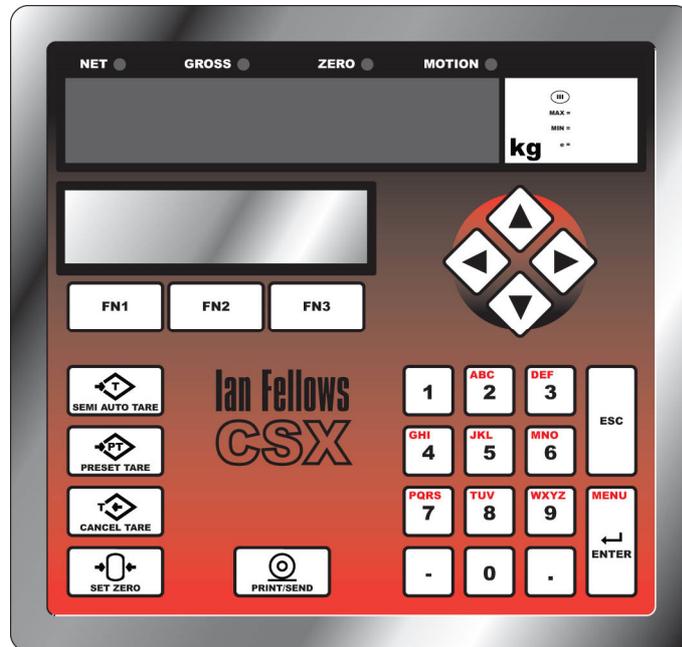


CSX



Manual Revision B Issue 001 2/12/2009

Series 7000 Software. (PO7_009/DX7_009)

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This Manual provides general installation and operation information for the CSX indicators.

Technical Reference information, required for detailed configuration and understanding of the software will be available online only (free download) at www.ianfellows.co.uk.

The actual functionality of the installed instrument will depend on settings applied, and implementation of host or control systems by the installer.

Consult the supplier for specific operating information.

Whilst every endeavour is made to ensure that the information contained herein is accurate and correct, The contents are the result of continual alteration and improvement, and therefore, no Guarantee can be given that this information will remain accurate.
Ian Fellows can assume no responsibility for any errors in this manual or their consequences.

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Software Version History

The CSX contains PCB assemblies

- IFE1302 Display board - Rev A or later - Firmware series DX7.xxx
- IFE1155E baseboard - Rev E or later - Firmware series PO7.xxx

Software Version	Changes	Known Issues (may also apply in earlier versions)
PO7.008 DX7.008	Misc development	
PO7.00x DX7.00x	Misc development	

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1. CONNECTIONS

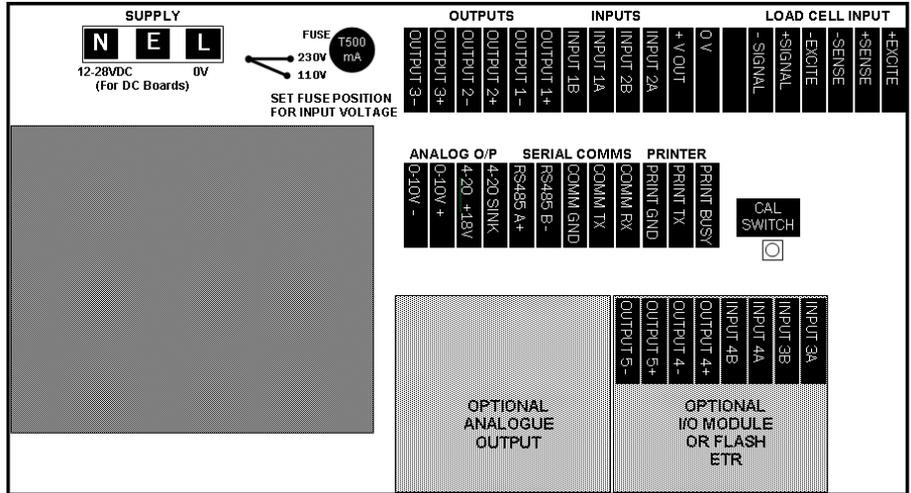
WARNING

All installation and connections should be carried out by suitably qualified persons only.

The unit should be isolated from all power before opening the case to make or alter any connections.

Opening a unit that has been verified for use for trade may break seals and render the verification invalid. Always consult the installer and/or local authority before attempting any modification or repair to a verified installation.

