CSW-20 Series

Operation Manual

Ian Fellows Limited

industrial
weighing
technology

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systems
instrumentation
applications
design

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 not withstanding, Ian Fellows Ltd. can assume no responsibility for any errors in this manual or their consequences.

Statement on Conformity

In 'Trade' mode, CSW-20 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. CSW-20 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.

Certificates of conformity can be provided on request.

Manual Revision B Issue 008 07/01/2014
Series PO6000 Software. (PO6_036/136 ⇒)

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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
Visit website
www.ianfellows.co.uk

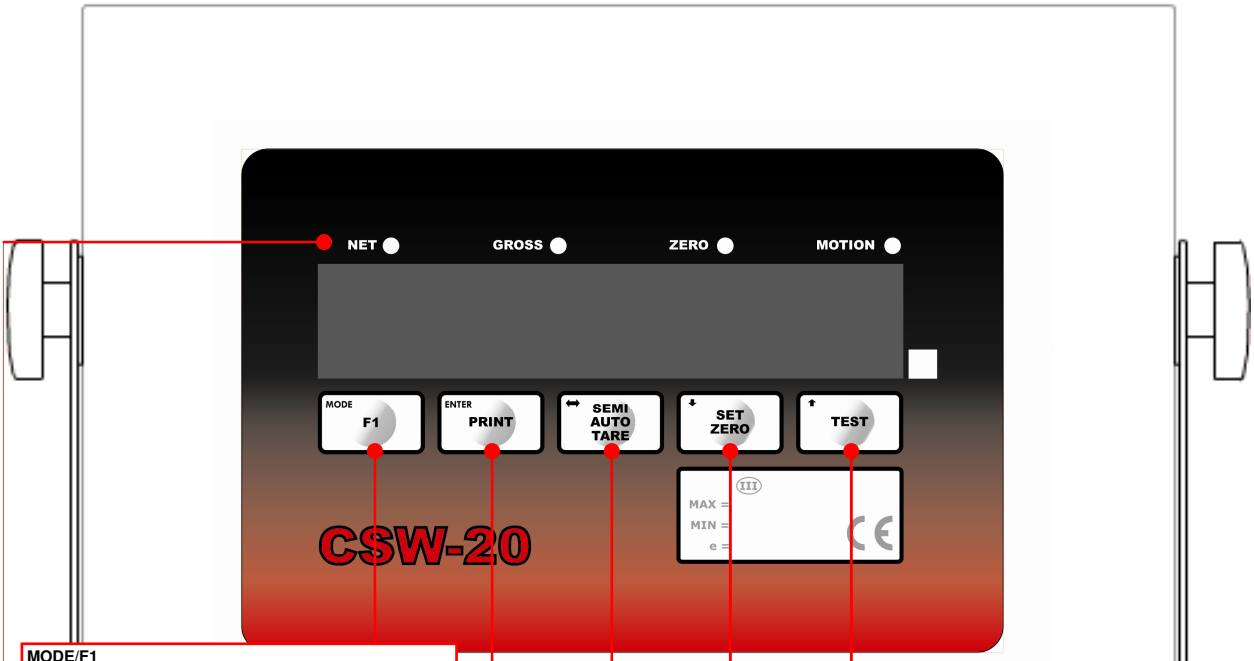
Software Version History

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	- 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	- 126 prepared for 'Flash ETR' options - modified handling of ? chr in serial comms - Help dump changed from ?? to ?* - DEAD acquire without clearing linearity adjust	- 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	- 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	- 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	- 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	- Once enabled, flash on this version can only be disabled at factory.
PO6.029/129	- Flash disable at level 2 by menu item FLSH - Increased protection against corruption that could affect CPI units during power disruption	
PO6.030/130	- 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. (factory use) and extended I/O test to cover future optional I/O	- Revised setpoint entry only applied for trade mode
PO6.031/131	- Revised setpoint entry applied for trade and non trade modes	- Remote display RMDS(ER) mode 20 could cause error loop at power on (Press TEST to skip)
PO6.032/132	- 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)	- 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	- 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.	- At power on always loads setpoint values for product code 1 regardless of last code. (Any Menu or Mode function updated)
PO6.035/135	-on power up, loads setpts for last product code used - Revised flash initialise to better suit latest devices.	-Deadweight inaccuracy when using extreme dead/gain -Serial errors on odd/even parity and 7 bit data
PO6.036/136	-Permit Flash Enable at access level2 without a code - NTEP parameter added for Handbook 44 approval - Accuracy of deadweight acquisition improved for high dead/gain applications - Corrections for odd/even parity and 7 bit data. - ME command permits embedded DP - Unsolicited diagnostic messages (eg DROPOUT) no longer sent. -mV/V displayed to 4dp - Misc tidying and improvements	

CSW-20 - Contents

1. GETTING STARTED

1.1 Panel Functions



MODE/F1
- 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 ☼	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 ☼	**GROSS WEIGHT** Displayed. (FLASHING, Display shows Gross Totalised Wt).		
ZERO ☼	GROSS WEIGHT IS **WITHIN 0.25** division ('e') OF ZERO.		
MOTION ☼	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	=	**C**ount mode
r	=	**R**ate mode
U	=	Converted mode, converted **U**nits.
.	=	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)
Ξ	=	Horizontal bars reflecting status of simple trip o/ps (SEtd = 07)

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

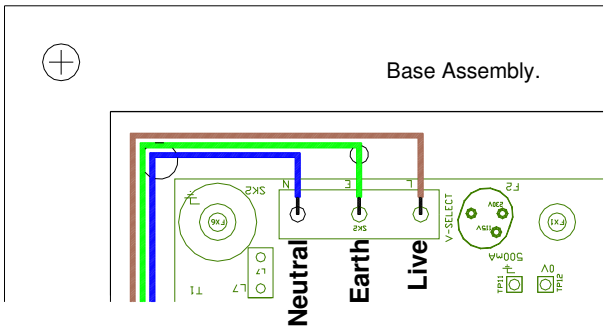
ALL indicators flash if a remote PC has placed a 'message' on the display (using ME command, introduced at version PO6.030/130).

1.2 Power Connection

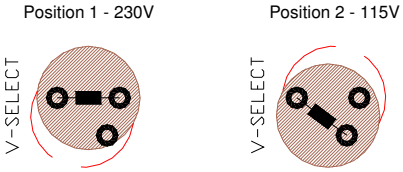
If not already pre-wired, connect incoming mains supply to terminals on SK2. Live to **'L'**; Neutral to **'N'**; Earth, attach an eyelet to end of wire and then to Earth Stud on the cover plate next to the cable gland. The earth connection then links as shown below. External supply should be fused according to supply cable capacity ~ typically 5 Amp.

Power Connection – revision E and earlier

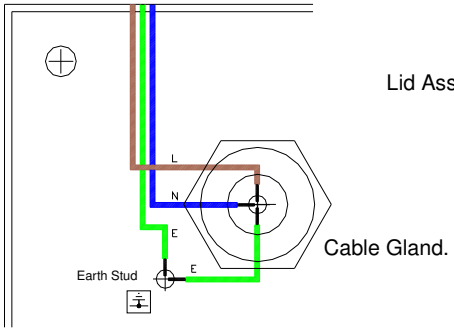
CSW-20 is usually supplied set for 230V (180-260V) operation unless specifically ordered (confirm by checking data plate). A replaceable internal fuse - T500mA (anti-surge) - is located at position F2 - configuration for 230V or 115V ac is possible by repositioning this fuse link– see below.



Conversion from 230V to 115V is possible by lifting the fuse out and replacing in alternative position.

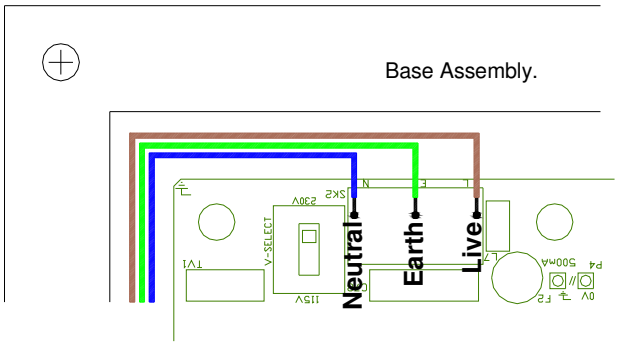


Remark the Manufacturers Plate if changed.

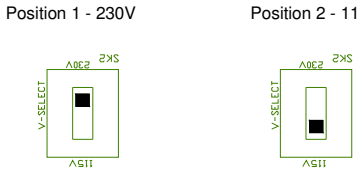


Power Connection – revision F

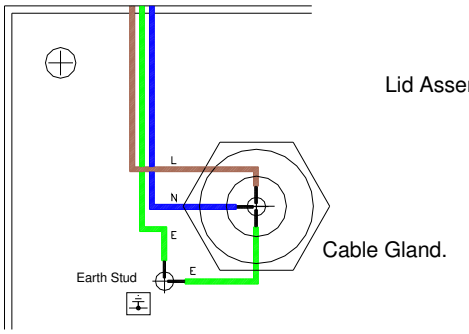
CSW-20 is usually supplied set for 230V (180-260V) operation unless specifically ordered (confirm by checking data plate). It is possible to configure for 115V ac by switching to the alternative position – see below.



Conversion from 230V to 115V is possible by switching to the alternative position.



Remark the Manufacturers Plate if changed.



1.3 Loadcell Connection

Note: Loadcell Cabling should be run separately from other wiring; especially mains A.C. supply wires and any such wiring crossing, if necessary, only at right angles and as far apart as possible.

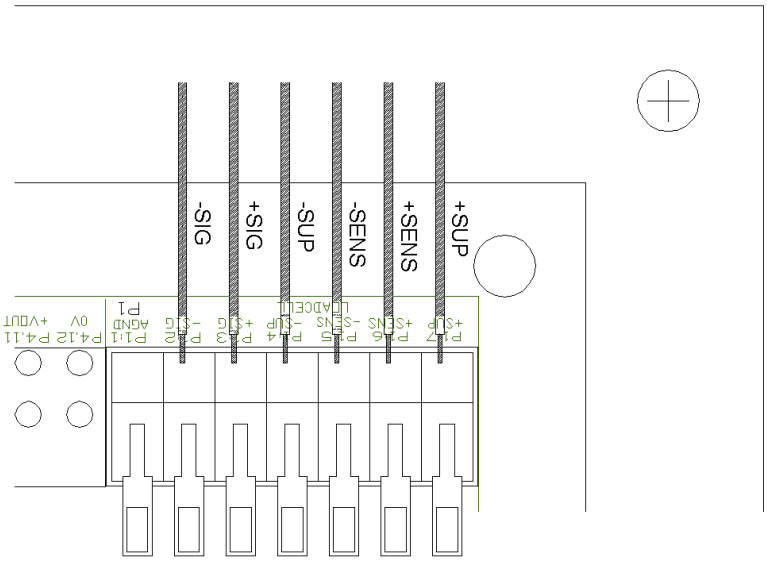
Maximum cable length between the indicator and loadcell junction box depends on the cross sectional area of the sense wires.
Max length = 150m/mm^2

The screen must be terminated to the case on entry, this can be achieved by removing the plastic insert from the cable gland, passing the cable through the insert and folding a small amount of screen back over the insert before refitting into the gland.

TAKE CARE TO ENSURE CABLE/SCREEN CLIPPINGS AND DEBRIS ARE NOT ALLOWED TO FALL IN THE CASE.

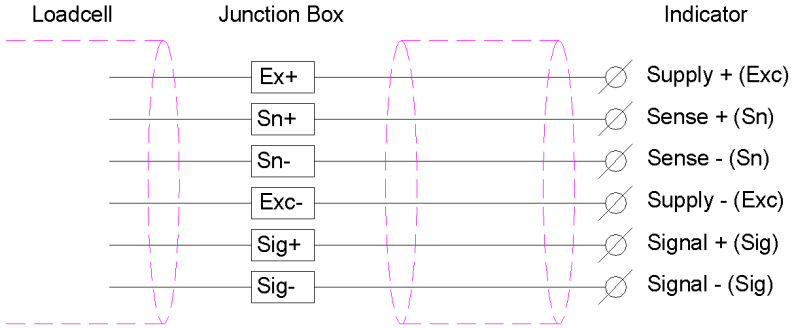
Each wire is stripped back 5 to 6mm and the core twisted before inserting into the appropriate 'WAGO' cage clamp terminal while depressing it's 'piano key' lever with a small screwdriver. Do not 'tin' the wire ends, or fit 'bootlace' terminations.

