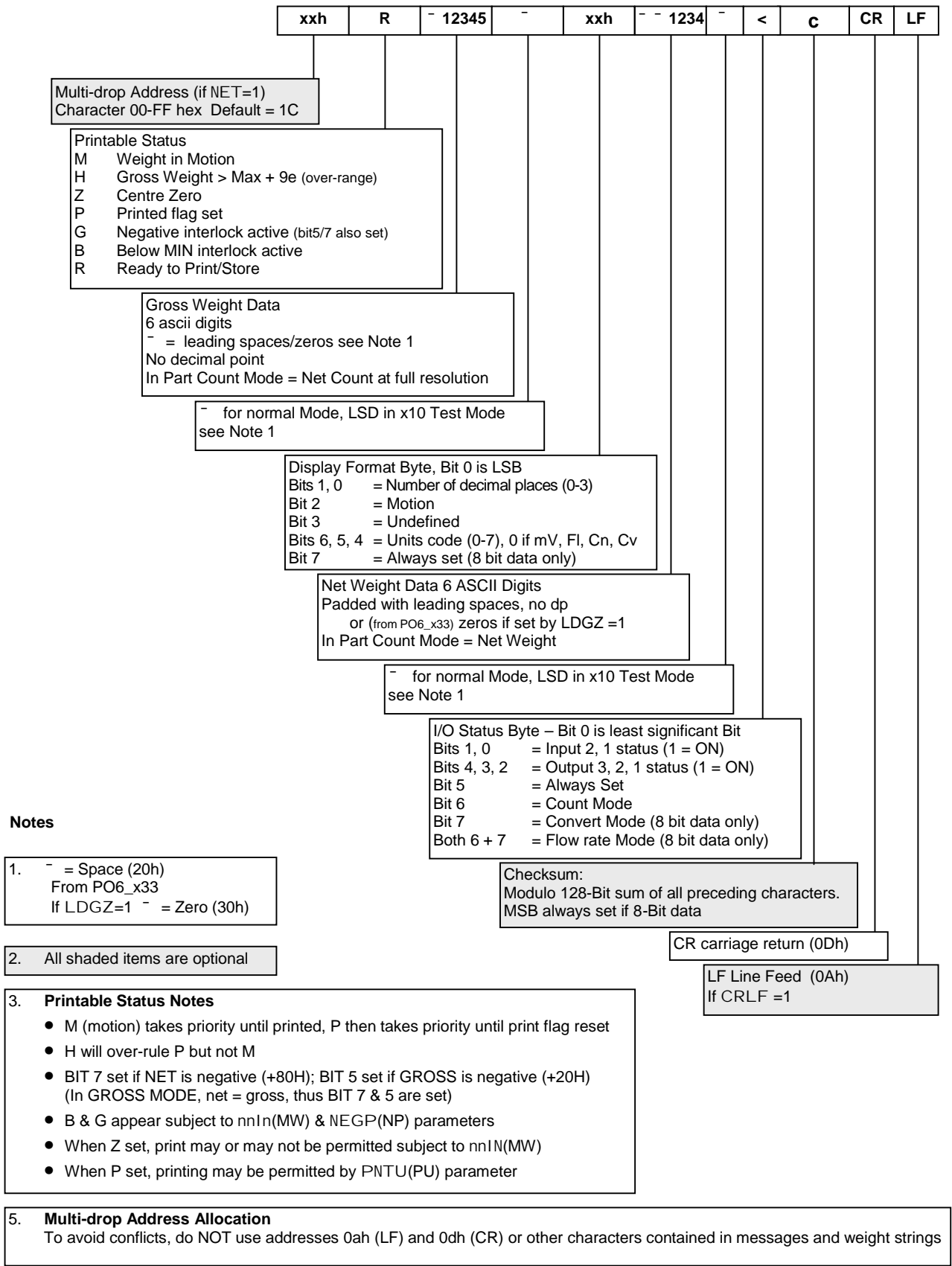
XG	Request gross	PG	Last printed Gross weight
XN	Request net	PN	Last printed Net weight
XT	Request semi-auto tare value	PM	Last printed Semi Auto Tare weight
ST1	Start Batch	WE1	Write data to eeprom from ram
ST0	Stop Batch	?*	Command list dump (from PO6_x26)
MO	Toggle net/tare/gross weight (= MODE)	SW	Read internal Pushbutton (from PO6_x33)
ET1	Select x10 weight mode	ET0	Deselect x10 weight mode
MExxxxxx	Set display to show message xxxxxxx (status indicators all flash). Send ME to clear message.		

To change parameters with serial commands still demands the correct access level. In most cases this will be level 1 which is gained by sending level 1 passcode PW1. As a general rule, for configuration parameters, send the command with no value to receive the current setting. Send with a valid value, at the right access level, to change the setting.

Weight registers are sent with extended x10 digit (ie superfluous 0 unless displaying x10 digit) and without decimal point. Some registers are sent with a suffix 'type' letter (W-weight, D-decimal, H-hex etc.) These are a legacy to earlier protocols, primarily retained for compatibility and bear no great significance.

Alternative SG1 weight string

If **SG1** command is sent to CSW-20 via the serial port, the following weight data format is available. Can also be set by STRG=1 in serial menu.



5.4 Multi-drop Operation (RS 485 only)

A MASTER can speak to several CPI over an RS485 network (all data must now be requested).

nEt 1 Set to force multi-drop mode ('0', non multi-drop is default).
SING 1 Set so weight data on request only
Addr nn Sets the multi-drop address this unit responds to (00-FF(h) 2 Digit Hex).
H232 (rev C) Set 0 for RS485 (1 = RS232)
or
485E (rev D+) Set 1 for RS485 (0=RS232)

RS232 can be used for addressed communications, but not multidrop)

Note - Change to NET parameter is not permanently stored until forced to store by change of additional items. After changing NET, force store by changing another parameter confirmed by 'stored' message.

- q Use not recommended below baud rate 9600.
- q Maximum 31 SLAVES (CPI) and only one MASTER.
- q SLAVES configured with addresses 00 – FF(h) (2 Digit Hex).
- q Connections to be twisted pair and 'daisy-chained' (not 'star' connected).
- q 2 Network ends to be specified and terminated. Install terminators in cable plugs at network ends.
Fit termination resistors to match the characteristic impedance of the comms cable (if unknown, fit 100Ω) externally on the cable connectors at the extreme ends of the network. Then all indicators are identical.
- q SLAVES (CPI) will always 'listen' unless spoken to (no unsolicited messages).
- q SLAVES will default to 'listen' within 1 character time of requested response.
- q Time-out on all operations to default 'SLAVES listen' mode is normally 1 second.
- q All communication 'packets' commence with 'Address' and terminate with CR (or CR, LF). If function demands a response with an indeterminate delay; MASTER must poll for it.
- q To avoid possible communication conflicts, either set 'UNITS' to 0 or do not use addresses that contain unit characters eg k, g or characters that may be in messages and weight strings and do not use 0ah (LF) or 0ch (CR)

Multi-Drop Network Notes

HINTS & TIPS: The most usual problem encountered whilst setting up a RS485 2-wire system is caused by two or more devices trying to 'talk' at the same time.

