



RANGER INSTRUMENTS



2100 QUICK START MANUAL

For use with Software Versions 2.0 & above

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SPECIAL NOTE

TRADE USE OF THE RANGER 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** units 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.

1. Introduction

The Ranger **2100** is a precision industrial digital indicator using the latest technology to ensure fast and accurate weight readings.

1.1. Approvals

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

1.2. Features

- 27mm alpha-numeric LCD display (LED back-lighting).
- Programmable special function key and three remote inputs.
- Full digital setup and calibration.
- Six wire load cell wiring.
- Checkweighing and lb/kg 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. “RANGER SMART” Software Options

- 0224 (SERIAL) Enable RS-232 serial communications.
- 0225 (SETP) Enable setpoint output.

1.4. Manuals

- For a more information on the **2100** refer to the **2100 Digital Indicator Reference Manual** and **2100 Operator Manual** (available free of charge from www.rangerinstruments.com).

2. Specifications

Performance	
Display Resolution	Up to 30,000 divisions, minimum of 0.25 μ V/division (Trade 6000 divisions at 1 μ V/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: < 0.1 μ V/ $^{\circ}$ C, Span < 10ppm/ $^{\circ}$ C, Linearity < 20ppm, Noise < 0.05 μ Vp-p
Operating Environment	Temperature: -10 to +50 $^{\circ}$ C ambient, Humidity: <90% non-condensing
Digital	
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
Dimensions	
Body size	189mm (L) x 99mm (H) x 23mm (D)
Panel cutout	Flush mounted with cable holes drilled separately (template supplied)

3. Installation

The following steps are required to setup the **2100** indicator.

- Inspect unit 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.
- Unit has built in panel mounting screws. Use the "Panel Drilling Template" provided for hole locations.
- Connect Power to unit and press **<POWER>** key (if not overridden) to start instrument.
- Follow instructions in Digital section page 11 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).

3.1. 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. Warnings

4.1. General

- Unit 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.
- Unit and load cell cable are sensitive to electrical noise. Install well away from any power or switching circuits.

4.2. DC Power Supply

- DC supply need not be regulated provided it is free of excessive electrical noise and sudden transients.
- Unit 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 9VDC to 12VDC with current outputs of 0.5 to 1A.

4.3. 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).

4.4. Application Configuration Issues

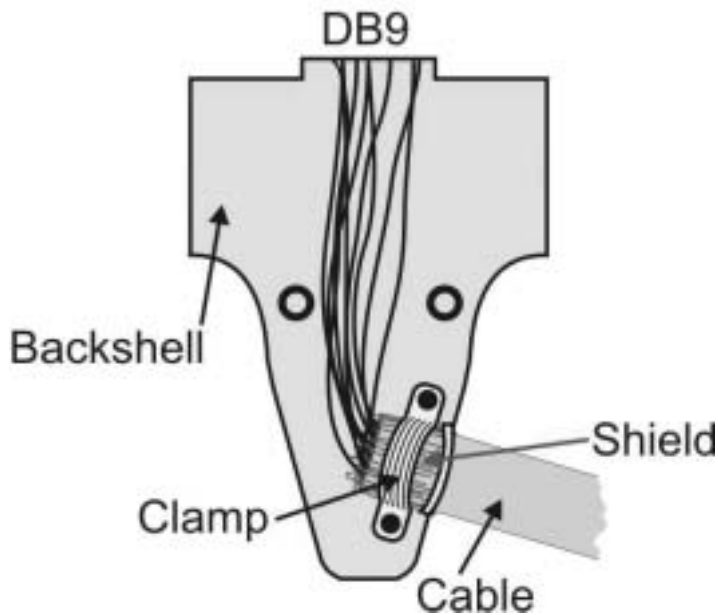
- Configuration and calibration can be performed from front panel, using digital setup. When Setup is used, all menu items are accessible and care must be taken to ensure no accidental changes are made to calibration and trade settings.
- Enter a passcode to prevent unauthorised or accidental tampering.