Power, I/O, Communication and Loadcell connections are made on the baseboard (PCB IFE1155)

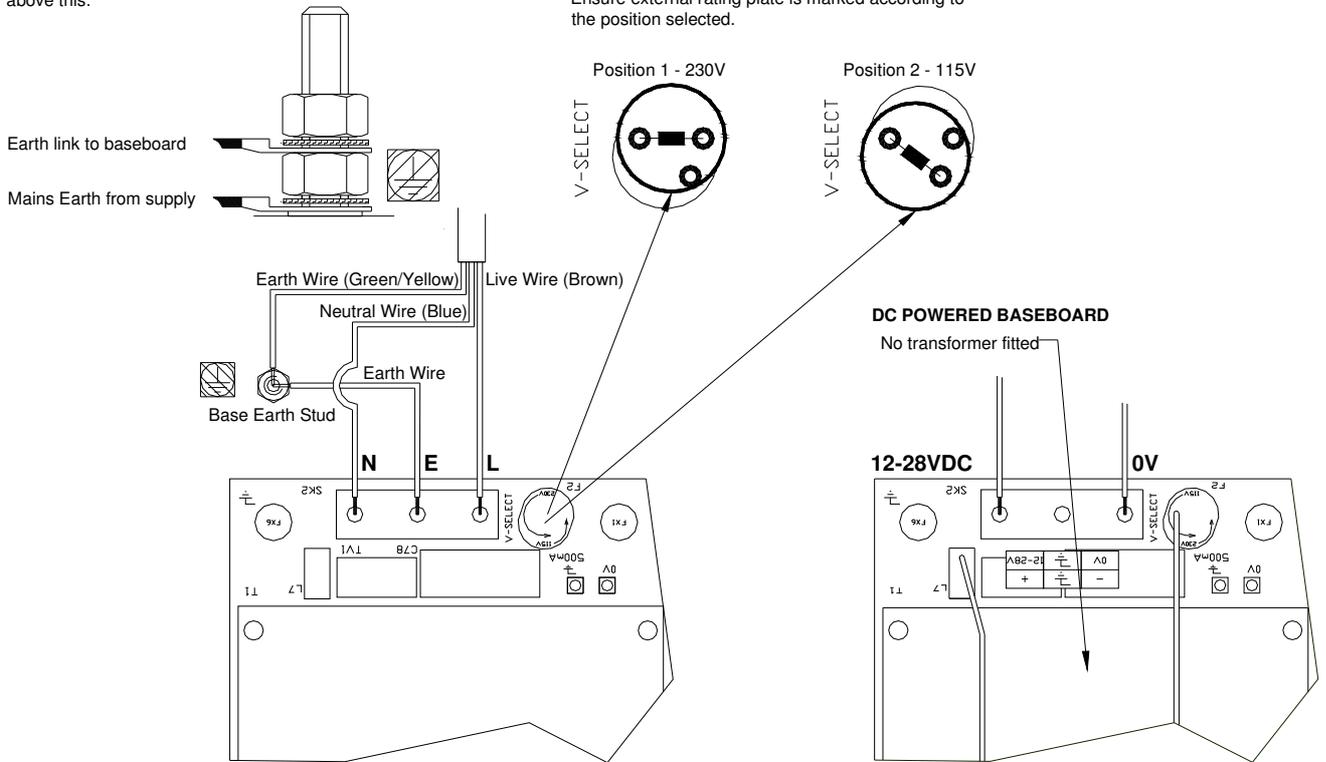


1.1 Power Connection and Voltage Selection

The supply earth is to be attached to the Safety Earth stud first using a serrated washer and M3 nut. The earth link to the baseboard is then fastened above this.

Fuse rating T500mA (Anti-surge). Fuse position selects for 115V/230V supply voltage.

Ensure external rating plate is marked according to the position selected.



1.2 Loadcell Connection

Loadcell Cabling should be run separately from other wiring; especially power carrying wires and any such wiring should crossing 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/mm²

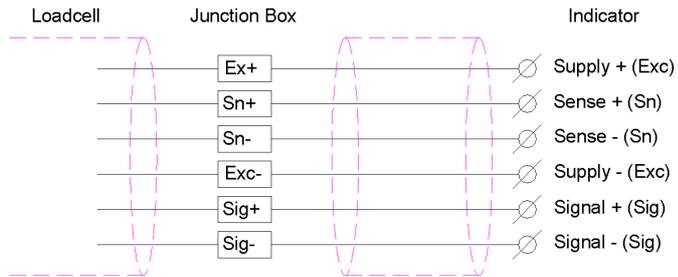
The screen MUST ground to the case at point of entry

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.

Strip and twist each wire, press down the connector lever and insert wire into the cage clamp terminal. Do not 'tin' the wire ends. Do fit wire ferrules if desired.

6-wire Loadcell Cable Connection

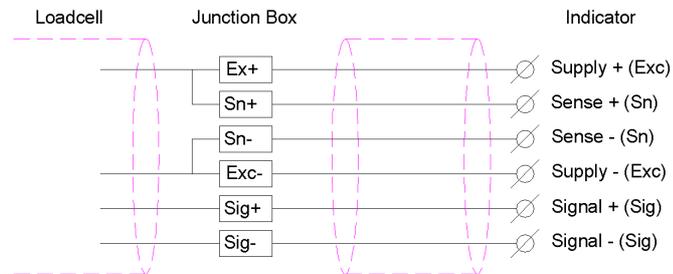


4-wire Loadcell Cable Connection

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 have to be linked directly to the 'excitation' terminals inside the indicator.