Loadcell Connection

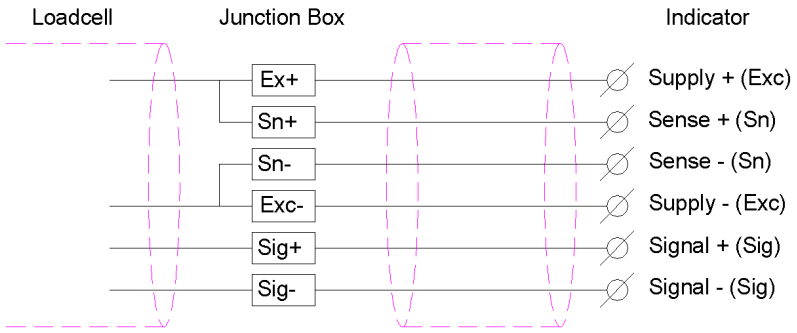


Press levers downwards and insert the prepared wires.

6-wire Loadcell Cable Connection Schematic



4-wire Loadcell Cable Connection Schematic



It is essential that the 'sense' inputs are connected. Normally, 6 wires are taken to the loadcell junction box where the 'sense' wires are linked to the 'excitation' terminals. For direct 4 wire loadcell connection, the 'sense' inputs must be linked directly to the 'excitation' terminals inside the indicator.

1.4 Control Outputs and Inputs

The IO interface was updated and revised at Baseboard Rev E to permit output switching positive or negative. Connection information is described below. See section 9 at rear of manual - Baseboard Layouts - to identify terminal locations. For operation of I/O see section 4.

Input/Output Cable Screens

It is recommended that screened multicore cables be used to connect to the various input contacts and output loads (use separate multicore cables for inputs and outputs). Ground cable screens to the cable gland at point of entry. Keep any unscreened portion of cable as short as possible to avoid electrical noise pick-up or radiation.

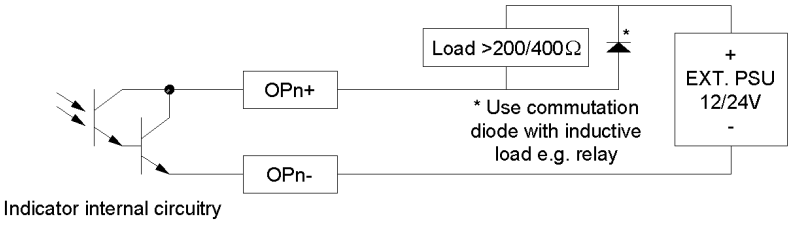
OUTPUTS 1, 2, 3 REV C Baseboard

Terminals marked for outputs 4 and 5 are never used

Recommended Interface

The recommended option is to use an external DC supply. 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. Use screened cable and connect screen to the gland at point of entry. Do not connect screen at 'load' end of cable.
Each output load may draw up to 60mA (Load resistance >200Ω for 12v; >400Ω for 24v). The outputs consist of uncommitted darlington opto-isolators, capable of 'sinking' >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 'OP COM', or damage to the output device will occur. 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.

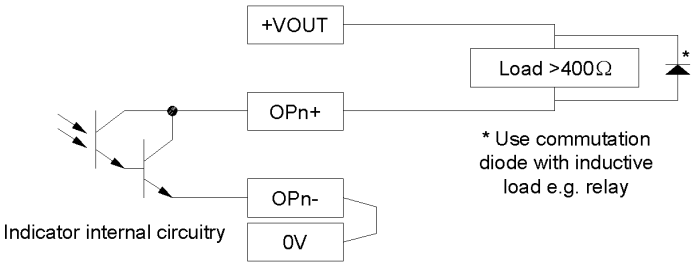
Recommended Interface - Common Positive Drive



Alternative Interfacing

Below is an alternative scheme using the internal, unregulated supply '+VOUT'. This method has potential to create a 'noise' hazard, because it involves external connection to the internal supplies. However, if the distance is short; it may be done, with care. The actual voltage available at '+VOUT' is variable dependent on the number of display segments illuminated, and other load factors. On a 230v supply, it will vary between 22v and 32v, on 115v; it may drop as low as 18v. However, it should be compatible with most industrial 24v rated inputs.
+VOUT will supply typically up to 100mA (200mA if DAC option not fitted).

Alternative Interface - Common Positive Drive



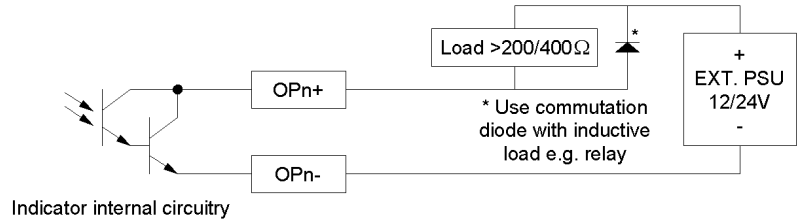
OUTPUTS 1, 2, 3 REV E Baseboard

Recommended Interface

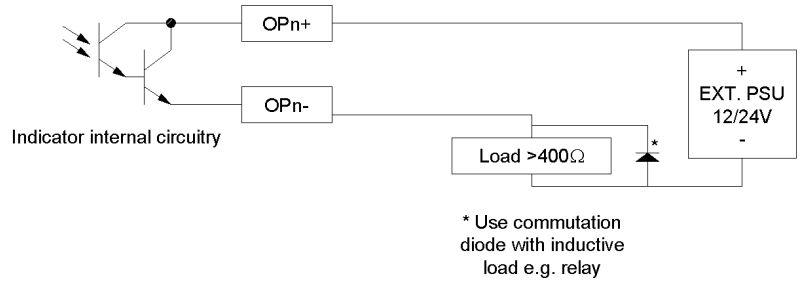
The recommended option is to use an external DC supply. Be sure to fit 'commutation' diodes across any inductive load such as a relay coil. Without it the indicator's opto-isolator transistor may be destroyed. Use screened cable and connect screen to the gland at point of entry. Do not connect screen at 'load' end of cable.
Each output load may draw up to 60mA (Load resistance >200Ω for 12v; >400Ω for 24v). The outputs consist of uncommitted darlington opto-isolators pairs, capable of 'sinking' or driving >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 incorporates a 100mA reset-able fuse - reset by power off and allow to cool. 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.

Recommended Interfacing

Common Positive Drive -



Common Ground Drive -

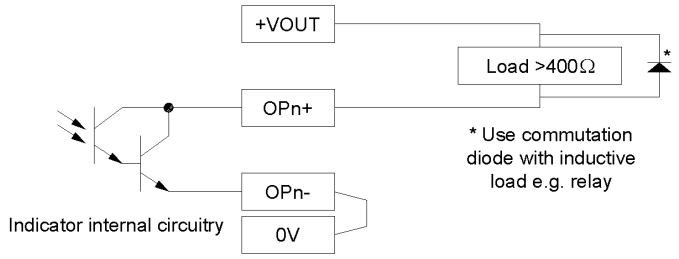


Alternative Interfacing

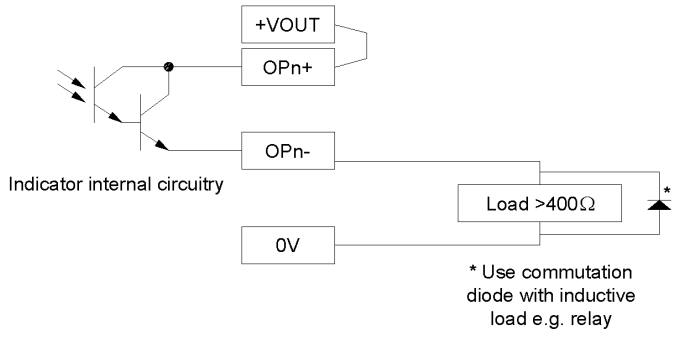
Below are alternative schemes using the internal, unregulated supply '+VOUT'. This method has potential to create a 'noise' hazard, because it involves external connection to the internal supplies. However, if the distance is short; it may be done, with care. The actual voltage available at '+VOUT' is variable. It will vary considerably, dependent on the number of display segments illuminated, and other load factors. On a 230v supply, it will vary between 22 and 32v, on 115v, it may drop as low as 18v. However, it should be compatible with most industrial 24v rated inputs. We recommend that the available +VOUT supply is checked to ensure suitability for your use. It will supply typically up to 100mA (200mA if DAC option not fitted).

Alternative Interface

Common Positive Drive -



Common Ground Drive -

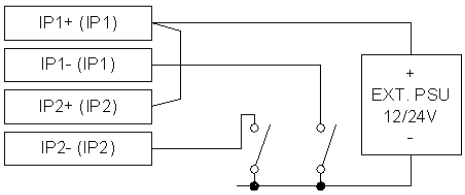


INPUTS 1 and 2 Rev C and Rev E Baseboard

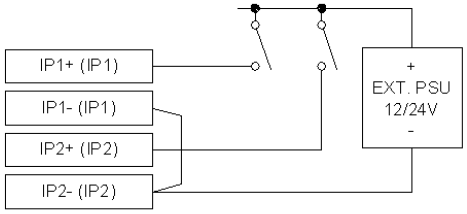
Important Note :-
Rev C baseboard Inputs are polarity dependent. (Connections marked: IP1+, IP1- & IP2+, IP2-)
Rev E baseboard Inputs are not Polarity dependent (Connections marked: IP1, IP1 & IP2, IP2)

The normal method for connecting to the control inputs is from an external 12-24V DC power source, 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). As 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). Special care should be taken with any relay contact selection, especially if 12v is used. Good quality, gold plated is recommended.

Recommended Interface - Switching to negative

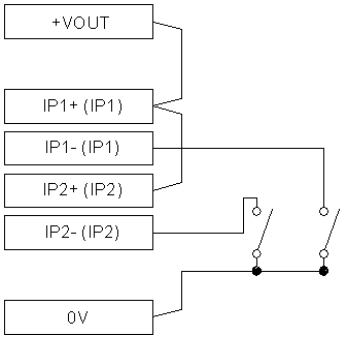


Recommended Interface Switching to positive

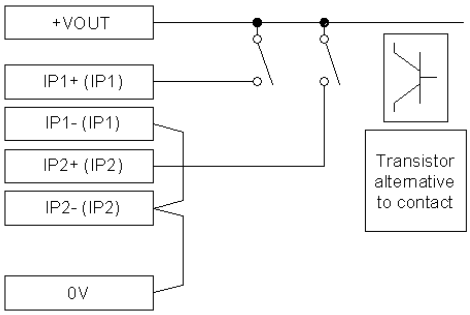


Alternative Interfacing
As with the output examples previously, there is an alternative, non-preferred scheme. Two examples are shown for positive and negative switching. These both use the internal, unregulated '+VOUT'. This is un-recommended because it involves external connection to the internal supplies; in some situations a 'noise' hazard. However, if the distance is short, it may be done, with care. The actual voltage available at '+VOUT' is variable but it will reliably drive the control inputs.

Alternative Interface - Switching to negative



Alternative Interface - Switching to Positive



1.5 Printer & Comms Connections

See section 9 at rear of manual - Baseboard Layouts - 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

CSW-20 Baseboard		Printer Function	9 Way 'D'	25 Way 'D'
COM (ground) P3:10	-	Comms Ground	5	7
PTX (transmit) P3:11	-	Receive (RX)	3	3
PBUSY (busy) P3.12	-	Busy (DTR)	6	20

Indicator to PC

CSW-20 Baseboard		PC Function	9 Way 'D'	25 Way 'D'
COM (ground) P3:7	-	Comms Ground	5	7
TX (transmit) P3:8	-	Receive (RX)	2	3
RX (receive) P3.9	-	Transmit (TX)	3	2

1.6 Switching On

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

- Software Version number display e.g. PO6_022 (give this number in event of a query).
- Traceable Access Number display e.g. tAn 021
  (This number increments when changes are made to calibration – Requiring Access Level 2
- Self testing of internal electronics; prom, eeprom, ram, a-d etc. will occur.
  Diagnostics indicate failures (see Section 6).
- 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 22PC [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**/ **HoP**) 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

❑ Press **MODE** for 1 second to display **PASS**. Obtain required Access Level using Passcode or pushbutton and proceed to MAIN MENU **USEr__** Then ⇧⇧⇧ to select **CALIbn__**	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 These are default passcodes and may be altered by installer Level 2 Passcode access is permitted when **En9_CF9 CErt** = 0/1
❑ Press **MODE** again to enter the calibration menu.	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.