5. Connections

5.1. Connecting Shields

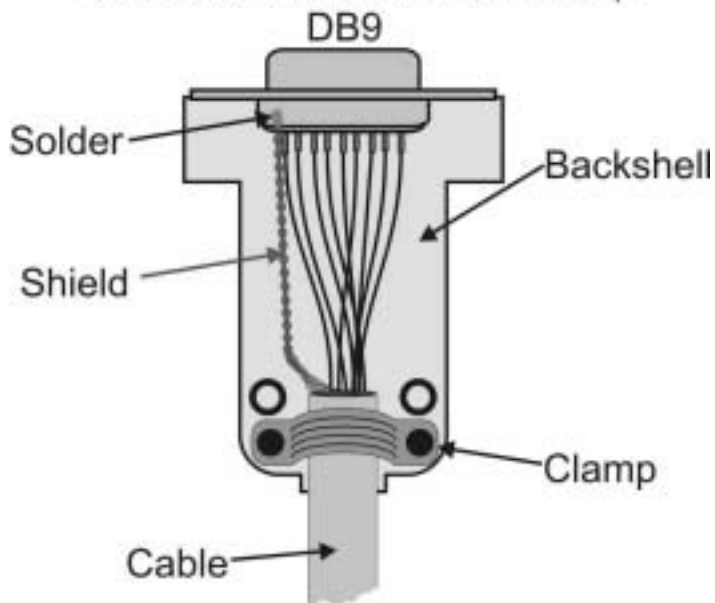
To obtain full EMC resistance with the 2100, the load cell shield **MUST** be connected electrically to the metal shell of the DB9 connector.

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.

Backshell without Shield Clamp



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 EMC immunity and minimise earth loops and cross-talk (interference) between instruments.
- For EMC 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).
- The unit 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.

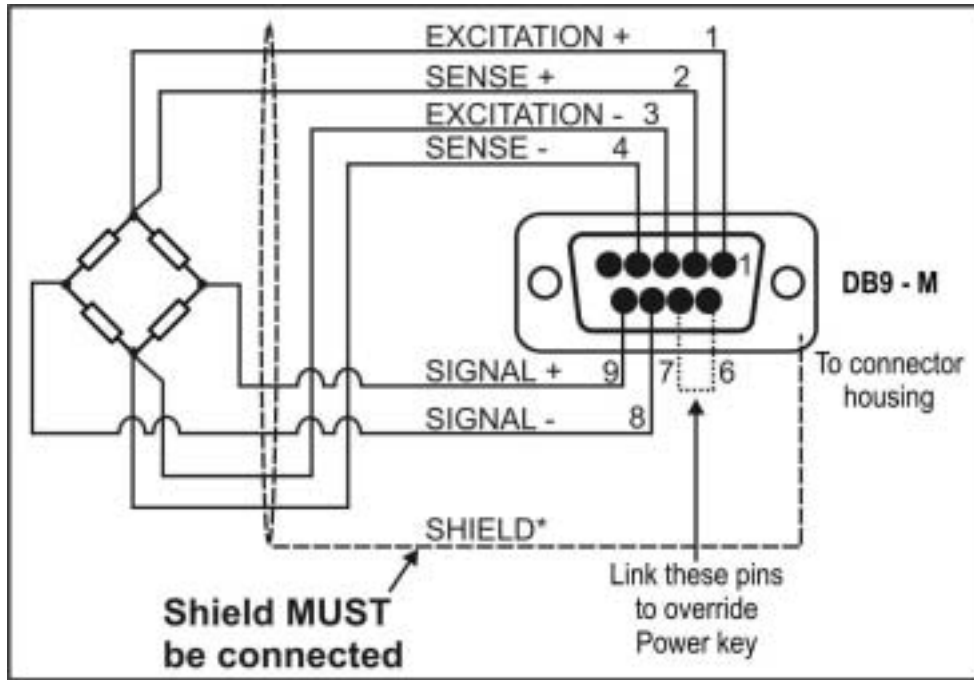
5.3. Unused Pins

Unused pins are NOT 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).