If more than one wire needs to be inserted to a single terminal, ensure the wires are securely twisted together or spliced within a single ferrule before insertion to the clamp.

1.3 Communications Connections

The system has two COM ports

SERIAL COMM PORT (RS232 or RS485)

Indicator to PC – RS232

1155 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

Indicator to PC – RS485

1155 Baseboard		PC Function	9 Way 'D'	Use daisy chain connections with twisted pair cable. There is inbuilt 'series' termination, separate cable termination is not required.
COM (ground) P3:7	-	Comms Ground	5	
A+ P3:5	-	Data A+	3	
B- P3:6	-	Data B-	7	

PRINTER PORT (RS232)

Indicator to Printer – RS232

1155 Baseboard		Printer Function	9 Way 'D'	25 Way 'D'	Printer port is transmit only with hardware handshake available through the P BUSY connection. May also be used as continuous transmission for a remote display
COM (ground) P3:10	-	Comms Ground	5	7	
PTX (transmit) P3:11	-	Receive (RX)	3	3	
P BUSY (Busy) P3:12	-	Busy (DTR)	6	20	

1.4 Control Outputs and Inputs

The indicator has 3 control outputs and 2 inputs on the IFE1155 baseboard and a further 2 inputs and 2 outputs can be provided from an optional plug in module IFE1232.

Cabling

Use screened multicore cables, preferably separate cables for inputs and outputs. Keep any unscreened portion of cable as short as possible to avoid interference.

Ground cable screens to the cable gland at point of entry.

OUTPUT CONNECTIONS (Baseboard Rev E)

Outputs are optically isolated from the CSX's internal circuitry and from one-another.

Each output is capable of switching:

- Maximum current 60mA (Load resistance $>200\Omega$ for 12v; $>400\Omega$ for 24v)
- Maximum 30V DC only
- Voltage drop $<1.5V$ when on

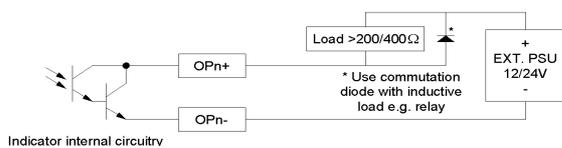
Each output circuit incorporates an onboard reset-able fuse.

(To reset, power off and allow to cool and check external circuit before re-use.)

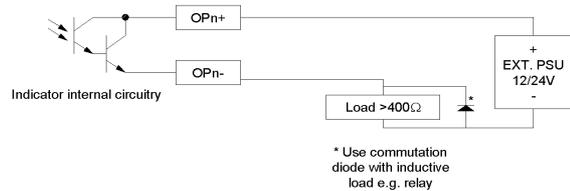
Commutation diodes must be fitted across any inductive load (eg. relay coil) to prevent damage.

Using an external 12-24V DC power source.

Common Positive Drive



Common Negative (Ground) Drive



Alternative use of internal supply

An external supply is preferred but where there is unlikely to be problems with interference it can be acceptable to use the internal, unregulated '+VOUT'.

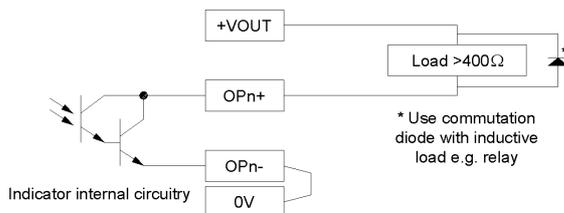
The actual voltage will vary, on a 230v supply, it will vary between 22 and 32v, on 115v, it may drop as low as 18v. However, it should be compatible with most industrial 24v rated inputs.

If used to drive relay coils or solenoids check the voltage obtained for the individual installation and select devices carefully.

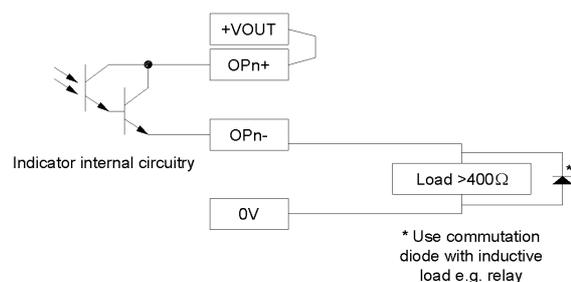
It will normally supply up to 100mA (200mA if analogue output option is not fitted).

Greater loads may be possible but will further reduce the voltage available.