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

❑ Press **MODE** to show 'increment' (scale interval) together with decimal point position, if applicable.	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
❑ Press **ENTER** to set selection and move on …	

HoP ~ Maximum Display Capacity ('max')

❑ Press **MODE** to show current value for MAX CAPACITY.	Edit using the ⇦⇩⇧ keys
	Note: The display will be maintained for 9 divisions (e) beyond this value. Having changed this value, **full calibration MUST be carried out.**
❑ Then press **ENTER** to set selection and move on…	

FILt ~ Filter Band Parameter

❑ Shows current Filter Band Setting 00 - 05 or 10	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 **FLtC** parameter in the **ConFI9_** Menu
❑ Press **ENTER** to set edited selection or ⇩ to step past and move on….	

FASt ~ Fast Track Parameter

❑ 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	**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.
❑ Press **ENTER** to set edited selection or ⇩ to step past and move on….	

FrE2 ~ Display Freeze Parameter

❑ 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	**0** = **OFF,** display tracks weight changes immediately **1** = **ON,** stable readings will latch for up to ~ 0.5s
❑ Press **ENTER** to set edited selection or ⇩to step past and move on….	

dEAd ~ Deadload Offset Calibrate

❑ Press **MODE** to show approx **millivolt per volt** output from loadcell(s).	Excitation is approx. 5 Volts Ensure weigh platform is empty and stable, and the mV/V reading is as might be expected.
❑ Press **ENTER** to initiate automatic DEADLOAD acquisition. This will take several seconds.	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.
❑ Display will eventually show… or press ⇩to skip Deadload Calibration and reach …	

CALAt ~ Enter Span Calibration Weight

❑ Press **MODE** to display currently defined Span Calibration Weight value. Press **MODE** to Edit using the ⇩⇧ keys	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**)
❑ Press **ENTER** to set selection and move on …	

CAL ~ Span Calibrate

❑ Press **MODE** to show approx **millivolt per volt** output from loadcell(s) less the deadload offset	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
❑ Press **ENTER** to initiate automatic SPAN acquisition. This will take several seconds.	For Trade mode, the loadcell signal must be ≥1µV for each division (e).
❑ Display will eventually show…. Or press ⇩ to skip span Calibration…	CAL may be skipped if it is only desired to re-acquire DEADLOAD on a previously calibrated system.

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.

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

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

tESt ~ Display Wt x10 (Fine Trim)

❑ Pressing **MODE** puts into **x10** weight display mode with a flashing t in the display MSD, then~	⇔Enters a 'SPAN TRIM' mode (only if level 2), indicated by flashing t. in MSD (with decimal point.).
	⇧ Nudges span calibration factor up by one tenth of a division.
	⇩ Nudges span calibration factor down.
	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.
	The limit of 12.5% of capacity applies so nudging is inhibited below this weight.
❑ **ENTER** or **MODE** ends the span trim procedure.	Unless at ACCESS LEVEL 2, it is not possible to 'fix' any values obtained above.
	If in Trade mode, ⇔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 AborT? 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.
	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 ⇔instead of **ENTER** will bring up the AborT? Message. A further press of the **ENTER** key or the ⇔key will restore the old values.
	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.
	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.

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 ⇔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. Adjustment is limited to a max amount equal to 12 scale divisions (12 x dISP)

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

2.3 Virtual Calibration

Pressing ⇩ 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.

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

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 mV/V. Enter **1.200** 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: -

❑	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
❑	The loadcell manufacturer's sensitivity figure may be wrong or may be affected by other cell summing/cornering devices.
❑	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))

CSW-20 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 **FrE2** – holds a stable reading from unnecessary flicker
Motion Band – see **Ξbnd** – affects the system conditions required for STABLE weight
Motion Delay – see **ΞdLY** – 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

FrE2 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 **FrE2** to 0.

Typical Fast/Freeze combinations

FASt	FrE2	TYPICAL APPLICATIONS
1= Fast Track ON	1= Display Freeze ON	Catch Weight, Parcel Weighing
	0 = Display Freeze OFF	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: CSW-20 Filling mode (SEtd 01) automatically handles the way in which the filter is applied during fill. However FASt & FrE2 settings will affect the behaviour before and after fill. For example if weight might need manual top up after fill set FASt =0 (Off)

Ξbnd parameter, found in the ConFIG menu (level 2 Access) can be used to relax the conditions defining stability.
By default Ξbnd = 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 Ξbnd (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 Ξbnd = 0.

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

ΞdLY	
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
								Non Trade Only			
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.

3. MENU FUNCTIONS

3.1 Set Up Menus

The basic operator functions and displays are illustrated in section 1.1 and section 4 gives information on quick access functions that can be configured on the **MODE** key. Many additional functions and features are accessed using 'Set Up Menus'.

To access the menus, press and hold MODE for 1 second - the display shows PASS

A pass code or use of the internal pushbutton switch will now determine the access level (permissions) to be granted.

Once within the menu system, the five front panel buttons will operate according to their secondary functions
MODE ENTER ⇔ ⇩⇧

3.2 Access Levels - Passcode & Pushbutton Entry

Parameters within the menus are protected by different **ACCESS LEVELS** - Most parameters can be read at any access level, but may only be edited at the specified access level or higher.

Access Level	Class	Procedure
0	General User Parameters eg Time/Date, Product Code…	
1	Installer/Supervisor eg Most configuration parameters, totals clear…	Level 1 code - At PASS prompt enter code Default = 1 :- ⇧ **ENTER** or serial command PW1
2	Installer/Engineer eg calibration and other restricted configuration parameters	Internal pushbutton if EnG_CFG CErt=2 ; Level 2 code if EnG_CFG CErt=0/1 At PASS or PSHbUt prompt, press internal pushbutton or enter code if permitted, Default = 900 :- ⇔⇔⇩ **ENTER** or serial command PW900
3	Factory only (some can be edited at level 2 by holding internal pushbutton when pressing **ENTER**)	
If higher access is not required, PSHbUt and PASS can be skipped by pressing **MODE** or **ENTER** without other entry.		

Pushbutton

The internal pushbutton for level 2 (S1) is located on the baseboard inside the unit.
See baseboard diagram at rear of this manual (Position reference 3)

Pass codes

- Codes are up to 4 digits long and are entered using the ⇔⇩⇧ keys and the **ENTER** button.
- Codes are entered from **right to left**, the actual digits are not displayed, a dot shows as each digit is set.
- Each digit can be cycled up 0-1-2… or down 0-9-8… using ⇩⇧. Step to the next **left** using ⇔.

EXAMPLE - code "900" could be entered		or more easily:	
Display	**Key**	**Display**	**Key**
PASS .	⇔	PASS .	⇔
PASS ..	⇔	PASS ..	⇔
PASS...	⇧⇧⇧⇧⇧⇧⇧⇧⇧ **ENTER**	PASS...	⇩ **ENTER**
ACCESS2		ACCESS2	
		(The access level is shown while the **ENTER** key is held pressed)	

Default level 1 code is '1' **- alter with** SPAS **in** ConFIG_
Default level 2 code is '900' **- alter with** CPAS **in** EnGCFG_

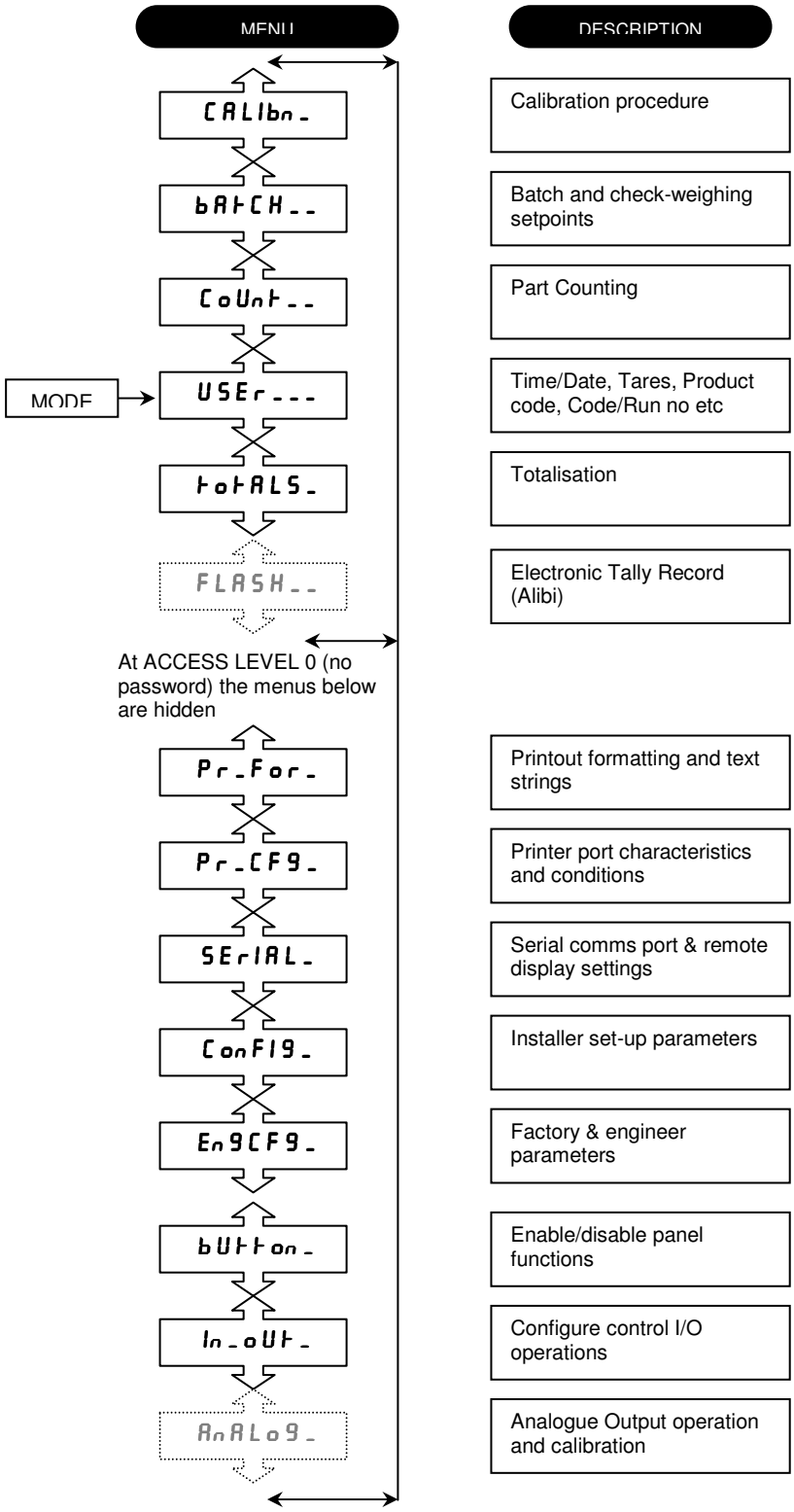
Level 2 is required to alter either code - Always set codes before sealing of instruments for trade use.

- Once an access level is obtained it remains effective so long as the system remains in menu mode.
- Return to weighing mode using the ⇔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 off, access will reset to level 0 automatically.
- Return to weighing mode using the **ENTER** key immediately resets access to level 0

3.3 Selecting Menus and Accessing Parameters

- On initial entry to the menus the first menu title USEr___ is displayed
- Step up or down through the available menu titles using the ⇩⇧ keys.
- At access level 0, only a subset of the available menus are displayed.
- At access level 1 and above the full menu set becomes available.
- Two special menus AnALog_ and FLASH_ only appear when these options have been enabled.
- 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.
- 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 CALIbn_ and EnGCFG_ menus.)
- The parameters within a menu are stepped through with ⇩⇧ keys.
- 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.