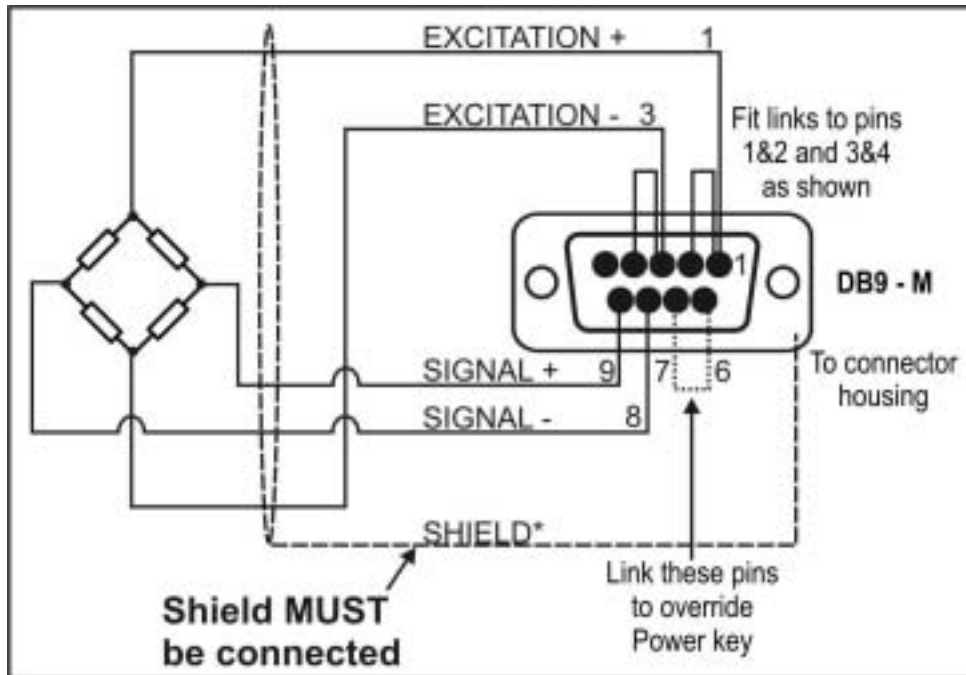
5.4. Load Cell Connection

5.4.1. 6-Wire Connection



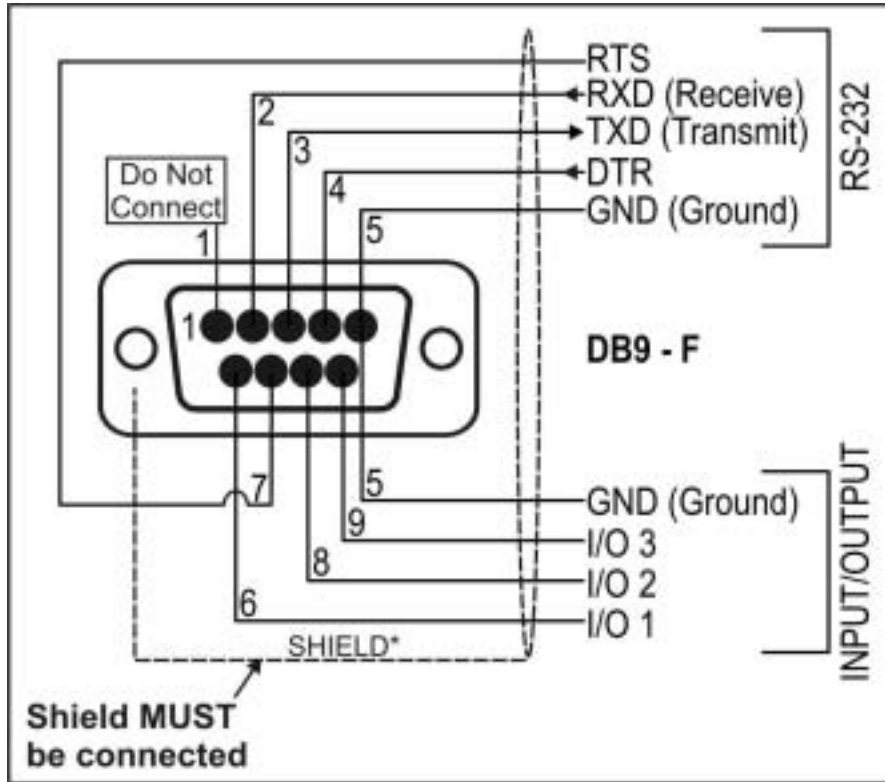
Note: Sense lines MUST be connected.

