S M A R T   W E I G H I N G   S O L U T I O N S

rinstrum

2100
Digital Indicator
Quick Start Manual
For use with Software Versions 2.0 and above

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SPECIAL NOTE
Trade Use of the Rinstrum 2100

This manual may occasionally make reference to Trade Use settings of the **2100**. Only properly marked Trade Certified versions of the **2100** can be used in Legal for Trade applications. Trade Certification is only available on **2100** instruments with software Versions 2.0 and above.

Some individual settings may not be legal for trade use. Please check regulations with the appropriate Weights and Measures Authority.

"Everything should be made as simple as possible, but not simpler."

- Albert Einstein -

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N2708

Table of Contents

1. Introduction

This manual contains information on the installation, calibration and setup of the **2100**.

1.1. Approvals
- NSC S403 approval (6000 divisions at 1μV/division).
- NMI TC6033 approval (6000 divisions at 1μV/division).
- C-tick approved and CE approved.

1.2. Features
- 27mm alphanumeric LCD display (LED back-lighting).
- Programmable special function key and three remote inputs.
- Full setup and calibration.
- Six wire load cell wiring.
- Checkweighing, kg/lb switching, totalising, intelligent batching, counting, live weight, hold/peak hold functions.
- Five point linearity correction.
- Real Time Clock and Calendar.
- RAM for storing Zero, Tare and Total settings, etc.
- Soft Power On/Off for inactivity auto power down.

1.3. rin-SMART Software Options
- 0224 (SERIAL) Enable RS-232 serial communications
- 0225 (SETP) Enable setpoint output

1.4. Manuals
For more information on the **2100** refer to the **2100 Reference Manual** and **2100 Operator Manual** (available free of charge from www.rinstrum.com).

2. Specifications

Performance	
Display	Backlit alphanumeric LCD with six 27mm high digits
Backlight	LED backlight with adjustable brightness
Display Resolution	Up to 30,000 divisions, minimum of 0.25μV/division (Trade 6000 divisions at 1μV/division)
Count-by	1, 2, 5, 10, 20, 50, 100 (Entered in Displayed Weight)
Zero Cancellation	+ / − 2.0mV/V
Span Adjustment	0.1mV/V to 3.0mV/V full scale
Stability/Drift	Zero: < 0.1uV/°C, Span < 10ppm/°C, Linearity < 20ppm, Noise < 0.05μVp-p
Operating Environment	Temperature: −10 to +50°C ambient, Humidity: <90% non-condensing

Digital	
Setup and Calibration	Full digital with visual prompting in plain messages
Memory Retention	Full non-volatile operation
Digital Filter	Averaging from 1 to 100 consecutive readings
Zero Range	Adjustable from +/− 2% to +/−20% of full capacity

A/D Converter	
Type	24bit Sigma Delta
Resolution	8,388,608 internal counts
A/D Sync Filter	Selectable 25/30Hz, FIR filter > 80dB

Load Cells	
Excitation	8 volts for up to 8 x 350 ohm load cells (6-wire + shield)

Serial Comms	(Software Option 0224)
Serial output	Single RS-232 as automatic transmit, network or printer drive

Power Input		
Standard	General	10 to15VDC (60mA to 400mA depending on load cells and backlight) ON/OFF key with override and Auto-Off software
Variants	AC	AC Power: 110/240VAC 50/60Hz 10VA fitted in s/s housing
	DC	DC Power: 12-24VDC 10VA fitted in s/s housing
	Battery	Rechargeable: 12VDC Battery fitted in s/s housing

Dimensions	
Body size	189mm (L) x 99mm (H) x 23mm (D)
Panel cutout	Flush mounted with cable holes drilled separately (template provided)

3.   Warnings

3.1. General

- Instrument not to be subject to shock, excessive vibration or extremes of temperature (before or after installation).
- Inputs are protected against electrical interference, but excessive levels of electro-magnetic radiation and RFI may affect the accuracy and stability.
- For full EMC or for RFI immunity, termination of the load cell shield at the **2100** end is important.
- Instrument and load cell cable are sensitive to excessive electrical noise. Install well away from any power or switching circuits.

3.2. DC Power Supply

- DC supply need not be regulated provided it is free of excessive electrical noise and sudden transients.
- Instrument can be operated from high quality plug-pack provided there is sufficient capacity to drive both it and load cells.
- Use plug packs with a rating of 10VDC to 12VDC with current outputs of 0.5 to 1A.

