# WEIGHING SOLUTIONS SMART Instrum 2100 **Digital Indicator Quick Start Manual**

For use with Software Versions 2.0 and above

2100-601-250

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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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## **1.Introduction**

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



## 1.1. Approvals

- NSC S403 approval (6000 divisions at  $1\mu$ V/division).
- NMI TC6033 approval (6000 divisions at  $1\mu$ V/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 <u>www.rinstrum.com</u>).

# 2. Specifications

Performanc	ce			
Display		Backlit alphanumeric LCD with six 27mm high digits		
Backlight		LED backlight with adjustable brightness		
<b>Display Res</b>	olution	Up to 30,000 divisions, minimum of $0.25\mu$ V/division		
		(Trade 6000 divisions at 1µV/division)		
Count-by		1, 2, 5, 10, 20, 50, 100 (Entered in Displayed Weight)		
Zero Cance	llation	+ / - 2.0mV/V		
Span Adjust	tment	0.1mV/V to 3.0mV/V full scale		
Stability/Drif	it	Zero: < 0.1uV/°C, Span < 10ppm/°C,		
		Linearity < 20ppm, Noise < 0.05µVp-p		
Operating		Temperature: –10 to +50°C ambient, Humidity: <90%		
Environmen	it	non-condensing		
Digital				
Setup and C	Calibration	Full digital with visual prompting in plain messages		
Memory Re	tention	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 Conver	rter			
Туре		24bit Sigma Delta		
Resolution		8,388,608 internal counts		
A/D Sync Fi	lter	Selectable 25/30Hz, FIR filter > 80dB		
Load Cells				
Excitation		8 volts for up to 8 x 350 ohm load cells (6-wire +		
		shield)		
Serial Com	ms	(Software Option 0224)		
Serial output	ıt	Single RS-232 as automatic transmit, network or		
		printer drive		
Power Inpu	ıt			
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		
Dimension	S			
Body size		189mm (L) x 99mm (H) x 23mm (D)		
Panel cutou	t	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.



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



## 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					
<b>Direct Compu</b>	uter 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



# 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.

$\otimes$	Indicates setting is trade critical and calibration counter
	will be incremented if setting is changed.
R	Indicates functions are only suitable for remote inputs.

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

SPEC	OP.PC	Security Passcode for	(0000 no passcode).	Accept
		Operator Menu Setup	Set 4 digit passcode (eg. 1234).	1000001
			SEL changes position, EDT changes digit.	
			Activated only when FULL.PC is also set.	
	FULL.PC⊗	Full Security Passcode for	( <u>0000</u> no passcode).	Accept
		Digital Setup	Set 4 digit passcode (eg. 1234).	1000001
			SEL changes position, EDT changes digit.	
	KEY.LOC⊗	Front Panel Key Locking	ZTGP Letter indicates key is unlocked.	Accent
		Zero, Tare, Gross/Net, Print	(-) Dash indicates key is locked.	necept
			SEL changes position, EDT changes digit.	
	KEY.FN	Key Functions	( no functions assigned).	Accent
		Position 1: Keypad Function	Keypad Function Key: U lb/kg switching, C Count,	1000001
		Кеу	H Hold, E Peak Hold, L Live Weight, S Show Total,	
		Positions 2, 3 & 4: Remote	B Batch, (-) No function.	
		Inputs	Remote Inputs: Z Zero, T Tare, G Gross/Net, P Print,	
			U lb/kg switching, C Count, H Hold, E Peak Hold,	
		®Front Panel Keys: Z Zero,	L Live Weight, S Show Total, B Batch, K Blank®,	
		T Tare, G Gross/Net, P Print	(-) No function (enable IO pin as output).	
	<b>B.LIGHT</b>	Backlight Operation	<u>ON</u> , AUTO, OFF	Accept
			(Automatically turns instrument off after 10 seconds of	
			inactivity)	
	BRIGHT	Backlight Brightness	01 to <u>10</u>	Accept
			(01=10%, 10=100%)	