The transmitter in each indicator is enabled only in response to a command/request directly addressed to it (anything else is ignored, and there are no unsolicited messages transmitted). Hence the 'host' PC or Controller initiates all 'dialogue'.

The only time two indicators might try to transmit simultaneously is if both have the same address (illegal) or there is a hardware fault. Try removing units until some dialogue is established.

It is important that the 'host' disables its transmitter *immediately* after sending a command/request and goes to 'listen' mode (also, beware of a situation where the host disables its transmitter prematurely, truncating the transmitted message).

If an external RS232 to RS485 converter is used by the 'host', its RTS signal is normally used to enable the transmitter. The 'host' programmer must generate this signal and ensure it correctly matches the transmitted message length.

5.5 Printer Config. ~ Pr_CFG_Menu

These parameters set up the printer-interface configuration. (Refer also to Printer manufacturer manuals).

Note: Setting Printer Baud rate to '00' re-directs output to the CPI **serial port**.

Printer Port Configuration

The printer port is permanently configured for 8 data bits, 1 stop bit. To use a printer with only 7 data bit setting, set the printer to receive zero parity, or no parity and 2 stop bits.

bAUD	Baud rate 00 =output via serial, 01 =19200, 02 =2400Bd, 04 =4800Bd, 09 =9600Bd, 10 =disable (Revised at PO6.032/132) Default 02 = 2400
Pr tY	Printer Parity (00 =none, 01 =odd, 02 =even). Default 00
Cr LF	Printer Linefeed mode (0 =CR only, 1 =CR+LF) Default 0
HdSH	Printer Handshake (00 =none, 01 =ready when high, 02 =ready when low) Default 01
EoLd	End of line delay (00-09 x 0.1 second delay after CR) If no handshake is used, some printers may need EOL delay to allow printer time to catch up with transmission.

Printing Conditions

Note: Default is 0 'off' for these parameters.

Nni n	1	Enables Printing when below Minimum weight (Minimum = 20 divisions '20e' Except See 5E ? below)
NegP	1	Enables Printout of a Negative Net weight (e.g. Print 'lost' weight). -ve Gross never allowed.
ChgE	1	Enables Print on Weight Change of 20e - otherwise, weight must return to below 3e above zero before printing is re-enabled.
5E ?	1	Sets Minimum weight to 5e. See Nni n above.
tol p	1	Restrict Printing to 'In Tolerance' conditions only
Post	1	Further limit above to Positive Tolerance only, where applicable

The tolerance conditions depend on setpoint mode that is in operation

For Set d = 00,02,04,05,06 In Tolerance is when the 'PASS' Condition is met

For Set d = 01 & 07 In Tolerance is when weight is within +/- pTOL about SPT3 / Targ

cal m		Batch Mode Calm Timer 01-99 x 0.1 sec.
Auto	1	Enable Autoprint mode - automatically prints when conditions satisfied and the weight becomes stable - e.g. if nni n , nEGP and CHgE are 0, a print would occur when weight stabilises above '20e' after returning to zero

Also – located in the Engc f g menu

PNTU	1	Unconditional Print - overrides print interlocks for weight change between prints (except in Setpoint mode 01 – Batching mode).
Live	1	Activates auto filter acquisition on Print (ie for Animal Weighing)

5.6 Print Formatting ~ Pr_For_Menu

Formatting Print Content

The print format is constructed as follows:

- q Up to 14 items of data may be printed in any sequence.
- q Parameter Pfor specifies the first 7 items to print, qfor specifies the next 7 items
- q Each digit (range 0-9,A-F) selects a different 'Data Type' – See next page
- q Items to be printed must be set as 'most significant digits', a type 0 terminates the print file (unless leading spaces are associated).
- q Parameters PSP & qsp set corresponding leading spaces for each item
- q Parameters Pcr & qcr set corresponding trailing Carriage Returns for each item (each digit has range 0-9,A-F = up to 15 spaces and/or carriage returns can be associated to each item)

- q Some 'data types' 2, 3, B, and C are text strings that can be pre-programmed using parameters St1A/St1b & St2A/St2b (see section 3.8)

- q Each PRODUCT CODE 01 to 12 recalls a different set of text strings
Data type 2 prints the St1A/St1b string for the currently selected product code
Data type 3 prints the St2A/St2b string for the currently selected product code

- q Separate text strings can also be programmed with PRODUCT CODE set to 99
Data type B prints code 99 St1A/St1b string regardless of the selected product code
Data type C prints code 99 St2A/St2b string regardless of the selected product code

- q Each string is up to 14 characters (first 7 set by StxA, next 7 set by Stxb) Each part of the string can be shortened with an end of string (EOS) terminator character. (The EOS character is ascii 1Fh ~ looks like 'ÿ'). Control characters may also be included; see 3.8.

Format Control Parameters

head 1= Enable Column Mode Printing (Default 0= standard mode)

Form 0 - 99 No. of lines to print before sending CTRF control string, see below
(00 = never send, 99 = send at end of every print)

Ctrlf Hex Control String appended to Print subject to Form setting above.

Ctrl Hex Control String prefixing entire print or each line subject to Line setting below
Special case – setting x xx xx EF cuts off the print 'Header Labels'.

Ctrlm Hex Control String placed in middle of each line if Line =1
Allows for example 'Gross' in standard chrs and '123.4kg' in double width

Line 0= Ctrl String only sent once before complete print out
1= Ctrl String sent before each line and Ctrlm string sent midline

- q Each Control Character string (Default 0 00 00 00) allows up to 4 Hex bytes to be set. The first 'byte' is only 1 digit long, so limited to Hex 01 - 0F
- q Nulls (Hex 00) are ignored, not sent.

Several Print parameters apply different functions when used for controlling a remote display on the printer port. See Section 5.7.