3.3. Load Cell Signals and Scale Build

- Very low output scale bases can be used but may induce some instability in weight readings when used with higher resolutions (ie. higher output/lower number of divisions equals greater display stability/accuracy).

3.4. Configuration Issues

- Configuration and calibration can be performed from front panel, using digital setup. When Full Setup is used, all menu items are accessible and care must be taken to ensure no accidental changes are made to calibration and trade settings.
- Enter a passcode to prevent unauthorised or accidental tampering.

4. Installation

The following steps are required to set up the **2100** indicator.
- Inspect indicator to ensure good condition.
- Ensure mounting options and connectors are available.
- Use connection diagrams to wire up load cell, power and auxiliary cables as required. Connectors for all cables are supplied with indicator.
- Instrument has built in panel mounting screws. Use the "Panel Drilling Template" provided for hole locations.
- Connect Power to instrument and press **<POWER>** key (if not overridden) to start instrument.
- Follow instructions in Full Setup section page 12 to configure and calibrate instrument.
- Enter passcode to protect settings from tampering. Record passcode for future reference.
- To turn instrument OFF press and hold **<POWER>** key for three seconds (until display blanks).

4.1. Special Function Key
- The Special Function Key on the **2100** ships as a blank key. If any of the special functions are to be used on the indicator it is important that the matching function key sticker (supplied) is applied to the keypad.
- Ensure keypad is clean and dry before affixing sticker. Cleaning Keypad: Wipe with a soft cloth slightly dampened with either methylated spirits or warm soapy water.
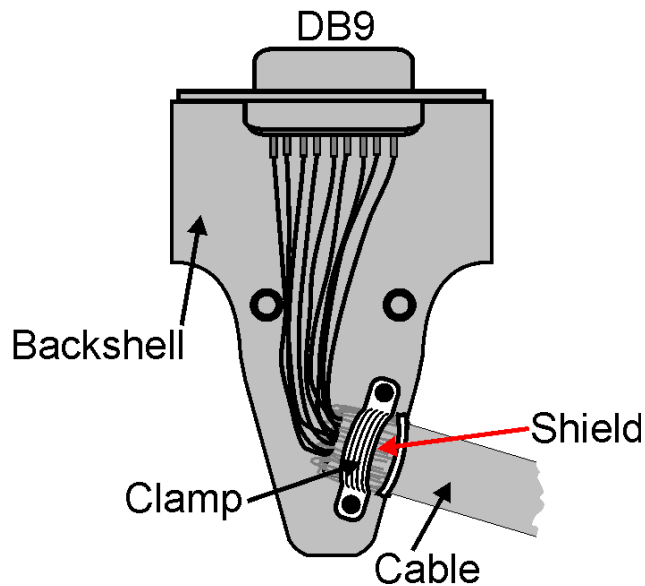
4.2. Electrical Safety
- For your protection all mains electrical hardware must be rated for environmental conditions of use.
- Pluggable equipment must be installed near an easily accessible power socket outlet.
- To avoid the possibility of electric shock or damage to the instrument, always switch off or isolate the instrument from the power supply before maintenance is carried out.

5.   Connections

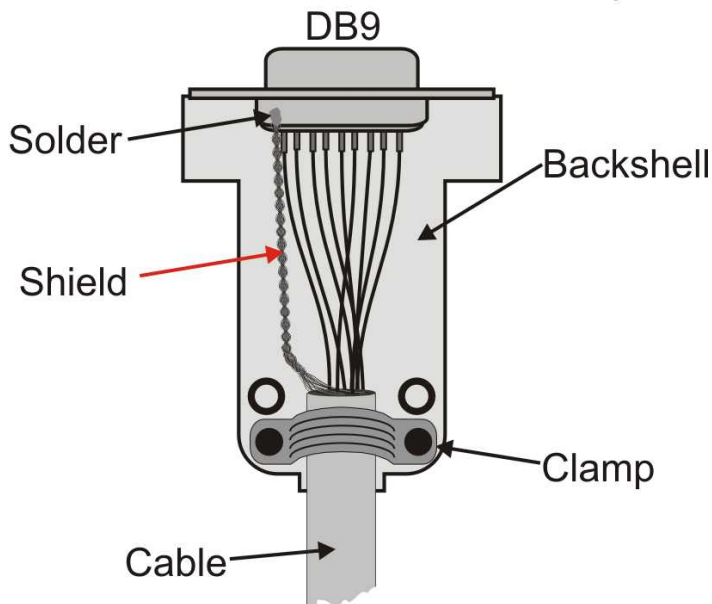## 5.1. Connecting Shields

> **To obtain full EMC or for RFI immunity with the 2100, the load cell shield MUST be connected electrically to the metal shell of the DB9 connector.   Refer to diagrams below or to instructions supplied with the connector.**

Backshell with Shield Clamp
(Preferred for Load Cells)

Fold shield wires back over outside of cable insulation so cable clamp of backshell makes good electrical contact with shield when installed.