- If the value is already shown then one digit will flash to show that it may be edited using the ⇩⇧ keys.
- If only the parameter name is displayed, then pressing **MODE** will reveal the value with one digit flashing ready to edit.
- If the ⇩ or ⇧ key is held depressed, an auto-increment mode begins after a short wait.
- ⇔ steps to the digit which flashes for editing (steps back to start when end reached).
- If ⇔ key is held depressed for 2 seconds, the displayed value is cleared to zeroes.
- **ENTER** sets the new value. A `noPASS` or other diagnostic message may be displayed if entry is not permitted or unsuitable.
- **MODE** toggles out of edit mode, but does not store the value. (Changes will be lost if stepped to another parameter)
- 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	⇩⇧ step through the choice of **MENUS** **ENTER** or ⇔ return to **WEIGHING MODE** 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.
AT PARAMETER DISPLAY	⇩⇧ step through the **PARAMETERS** **ENTER** returns to **MAIN MENU** title**,** ⇔ returns to **WEIGHING MODE** 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.
EDITING PARAMETERS	**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

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 ~

- To make entry easier, text strings are entered from the left instead of from the right as with numeric and hexa-decimal values.
- If the ⇔key is held pressed for 2 secs, alpha strings clear to spaces.
- The increment/decrement ⇩⇧ sequence is 0-9, A-Z using UP, or a-z going DOWN, 'Esc' (1Bh), 'EOS' code (1Fh), 'space' code (20h).
- Alpha characters are represented by a 'stylised' 7 segment character set (see note below).
- 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.
- Non-printing control characters (special entry routine; see below) are displayed as ' ¯ '
- 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).

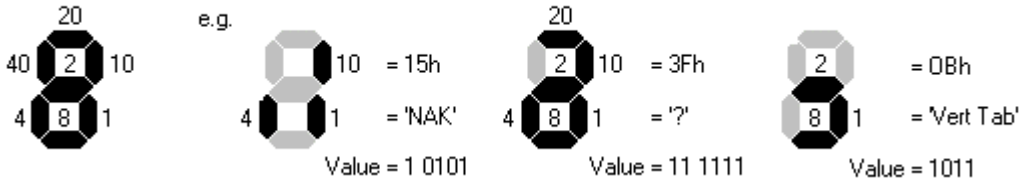
NOTE: The 7-segment display uses a stylised alphabet. Most letters are obvious but the following are cryptic:

J = J k = k M = M t = t U = U and V W = W X = 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 ~

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

CSW-20 contains a Real Time Clock - time and date can be adjusted by using parameters in the USEr__ Menu

tIme 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 (PtotL), 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 / St2A / St2b 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 (PArt) 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)

Whist 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 ConFIg_ 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 tArE

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 then repeat for the second item prompted

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 LoUU
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.

- In the USEr___ MENU, select tArE ~ the currently selected 'register address' is shown.
- Press **MODE** and use arrow keys to select a tare code between **01** and **12** then press **ENTER**
- The stored tare for this code is now displayed (**NET** and **GROSS** LEDs flash).
- At this stage, you may browse other tare codes using ⇩⇧ keys
- To modify the value of any tare, press **MODE** and edit using the arrow keys then press **ENTER**
- 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 2SEt = 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 **SEtd** in the **In_oUt_** MENU.

SEtd = 07 (Default) provides 3 simple trip outputs.

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

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

SEtd = 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 (**SEtd**) 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.
- Select **CodE** parameter and set PRODUCT CODE (**01 - 12**)
- 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 SEtd 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 weight indicators using only two outputs. Normal operation might be further altered by use of the **oPAL** parameter, see later.

SEtd 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
> SPt1	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 LoUU 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
> LoUU	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---

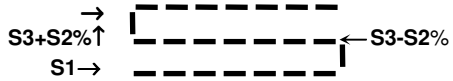
tArg (Setpoint 3) defines centre of pass band

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)
SPt 1 (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)
Jo9t (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)

SAEP (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 **toLP** 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.

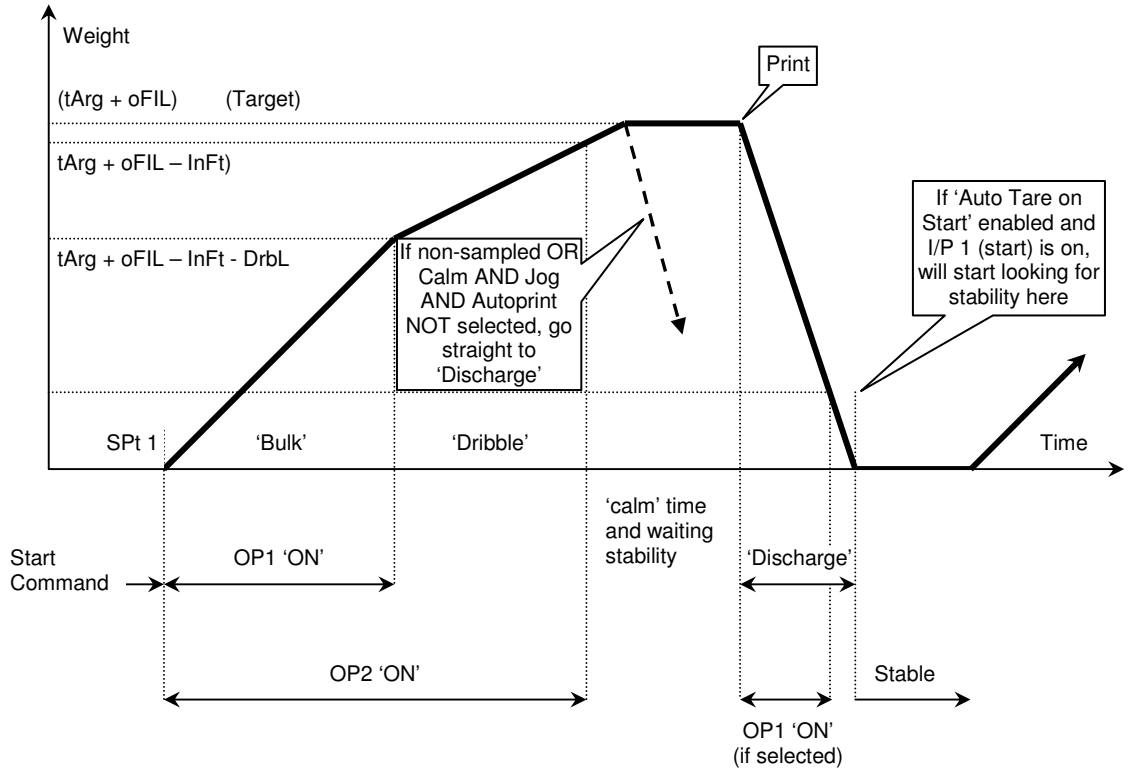
dSPr Discharge on Print parameter can be used to inhibit the discharge if a successful print has not occured. May either be ON (1) or OFF (0) and if OFF, the default value, then discharge will be dependent solely on the state of **dSCH** as above. If ON then discharge will only occur after a successful 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.

Jog 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/toLP/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).

- 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" - **IPALOx**
  - 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.

- **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.

- **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.

- **CUT-OFF –** occurs (display MSD blank)
  If a Non-Sampled weighment go to Batch Complete below.
  If **CALΞ** timeout is awaited **bUSY** displays.
  - If Automatic In-flight Compensation Adjustment is selected **AInF 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 **Jogt** 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 **CALΞ 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.

- **BATCH COMPLETE** (**E** status character)
  Subject to Discharge conditions, Output 1 OPERATES to denote **DISCHARGE.** This special discharge state may be used to initiate **DISCHARGE**, or operator controls load removal directly. Batch Complete status (see 4.7) could be allocated to O/ps 1 or 2, if single feed, or O/p 3 if available.

- If **START COMMAND** from remote Input 1 is still valid, the next cycle starts as soon as weight stabilises below Setpoint 1. Otherwise, a new Start Command is awaited before re-commencing the cycle.

Note
- If not required, it is preferable to disable the analogue output when batchweighing in order to achieve best 'cutoff' accuracy in high-speed applications (**AnEn 0** in **En9_CF9**). Default is disabled.
- **SEMI-AUTO TARE** and **PRINT** are disabled during fill.

4.6 Remote Operation (Control I/P assignment)

The two Control Inputs can be configured to act as Start/Stop Batch signals or as remote alternatives for the front panel buttons (see 4.3 for typical wiring).
The **IPAL** parameter in **In_oUt_** is a two-digit parameter; the first selects input 1 action; the second (least significant) selects input 2 action.

'IPAL . <i/p1> . . . . <i/p2>'	
0 = start batch	**0** = start batch
1 = hold batch (after fill)	**1** = stop batch
2 = acquire tare (default)	**2** = acquire tare
3 = toggle tare (acquire if in Gross,	**3** = cancel tare (default)
4 = print cancel if in Net)	**4** = print
5 = set zero	**5** = set zero
6 = display gross	**6** = display gross
7 = send/display totalised net wt.+	**7** = send/display totalised net wt.+
8 = print/clear totalised wt.+	**8** = print/clear totalised wt.+
9 = print, don't clear, totalised wt.+	**9** = re-configure i/p2 as output 3*

+ operate on currently selected PRODUCT CODE total. 8/9 clear/print all if CODE = 99.
* requires i/p2 to be factory (hardware) configured as an output.

A second indicator may be used as a 'Remote' Display/Keyboard for the 'Local' indicator. They are interconnected via their Serial Interface ports and the **rEdS** parameter in **SErIAL_** is set in each unit according to the list in Section 5.2.

4.7 Control O/P and Printout Assignment

The **oPAL** parameter in **In_oUt_** consists of six hex digits which can modify the operation of each output as below:

Digit No: 1 2 3 4 5 6 7

	OUTPUT 1		OUTPUT 2		OUTPUT 3 (only if fitted)	
Not Used – see note	Comparator Mode	OUTPUT 1	Comparator Mode*	Status Mode	Comparator Mode*	Status Mode

Note: Digit 1 is unused – from NO6_00F is automatically set by the software and used as a check digit.
***** These digits unused except in Setpoint Mode **SEtd 07**.

Outputs operate as described in Setpoint Mode descriptions (see 4.3 and 4.4), but may be customised using these digits. Leave as all zeroes unless special function required. In such cases, read the following carefully before modifying Digits 2-7.

Digit 2 Modifies how outputs operate in **Setpoint Modes** other than **'07'**
0 (Default) Setpoint weight value based on **Net Weight.** Setpoint values are positive of this zero, and output operation is 'instantaneous' (stability is not awaited).
1 Setpoint weight values based on **Gross Weight** ('zero' is always true zero weight). Only valid for **Setpoint Modes 00, 02, 03** and **07**.
2 Setpoints operate when **Negative** of indicated zero instead of positive (for weighing out).
4 Setpoints operate when **Positive** *or* **Negative** (i.e. on the *modulus* of weight).
8 Must await **stability** (no-motion) before outputs operate.

The values above may be summed to give a combination of 'modifications'. E.G. '**OPAL 9**xxxxx' (i.e. 8+1) would delay output operation until a stable gross weight at or above the particular setpoint was reached. **'OPAL C**xxxxx' (8+4); output operates when no motion at or beyond setpoint, positive *or* negative of NET zero.

Digits 2, 4, 6 Modify how outputs operate in **Setpoint Mode '07'**
In this mode, each output has it's 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.