5.4.2. 4-Wire Connection



*For more information on shielding refer to page 7.

5.4.3. Auxiliary Connection

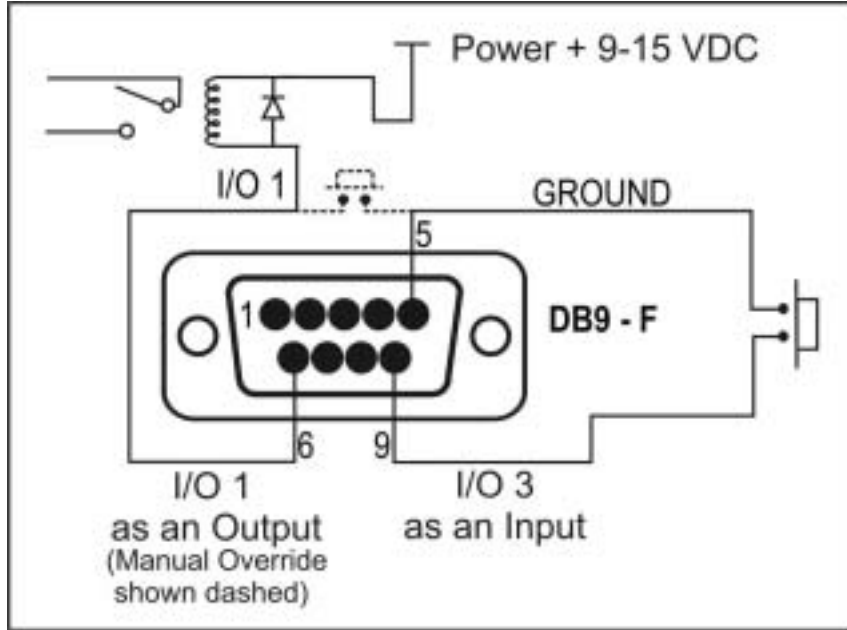


*For more information on shielding refer to page 7.

Note: Do NOT connect unused pins. For more information refer to page 8.

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

<p>POWER 9 TO 15 Volts DC 0.5A</p>	<p>Warning</p> <p>For 2100 use only 9-15 VDC</p> <p>Voltages outside this range may cause improper operation or damage.</p>
<p>Note: Variants of the 2100 may require different power requirements. Refer to Variant Data Sheet.</p>	

6. Instrument Setup - Full Digital







Full Digital Setup provides access to configure and calibrate the instrument.

- Ensure unit is On. Press the **<ZERO>** and **<POWER>** keys together for two seconds.
- To exit and return to Operator Interface, press the **<ZERO>** and **<POWER>** keys together for two seconds or select - **End** - from the menus.

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






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GRP 	ITM 	SEL 	EDT 	OK 
			Underline = Defaults	
BUILD	DP⊗	Decimal Point Position	<u>000000</u> , 00000.0, 0000.00, 000.000, 00.0000, 0.00000	Save
	CAP⊗	Maximum Capacity	SEL changes position, EDT changes digit.	Save
	RES⊗	Resolution (Count-By)	<u>1</u> , 2, 5, 10, 20, 50, 100	Save
	UNITS⊗	Units of Measure	none, g, <u>kg</u> , lb, t , oz	Save
	HI.RES⊗	Resolution x 10 Mode	<u>OFF</u> , ON	Save
OPTION	USE⊗	Industrial or Trade Use	<u>TRADE</u> (Trade), INDUST (Industrial) (+ and – weighing)	Save
	FILTER	Digital Filtering/Averaging	1 ,2, 5, <u>10</u> , 25, 50, 75, 100	Save
	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 Divisions in 1.0 Seconds (Time)	Save
	AUTO.Z	Auto Zero on Power Up	<u>OFF</u> , ON	Save
	Z.TRAC⊗	Zero Tracking Setting	<u>OFF</u> , SLOW (0.5 div/sec), MED (2 div/sec), FAST (10 div/sec)	Save
	Z.RANGE⊗	Zero Key Range	<u>-2+2</u> , -1+3 , -20+20 (% of full scale)	Save
	Z.BAND⊗	Zero Deadband	SEL changes position, EDT changes digit.	Save