Twist shield wires together and solder ends to DB9 casing.

5.2. Cable Shield Connection and Earthing

- Care should be taken when connecting shields to maximise RFI immunity and minimise earth loops and cross-talk (interference) between instruments.
- For RFI immunity, termination of the load cell shield at the **2100** end is important (ie. with connection to the **2100** case via the shield connection).
- The **2100** enclosure is directly connected to the shield connections on the cables.
- The **2100** should be connected to earth via a single reliable link to avoid earth loops.
- Where each instrument is separately earthed, interconnecting cable shields should be connected at one end only.
- **Caution:** Some load cells connect the cable shield directly to the load cell (and therefore the scale base). Connection of the shield in this situation may be site specific.
- The instrument complies with relevant EMC standards provided case ground connection is correctly made. Resistance measured between **2100** case and nearest earth point should be less than 2 ohms.
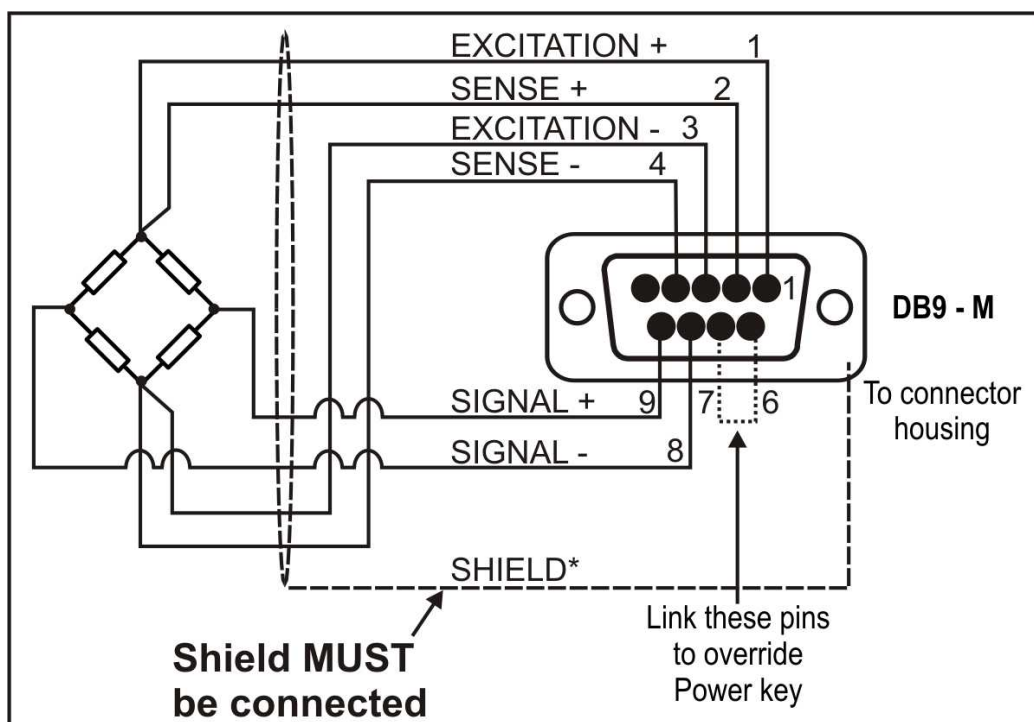- If static problems are expected, options 0084/0085 may be required to protect the serial outputs.

5.3. Unused Pins

Unused pins are <u>NOT</u> to be connected.