- **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 releases (i.e. failsafe) on **Alarm** condition*.
4 Output operates when **Negative** and in **Net** mode.
5 Output operates on **Negative Gross**.
6 Output releases (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

- ❑ With the weighpan empty, ensure the 'ZERO' light is on ~ press **SET ZERO** if not.
- ❑ Add the required sample number (1-99) to the weighpan ~ press **MODE**
- ❑ 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 00` a second press will toggle the display to show `Add --`.
  Pressing **ENTER** whilst displaying `Add 00` 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

- ❑ Count mode can be exited by setting the `CnEn` parameter to zero.
- ❑ Whilst in the count mode, pressing **TEST** will display the live weight

Changing to a Different Part (or to Cancel Mode)

- ❑ Ensure COUNT mode is enabled as Sample Weighing above
- ❑ With the weighpan empty, ensure the **ZERO** light is on ~ press **SET ZERO** if not
- ❑ Press **MODE** ~ display will indicate **'Add 10'** (or **01 - 99**, as previously set)
- ❑ 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
- ❑ Add the selected/requested sample number to the weighpan (none if cancelling mode)
- ❑ Press **ENTER**
- ❑ Display will show live count with flashing `C` in leftmost digit position
- ❑ NOTE: Pressing **ENTER** with `Add 00` displayed cancels Part Count Mode

Counting with known Part(s) Weight

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

Counting with Part Weight stored against Code

- ❑ 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 weighment.
- ❑ Select `CoUnt_` (or `USEr___`) menu, Select appropriate `CodE`
- ❑ Press **ENTER**, **ENTER**, **ENTER** to return to direct part counting of the selected item.
- ❑ Use any of the above routines to programme alternative weight into the selected **'CodE'** location.
- ❑ 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

- ❑ Press **MODE** then ⇔to show `Add 00` then **ENTER**.
- ❑ Alternatively, select `CnEn 00` 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 ConFIG_ 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.

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

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

4.11 Analogue Output (Option)

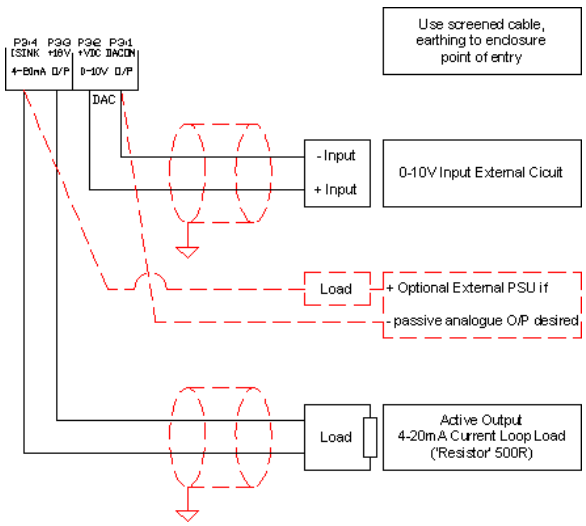
Baseboards Rev C may have an integral analogue output fitted. Rev D onward use an optional plug in module.

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 4-20 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 2Adj 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 2Ero parameter.

Similarly to calibrate the gain, select 9Adj 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 9AIn 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 rAtE 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 AnALog_ 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 – See section 1.5

5.2 Serial Comms ~ SErIAL_ Parameter Menu

- 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 Note – CSW-20 Flash ETR Rev2+.**
- 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).
- 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 CSW-20.
- All of the parameters available on the CSW-20 are available via the Serial Interface.
- 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, 03=38400, 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 d.p. from weight and adds as a byte after units (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).
Ld92 (from PO6_x33)	1	spaces in weight string bytes are replaced by zeros (default '0' = spaces).
Str9	1	sets serial string format (SG1 or O – see 5.3).
SIn9	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 00 00 00 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

MExxxxxxx 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.

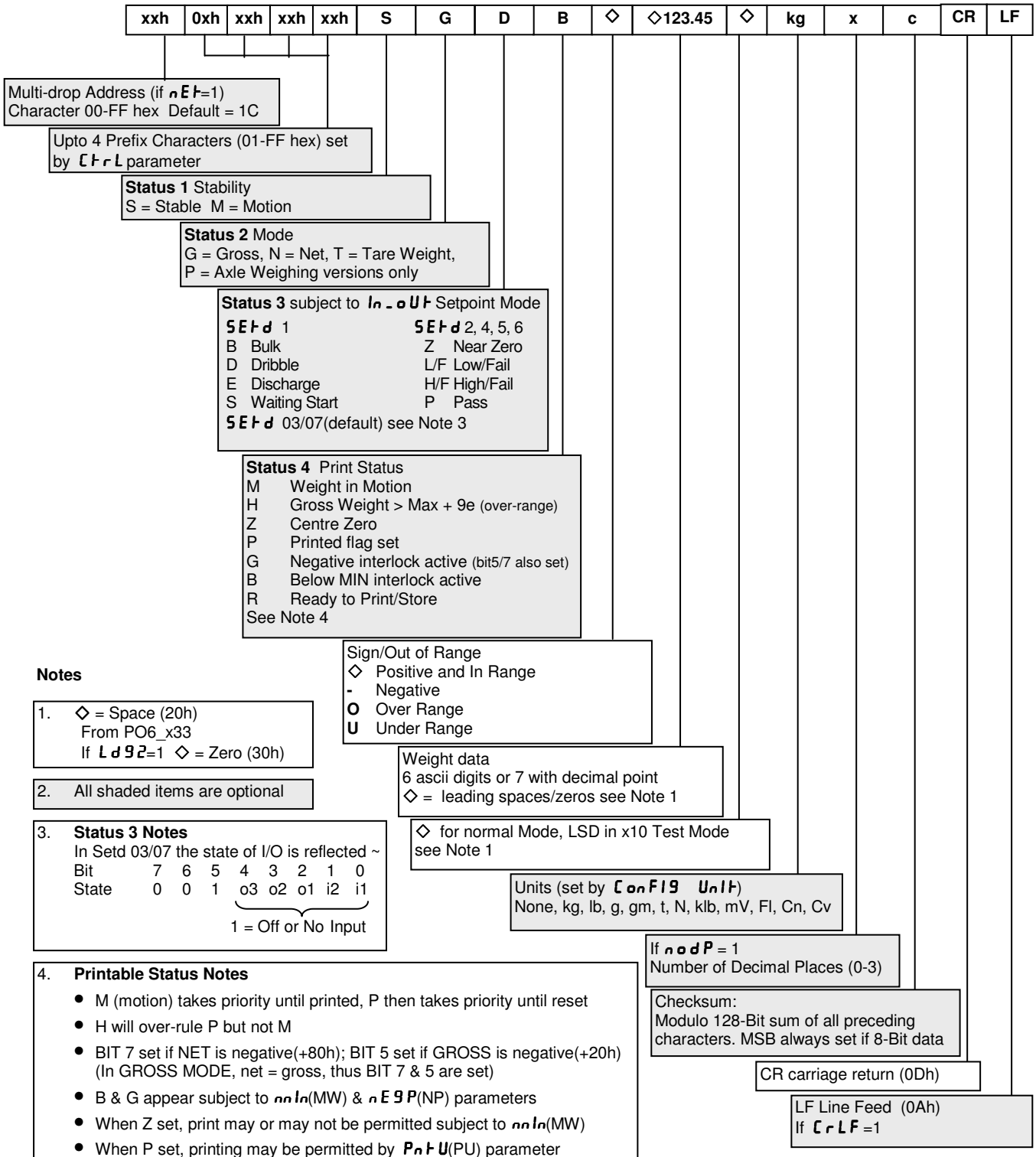
Weight registers are sent with extended x10 digit (ie superfluous 0 unless displaying x10 digit) and without decimal point. Some registers are sent with a suffix 'type' letter (W-weight, D-decimal, H-hex etc.) These are a legacy to earlier protocols, primarily retained for compatibility and bear no great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

5.3 Serial Interface Weight Data Format

The serial interface can be set to continuously transmit (SIn9 0) a weight string each time the weight display is updated (default ~300ms) or on request only (SIn9 1) - request command **WT**
(Same formats apply for request gross XG, net XN and semi-auto tare XT)

There are two string formats, selected by parameter Shr9 or command SG0/SG1. Each has elements that are subject to other parameters settings.

The default SG0 weight string:



Notes

1. ◇ = Space (20h)
   From PO6_x33
   If Ld92=1 ◇ = Zero (30h)
2. All shaded items are optional
3. **Status 3 Notes**
   In Setd 03/07 the state of I/O is reflected ~

Bit	7	6	5	4	3	2	1	0
State	0	0	1	o3	o2	o1	i2	i1

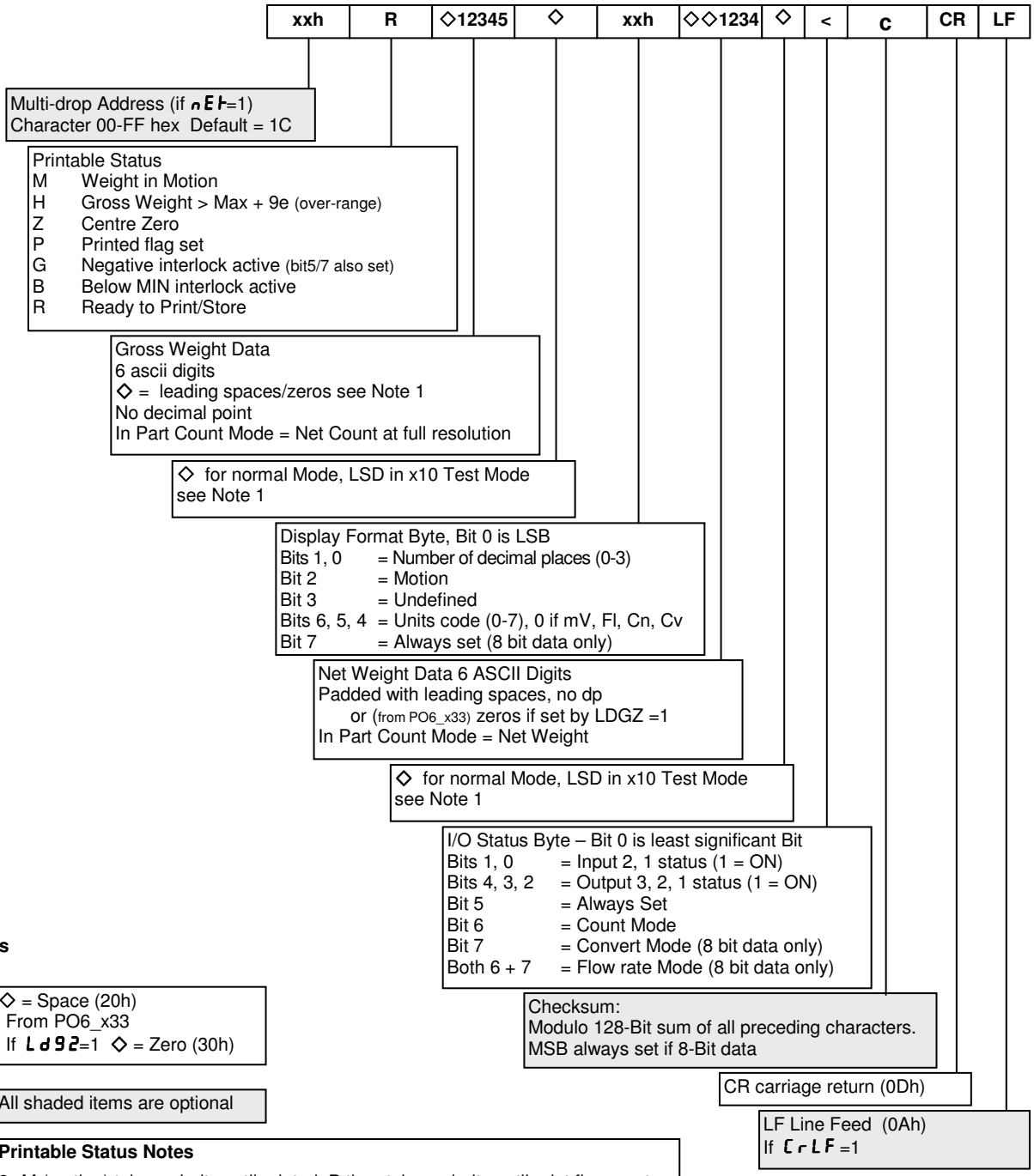
   1 = Off or No Input

4. **Printable Status Notes**
   - M (motion) takes priority until printed, P then takes priority until reset
   - H will over-rule P but not M
   - BIT 7 set if NET is negative(+80h); BIT 5 set if GROSS is negative(+20h) (In GROSS MODE, net = gross, thus BIT 7 & 5 are set)
   - B & G appear subject to noIn(MW) & nEgP(NP) parameters
   - When Z set, print may or may not be permitted subject to noIn(MW)
   - When P set, printing may be permitted by PrtU(PU) parameter

4. **Multi-drop Address Allocation**
   To avoid conflicts, do NOT use addresses 0ah (LF) and 0dh (CR) or other characters contained in messages and weight strings

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 SPrG=1 in SErIAL menu.