Data Type Selection

DATA TYPE	COMMENTS	EXAMPLE
0 End Print File	Unless spaces associated by PSP/QSP	
1 Product Code	Currently selected Code Number	Product Ref . 01
2 Text String 1A/1B	St 1A/St 1b for current Product code	Product 1
3 Text String 2A/2B	St 2a/St 2b for current Product code	Description 1
4 Date	Current Date – set by date in user menu	Date dd / mm/ yy
5 Time	Current Time – set by tinn in user menu	Time hh : mm
6 Running Number	Runn in user menu, auto increments on Print	Running No . xxxxxx
7 Numeric ID Code	ldnt in user menu	Code xxxxxx
8 Gross Weight		Gross xxxxx . x kg
9 Net Weight	If no tare & no item 8 in printout, prints 'Gross' not 'Net'	Net xxxxx . x kg
A Preset Tare	Inc. tare code. If no preset tare active, prints 'NONE'	Preset Tare 01 xxxxx . x kg
B Text String 1A/1B	St 1A/St 1b for Product code 99	Header
C Text String 2A/2B	St 2A/St 2b for Product code 99	Description
D Semi Auto Tare	From PO6.x27 Prints tare value (G-N-PT)	Semi - Auto Tare xxxxx . x kg
E Target/Tolerance	Target/Code/Tolerance/Pass/Fail Setd 00 02	Target 01 FAIL
	Dependent on Setpoint Mode in use Setd 04 05 06	Target 01 FAIL xxxx . x kg
	Setd 01 as above plus PTOL extension on same line	(+/- xxxx . x kg)
F Count/Conversion	If Count mode	Count xxxxxx
	If Convert Mode	Conversion xxxxx . x
	If Rate Mode	Flow Rate xxxxx . x

- The shaded items represent variable data dependent on configuration or result of weighing.
- The Fixed Text (Header Labels, ie 'Time', 'Gross' etc.) can be suppressed - Set CTRL = xxxxx EF

Default Print Format

Pfor	5 4 9 0 0 0 0	Ofor	0 0 0 0 0 0 0
P sp	0 0 0 0 0 0 0	O sp	0 0 0 0 0 0 0
P cr	1 1 1 0 0 0 0	q cr	0 0 0 0 0 0 0

The default print format settings select TIME, DATE, NET WEIGHT each followed by a single carriage return. Creates a basic print out:

```

Time                hh : mm
Date                dd / mm/ yy
Net                 xxx . xx kg
    
```

Formatting Example:

q Note - Each time these parameters are altered a revised sample printout will be produced.

Pfor	B C 4 7 2 8 D	Ofor	9 3 0 0 0 0 0
P sp	8 6 0 0 5 0 0	O sp	0 6 0 0 0 0 0
P cr	1 2 1 2 1 1 1	q cr	1 2 0 0 0 0 0

- q In this example, the first DATA TYPE (first digit in PFor) is **B**, which will print out the text string St 1A + St 1b regardless of currently selected Product Code.
- q It is preceded by **8** spaces (first digit in P SP) and followed by **1** carriage return (first digit in P_Cr), so the next item will appear on the next line with no gap.
- q The next item is **C**, preceded by **6** spaces (to centralise) and followed by **2** carriage returns.
- q The 3rd item is **4** causing the current date to be printed with **0** leading spaces
- q The 4th item **7** (Code) prints the value entered by the operator into ldnt in USER _ menu
- q The 5th item **2** prints out the text string in St 1A+St 1b programmed when the current Product Code was selected (a different string will print with another Product Code).
- q The 6th, 7th and 8th items give the current weight data.
- q The 9th item **3** prints out the text string in St 2A+St 2b for the current Product Code (again string may be different for another Product Code)
- q The 10th-14th items (3rd-7th items in q For) are **0**, so nothing more is printed.

The resulting Print will be:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TYPE	
HEADER																								B	St1A/St1B string for Code 99
DESCRIPTION																								C	St2A/St2B string for Code 99
Date																								4	
Code																								7	
Product Name																								2	St1A/St1B string for current Code
Gross																								8	
Semi - Auto Tare																								D	
Net																								9	
Description																								3	St2A/St2B string for current Code

Column Print Example:

- q Usually used with 80 column printers, to print data in columns set HEAD1 in Pr_For_.
- q Pfor/qfor set the data types and order they are to be printed, but in this case the data labels are printed as a header on the first printout, with subsequent lines printing variable data only. The number of Data Types in the print format must be chosen to suit the print page width available.
- q PSp/qsp can be used to adjust spacing across the page. Pcr/qcr are ignored.
- q The number of lines to print on a page might be controlled by the printer's own settings or the Form parameter can be used to set the number of lines at which any control characters in CTRF will be transmitted and a new header generated. A new header is also generated after power on or Totals print.

Example Pfor = '2567890'

2	5	6	7	8	9 (Data Types)
Product Name	Time	Running No.	Code	Gross	Net
Product Name	21:02	3391502	7654321	12.567kg	9.230kg
Product Name	21:05	3391503	7654321	12.569kg	9.232kg
Product Name	21:08	3391504	7654321	12.565kg	9.228kg

Totals Printing and Formatting

- q Any weighing 'Printed' adds the recorded weight to registers for the current product code.
- q Totals can be printed and cleared by using the Totals menu or remote inputs.
- q In the menu, Ptot prints totals without clearing, clrt prints and clears the totals. Choose the appropriate parameter change 0 to 1 and press **ENTER**
- q The total printed is for the currently selected Product Code. If Code is set to 99, individual totals will be printed for all weighed products. (Ensure code is set 1-14 before continuing weighments)
- q The clrt option requires level 1 access, hence the correct password must be entered to the PASS prompt when entering the Totals menu.
- q Alternatively, if the remote inputs are available, these can be configured to initiate Totals Print/Clear commands. (See section 4.6)
- q The Format for Totals Printing is separately defined, in a similar fashion to above but using the parameters tFor/Ufor, tSP/USP, tCr/UCr
- q Totals formatting uses the same DATA TYPE Designations except, here:

	DATA TYPE	COMMENTS	EXAMPLE
8	Total Gross	Total Gross Weight for Product Code shown	Total Gross 01 xxxxxxxxkg
9	Total Net	Total Net Weight for Product Code shown	Total Net 01 xxxxxxxxkg
A	Total Number	Total No of Weighings for Product Code shown	Total N 01 xxx

5.7 Remote Displays/Port Assignment

Two methods of remote display configuration are possible. In each case the 'Printer' or 'Serial' port might be used. The choice of port will most usually depend on which is available. If a printer is in use the serial port can be used for the remote, whilst if the indicator is linked to a computer the printer port would be used.

CPI to CPI Configuration

A standard CPI indicator can be used as a remote display.

Using Master	Master CPI		Slave CPI
Serial Port	Serial rmds 10 Serial baud Serial Prty	= = =	Serial rmds 80 Serial baud Serial Prty
Printer Port	Serial rmds 20 Pr_cfg baud Pr_cfg Prty	= = =	Serial rmds 80 Serial baud Serial Prty

(Always connect to the Serial port of the slave CPI)

A slave CPI connected to the 'Serial' port of the Master benefits from bi-directional communication and as such enables use of the front panel buttons on the slave.