Common Positive Drive



Common Negative (Ground) Drive

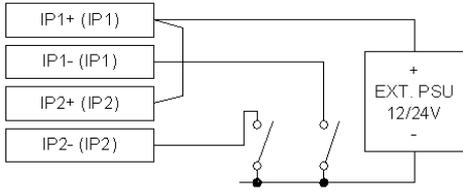


INPUT CONNECTIONS

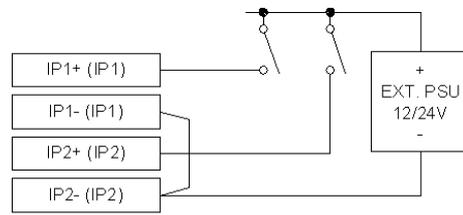
Inputs are independently isolated and are not polarity dependent. The switching current is 5-12mA
(Diagrams show connections for inputs 1&2, connections for option inputs 3&4 are the same)

Using an external 12-24V DC power source.

Switching to negative ('NPN output')



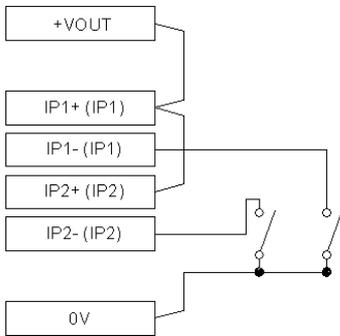
Switching to positive ('PNP output')



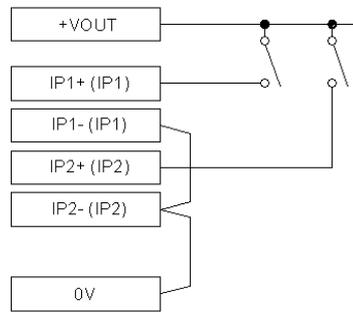
Alternative use of internal supply

An external supply is preferred but where there is unlikely to be problems with interference it can be acceptable to use the internal, unregulated '+VOUT'. The actual voltage can vary but will reliably drive the inputs. Obviously, in this case, the controls are not fully isolated.

Switching to negative



Switching to Positive

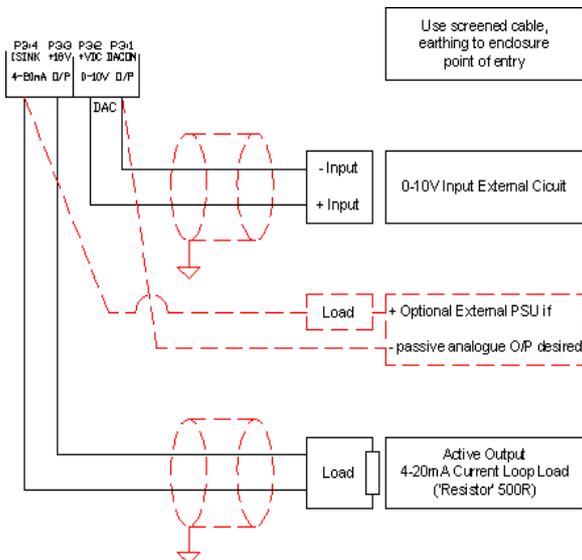


1.5 Analogue Output Connections (Option Module IFE1230)

An optional module may be installed to provide either 4-20mA or 0-10V analogue output through field connections on the baseboard terminals P3.1 to P3.4.

The device has an ultimate resolution of about 1 part in 50,000 over full range output. However, its overall typical system accuracy is in the order of 0.1% full scale over 10°C range. The current output may be used as active or passive.