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

SERIAL	PRN.ROW	Row Padding on Printout	<u>00.0</u> to 10.10	Accept
ctd.			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.	
	PRN.COL	Column Padding on Printout	00 to 20 (Number of spaces to add at start of each line of	Accept
			printout.)	
SET.PTS	OPTN A	- G O H -	- GOH - (Default Setpoint Settings)	Accept
		- none	- None disables the setpoint when not in use	
		Active	A Active for level control and overload alarms	
		Slow	S Slow Fill used in conjunction with Fast Fill	
		Gross	G Gross (use gross weight)	
		Net	N Net (use net weight, Tares before operating relay)	
		Reading	R Reading (use current displayed weight)	
		Held	H Held (use Held reading)	
		Over	O Over (weight increasing)	
		Under	U Under (weight decreasing, negative weighing)	
		High	H High (Active High logic)	
		Low	L Low (Active Low logic)	
		- none	- None (no internal beep during relay operation)	
		Single	S Single (one internal beep during operation)	
		Double	D Double (double internal beeps during operation)	
		Flash	F Flash (Display flashes)	
	TARG A	Target A	SEL changes position, EDT changes digit.	Accept
		(Primary target in batching)		

GRP					ſ		EDT PRINT/M+	OK
<b>→</b> ()←	→   ←						Underline = Defaults	
SET.PTS ctd.	OPTN B	- -none Active	G Gross Net	O Over Under	H High Low	- -none Single	<u>- G O H -</u> (Default) Same as OPTN A except: F Fast Fill used in conjunction with Slow Fill.	Accept
		Fasi	Readin Held	g		Double Flash		
	TARG B	Target (Prelim	B iinary va	alue in b	atching	)	SEL changes position, EDT changes digit.	Accept
	OPTN C	- -none Active Dump Pass	G Gross Net Readin Held	O Over Under g	H High Low	- -none Single Double Flash	<ul> <li><u>GOH</u> (Default)</li> <li>Same as OPTN A except:</li> <li>D Dump signal for weight to return to zero or dump time (refer to D.TIME below).</li> <li>P Pass output for setpoint 3 only. (checkweigh application)</li> </ul>	Accept
	TARG C	Target C (Not used in batching)				ng)	SEL changes position, EDT changes digit.	Accept
	FLIGHT	In-Flig	ht				SEL changes position, EDT changes digit.	Accept
	HYS	Hyster	esis				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	Set time in the format HH.MM	Accept
		HH.MM.SS displays	SEL changes position, EDT changes digit.	
	DATE	Date Setting	Set day and month in the format DD.MM	Accept
		DD.MM.YY displays	Set the year in the format YYYY	Accept
	QA.OPT⊗	Quality Assurance Reminder	OFF, ON (Flashes QA Due on due date)	Accept
	QA.DATE⊗	Quality Assurance Due Date	Set day and month in the format DD.MM	Accept
			Set the year in the format YYYY	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	<u></u> (Default display)	
			EDT advances through each output (1, -2-,3)	
	TST.INP	Test Inputs	<u></u> (Default display)	
			EDT advances through each input (1, -2-,3)	
FACTRY	DEFLT	Restore Factory Defaults	<u>Cont.N</u>	Accept
		Cont.N (No)	Warning: Choosing Cont.Y will clear all stored	10000
		Cont.Y (Yes)	data except calibration.	
	CONFIG	Configure Software Options	Used to enter license codes for software options.	Accept
- END -	EXIT SETUP	Accept settings and return to		Accept
		normal weighing mode		

## 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). **SEL EDT**
- 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.



PRINT/M+

GROSS/NET

门

#### 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.				
(0)	The weight reading is above the maximum capacity of the equipment.				
(ZERO)	The weight is outside the zero range				
(ERROR)	tolerance setting. See Note below.				
(STABLE)	The scale motion has prevented a zero,				
(ERROR)	tare or print operation from occurring. See				
	Note below.				
(QA)	Quality assurance testing is due. Press				
(DUE)	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)