CPI to other serial displays

(Separate Application Note Available)

The remote may use the standard Serial port continuous transmission or a continuous transmission can be created via the Printer port by setting Serial rmds to 01.

The content of the Printer port transmission can be configured using the print format parameters.

In these cases, there is often no specific set up as both the CPI and remote may be configurable. Once a string is created from the CPI, the remote may also need settings altered to suit.

Connections

Using	Master CPI	Slave CPI	Other Serial Display
Serial Port	RS232 TX (transmit)	RS232 RX	RECEIVE
	RS232 RX (receive)	RS232 TX	-
	GND (ground)	GND	COMMS GROUND
Printer Port	PRN TX (transmit)	RS232 RX	RECEIVE
	-	-	-
	GND (ground)	GND	COMMS GROUND

Note

If using the printer port for any continuous transmission, then always set the SERIAL BAUD rate less than or equal to the PRINTER BAUD rate.

6. DIAGNOSTICS

During parameter entry, erroneous values will result in the parameter not being stored and the display reverting to the corresponding sub-menu heading display but with a 'x?' appended to that display ('x' is a diagnostic, and can be used to determine the nature of the error).

Parameter Entry Error Codes - See Serial Responses Section 5.2

- ?? Entered parameter out of allowed range.
C? Command or parameter value not permitted under current access level (Usually re-interpreted as nOPASS).
D? Start of calibration deadload acquisition at each PGA setting.

In response to a dEAd calibrate deadload command

- ?? If deadload outside +/- 40 mV.
M? Excessive motion.

In response to a CAL or CALAt calibrate command

- F?** If attempt to calibrate without valid deadload having been previously acquired. (trade only).
A? Calibration weight is not within 12.5% - 100% of capacity ('toP'), or I.s.d. incompatible with 'DISP'.
L? If input resolution <1mV/e in 'trade' mode or <0.1mV/e in non trade mode.


H? (Calibrn Deadload) End of each deadload acquisition step.
(Calibrn Span) Loadcell input too high during span acquisition (>100mV)

Full Display Status/Error Messages

STATUS MESSAGES

Abor t?	Do you wish to abort this calibration, forgetting all alterations? ENTER or i to confirm else back to calibrate.
ACCESSn	Displays ACCESS LEVEL achieved on entry to MENU (n = 0-3).
Add nn	Place requested number of sample parts on weighpan and press ENTER Else press i to alter sample number or ' CAnCEL '.
BUSY	Awaiting ' CALm ' timeout or Flashcard is busy (please wait).
CLEAR n	Flashcard clearing in progress. 'n' indicates progress.
FLASH	Flashcard transaction in progress (please wait).
NEg	Print/store inhibited - Print disallowed when weight is negative.
NonE	Selected flashcard location has been erased.
NoPASS	Access denied; enter password or operate internal button (if authorised).
PASS .	Enter Password (or press MODE to skip). '.' indicates current digit entry position.
PrInt	Printing in progress.
PSHbUt	Press Internal (S1) pushbutton (or press MODE to skip).
REAd_E	Parameters read from permanent to working memory.
SndIng	Flashcard dump to printer in progress (please wait).
StorEd	Newly edited parameter written to permanent memory store.
SUR E?	Do you wish to accept this calibration? ENTER or i if so, else back to calibrate.
Too Lo	Print/store inhibited - Net Weight is below Minimum.
UnLoAd	Print/store inhibited - change in weight since last print is too small.
UnUSEd	Flashcard location with nothing yet stored.

DIAGNOSTIC MESSAGES - Some require service assistance.

--20%-- -- 4%--	Cannot re-zero because outside 20% (or 4%, dependent on condition) zero setting limits. If at switch-on, either adjust weight or press SET ZERO to re-select previous zero setting. New zero (within +/-10% of original calibration) may be set with SET ZERO+MODE .
A-d?	Analogue to Digital converter interface failure.
BUt tS?	Keyboard fail ~ shorted tracks ... service required.
CCCCC	Serial port acknowledge not received so Flash store not performed. Check serial interface and host computer.
CELL?	Faulty or incorrectly connected loadcell.
CLOct?	Failure to Read or Write to Clock - Service required
DEFAULn	Waiting to load default parameters. 'n' (0,1 or 2) indicates default level. Internal pushbutton initiates loading.
DIAg n	System Error... service required.
Dog?	Watchdog failure...service required.
DrOPoUt	Battery low or power failure.
EEProm?	EEPROM checksum failure ~ corrupted information. Attempt to reload defaults.
I2C r	Failure to read (write) from (to) Clock/RAM or EEPROM ... service required.
oUt_toL	Out of printable range in batch mode.
rom?	Program ROM checksum failure ... service required.
FAULtYn	Print/store inhibited- Printer fault due to power, connection, paper low or handshake fail, or 'flash' problem. N='S'~ serial loopback fail. n='1' or '2'~ control I/O test 1 or 2 fail. N='P'~ printer loopback test fail
F CALn	Span calibration in progress ~ part of calibration ('n' indicates progress).
StACK	System error.....Service required
EEProMb	Power failed while backing up new parameter (possible corruption) . i allows resumption (check last entered data). Internal S1 pushbutton forces a default 2 reset.
EEProMc	Potentially fatal error in stored parameters ~ use Internal S1 pushbutton to force default 2 reset ~ all user data will be lost.
EEProMF	Failure to correctly verify parameter written to EEPROM...service required.
Cl oCk?n	Failure to read/write to Clock/RAM ... service required (n='w' write fail, ='r' read fail
F dEAdn	Deadload calibration in progress ~ part of calibration (rotating zero in MSD).
FLASH?	Awaiting Flashcard initialisation, please wait. If FLASH? e /O/S consult factory for assistance
F CALn	As dEAd msd F is rotating zero 1 
Lo-bAt	Clock/RAM failed to hold data while power down...service required.
Not CAL	Not yet calibrated. Perform a calibration.
PASS n	n='S' Serial loop-back passed 'P' Printer loop-back passed 'C' Control loop passed
r FAIL	Ram failure ... service required.