Connections

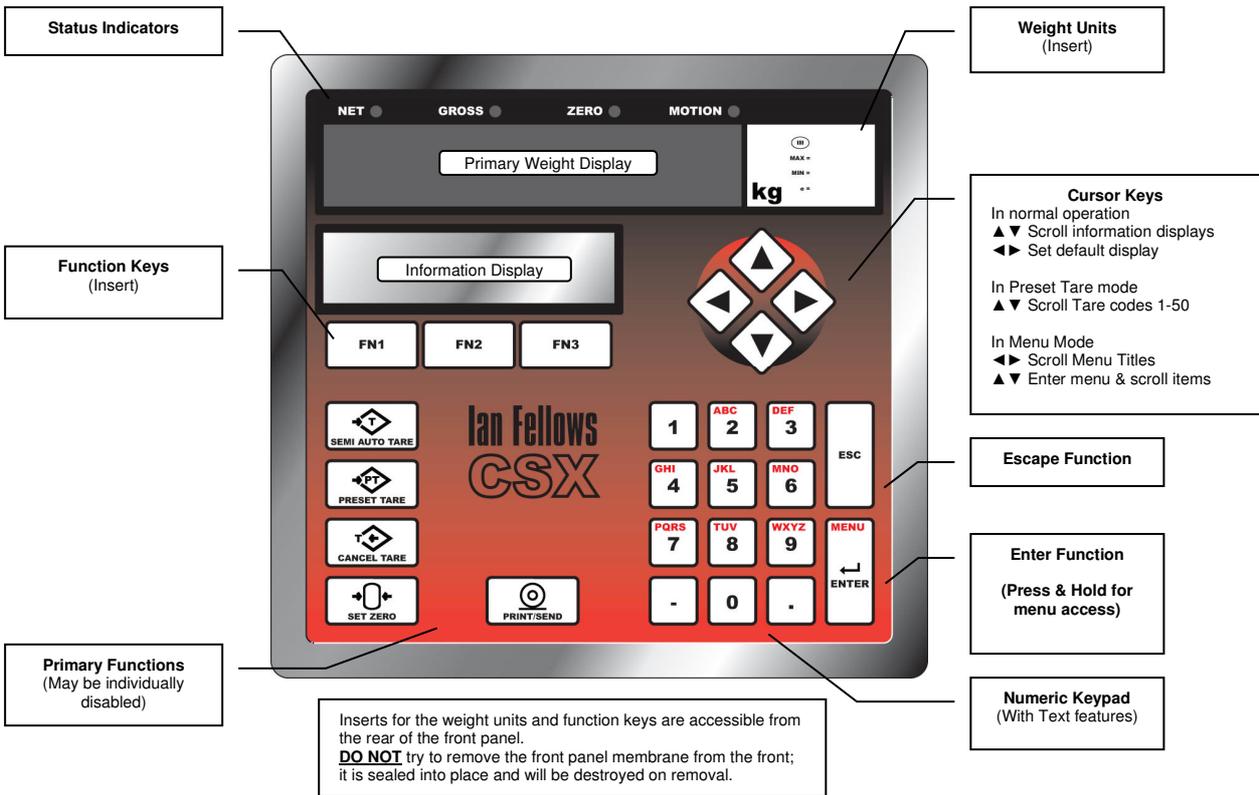


Analogue Output terminals

1155 Baseboard	0-10V	Active 4-20mA	Passive 4-20mA
P3:1 DACOM	-	✓	✓
P3:2 +VDC	-	✓	
P3:3 +18V	-	✓	
P3:4 ISINK	-	✓	✓
Information for set up and adjustment is in Section 3			

2. OPERATION - GENERAL

2.1 Panel Layout



2.2 Switching On

At switch-on, the information display will show the software versions installed in the baseboard and the display board
 eg PO7_007
 DX7_007

A display test is performed which includes display of a Traceable Access Number e.g. **TAN 021**
 (TAN increments if calibration is adjusted)

A self test of internal electronics is carried out and any failure produces a diagnostic error message.

The system should then show a live weight display ready for use.

If the display shows **-- 2 0% --** or **-- 4% --** the weight signal is outside permitted zero limits.
 If there is a load on the scale, remove it or press **SET ZERO** to bypass checks and display current weight.

The configuration menus provide options for how zero checks and restrictions are applied at power on.

Further Reference

- ◀--ENGINEERING--▶ Power On No Zero
- ◀--ENGINEERING--▶ Trade Mode
- ◀--CONFIGURATION--▶ 2% Max New Zero

2.3 Information Display

During operation the LCD display window can provide various information.

For standard software versions, the lower line will usually provide status messages and the operator can choose, from a range of items, what to show on the upper line.



- ▲▼ Cursor keys scroll display options
- ◀▶ Sets default display selected by the parameter ◀--CONFIGURATION--▶ Second Display

2.4 Set Zero Function



SET ZERO sets Gross Zero. At Gross Zero the ZERO status indicator is on. The indicator must be in Gross mode (no tares active), stable and within currently permitted zero limits. Ensure all loads are removed from the weighing system.

The permitted set zero limit depends on system configuration and will be a band of either +/-2% or +/-10% about the initial (power on) zero point.

Further Reference

- ◀--ENGINEERING--▶ Power On No Zero
- ◀--ENGINEERING--▶ Trade Mode
- ◀--CONFIGURATION--▶ 2% Max New Zero

2.5 Cancel Tare Function



CANCEL TARE cancels any active Semi Auto or Preset Tare placing the system in Gross mode. In Gross mode the GROSS status indicator is on.

During Preset Tare entry this function cancels any Preset Tare and exits without affecting any Semi Auto Tare. At other times, it cancels all tares.

2.6 Preset Tare Function



PRESET TARE permits selection of a memory tare and entry of a Tare value. A Preset Tare may be applied in addition to any Semi Auto Tare already applied.

When pressed the system prompts **Set P/set Tare** - the lower line shows **TLU:XX XXXXXkg**

A tare value can be entered using the numeric keypad or a different Tare code (1-50) selected using the ▲▼ Cursor keys.

To exit and set the tare press **ENTER**.