Reason: The functions of the pins may not be compatible with equipment at the other end (eg. connecting output pins to a PC communications port may affect the operation of the PC).
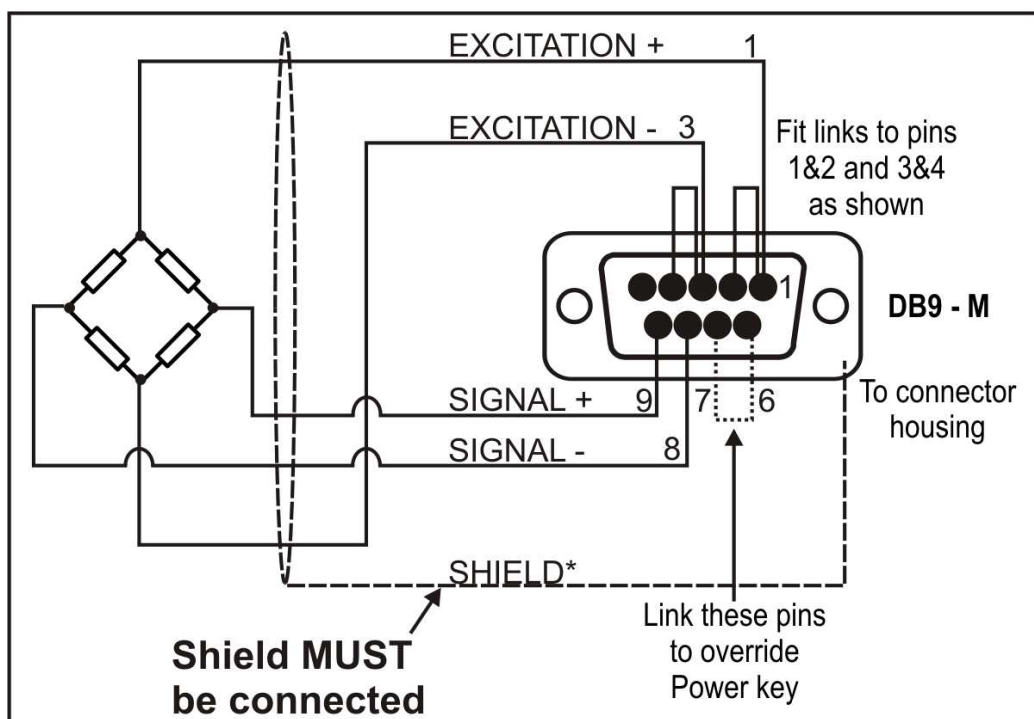
5.4. Load Cell Connection

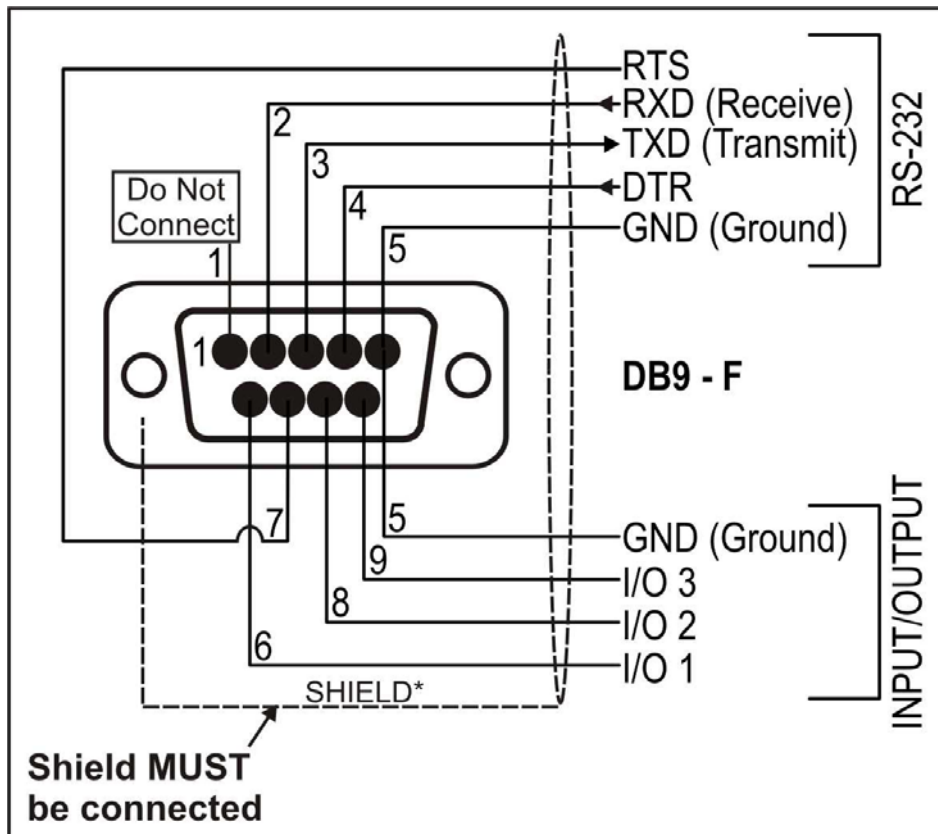## 5.4.1. 6-Wire Connection

Note: Sense lines MUST be connected.