Also, during warm-up

N1 2345	Software revision number
tAn 123	Traceable Access Number (number of changes performed at ACCESS LEVEL 2; typically shows number of calibration procedures performed)

7. APPENDIX

7.1 Specifications

- | | |
|--|--|
| <p>Features</p> <ul style="list-style-type: none"> q High Quality – Low Cost. q 7 Digit, bright, easy to read, LED display. q DIN standard, panel mount enclosure. q Two part connections for quick replacement. q Trade Approved for any R60 loadcells. q High resolution weighing performance. q Multi point linearity adjustment. q Accommodates extremes of dead load and signal. q Superb digital weight filtering with fast settle times. q x10 resolution test mode. q Configuration via front panel or serial communication. q Firmware upgrades via serial port. q Two serial ports, printer port can be used for remote display. <p>Options</p> <ul style="list-style-type: none"> q 15 bit Analogue Output 4-20mA or 0-10V. q Flash Electronic Tally Record (Alibi device). q ModBus Communications. q 24V DC powered version. q Additional 2 i/p, 2 o/p. | <ul style="list-style-type: none"> q Preset & Memory tares q Semi automatic tare q Set zero q 3 outputs, 2 inputs as standard. q Real time clock as standard. q Versatile print formatting. q PLU's for A/N text, setpoints, part weights and totals. q Multi-drop communications. q Sophisticated fill control with fast predictive cut off. q Variety of setpoint operating modes. q Many advanced software features. |
|--|--|

General Specifications	Display	mm	7 Red LED digits 14mm
	Front Panel		Membrane with tactile metal domes, BEEP response, 5 button operation.
	Annunciators		4 LEDS (Motion/Zero/Net/Gross)
	Internal Resolution,	counts	24 bit ADC (1:16,777,215)
	Maximum Display Resolution (trade)	divisions	10,000
	Maximum Display Resolution (non-trade)	divisions	500,000 (x10 test mode)
	EC Approvals OIML Class III + III s	certificate	NWML UK2677
	Input Signal Range	mV/V	-6.5 → 6.5
	Zero Offset Range	%	100% of Input Signal Range
	ADC Conversion Rate	Hz	50 (25/100*)
	Linearity error	%FS	< ± 0.0015% (+ digital correction)
	Differential non linearity		± 0.5 LSB
	Span temperature coefficient	ppm/°C	1.6
	Zero temperature coefficient	mV/°C	< 0.005
	Power consumption (typical)	W	5-10
	Common Mode Rejection (@500Hz)	dB	120
	Power Supply Rejection (@500Hz)	dB	120
	Operating voltage	V	12-28Vdc
	Weight	kg	2.5kg (shipping 2.9kg)

Transducer Input Specifications	Transducer type (4 or 6 wire)		Resistive, full bridge
	Transducer input resistance	Ω	min 43Ω (up to 8 x 350Ω cells)
	Excitation voltage	Vdc	5 (nominal)
	Minimum signal requirement (approved)	mV/e.	1
	Minimum signal requirement (non-approved)	mV/e	0.1
	Input impedance	MΩ	≥ 20 (sense and signal)

Serial Communication	Communication Ports		1.Comms RS232 or RS485 2.Printer port RS232 (TX/Busy)
	Baud rate	bits/sec	2400, 4800, 9600, 19200, 38400
	Protocol		7/8 data bits, odd/even/no parity, 1/2 stop bits
	Maximum continuous data Rate (test mode)	Hz	50
	Communication protocol		Ascii or ModBus*

Environmental	Operating Temperature	°C	-10 → 40
	Storage Temperature	°C	-10 → 70
	EMC Immunity/Emissions		EN45501, EN50082-2
	Sealing		IP54 front panel
	Enclosure		Panel mount DIN standard 43700

I/O	Analogue output* 0-10V or 4-20ma		15 bit (adjustable range) Max drive load for 4-20mA: 500Ω (active)/1200Ω (passive)
	Inputs	2 (4*)	Opto coupled inputs <6V off; >10 –30V on (Supply rail on board)
	Outputs	3 (5*)	Darlington type transistors Max OFF voltage 27V; Max ON current 60mA Leakage <0.1ma Switched + or -

* According to specification

7.2 Calibration Transfer

For non-certified, low accuracy applications (e.g. silo contents monitoring) where in-service re-calibration is often extremely difficult, it is possible to replace the 'baseboard' and simply transfer across old calibration constants (with some modification to account for slightly different characteristics). The overall accuracy should not vary by more than 0.5%.

It is in any case a good idea to maintain a record of all of the parameters mentioned in the first 'bullet' below, plus ZERO and gAIn parameters from AnALog_ if an analogue output module is installed. Also, if a printer is installed, print out the ADC Configuration and Memory Image by setting AdC 1 then mEm 1 in EngCFg_. If the existing baseboard parameters should ever be lost, they may enable a service technician to restore calibration *exactly*, without having to physically re-calibrate.

When replacing a 'baseboard' ~

- Have a record of all relevant (i.e. to you) previous system parameters (always keep an up-to-date record), especially UnPo, FACt, dEdF, CALF, CFrg.

Restoring to EEPROM level 2 access

Calibration data can be restored into EEPROM should data be lost for any reason by re-entering the calibration data as follows (this data should ALWAYS be recorded at the time of calibration).

In CALIbn_ re-enter the original dISp, tOP and, if known, the CALAt value.

Re-enter the ADC Configuration data parameters in the printout order.

ADC Configuration

Serial Cmd	Description	Typical	Parameter
MF	Millivolt Factor *	0263295	FACt
CG	Config Reg	%060000	CFrg
DD	Deadload o/s	7960170	dEdF
CF	Cal Factor	0201050	CALF
IZ	Init Zero o/s	0005026	ZerO
ZE	Working Zero o/s	0000000	ZoFF

Items marked * require the calibration button to be pressed when being entered.

Set UCAL to zero (Serial Cmd **SU**) and ensure that the FILt setting is restored.

Restoring Calibration with Replacement Baseboard

1. Install and power up the replacement baseboard.
2. In CALIbn_ re-enter the original disp top and CALAt
3. Re-enter the original calibration data CFrg dedf cal f zero and zoff
4. Enter the old FACT value into the CHgF parameter. This will cause a new CALF to be calculated, alternatively, as before, this can be re-calculated manually.
5. Reset the Filter Band FILt
6. Force an initial zero with the scale unloaded or re-acquire the dead
7. If default reload has occurred then the UCAL parameter must be set to zero.