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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 fullscale)	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 fullscale)	OK to clear point or ITM key to exit.	
	FAC.CAL ⊗	Factory Calibration Cont.N (No) Cont.Y (Yes)	<u>Cont.N</u> Warning: Choosing Cont.Y will restore default factory calibration in BUILD and CAL menus.	Save






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GRP 	ITM 	SEL 	EDT 	OK 
			Underline = Defaults	
SPEC	OP.PC	Operator Menu Access Passcode	(<u>000000</u> no passcode). Set 4 digit passcode (eg. 001234). SEL changes position, EDT changes digit. Activated only when FULL.PC is also set.	Save
	FULL.PC	Full Digital Setup Access Passcode	(<u>000000</u> no passcode). Set 4 digit passcode (eg. 001234). SEL changes position, EDT changes digit.	Save
	KEY.LOC⊗	Front Panel Key Locking Zero, Tare, Gross/Net, Print	<u>Z T G P</u> Letter indicates key is unlocked. (-) Dash indicates key is locked. SEL changes position, EDT changes digit.	Save
	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	(<u>----</u> 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).	Save

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	B.LIGHT	Backlight Operation	<u>ON</u> , AUTO, OFF (Automatically turns unit off after 10 seconds of inactivity)	Save
	BRIGHT	Backlight Brightness	000001 to <u>000010</u> (000001=10%, 000010=100%)	Save
	AUT.OFF	Automatic Power Off	<u>NEVER</u> , 20 s, 30 s, 60 s, 300 s, 600 s (Seconds of inactivity before power down)	Save
	AUX.DSP	Auxiliary Display (Time) (Recommended for batching Operations)	<u>OFF</u> , TIME	Save
	SYNC⊗	A/D Frequency	<u>25Hz</u> or 30Hz (This setting may affect calibration.)	Save
SERIAL	TYPE	Serial Output Type	OFF, <u>NET</u> , AUTO, PRINT, MASTER	Save
	ADDR	Serial Address	000000 to <u>000031</u> SEL changes position, EDT changes digit.	Save
	BAUD	Serial Baud Rate	1200, 2400, 4800, <u>9600</u> , 19200	Save
	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	Save






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GRP 	ITM 	SEL 	EDT 	OK 
SET.PTS	OPTN A	<p style="text-align: center;">- G O H -</p> <p>- none</p> <p>Active</p> <p>Slow</p> <p style="padding-left: 20px;">Gross</p> <p style="padding-left: 20px;">Net</p> <p style="padding-left: 20px;">Reading</p> <p style="padding-left: 20px;">Held</p> <p style="padding-left: 40px;">Over</p> <p style="padding-left: 40px;">Under</p> <p style="padding-left: 60px;">High</p> <p style="padding-left: 60px;">Low</p> <p style="padding-left: 40px;">- none</p> <p style="padding-left: 20px;">Single</p> <p style="padding-left: 20px;">Double</p> <p style="padding-left: 20px;">Flash</p>	<p style="text-align: center;">- <u>G O H</u> - (Default Setpoint Settings)</p> <p>- None disables the setpoint when not in use</p> <p>A Active for level control and overload alarms</p> <p>S Slow Fill used in conjunction with Fast Fill</p> <p>G Gross (use gross weight)</p> <p>N Net (use net weight, Tares before operating relay)</p> <p>R Reading (use current displayed weight)</p> <p>H Held (use Held reading)</p> <p>O Over (weight increasing)</p> <p>U Under (weight decreasing, negative weighing)</p> <p>H High (Active High logic)</p> <p>L Low (Active Low logic)</p> <p>- None (no internal beep during relay operation)</p> <p>S Single (one internal beep during operation)</p> <p>D Double (double internal beeps during operation)</p> <p>F Flash (Display flashes)</p>	<p>Underline = Defaults</p> <p>Save</p>