5.4.2. 4-Wire Connection

*For more information on shielding refer to page 8.

5.4.3. Auxiliary Connection

*For more information on shielding refer to page 8.

Note: Do NOT connect unused pins. For more information refer to page 9.

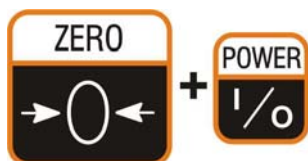| Remote Display	
2100 Pin	Remote Display Plug
3 (TXD)	RXD / Receive
5 (GND)	GND / Ground
Printer	
2100 Pin	Printer Plug - DB25F
3 (TXD)	RXD - Pin 3
5 (GND)	GND - Pin 7
4 (DTR)	DTR - Pin 20
Direct Computer Link	
2100 Pin	Computer DB-9F (DB-25F)
2 (RXD)	TXD - Pin 3 (Pin 2)
3 (TXD)	RXD - Pin 2 (Pin 3)
5 (GND)	GND - Pin 5 (Pin 7)

5.4.4. IO Connections

5.4.5. Power

POWER 10 TO 15 Volts DC 0.5A	**Warning** **For 2100 use only 10-15 VDC** Voltages outside this range may cause improper operation or damage.
Note: Variants of the **2100** may require different power requirements. Refer to Variant Data Sheet.	

6. Full Setup

 Full Setup provides access to configure and calibrate the instrument.

• Ensure instrument is On. Press the **<ZERO>** and **<POWER>** keys together for two seconds.

• To save settings, exit and return to normal weighing mode, press the **<ZERO>** and **<POWER>** keys together for two seconds or select **- End -** from the menus.

⊗	Indicates setting is trade critical and calibration counter will be incremented if setting is changed.
®	Indicates functions are only suitable for remote inputs.

GRP ZERO →O←	ITM TARE →T←	SEL GROSS/NET	EDT PRINT/M+ ⊙ Underline = Defaults	OK
BUILD	DP⊗	Decimal Point Position	<u>000000</u>, 00000.0, 0000.00, 000.000, 00.0000, 0.00000	Accept
	CAP⊗	Maximum Capacity	**SEL** changes position, **EDT** changes digit.	Accept
	RES⊗	Resolution (Count-By)	<u>1</u>, 2, 5, 10, 20, 50, 100	Accept
	UNITS⊗	Units of Measure	none, g, <u>kg</u>, lb, t , oz	Accept
	HI.RES⊗	Resolution x 10 Mode	<u>OFF</u>, ON	Accept
OPTION	USE⊗	Industrial or Trade Use	<u>**TRADE**</u> (Trade), **INDUST** (Industrial) (+ and – weighing)	Accept
	FILTER	Digital Filtering/Averaging	1 , 2, 5, <u>10</u> , 25, 50, 75, 100 (number of readings)	Accept
	MOTION⊗	Motion Detection Setting	**none**, <u>0.5-1.0t</u>, 1.0-1.0t, 0.5-0.5t (fine), 1.0-0.5t, 0.5-0.2t, 1.0-0.2t, 5.0-0.2t (coarse) Default = 0.5 graduations per 1.0 second (Time)	Accept
	AUTO.Z	Auto Zero on Power Up	<u>OFF</u>, ON	Accept
	Z.TRAC⊗	Zero Tracking Setting	<u>OFF</u>, **SLOW** (0.5 div/sec), **MED** (2 div/sec), **FAST** (10 div/sec)	Accept
	Z.RANGE⊗	Zero Key Range	<u>**–2+2**</u> , **–1+3** , **–20+20** (% of full scale)	Accept
	Z.BAND⊗	Zero 'Dead' Band	**SEL** changes position, **EDT** changes digit.	Accept