To exit without change press **ESC** (Exits without change automatically if left for 10 seconds)

To cancel the tare and exit press **CANCEL TARE**

Tare values remain stored against the tare code selected.

2.7 Semi Auto Tare Function



SEMI AUTO TARE tares any load to net zero. Semi Auto Tare is prohibited if there is already an active Preset Tare.

2.8 Print/Send Function



PRINT/SEND initiates data transmission to a printer or other devices and/or stores weight to totals. Actual transmission or use will depend on system configuration.

2.9 Function keys

FNx

The three function keys below the information display would normally be configured by the installation engineer and can perform many functions to suit individual applications. A removable legend insert permits the keys to be labelled for their specific purpose.

Each key can have multiple function steps and if required can be protected using the level 1 Supervisor Passcode.

Configuration is carried out using the ◀---Hot Keys---▶ menu

2.10 Extended Weight Display (x10 resolution)



For extended weight display mode, first access the configuration menu system:

Press and Hold **MENU/ENTER** for approx 1s
When prompted for Password press **MENU/ENTER** again (no password required)

Note the information display now shows **X10** above the middle function key **FN2**



Press **FN2** for **X10** weight display.

In Trade Mode the extended weight is shown only while the key is held pressed.

In Non-Trade Mode extended weight toggles on/off with each press and can remain on when the menu system is exited by pressing EXIT (FN1) or ESC.

2.11 Accessing Configuration Menus



Press and Hold **MENU/ENTER** for approx 1s

When the display shows **Enter Password** - key a passcode (see below) then **ENTER**

- Invalid or no password permits viewing, most changes are restricted.
- Supervisor password (Default **1**) gives access level 1 - permits changes to most items
- Engineer pass (Default **900**) gives access level 2 - permits changes to Calibration and critical items

Both codes can be altered at level 2 access.

Instead of entering a code, pressing the internal CAL pushbutton will also provide level 2 access.

If the system is configured in Trade Mode 02, then the internal CAL button is required for level 2 access, a code is not permitted.

The **MENU/ENTER** key may be disabled to deter menu access. In this case menus are accessed by holding down ESC and then pressing **MENU/ENTER**.

Further Reference- ◀--ENGINEERING--▶ Trade Mode
◀--CONFIGURATION--▶ Password 1

◀--ENGINEERING--▶ Password 2
◀--KEY DISABLE--▶ Menu Key Disable

Navigating the Menus

On access to menus, the first title is displayed

◀--USER MODE--▶

Browse the available menu titles using the ◀ and ▶ keys

Access parameters by pressing ▼ ▲ or ENTER

Then browse parameters using the ▼ and ▲ keys

ESC exits to the menu title where another menu can be selected.

From a menu title exit to operating mode with **ESC** or **FN1 (EXIT)**

The system will automatically exit menu mode if inactive for 4 minutes.

Editing Parameters

Select the parameter then key the required value using the keypad, finishing with **ENTER**.

Where an item permits Alphanumeric entry, letter characters (aA, bB, cC...zZ) are obtained from the numeric keys by repeat presses. Example: The 2 key steps through 2 a b c2 A B C 2

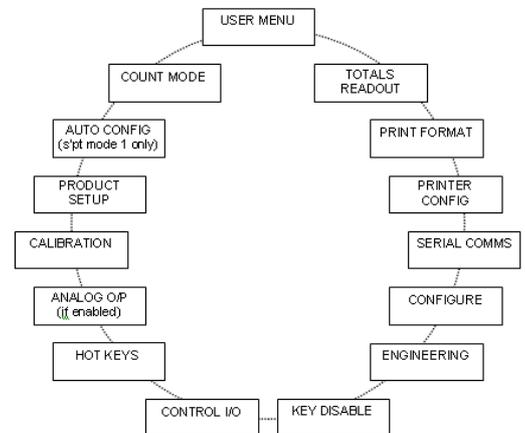
The 1 key steps through 1 <space> - ? , . + & * () # ¥ /

The cursor steps automatically to the next digit after a short pause or if a different key is used.

The ◀ and ▶ keys allow movement up and down the line being edited.

FN1 (CLEAR) resets the string any time before **ENTER** is pressed.

Some parameter values are 'Hexadecimal' in this case keys 2 & 3 provide the necessary digits A-F.



3. CALIBRATION & ADJUSTMENT

Menu ◀-CALIBRATION--▶ allows part or full re-calibration and is a valuable diagnostic tool.

Before initial calibration, decide suitable scale display range (**Max**) and increment (**e**).
Selection is dependent on many factors and will usually be determined by an experienced scale engineer.

3.1 Calibration Sequence

The calibration menu is different to other menus in that pressing **ENTER** at each parameter, steps automatically to the next, thus ensuring correct progression through the calibration procedure.

At any stage, to accept the current value just press **ENTER** or ▼. Individual stages can be accessed using ▼ ▲ s.