7.3 Replacing Legends

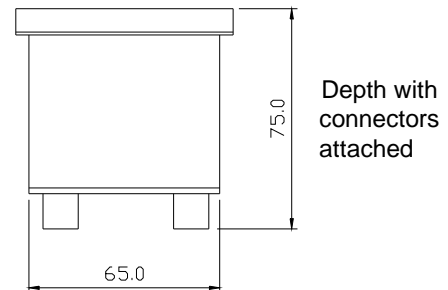
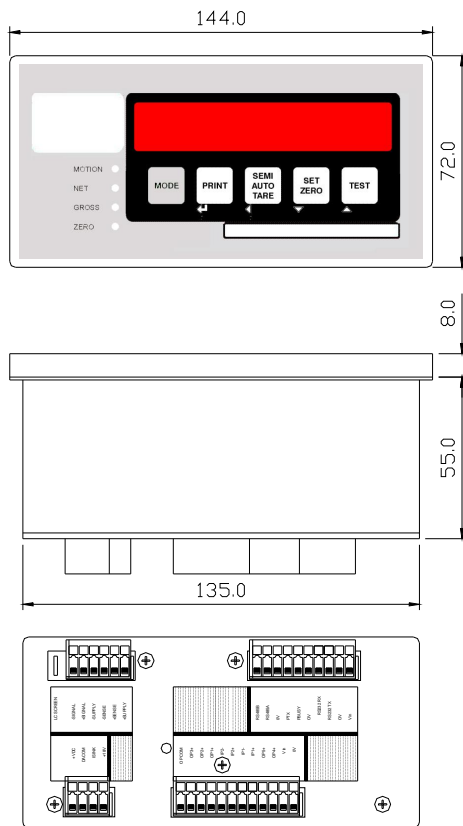
The internal front panel legends for indicator data and units of measurement are inserted as follows ~

1. Remove power.
2. Remove indicator from any enclosure after disconnecting rear cable harness at the connectors.
3. Remove clip-on bezel to reveal the keyboard membrane.
4. The membrane and its aluminium backing plate are pressed into the body. Avoid any force that may dislodge them. If dislodged, it must not be allowed to fall and stress the connecting ribbon cable.
5. VERY carefully lift the bottom right-hand corner of the membrane from the backing plate (a triangle of backing paper is left in place at this point when the panel is manufactured).
6. Taking care not to lift the corner more than a few millimetres so as not to crease the membrane; particularly across where the buttons are located; slide in the paper slip containing the appropriately printed indicator data.
7. The backing paper may now be fully removed so that the membrane is completely stuck down.
8. Replace the bezel and return the indicator to any enclosure.

7.4 Dimensions

All dimensions are approximate and measured in millimetres unless otherwise stated.

CPI



Notes:-

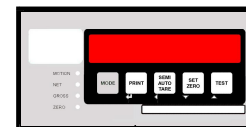
Recommended Cut-Out size: 138 x 68mm.

All dimensions in mm unless otherwise stated.

8. MENU TABLES

From Weight Display Mode

- MODE** for 1 sec. ~ Selects PASS (Access via pushbutton or password) - MAIN MENU MODE
0n ~ Step ACROSS top of columns
MODE ~ Selects PARAMETER DISPLAY MODE
0n ~ Step UP and DOWN the columns
ENTER ~ Steps back to MAIN, then back to WEIGHING (Returns Access Level to 0)
6 ~ Steps directly back to WEIGHING (Retains Access Level)



MODE

Calibrn			
Calibration			
Disp	2	DI DP	Display Increment (e)
Top	2	TO	Top (Max Capacity)
Filt 02	2	FB	Filter Band Setting 01-08, 01=light, 08=stiff, 10=custom
Fast 1	2	FK	Fastrack Setting 1=On 0=Off
Frez 0	2	SZ	Freeze 1=On 0=Off
dead	2	CD	Calibrate Deadload
Cal at	2	CW	Cal. Weight Value 12.5-100% of Top
cal test	2	CW	Calibrate Span
span	2	ET/NU MC	Test/Trim Span
span	2	MC	Span Calibration Entered in mV/V

Batch			
Batch Mode			
Strt 0	0	ST	Start Batch 1=Start
Code 01	0	TR	Select Product Code 01 to 12
Spt3	0	S3	Setpoint 3 - See Setpoint Mode Table
Spt2	0	S2	Setpoint 2 - See Setpoint Mode Table
Spt1	0	S1	Setpoint 1- See Setpoint Mode Table
Inft	0	IF	In-Filght Comp.
Ptol	0	BT	Print Tolerance
Samp 00	0	SV	Batch Sample Int. Runs full batch weigh program on every nn th batch
Joat 00	1	JT	Jog Timer (mS)
Ofil	0	OF	Overfill

Count			
Part Count Mode			
Code 01	0	TR	Select Product Code 01 to 12
Cnt 00	0	CN	Count Mode 00=Off 01-99 Sample Size
Cnen 0	0	CS	Count Enable 1=On
part fact	0	PT	Part Weight Value
fact	1	VF	Conversion Factor x 0.1000 - 10.0000
Cons 0	0	CV	Convert Status 1=Enable

User			
User Menu			
Tare 00	0	NT FT	Tare Store Number 01 to 12 00=Force Gross
Code 01	0	TR	Select Product Code 01 to 12
Idnt 00	0	CO	Numeric code for Printing 0-9999999
Runn 00	0	RN	Running No. for Printing 0-9999999
Date	0	DA	Date for Printing ddmmyy
Tinn	0	TM	Time for Printing hhmmss

Totals			
Totals			
Code 01	0	TR	Select Product Code 01 to 12 99=Clear/Print all
Ptot 0	0	TA	Print Current Total 1=Print (don't clear) (All if code 99)
Clrt 0	0	TB	Prt/Clr Current Total 1=Print & Clear (All if code 99)
Gros	0	TG	Display Total Gross
Net No	0	TN	Display Total Net
No	0	NG	Display Number of weighments

FLASH menu only displays if option installed and enabled
 See separate application note

FLASH			
DSD/Alibi			
read 01	0	FR	To view stored records
dump 0	0	FD	To transmit stored records to prn/ser ports
mode 0	2	FM	Alternative modes of operation

Nomenclature - Example:

Menu:-			
Calibrn			
Calibration			
disp 1	2	DI DP	Display Increment (e)
Parameter System configuration parameter and default setting	Access Level Level required to alter parameter values see section 3.3.	Serial Command 2 letter serial command for the advanced user or 'Systems Integrator'	Description Brief description for more advanced explanation refer to section manual

Setpoint Prompts – Setpoint Mode as set in in_out_menu

Mode Value	Setd 01	Setd 00-02	Setd 03-07	Setd 04-05-06
Setpoint 1	Spt1	Spt1	Spt1	Spt1
Setpoint 2	drbl	louu	Spt2	Tol
Setpoint 3	targ	high	Spt3	targ

PR FOR Printout Format			
CODE 01	0	TR	Select Product Code 01-12 and 99
ST1A	1	SA	Print String 1A
ST1B	1	SB	Print String 1B
ST2A	1	SC	Print String 2A
ST2B	1	SD	Print String 2B
PFOR	1	PF	Print Format 'file' For items 1-7
QFOR	1	QF	Print Format 'file' For items 8-14
P SP	1	PS	Leading Space 'file' For items 1-7
Q SP	1	QS	Leading Space 'file' For items 8-14
P CR	1	PC	Trailing CR 'file' For items 1-7
Q CR	1	QC	Trailing CR 'file' For items 8-14
Totals Management			
TFOR	1	TF	Format 'file' 1-7
UFOR	1	UF	Format 'file' 8-14
T SP	1	TS	Space 'file' 1-7
U SP	1	US	Space 'file' 8-14
T CR	1	TC	CR 'file' 1-7
U CR	1	UC	CR 'file' 8-14
Formatting Control			
HEAD 0	1	TH	1=Enable column mode print
FORM 00	1	FF	Form length
CTRF	1	HF	Form feed control characters
CTRL	1	HP	Prefix control characters
CTIM	1	HM	Mid line control characters
Line 0	1	HL	Control character mode