GRP	ITM	SEL	EDT	OK
ZERO ⟶0⟵	TARE ⟶T⟵	GROSS/NET	PRINT/M+ ⊙ Underline = Defaults	
CAL	ZERO⊗	**Zero Calibration Routine** (Current weight displays)	Remove all weight. **OK** starts routine (**Z.in P** displays). **ITM** key to exit, **OK** to repeat routine.	
	SPAN⊗	**Span Calibration Routine** (Current weight displays)	Add test weight. Set correct weight. **SEL** changes position, **EDT** changes digit. **OK** starts routine (**S.in P** displays). **ITM** key to exit, **OK** to repeat routine.	
	ED.LIN⊗	**Edit Linearisation Points** **L1. - - -** Select Linearisation point 1 to 5 (**L2**, **L3**, **L4**, **L5**). (Approx. % of full scale)	Set capacity of test weight. **SEL** changes position, **EDT** changes digit. **OK** starts routine (**L.in P** displays). **ITM** key to exit, **OK** to repeat routine.	
	CLR.LIN⊗	**Clear Linearisation Points** **L1. - - -** Select Linearisation point 1 to 5 (**L2**, **L3**, **L4**, **L5**). (Approx. % of full scale)	**OK** to clear point or **ITM** key to exit.	
	FAC.CAL⊗	**Factory Calibration** **Cont.N** (No) **Cont.Y** (Yes)	Cont.N **Warning**: Choosing **Cont.Y** will restore default factory calibration in **BUILD** and **CAL** menus.	Accept

SPEC	OP.PC	Security Passcode for Operator Menu Setup	(**0000** no passcode). Set 4 digit passcode (eg. 1234). **SEL** changes position, **EDT** changes digit. Activated only when **FULL.PC** is also set.	Accept
	FULL.PC⊗	Full Security Passcode for Digital Setup	(**0000** no passcode). Set 4 digit passcode (eg. 1234). **SEL** changes position, **EDT** changes digit.	Accept
	KEY.LOC⊗	Front Panel Key Locking **Z**ero, **T**are, **G**ross/Net, **P**rint	**Z T G P** Letter indicates key is unlocked. (-) Dash indicates key is locked. **SEL** changes position, **EDT** changes digit.	Accept
	KEY.FN	Key Functions Position 1: Keypad Function Key Positions 2, 3 & 4: Remote Inputs ®Front Panel Keys: **Z** Zero, **T** Tare, **G** Gross/Net, **P** Print	(**- - - -** no functions assigned). **Keypad Function Key: U** lb/kg switching, **C** Count, **H** Hold, **E** Peak Hold, **L** Live Weight, **S** Show Total, **B** Batch, (-) No function. **Remote Inputs: Z** Zero, **T** Tare, **G** Gross/Net, **P** Print, **U** lb/kg switching, **C** Count, **H** Hold, **E** Peak Hold, **L** Live Weight, **S** Show Total, **B** Batch, **K** Blank®, (-) No function (enable IO pin as output).	Accept
	B.LIGHT	Backlight Operation	**ON**, AUTO, OFF (Automatically turns instrument off after 10 seconds of inactivity)	Accept
	BRIGHT	Backlight Brightness	**01** to **10** (01=10%, 10=100%)	Accept

GRP ZERO →O←	ITM TARE →T←	SEL GROSS/NET	EDT PRINT/M+ ⊙ Underline = Defaults	OK
SPEC ctd.	AUT.OFF	Automatic Power Off	<u>NEVER</u>, 20 S, 30 S, 60 S, 300 S, 600 S (Seconds of inactivity before power down)	Accept
	AUX.DSP	Auxiliary Display (Time) (Recommended for batching Operations)	<u>OFF</u>, TIME	Accept
	SYNC⊗	A/D Frequency	<u>25Hz</u> or **30Hz** (This setting may affect calibration.)	Accept
SERIAL	TYPE	Serial Output Type	OFF, <u>NET</u>, AUTO, PRINT, MASTER	Accept
	ADDR	Serial Address	**00** to **31** (Default = <u>01</u>) **SEL** changes position, **EDT** changes digit.	Accept
	BAUD	Serial Baud Rate	1200, 2400, 4800, <u>9600</u>, 19200	Accept
	BITS	Serial Format Options Position 1: Parity Position 2: Data Bits Position 3: Stop Bits Position 4: DTR Handshake	<u>N 8 1 -</u> (Default Serial Format Options) **SEL** changes position, **EDT** changes digit. **Parity: N** None, **O** Odd, **E** Even **Data Bits: 7** or **8** data bits **Stop Bits: 1** or **2** stop bits **DTR:** (-) DTR disabled or **d** DTR enabled	Accept
	PRN.ID	Printout ID	<u>OFF</u>, ON (Adds ADDR ID to printouts)	Accept

SERIAL ctd.	PRN.ROW	Row Padding on Printout	<u>00.0</u> to 10.10
			    00.00 Number of line feeds to add before printout.
			    00.**00** Number of line feeds to add after printout. If padding is set to 10 then a form feed character is sent.
				Accept

	PRN.COL	Column Padding on Printout	<u>00</u> to **20** (Number of spaces to add at start of each line of printout.)	Accept