ACTION

- Press & Hold **MENU/ENTER** for 1 sec
- Enter Level 2 Passcode or Pushbutton
Default code is 900 (If permitted) -Internal CAL Switch also gains Level 2
To view only, just press ENTER
- Press ◀ until...
- Press ▼ to enter the calibration menu
- Key display increment (e) including decimal point and **ENTER**
- Key top capacity (MAX) and **ENTER**
- Key filter band and **ENTER**
- Set fast tracking on(1) or off (0) and **ENTER**
- Set display freeze on(1) or off(0) and **ENTER**
- Ensure load receptor is empty and stable, and the mV/V reading is as expected then **ENTER**
Top display shows live mV/V reading. (Excitation is approx. 5 Volts)
- Wait for acquisition of deadload to complete
- Key value of weights that will be used and **ENTER**
- Load the weights, ensure scale is stable and the mV/V reading is as expected then press **ENTER**
The live mV/V is now offset for deadweight. (Excitation is approx. 5 Volts)
- Wait for acquisition of span to complete

DISPLAY

*Enter Password
+ ENTER*

◀--USER MENU--▶

◀--CALIBRATION--▶

Divs(e) / Decpnt

Indicator MAX

Filter Band

Fast Tracking

Display Freeze

*Check DEAD mV/V
ENTER to Start*

*Calib DEADLOAD
Calibrating*

New CALIB Load

Place Wts-ENTER

Calibrating

*Test / Nudge
DOWN UP*

The main weight display now shows a live weight reading at X10 resolution.
If necessary the span can be trimmed using the **Nudge Down & Up** Functions.

If it is necessary to adjust the linearity or to perform a calibration without weights then press **ENTER** or ▼.

In most cases the adjustment will be complete and the calibration process can be ended by pressing **ESC** (See Sec 3.4)

3.6 Analogue Output Adjustment (Option)

If an analogue output module is fitted it will need to be configured and adjusted using the ◀--ANALOG O/P--▶ menu.
(If the menu is not displayed, it must first be enabled by the parameter ◀--ENGINEERING--▶ *Analog Enable* =1)

No weights are required to calibrate the output, the scale can be at any load. A suitable meter must be connected.

Adjustment procedure

Select the type of output to be adjusted using parameter **4-20mA Output**: 0= 0-10V output 1= 4-20mA output

Select **Trim Zero** - the output automatically sets to the level it will provide at zero weight.

Check the reading with the meter

Adjust it to the correct reading (eg 0V or 4mA) using ◀and ▶ cursor keys.

Select **Trim Span** - the output automatically sets to the level it will provide at the **Analog OP Calat** weight.

Check the reading with the meter

Adjust it to the correct reading (eg 10V or 20mA) using ◀and ▶ cursor keys.

If a large adjustment is required manually alter the values for **OP Zero factor** and **OP Span factor** until the correct readings are obtained.

Analog OP Calat is usually the same as maximum for the scale but can be altered if the output is required to work over a different range.

Once adjustment is complete, additional items in the menu can be used to configure the output to monitor gross/net weight or how it operates for negative weight.

Further reference

◀--ANALOG O/P--▶

4. SPECIFICATIONS & DIMENSIONS

4.1 Specifications

- | | | |
|----------|--|--|
| Features | <input type="checkbox"/> High Quality – Low Cost
<input type="checkbox"/> 7 digit, large bright LED, easy to read, main weight display
<input type="checkbox"/> 2 x 16 character LCD Information display
<input type="checkbox"/> Stainless steel enclosure
<input type="checkbox"/> Connections via 5mm press clamp terminals
<input type="checkbox"/> Two serial ports
<input type="checkbox"/> Real time clock/calendar
<input type="checkbox"/> 3 outputs, 2 inputs
<input type="checkbox"/> Multi-drop RS485 communications.
<input type="checkbox"/> High resolution weighing performance | <input type="checkbox"/> Multi-point linearity adjustment
<input type="checkbox"/> Works with extremes of high deadload and low signal
<input type="checkbox"/> Superb digital weight filtering with fast settle times
<input type="checkbox"/> x10 resolution test mode
<input type="checkbox"/> Preset tare/Memory tares/Semi-automatic tare
<input type="checkbox"/> Set zero/Zero tracking
<input type="checkbox"/> PLU's for alpha-numeric text & setpoints
<input type="checkbox"/> Variety of specialised operating modes
<input type="checkbox"/> Configuration via front panel or serial communication
<input type="checkbox"/> Firmware upgrades possible via serial port |
| Optional | <input type="checkbox"/> Integrated Wireless communications
<input type="checkbox"/> Additional 2 output and 2 input
<input type="checkbox"/> Analogue Output
<input type="checkbox"/> Flash Electronic Tally Record (alibi) memory
<input type="checkbox"/> 24v DC Power
<input type="checkbox"/> Flanged panel mounting enclosure CSX-PM | |