Notes

1. ◇ = Space (20h)
   From PO6_x33
   If Ldg2=1 ◇ = Zero (30h)

2. All shaded items are optional

3. **Printable Status Notes**
   - M (motion) takes priority until printed, P then takes priority until print flag reset
   - H will over-rule P but not M
   - BIT 7 set if NET is negative (+80H); BIT 5 set if GROSS is negative (+20H) (In GROSS MODE, net = gross, thus BIT 7 & 5 are set)
   - B & G appear subject to mnIn(MW) & nEGP(NP) parameters
   - When Z set, print may or may not be permitted subject to mnIn(MW)
   - When P set, printing may be permitted by PrtU(PU) parameter

5. **Multi-drop Address Allocation**
   To avoid conflicts, do NOT use addresses 0ah (LF) and 0dh (CR) or other characters contained in messages and weight strings

5.4 Multi-drop Operation (RS 485 only)

A MASTER can speak to several CSW-20 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.

- Use not recommended below baud rate 9600.
- Maximum 31 SLAVES (CSW-20) and only one MASTER.
- SLAVES configured with addresses 00 – FF(h) (2 Digit Hex).
- Connections to be twisted pair and 'daisy-chained' (not 'star' connected).
- 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.
- SLAVES (CSW-20) will always 'listen' unless spoken to (no unsolicited messages).
- SLAVES will default to 'listen' within 1 character time of requested response.
- Time-out on all operations to default 'SLAVES listen' mode is normally 1 second.
- 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.
- 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 it's 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 CSW-20 **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
PrtY	Printer Parity (**00**=none, **01**=odd, **02**=even). Default 00
CrLF	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.

nnIn	**1**	Enables Printing when below Minimum weight (Minimum = 20 divisions '20e' Except See 5E P 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 P	**1**	Sets Minimum weight to 5e. See nnIn above.
toLP	**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 SEtd = 00,02,04,05,06 In Tolerance is when the 'PASS' Condition is met
For SEtd = 01 & 07 In Tolerance is when weight is within +/- PtoL about SPt3 / tArG

CALE		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 nnIn , nEGP and CHGE are 0, a print would occur when weight stabilises above '20e' after returning to zero

Also – located in the EnGCFG 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:

- Up to 14 items of data may be printed in any sequence.
- Parameter PFor specifies the first 7 items to print, 9For specifies the next 7 items
- Each digit (range 0-9,A-F) selects a different 'Data Type' – See next page
- Items to be printed must be set as 'most significant digits', a type 0 terminates the print file (unless leading spaces are associated).
- Parameters PSP & 9SP set corresponding leading spaces for each item
- Parameters PCr & 9Cr 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)

- 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)

- 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

- 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

- 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 '⌐'). Control characters may also be included; see 3.8.

Format Control Parameters

HEAd	1= Enable Column Mode Printing (Default 0= standard mode)
ForΞ	0 - 99 No. of lines to print before sending CtrF control string, see below (00 = never send, 99 = send at end of every print)
CtrF	Hex Control String appended to Print subject to ForΞ 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'.
CtrΞ	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 CtrΞ string sent midline

- 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
- 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/9SP		
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	St2A/St2b 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 tIme in USEr menu		Time hh:mm
6	Running Number	rUnn in USEr menu, auto increments on Print		Running No. xxxxxxx
7	Numeric ID Code	Idnt in USEr menu		Code xxxxxxx
8	Gross Weight			Gross xxxxx.xkg
9	Net Weight	If no tare & no item 8 in printout, prints 'Gross' not 'Net'		Net xxxxx.xkg
A	Preset Tare	Inc. tare code. If no preset tare active, prints 'NONE'		Preset Tare 01 xxxxx.xkg
B	Text String 1A/1B	St 1A/St 1b for Product code 99		Header
C	Text String 2A/2B	St2A/St2b for Product code 99		Description
D	Semi Auto Tare	From PO6.x27 Prints tare value (G-N-PT)		Semi-Auto Tare xxxxx.xkg
E	Target/Tolerance	Target/Code/Tolerance/Pass/Fail Dependent on Setpoint Mode in use	Setd 00 02	Target 01 FAIL
			Setd 04 05 06	Target 01 FAIL xxxx.xkg
		Setd 01 as above plus PtoL extension on same line		(+/-xxxx.xkg)
F	Count/Conversion	If Count mode		Count xxxxxx
		If Convert Mode		Conversion xxxx.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 = x xx xx EF