SET.PTS	OPTN A	- G O H -
		- none
		Active
		Slow
		        Gross
		        Net
		        Reading
		        Held
		                Over
		                Under
		                        High
		                        Low
		                                - none
		                                Single
		                                Double
		                                Flash
			<u>- G O H -</u> (Default Setpoint Settings)
			- None disables the setpoint when not in use
			A Active for level control and overload alarms
			S Slow Fill used in conjunction with Fast Fill
			G Gross (use gross weight)
			N Net (use net weight, Tares before operating relay)
			R Reading (use current displayed weight)
			H Held (use Held reading)
			O Over (weight increasing)
			U Under (weight decreasing, negative weighing)
			H High (Active High logic)
			L Low (Active Low logic)
			- None (no internal beep during relay operation)
			S Single (one internal beep during operation)
			D Double (double internal beeps during operation)
			F Flash (Display flashes)
				Accept

	TARG A	Target A (Primary target in batching)	**SEL** changes position, **EDT** changes digit.	Accept

GRP ZERO →O←	ITM TARE →T←	SEL GROSS/NET	EDT PRINT/M+ ⊙ Underline = Defaults	OK
SET.PTS ctd.	OPTN B	<table><tr><td>-</td><td>G</td><td>O</td><td>H</td><td>-</td></tr><tr><td>-none</td><td>Gross</td><td>Over</td><td>High</td><td>-none</td></tr><tr><td>Active</td><td>Net</td><td>Under</td><td>Low</td><td>Single</td></tr><tr><td>Fast</td><td>Reading</td><td></td><td></td><td>Double</td></tr><tr><td></td><td>Held</td><td></td><td></td><td>Flash</td></tr></table>	- G O H - (Default) **Same as OPTN A except:** **F** Fast Fill used in conjunction with Slow Fill.	Accept
	TARG B	Target B (Preliminary value in batching)	**SEL** changes position, **EDT** changes digit.	Accept
	OPTN C	<table><tr><td>-</td><td>G</td><td>O</td><td>H</td><td>-</td></tr><tr><td>-none</td><td>Gross</td><td>Over</td><td>High</td><td>-none</td></tr><tr><td>Active</td><td>Net</td><td>Under</td><td>Low</td><td>Single</td></tr><tr><td>Dump</td><td>Reading</td><td></td><td></td><td>Double</td></tr><tr><td>Pass</td><td>Held</td><td></td><td></td><td>Flash</td></tr></table>	- G O H - (Default) **Same as OPTN A except:** **D** Dump signal for weight to return to zero or dump time (refer to D.TIME below). **P** Pass output for setpoint 3 only. (checkweigh application)	Accept
	TARG C	Target C (Not used in batching)	**SEL** changes position, **EDT** changes digit.	Accept
	FLIGHT	In-Flight	**SEL** changes position, **EDT** changes digit.	Accept
	HYS	Hysteresis	**SEL** changes position, **EDT** changes digit.	Accept
	D.TIME	Dump Time	00.0 to 20.0 seconds 0 for dump to zero weight, otherwise operated for the time specified.	Accept

CLOCK	TIME	**Time Setting** 24 hour clock HH.MM.SS displays	Set time in the format **HH.MM** **SEL** changes position, **EDT** changes digit.	Accept
	DATE	**Date Setting** DD.MM.YY displays	Set day and month in the format **DD.MM** Set the year in the format **YYYY**	Accept Accept
	QA.OPT⊗	**Quality Assurance Reminder**	<u>OFF</u>, **ON** (Flashes QA Due on due date)	Accept
	QA.DATE⊗	**Quality Assurance Due Date**	Set day and month in the format **DD.MM** Set the year in the format **YYYY**	Accept Accept
TEST	SCALE	**Load Cell Test**	Displays load cell output in mV/V (Format=0.0000) Trade Mode=5 sec display	
	FRC.OUT	**Force Outputs**	**- - -** (Default display) **EDT** advances through each output (1--, -2-, --3)	
	TST.INP	**Test Inputs**	**- - -** (Default display) **EDT** advances through each input (1--, -2-, --3)	
FACTRY	DEFLT	**Restore Factory Defaults** **Cont.N** (No) **Cont.Y** (Yes)	<u>Cont.N</u> **Warning**: Choosing **Cont.Y** will clear all stored data except calibration.	Accept
	CONFIG	**Configure Software Options**	Used to enter license codes for software options.	Accept
- END -	EXIT SETUP	Accept settings and return to **normal weighing mode**		Accept

7.   Safe Setup

Safe Setup provides access to configure the instrument without access to trade or calibration specific items.