General Specifications	Primary Weight Display		7 Red LED digits 20mm	
	Message Display		2 x 16 character LCD, 8mm dot matrix	
	Front Panel		Membrane with tactile metal domes, Beep response 26 key operation.	
	Annunciators		4 LEDES (Motion/Zero/Net/Gross)	
	Internal Resolution,	counts		24 bit ADC (1:16,777,215)
	Maximum Display Resolution (trade)	divisions		10,000
	Maximum Display Resolution (non-trade)	divisions		500,000 (x10 test mode)
	EC Approvals OIML Class III + III s	certificate		UK 2677 rev 8
	Input Signal Range	mV/V		-6.5 → 6.5
	Zero Offset Range	%		100% of Input Signal Range
	ADC Conversion Rate	Hz		50 (25/100*)
	Linearity error	%FS		< ± 0.0015% (+ digital correction)
	Differential non linearity			± 0.5 LSB
	Span temperature coefficient	ppm/°C		1.6
	Zero temperature coefficient	µV/°C		< 0.005
	Power consumption (typical)	W		10-20
	Common Mode Rejection (@500Hz)	dB		120
Power Supply Rejection (@500Hz)	dB		120	
Operating voltage	V		230/115Vac (Selectable) 24V DC *option	

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	

Serial Communication	Communication Ports		1.Comms RS232 or RS485 2. Aux/printer port RS232 (TX with Busy only)	
	Baud rate	bits/sec	2400, 4800, 9600, 19200, 38400, 57,600	
	Protocol		7/8 data bits, odd/even/no parity, 1/2 stop bits	
	Maximum continuous data Rate (test mode)	Hz		50
	Communication protocol			Ian Fellows Ltd Ascii-text Based

Environmental	Operating Temperature	°C	-10 → 40
	Storage Temperature	°C	-10 → 70
	EMC Immunity/Emissions		EN45501, EN50082-2
	Sealing		IP66
	Case		Grained 304 Stainless Steel

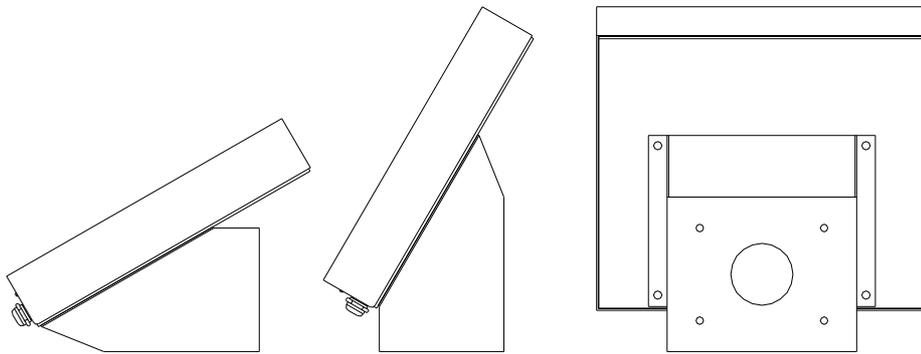
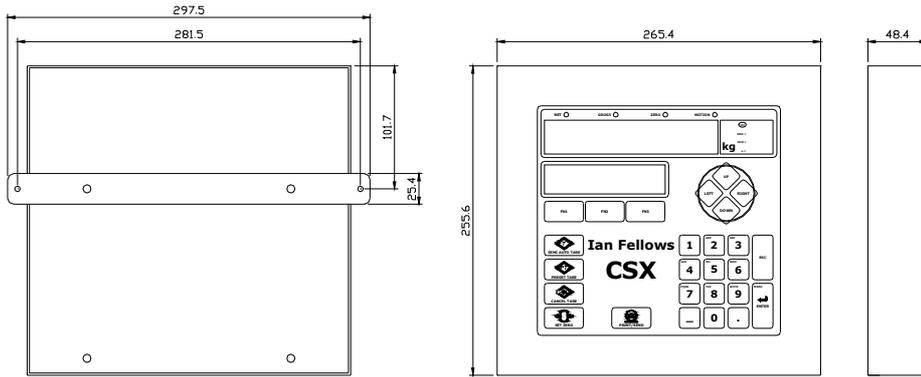
	Inputs	2 (4*)	Opto-coupled and individually isolated inputs <6v=off; >10v=on (max of 30v AC or DC) (Option of supply rail on board)
	Outputs	3 (5*)	Opto-coupled and individually isolated transistor outputs Max OFF voltage 27V Max ON current 60mA Leakage <0.1ma (Can be config'd for high or low switch)

* According to specification

CANCEL TARE
Clears any tare
(Gross displayed)

Dimensions

Dimensions are approximate and measured in millimetres unless otherwise stated.



CSX PM - shown with cover - Ref A = 8 off M4 x 16mm mounting studs