PR CFG Printer Configure			
BAUD 02	1	PV	Printer Baud Rate 00=dump via serial 01=19200, 02=2400 03=38400, 04=4800 04=4800, 09=9600 10=disable print
Prtv 00	1	PP	Printer Parity 00=none 01=odd 02=even
CRLF 0	1	PL	Printer LF mode 0=cr only 1=cr+lf
Hdsh 01	1	PH	Printer Handshake 00=none 01=ready hi 02=ready lo
EOLD 00	1	PV	Printer EOL delay 00-09 x 0.1seconds
NNIN 0	1	MW	Print below minimum weight 1=allow print < minimum
NEGP 0	1	NP	Negative Print 1=allow print if -ve net
CHGE 0	1	FC	Print on wt. change 0=wt must go to 0 Or -ve 1=wt must change 20d
SE ? 0	1	MS	Set minimum to 5e 0=20e, 1=5e
TOLP 0	1	TL	Print in tolerance. 1=Only print if tolerance criteria met
POST 0	1	PO	Positive tolerance 1=use positive tolerance only
CALM 00	1	BF	Calming timer 01-99 x 0.1 sec settle time for Batch Mode
AUTO 0	1	AP	Auto Print mode 1=print on stable weight
Pntu 0	1	PU	Print unconditional 1=overrides printer flag
LIVE 0	1	AN	Animal weighing 1=enable auto filter on PRINT

Serial Serial Set-up			
Baud 09	1	EV	Baud rate 01=19200, 02=2400 03=38400, 04=4800 05=57600, 09=9600
Prtv 00	1	CP	Parity 00=8 data+none 01=7data+odd 02=7data+even 09=8data+odd 0A=8data+even
Crlf 1	1	EL	Line feed mode 1=cr+lf : 0=cr only
Echo 0	1	EE	Echo mode 1=echo ON
Ctrl 0	1	HC	Control character prefix w xx yy zz (hex)
Nodp 0	1	ED	No DP in wt data 0=embedded dp
chsu 0	1	EC	Append Checksum 1=append
nost 0	1	SE	No status information 0=embedded status info.
Ldaz 0	1	LZ	Leading/trailing zeros instead of spaces (0=spaces)
STRa 0	1	SG	Serial string Alternative formats SG0/1
Sina 1	1	EO	Data on request 0=continuous
Rmds 00	1	ER	Remote display 00=standard 01=cont o/p on print port 10=master (via serial) 20=master (via print port) 80=slave mode
net 0	1	EM	Multi-drop mode 1=multi-drop
Mbus 0	2	MD	Modbus Protocol (Factory Option)
485E 0	1	H4	RS232/485 select 0=RS232, 1=RS485 (*Note below)
addr IC	1	AE	Multi-drop Address 00-FF(h)

Config User Configure			
Unit 01	2	UN	Units (for printing) 00=none 01=kg 02=lb 03=g 04=gm 05=t 06=N 07=klb 09=mV(convert md)
Afil 0	1	AF	Auto filter acquire 1=acquire
Filt 02	1	FB	Digital filter band 1-8 (1 is lightest)
Filtc 40	1	DF	Digital filter coefficient 01-FF (FF is lightest)
Fast 01	1	FK	Fast Track 00=Off, 01=On
FrEz 0	1	SZ	Freeze 1=On 0=Off
Mbnd 00	2	MB	Motion band sensitivity
Mdlv 01	2	MY	Motion delay 00=Off 1-15=On - set delay stability criteria
Tout 01	1	MT	Motion time-out 00-98 seconds 99=no timeout
Updt 03	1	UD	Display update rate 01-06=0.1 to 0.6sec Except 00=20ms 02=40ms Non Trade 07-10=0.7 to 1.0sec
PEAK 0	1	MA	Max./Min. mode 1=enable
Func 0	1	FU	Select Function for MODE key 0-9
Dflt 0	0 1 2 3	DE	Default set-up 1=force defaults
Rn d 0	2	NE	Running No. disable 1=entry disabled
Pont 0	1	TV	Previous tare enable 1=ON
Zset 0	1	ZM	Auto zero set 1=ON
Zzbc 0	1	ZZ	Initial Zero Range 1=G 2% 0=G 10%
Trac 1	1	ZT	Zero track enable 0=disable
Spas 01	2	VP	Supervisor password

The Full Menus reveal only when Access Level is 1 or 2.

At PASS prompt: For level 1 : **↵**ENTER
For level 2 : **↵↵↵**ENTER

*Note - For units with Rev B/C baseboard (s/w PO6.0xx)
the 485E parameter becomes

H232 1	1	H2	RS232/485 select 1=RS232, 0=RS485
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Enacfa Engineering Configuration			
CERT 01	2	EX	Trade Mode 00=non-certified (pushbutton or password) 01=trade (pushbutton or password) 02=trade (pushbutton only)
Ucal	2	SU	Set/Force Uncal 1=not calibrated
rset	0	RS	Rest system 1=reboot
Pdel 0	2	EY	Power on delay 0=reduced power up time
Ponz 0	2	EP	Power on weight displayed 1=non zero power up
Fzer 0	1	CZ	Calibration zero value 1=restore original zero
Pntu 0	1	PU	Print unconditional 1=overrides printer flag
Lin2	2	L2	Set linearity breakpoint
Lin4	2	L4	Set linearity breakpoint
Lin6	2	L6	Set linearity breakpoint
Lin8	2	L8	Set linearity breakpoint
UNPO 0	1	EU	0=Bipolar wt 1=Unipolar (limited -ve range)
Fact	3=	MF	mV display calibration factor
CFRG	3*	CG	Adc configure display
Dedf	2*	DD	Adc deadload offset
Cal f	2*	CF	Adc calibration factor
DLTR	3=	DB	Factory deadweight optimizer
Zero	3*	IZ	First zero offset
Zoff	2	ZE	Zero offset
ADC	1	XA	Dump adc configuration
Cal b	1	RW	Restore calibration
S no	3	NS	Serial number
P no	3	VN	Version number
Cpas	2	PE	Level 2 (cal) password (Non-trade mode only)
ELOG	1	LO	Error log 1=dump error log
Pdmp	1	XC	Parameter dump 1=full parameter dump
Mem	1	XR	Memory image 1=dump memory
FLSH	1/2	FE	Flash ETR enable See application note
anen 0	2	EA	1=enable analogue
R en 0	2	EF	Enable flow rate 1=enable flow mode

= Pushbutton – values may be entered at level 2 if pushbutton is held down

Button Keyboard Button Disable			
Modb 0	1	KM	Mode key disable 0=enabled
pnth 0	1	KP	Print key disable 0=enabled
tarb 0	1	KT	Tare key disable 0=enabled
zerb 0	1	KZ	Zero key disable 0=enabled
tstb 0	1	KE	Test key disable 0=enabled

If MODE is disabled, hold it and press TEST to re-enter PARAMETER mode.