- Ensure instrument is On. Press the **<GROSS/NET>** and **<POWER>** keys together for two seconds.
- To save settings, exit and return to normal weighing mode, press the **<GROSS/NET>** and **<POWER>** keys together for two seconds or select **- End -** from the menus.

8.   Operator Menu Setup

The Operator Menu provides access to setpoint target and flight settings.
- Ensure instrument is On. Press the **<TARE>** key for two seconds.
- To save settings, exit and return to normal weighing mode, press the **<TARE>** key for two seconds or select **- End -** from the menus.

9.   Enabling Software Options

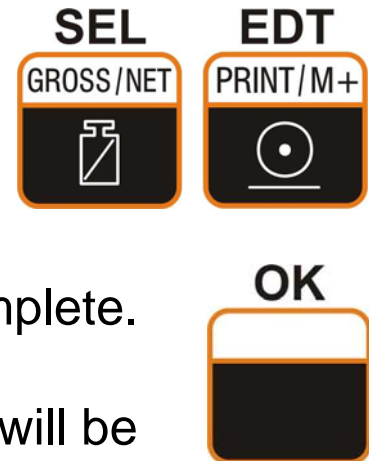To enable any of the rin-Smart Software options a license code must be entered. The license codes are unique to each option and to each instrument. These options may be factory installed or installed in the field.

Follow the steps below to discover which options are installed or to install another option:
- Ensure the instrument is On.
- Press the **<POWER>** and **<FUNCTION>** keys together for two seconds.

- The **2100** will display the installed options and prompt for a new license code. (eg. **SERIAL** is displayed if the RS-232 Serial Option is installed).

- The **<GROSS/NET>** key changes the position and the **<PRINT/M+>** key changes the digit. (A code of 000000 leaves the instrument unchanged.)

- Press the **<FUNCTION>** key when complete. The **2100** returns to normal operation.

- If successful the new rin-Smart Option will be displayed, otherwise the **2100** will sound a beep.

10. RS-485 Communications

The **2100** is compatible with the RI 0080 RS-232 to RS-485 serial converter. There is no need to provide external power to the RI 0080 module as this is provided directly by the **2100.**

11. Error Messages

Error	Description
(U - - - - - - -)	The weight reading is below the normal weighing range.
(O - - - - - - -)	The weight reading is above the maximum capacity of the equipment.
(ZERO) (ERROR)	The weight is outside the zero range tolerance setting. See Note below.
(STABLE) (ERROR)	The scale motion has prevented a zero, tare or print operation from occurring. See Note below.
(QA) (DUE)	Quality assurance testing is due. Press any key to clear this warning for one hour.

Note: The **ZERO** and **STABLE** error messages are accompanied by a series of long beeps. The messages repeat until a key is pressed.

12. Battery Operation

BAT is flashed on the auxiliary display if the battery voltage falls below 11V. If the battery voltage falls below 10.5V the instrument automatically powers down. Battery checking is only carried out if the Automatic Off (**AUT.OFF**) option is set to a value other than NEVER.

13. Diagnostic Errors

Error	Description	Action
E00001	Power supply voltage too low.	Check supply
E00002	Power supply voltage too high.	Check scale / cables
E00004	Load cell excitation voltage too low. (8 volts for up to 8 x 350 ohm load cells)	Check scale / supply
E00008	Load cell excitation voltage too high. (8 volts for up to 8 x 350 ohm load cells)	Check scale / supply
E00010	Temperature outside limits. (−10 to +50°C ambient)	Check location
E00020	Scale build incorrect. (100 to 30000 grads).	Fix up scale build
E00100	Digital setup information lost.	Re-enter setup
E00200	Calibration information lost.	Re-calibrate
E00300	All setup information lost.	Enter setup and calibrate
E00400	Factory information lost. (FATAL)	Service
E00800	EEPROM memory chip failed. (FATAL)	Service
E02000	ADC out of range. Possible load cell or cable damage.	Check load cell cable
E04000	Battery backed RAM data lost.	Re-enter setup
E08000	FLASH program memory incorrect. (FATAL)	Service

The **E** type error messages are additive. For example, **E00005** (00001+00004) would indicate that both Excitation and Power Supply Voltage are low. The numbers add in hexadecimal as follows:

1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - A - B - C - D - E - F

(For example, 2 + 4 = 6, or 4 + 8 = C)

SMART WEIGHING SOLUTIONS

rinstrum