Default Print Format

PFor	5 4 9 0 0 0 0	9For	0 0 0 0 0 0 0
P SP	0 0 0 0 0 0 0	9 SP	0 0 0 0 0 0 0
P Cr	1 1 1 0 0 0 0	9 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.xxkg
```

Formatting Example:

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

PFor	B C 4 7 2 8 D	9For	9 3 0 0 0 0 0
P SP	8 6 0 0 5 0 0	9 SP	0 6 0 0 0 0 0
P Cr	1 2 1 2 1 1 1	9 Cr	1 2 0 0 0 0 0

- 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.
- 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.
- The next item is **C**, preceded by **6** spaces (to centralise) and followed by **2** carriage returns.
- The 3rd item is **4** causing the current date to be printed with **0** leading spaces
- The 4th item **7** (Code) prints the value entered by the operator into Idnt in USEr_ menu
- 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).
- The 6th, 7th and 8th items give the current weight data.
- The 9th item **3** prints out the text string in St2A+St2b for the current Product Code (again string may be different for another Product Code)
- The 10th-14th items (3rd-7th items in 9For) 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 dd/mm/yy	**4**	
Code 1234567	**7**	
Product Name	**2**	St1A/St1B string for current Code
Gross xx.xxkg	**8**	
Semi-Auto Tare xx.xxkg	**D**	
Net xx.xxkg	**9**	
Description	**3**	St2A/St2B string for current Code

Column Print Example:

- Usually used with 80 column printers, to print data in columns set **HEAd 1** in **Pr_For_**.
- **PFor**/**9For** 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.
- **PSP**/**9SP** can be used to adjust spacing across the page. **PCr**/**9Cr** are ignored.
- The number of lines to print on a page might be controlled by the printer's own settings or the **ForE** 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)
	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

- Any weighing 'Printed' adds the recorded weight to registers for the current product code.
- Totals can be printed and cleared by using the **totALS** menu or remote inputs.
- 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**
- 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)
- The **CLrt** option requires level 1 access, hence the correct password must be entered to the **PASS** prompt when entering the **totALS** menu.
- Alternatively, if the remote inputs are available, these can be configured to initiate Totals Print/Clear commands. (See section 4.6)
- The Format for Totals Printing is separately defined, in a similar fashion to above but using the parameters **tFor**/**UFor**, **t SP**/**U SP**, **t Cr**/**U Cr**
- 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 xxxxxxxkg
9	Total Net	Total Net Weight for Product Code shown	Total Net 01 xxxxxxxkg
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.

CSW-20 to CSW-20 Configuration
A standard CSW-20 indicator can be used as a remote display.

Using Master	Master CSW-20		Slave CSW-20
Serial Port	SErIAL rEdS 10 SErIAL bAUd SErIAL PrtY	= =	SErIAL rEdS 80 SErIAL bAUd SErIAL PrtY
Printer Port	SErIAL rEdS 20 Pr_CFG bAUd Pr_CFG PrtY	= =	SErIAL rEdS 80 SErIAL bAUd SErIAL PrtY

(Always connect to the Serial port of the slave CSW-20)

A slave CSW-20 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.

CSW-20 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 rEdS 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 CSW-20 and remote may be configurable. Once a string is created from the CSW-20, the remote may also need settings altered to suit.

Connections

Using	Master CSW-20	Slave CSW-20	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 CALAb 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 l.s.d. incompatible with **'DISP'**.
L? If input resolution <1µV/e in 'trade' mode or <0.1µV/e in non trade mode.

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

Full Display Status/Error Messages

STATUS MESSAGES

Abort?	Do you wish to abort this calibration, forgetting all alterations? **ENTER** or ⇔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 ⇔to alter sample number or '**CAnCEL'.**
bUSY	Awaiting **'CALm'** timeout or Flashcard is busy (please wait).
CLEArn	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.
SUrE?	Do you wish to accept this calibration? **ENTER** or ⇔ 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-dP	Analogue to Digital converter interface failure.
bUttSP	Keyboard fail ~ shorted tracks ... service required.
CCCCCC	Serial port acknowledge not received so Flash store not performed. Check serial interface and host computer.
CELLP	Faulty or incorrectly connected loadcell.
CLoCtP	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.
doGP	Watchdog failure
droPoUt	Power failure or internal power fault
EEProΞP	EEProm checksum failure ~ corrupted information. Attempt to reload defaults.
I2C r	Failure to **r**ead (**w**rite) from (to) Clock/RAM or EEPROM
oUt_toL	Out of printable range in batch mode.
roΞP	Program ROM checksum failure
FAULtyn	Print/store inhibited- Printer fault due to power, connection, paper low or handshake fail.
StACP	System error
EEProΞb	Power failed while backing up new parameter (possible corruption). ⇔allows resumption (check last entered data). Internal S1 pushbutton forces a default 2 reset.
EEProΞC	Potentially fatal error in stored parameters ~ use Internal S1 pushbutton to force default 2 reset ~ all user data will be lost.
EEProΞF	Failure to correctly verify parameter written to EEPROM…service required.
CLoCPPn	Failure to read/write to Clock/RAM (n='w' write fail, ='r' read fail
F dEAdn	Deadload calibration in progress ~ part of calibration (rotating zero in MSD).
FLASHP	Awaiting Flashcard initialisation, please wait. If FLASHPE / 0/ 5 consult factory for assistance
F CALn	Span calibration in process. msd F is rotating zero
Lo-bAt	Clock/RAM failed to hold data while power down…service required.
not CAL	Not yet calibrated. Perform a calibration.
r FAIL	Ram failure

Also, during warm-up

Po6 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

Features
- ❑ High Quality – Low Cost.
- ❑ 7 Digit, bright, easy to read, large LED display.
- ❑ Stainless steel enclosure with bracket for wall/desk mount.
- ❑ Connections via 5mm press clamps.
- ❑ Trade Approved for any R60 loadcells.
- ❑ High resolution weighing performance.
- ❑ Multi point linearity adjustment.
- ❑ Accommodates extremes of dead load and signal.
- ❑ Superb digital weight filtering with fast settle times.
- ❑ x10 resolution test mode.
- ❑ Configuration via front panel or serial communication.
- ❑ Firmware upgrades via serial port.
- ❑ Two serial ports, printer port can be used for remote display.
- ❑ Preset Tare & Memory tares
- ❑ Semi automatic tare and set zero functions.
- ❑ 3 outputs, 2 inputs as standard.
- ❑ Real time clock as standard.
- ❑ Versatile print formatting.
- ❑ PLU's for A/N text, setpoints, part weights and totals.
- ❑ Multi-drop communications.
- ❑ Sophisticated fill control with fast predictive cut off
- ❑ Variety of setpoint operating modes.
- ❑ Many advanced software features.

Options
- ❑ 15 bit Analogue Output 4-20mA or 0-10V.
- ❑ Flash Electronic Tally Record (Alibi device).
- ❑ Integrated WiFi or Ethernet.
- ❑ ModBus Communications.
- ❑ 24V DC powered version.

General Specifications	Display	mm	7 Red LED digits 20mm
	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 + IIII 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/℃	1.6
	Zero temperature coefficient	μV/°C	< 0.005
	Power consumption (typical)	W	5-10
	Common Mode Rejection (@500Hz)	dB	120
	Power Supply Rejection (@500Hz)	dB	120
	Operating voltage	V	230/115Vac (Selectable) 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)	μV/e.	1
	Minimum signal requirement (non-approved)	μV/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	℃	-10 → 40
	Storage Temperature	℃	-10 → 70
	EMC Immunity/Emissions		EN45501, EN50082-2
	Sealing		IP66
	Case		Grained 304 Stainless Steel Swivel Stand (bench or wall mount)

I/O	Analogue output* 0-10V or 4-20ma*		15 bit (adjustable range) Max drive load for 4-20mA: 500R(active)/1200R (passive)
	Inputs	2	Opto coupled inputs <6V off; >10 –30V on (Supply rail on board)
	Outputs	3	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 2Ero and 9AIn parameters from AnALo9_ if an analogue output module is installed. Also, if a printer is installed, print out the ADC Configuration and Memory Image by setting AdC I then ΞEΞ I in En9CF9_. 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, CFr9**.

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, HoP 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**	CFr9
DD	**Deadload o/s**	**7960170**	dEdF
CF	**Cal Factor**	**0201050**	CALF
IZ	**Init Zero o/s**	**0005026**	2Ero
ZE	**Working Zero o/s**	**0000000**	2oFF

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.

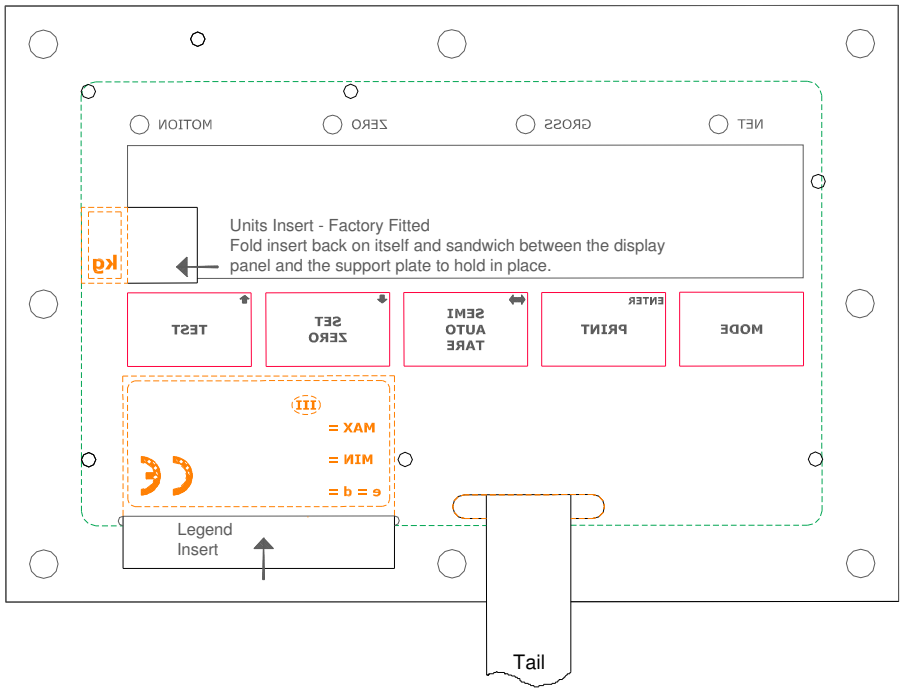
Restoring Calibration with Replacement Baseboard

1. Install and power up the replacement baseboard.