In out Configure Control I/O			
Setd 07	1	SM	Setpoint mode 00=comparator P/F 01=batching 02=comparator L/P/H 03=test I/O 04=comparator+tolerance 05=comparator+tolerance% 06=comparator+tolerance%'S' 07=simple trip
Stat 0	1	LF	Status byte displayed in MSD 1=On
_3_2_1_	0	H/I I2	Test inputs =ON =OFF
OP 1 0	1	O1	Test output 1 1 forces ON
OP 2 0	1	O2	Test output 2
OP 3 0	1	O3	Test output 3
OP 4 0	1	O4	Test output 4 if fitted
OP 5 0	1	O5	Test output 5 if fitted
IPAL 23	1	IA	Allocate inputs 2 digits: i/p1, i/p2 See section 4.6
OPAL	1	OA	Allocate outputs See section 4.7
O3en 1	1	OC	Third output 1=On, 0 for Lucid emulation
SteP 00	1	SP	Enables/adjusts checkweigher lightbar fitted in CM models. 00=disabled.
ATST 0	1	AS	Auto tare on start 1=tare before fill
AINF 0	1	IC	Auto inflight compensation 1=auto compensation enable
CALM 00	1	BF	Calm timer 0-99 in 0.1seconds
DSCH 0	1	DM	Discharge status 1=discharge mode
DSPR 0	1	PB	Discharge on print 1=enable

Analog Analog Output Set-up Only if option available and selected			
Err 0	1	GE	Error action 0=maximum on error 1=minimum on error
RATE 0	2	RO	Enable rate signal 1=follow flow rate
4 20 0	2	GC	Current mode 0=0-10V 1=4-20mA
NET 0	2	GT	Net tracking 0=o/p is gross 1=o/p is net
NEGN 0	2	GN	Weigh out mode 1=increasing o/p with decreasing weight
ZERO	2	GZ	Zero offset factor
ZADJ 0	2	YZ	Zero trim r and o step zero offset
CALA (Calat)	2	CA	Set full o/p at other than top (i.e. max) (default=cal at value)
Gain	2	GG	Gain factor
gadi 0	2	YG	Gain trim r and o step zero factor

The Full Menus reveal only when Access Level is 1 or 2.

At PASS prompt: For level 1 : **ñENTER**
For level 2 : **óóòENTER**

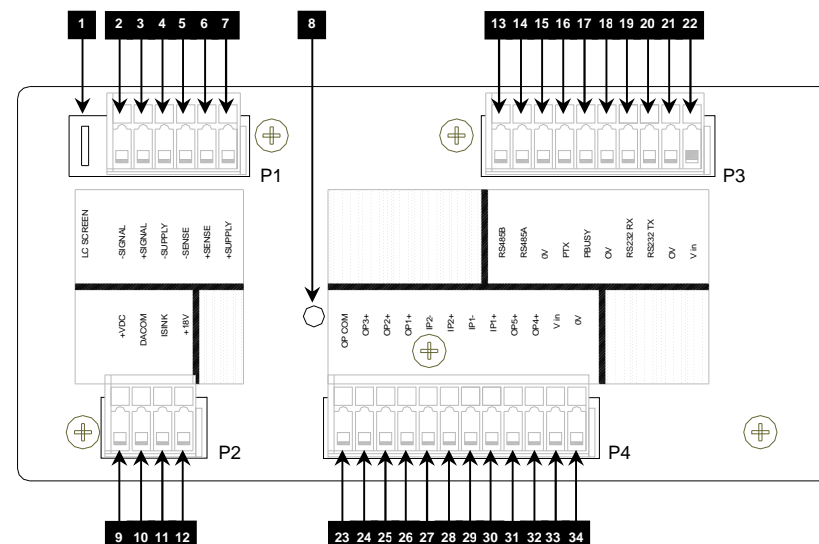
9. BASEBOARD LAYOUT - REFERENCES

Wiring Location References

No	Description – Rev C (or earlier) Baseboards	Description – Rev E Baseboards
P1	ADC	ADC
1	Loadcell Screen (Faston 6.35mm crimp)	Loadcell Screen (Faston 6.35mm crimp)
2	- Signal	- Signal
3	+ Signal	+ Signal
4	- Supply	- Excite
5	- Sense	- Sense
6	+ Sense	+ Sense
7	- Supply	- Excite
8	Calibration Switch Access Location (updating any parameter of Access Level 2 will immediately invalidate the Unit Verification. Until Verified (or Re-Verified) by a competent body the indicator will NOT BE LEGAL FOR TRADE).	Calibration Switch Access Location (updating any parameter of Access Level 2 will immediately invalidate the Unit Verification. Until Verified (or Re-Verified) by a competent body the indicator will NOT BE LEGAL FOR TRADE).
P2	DAC	DAC
9	+ VDC	+ VDC
10	DACOM	DACOM
11	ISINK	ISINK
12	+ 18V	+ 18V
P3	Serial Communications	Serial Communications
13	RS485B	RS485B
14	RS485A	RS485A
15	0V	0V
16	PTX	PTX
17	PBUSY	PBUSY
18	0V	0V
19	RS232 RX	RS232 RX
20	RS232 TX	RS232 TX
21	0V	0V
22	Vin	Vin
P4	I/O	I/O
23	OP COM	OP3-
24	OP3+	OP3+
25	OP2+	OP2-
26	OP1+	OP2+
27	1P2-	OP1-
28	IP2+	OP1+
29	IP1-	IP2
30	IP1+	IP2
31	OP5+	IP1
32	OP4+	IP1
33	Vin	Vin
34	0V	0V

Revision C baseboard (or earlier).

Note: Firmware version prompted at power on will be **PO6.0xx**.



Revision E baseboard.

Identified by REV.E printed on terminal connection label.

Revisions to the IFE1131 baseboard mean that the I/O terminal positions on P4 connector are different to earlier revisions, not directly interchangeable.

All revision E baseboards will be fitted with a 'polarising' pin and a mating connector.

Note: Firmware version prompted at power on will be **PO6.1xx**.