2. In CALIbn_ re-enter the original dISP HoP and CALAt
3. Re-enter the original calibration data CFr9 dEdF CALF 2Ero and 2oFF
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

1. A suitably prepared printed slip can be slid into the legend slot accessible from the rear without board removal
2. **DO NOT** try to remove the front panel membrane from the front; it is glued into place and will be damaged.
3. Turn off power.
4. Remove the lid securing screws (Any seal has to be broken).
5. The front panel legend slot is now accessible.
6. Insert legend ensuring that it is fully home and square – see diagram.

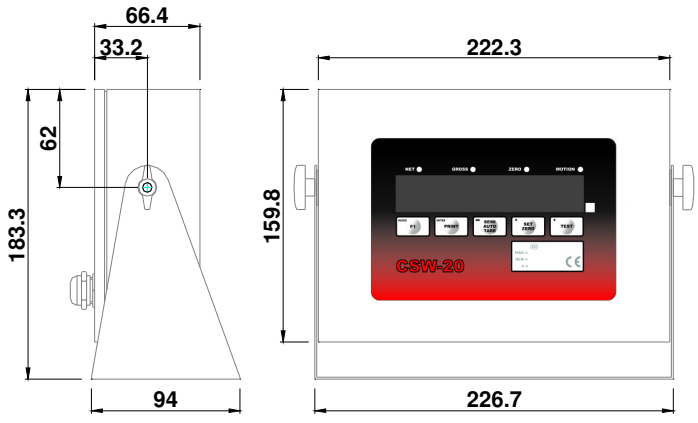
The units legend is factory fitted. Replacement requires board removal and should be attempted by qualified personnel only.

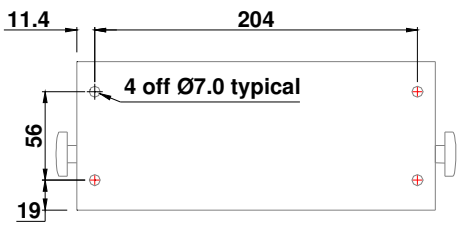


7.4 Dimensions

CSW-20

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





8. MENU TABLES

From Weight Display Mode

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

CALIbn_ 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
FrE2 0	2	SZ	Freeze 1=On 0=Off
dEAd	2	CD	Calibrate Deadload
CALAt	2	CW	Cal. Weight Value 12.5-100% of Top
CAL	2	CW	Calibrate Span
tESt	2	ET/ NU	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 nnth batch
Jo9t 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	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
tIm	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)
9roS	0	TG	Display Total Gross
nEt	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:- **CALIbn_** 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	tAr9	HI9H	SPt3	tAr9

Pr.For.
Printout Format

CodE 01	0	TR	Select Product Code 01-12 and 99
St1A	1	SA	Print String 1A (For current Product Code)
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
9For	1	QF	Print Format 'file' For items 8-14
P SP	1	PS	Leading Space 'file' For items 1-7
9 SP	1	QS	Leading Space 'file For items 8-14
P Cr	1	PC	Trailing CR 'file' For items 1-7
9 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
ForE 00	1	FF	Form length
CtrF	1	HF	Form feed control characters
CtrL	1	HP	Prefix control characters
CtLE	1	HM	Mid line control characters
LinE 0	1	HL	Control character mode

Pr.CF9.
Printer Configure

bAUd 02	1	PV	Printer Baud Rate 00=dump via serial 01=19200, 02=2400 04=4800, 09=9600 10=disable print
PrtY 00	1	PP	Printer Parity All 8 bit 1 stop 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	PY	Printer EOL delay 00-09 x 0.1seconds
mnln 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 0r –ve 1=wt must change 20d
SE 5 0	1	M5	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
CALE 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=overides 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
PrtY 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	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.
Ld92 0	1	LZ	Leading/trailing zeros instead of spaces (0=spaces)
Str9 0	1	SG	Serial string Alternative formats SG0/1
SInG 1	1	EO	Data on request 0=continuous
rEdS 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
EbUS 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)

*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

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 aquire 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
FrE2 0	1	SZ	Freeze 1=On 0=Off
Ebnd 00	2	MB	Motion band sensitivity
EdLY 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
2SEt 0	1*	ZM	Auto zero set 1=ON
22PC 0	1*	Z2	Initial Zero Range 1=±2% 0=±10%
trAC 1	1	ZT	Zero track enable 0=disable
SPAS 01	2	VP	Supervisor password

*level2 for NTEP see H44 setting

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

At PASS prompt: For level 1 : ⇧ENTER
For level 2 : ⇔ ⇔ ⇩ENTER
If ENGCFG-CERT set 02, Internal Cal Switch must be pressed for Level 2 access

EnGCFG
Engineering Configuration

CErt 01	2	EX	Trade Mode 00=non-trade 01=trade 02=trade Cal pushbutton reqd
UCAL	2	SU	Set/Force Uncal 1=not calibrated
rSEt	0	RS	Reset system 1=reboot
PdEL 0	2	EY	Power on delay 0=reduced power up time
Pon2 0	2	EP	Power on weight displayed 1=non zero power up
F2Er	1	CZ	Calibration zero value 1=restore original zero
PntU 0	1	PU	Print unconditional 1=overides 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
CFr9	3*	CG	Adc configure display
dEdF	2*	DD	Adc deadload offset
CALF	2*	CF	Adc calibration factor
dLtr	3†	DB	Factory deadweight optimizer
2Ero	3*	IZ	First zero offset
2oFF	2	ZE	Zero offset
AdC	1	XA	Dump adc configuration
CALb	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)
ELo9	1	LO	Error log
PdEP	1	XC	Parameter dump
EE	1	XR	Memory image
H44 0	2	HN	NTEP Setting 1 for Handbook 44 regs Sets CERT=02
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

Eodb 0	1	KM	Mode key disable 0=enabled
Pntb 0	1	KP	Print key disable 0=enabled
tArb 0	1	KT	Tare key disable 0=enabled
2Erb 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	I1/ 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
03En 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
CALE 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

AnALo9
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
2Ero	2	GZ	Zero offset factor
2Adj 0	2	YZ	Zero trim ⇧ and ⇩ step zero offset
CALA (Calat)	2	CA	Set full o/p at other than FoP (i.e. max) (default= CALAt value)
GAIn	2	GG	Gain factor
GAdj 0	2	YG	Gain trim ⇧ and ⇩ step zero factor

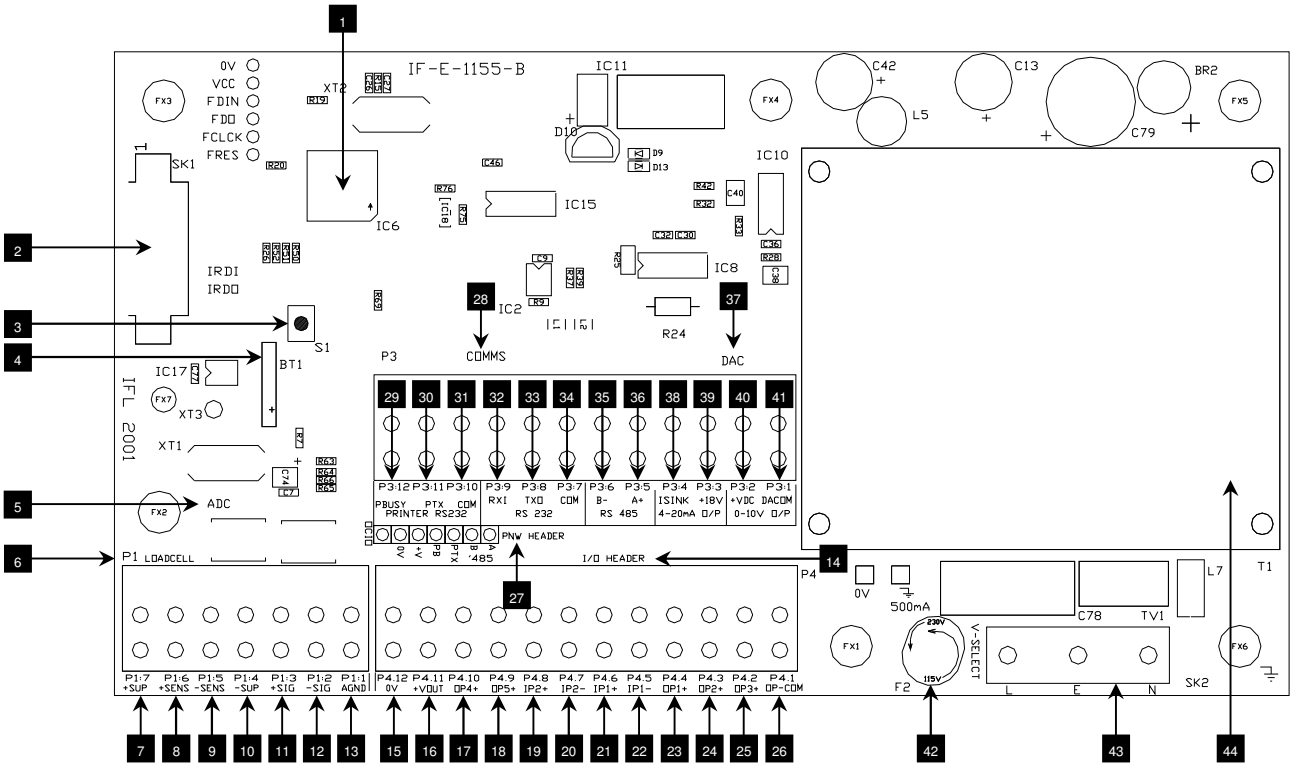
The Full Menus revealed only when Access Level is 1 or 2.

At PASS prompt: For level 1 : ⇧ ENTER
For level 2 : ⇔ ⇔ ⇩ ENTER

If ENGCFG-CERT set 02, Internal Cal Switch must be pressed for Level 2 access

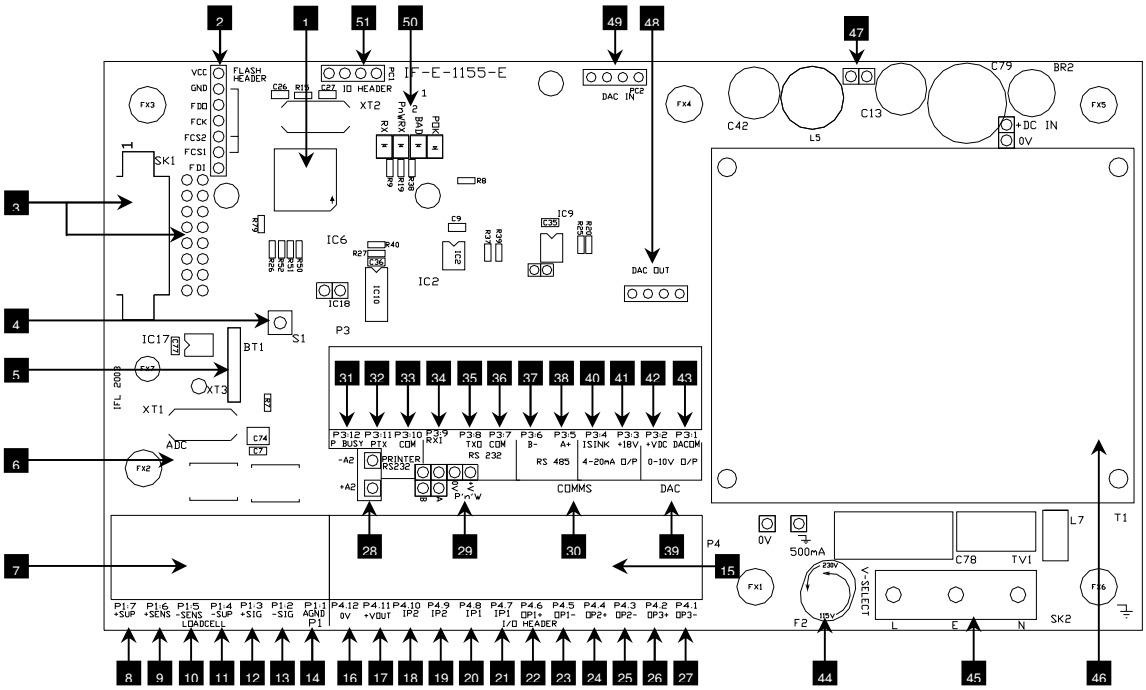
9. BASEBOARD LAYOUT REFERENCE

Baseboard Location References: (Revision B/C version)



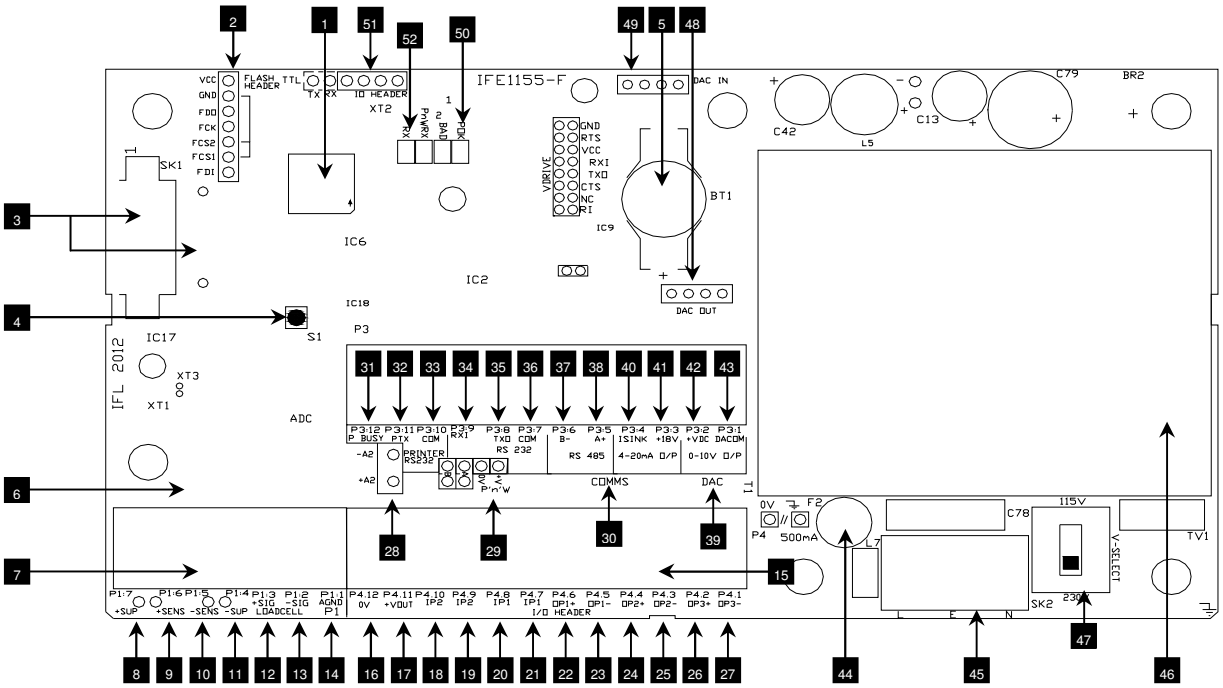
#	Description	PCB ID	#	Description	PCB ID
1	PROCESSOR	IC6	27	PNW HEADER	N/A
2	INTERFACE TO DISPLAY	SK1	28	COMMS (PRINTER RS232, RS232, RS485)	P3
3	CAL SWITCH	S1	29	PBUSY	P3:12
4	BATTERY	BT1	30	PTX	P3:11
5	ADC – ONBOARD SURFACE MOUNT	N/A	31	COM	P3:10
6	LOADCELL HEADER	P1	32	RXI	P3:9
7	+ SUPPLY	P1:7	33	TXO	P3:8
8	+ SENSE	P1:6	34	COM	P3:7
9	- SENSE	P1:5	35	B-	P3:6
10	- SUPPLY	P1:4	36	A+	P3:5
11	+ SIGNAL	P1:3	37	DAC (4-20mA O/P, 0-10V O/P)	P3
12	- SIGNAL	P1:2	38	ISINK	P3:4
13	AGND	P1:1	39	+18V	P3:3
14	I/O HEADER	P4	40	+VDC	P3:2
15	0V	P4:12	41	DACOM	P3:1
16	+VOUT	P4:11	42	115V/230V VOLTAGE SELECT FUSE	F2
17	OP4+	P4:10	43	MAINS CONNECTOR	SK2
18	OP5+	P4:9	44	TRANSFORMER	T1
19	IP2+	P4:8			
20	IP2_	P4:7			
21	IP1+	P4:6			
22	IP1_	P4:5			
23	OP1+	P4:4			
24	OP2+	P4:3			
25	OP3+	P4:2			
26	OP-COM	P4:1			

Baseboard Location References: (Revision E version)



#	Description	PCB ID	#	Description	PCB ID
1	PROCESSOR	IC6	27	OP3-	P4:1
2	EXTENSION/FLASH ETR HEADER	N/A	28	SECOND AIN INPUT – Not used/Special Build	N/A
3	DISPLAY CONNECTIONS	SK1	29	PNW HEADER– Not used/Special Build	N/A
4	CAL SWITCH	S1	30	COMMS (PRINTER RS232, RS232, RS485)	P3
5	BATTERY	BT1	31	PBUSY	P3:12
6	ADC AREA, SMT not replaceable	N/A	32	PTX	P3:11
7	LOADCELL CONNECTIONS	P1	33	COM	P3:10
8	+ SUPPLY	P1:7	34	RXI	P3:9
9	+ SENSE	P1:6	35	TXO	P3:8
10	- SENSE	P1:5	36	COM	P3:7
11	- SUPPLY	P1:4	37	RS485 B-	P3:6
12	+ SIGNAL	P1:3	38	RS485 A+	P3:5
13	- SIGNAL	P1:2	39	DAC (4-20mA O/P, 0-10V O/P)	P3
14	AGND	P1:1	40	ISINK	P3:4
15	I/O HEADER	P4	41	+18V	P3:3
16	0V	P4:12	42	+VDC	P3:2
17	+VOUT	P4:11	43	DACOM	P3:1
18	IP2	P4:10	44	FUSE & VOLTAGE SELECT	F2
19	IP2	P4:9	45	MAINS CONNECTOR	SK2
20	IP1	P4:8	46	TRANSFORMER	T1
21	IP1	P4:7	47	UNREG DC OUT	N/A
22	OP1+	P4:6	48	15 BIT DAC PLUG IN OPTION HEADER	DAC OUT
23	OP1-	P4:5	49	15 BIT DAC PLUG IN OPTION HEADER	DAC IN
24	OP2+	P4:4	50	DIAGNOSTIC LEDS	
25	OP2-	P4:3	51	EXTENSION I/O or COMMS INTERFACE	PC1
26	OP3+	P4:2			

Baseboard Location References: (Revision F version)



#	Description	PCB ID	#	Description	PCB ID
1	PROCESSOR	IC6	27	OP3-	P4:1
2	EXTENSION/FLASH ETR HEADER	N/A	28	SECOND AIN INPUT – Not used/Special Build	N/A
3	DISPLAY CONNECTIONS	SK1	29	PNW HEADER– Not used/Special Build	N/A
4	CAL SWITCH	S1	30	COMMS (PRINTER RS232, RS232, RS485)	P3
5	BATTERY	BT1	31	PBUSY	P3:12
6	ADC AREA, SMT not replaceable	N/A	32	PTX	P3:11
7	LOADCELL CONNECTIONS	P1	33	COM	P3:10
8	+ SUPPLY	P1:7	34	RXI	P3:9
9	+ SENSE	P1:6	35	TXO	P3:8
10	- SENSE	P1:5	36	COM	P3:7
11	- SUPPLY	P1:4	37	RS485 B-	P3:6
12	+ SIGNAL	P1:3	38	RS485 A+	P3:5
13	- SIGNAL	P1:2	39	DAC (4-20mA O/P, 0-10V O/P)	P3
14	AGND	P1:1	40	ISINK	P3:4
15	I/O HEADER	P4	41	+18V	P3:3
16	0V	P4:12	42	+VDC	P3:2
17	+VOUT	P4:11	43	DACOM	P3:1
18	IP2	P4:10	44	FUSE	F2
19	IP2	P4:9	45	MAINS CONNECTOR	SK2
20	IP1	P4:8	46	TRANSFORMER	T1
21	IP1	P4:7	47	VOLTAGE SELECT SWITCH	V-SELECT
22	OP1+	P4:6	48	15 BIT DAC PLUG IN OPTION HEADER	DAC OUT
23	OP1-	P4:5	49	15 BIT DAC PLUG IN OPTION HEADER	DAC IN
24	OP2+	P4:4	50	LED Vcc Power OK	POK
25	OP2-	P4:3	51	EXTENSION I/O or COMMS INTERFACE	PC1
26	OP3+	P4:2	52	LED Comms RX Data	RX

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