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TARG A	Target A (Primary target in batching)	SEL changes position, EDT changes digit.	Save
OPTN B	- G O H - -none Gross Over High -none Active Net Under Low Single Fast Reading Double Held Flash	- <u>G O H</u> - (Default) Same as OPTN A except: F Fast Fill used in conjunction with Slow Fill.	Save
TARG B	Target B (Preliminary value in batching)	SEL changes position, EDT changes digit.	Save
OPTN C	- G O H - -none Gross Over High -none Active Net Under Low Single Dump Reading Double Pass Held Flash	- <u>G O H</u> - (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)	Save
TARG C	Target C (Not used in batching)	SEL changes position, EDT changes digit.	Save
FLIGHT	In-Flight	SEL changes position, EDT changes digit.	Save
HYS	Hysteresis	SEL changes position, EDT changes digit.	Save
D.TIME	Dump Time	<u>00000.0</u> to 000020.0 seconds 0 for dump to zero weight, otherwise operated for the time specified.	Save

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GRP 	ITM 	SEL 	EDT 	OK 
			<u>Underline = Defaults</u>	
CLOCK	TIME	Time Setting 24 hour clock HH.MM.SS displays	Set time in the format 00.HH.MM SEL changes position, EDT changes digit.	Save
	DATE	Date Setting DD.MM.YY displays	Set day and month in the format 00DD.MM Set the year in the format 00YYYY	Save Save
	QA.OPT⊗	Quality Assurance Reminder	<u>OFF</u> , ON (Flashes QA Due on due date)	Save
	QA.DATE⊗	Quality Assurance Due Date	Set day and month in the format 00DD.MM Set the year in the format 00YYYY	Save Save
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 Cont.N (No) Cont.Y (Yes)	<u>Cont.N</u> Warning: Choosing Cont.Y will clear all stored data except calibration.	Save
	CONFIG	Configure Software Options	Used to enter license codes for software options.	Save
- END -	EXIT SETUP	Return to Operator Interface		Save

7. Instrument Setup - Operator Menu



The Operator Menu provides access to setpoint target and flight settings.

Ensure unit is On. Press the <TARE> key for two seconds.

- To exit and return to Operator Interface, press the <TARE> key for two seconds or select - **End** - from the menus.

8. Enabling Software Options

To enable any of the “Ranger 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 unit 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 unit unchanged.)
- Press the <FUNCTION> key when complete. The **2100** returns to normal operation.
- If successful the new “Ranger Smart” Option will be displayed, otherwise the **2100** will sound a beep.



9. 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**.

10. 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.

11. 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.

12. Diagnostic Errors

Error	Description	Action
E0001	Power supply voltage too low.	Check supply
E0002	Power supply voltage too high.	Check scale / cables
E0004	Load cell excitation voltage too low. (8 volts for up to 8 x 350 ohm load cells)	Check scale / supply
E0008	Load cell excitation voltage too high. (8 volts for up to 8 x 350 ohm load cells)	Check scale / supply
E0010	Temperature outside limits. (-10 to +50°C ambient)	Check location
E0020	Scale build incorrect. (100 to 30000 grads).	Fix up scale build
E0100	Digital setup information lost.	Re-enter setup
E0200	Calibration information lost.	Re-calibrate
E0300	All setup information lost.	Enter setup and calibrate
E0400	Factory information lost. (FATAL)	Service
E0800	EEPROM memory chip failed. (FATAL)	Service
E2000	ADC out of range. Possible load cell or cable damage.	Check load cell cable
E4000	Battery backed RAM data lost.	Re-enter setup
E8000	FLASH program memory incorrect. (FATAL)	Service

The **E** type error messages are additive. For example, E0005(0001+0004) 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)



This document is designed as a guide to the operation of the product. It shall not form any contract. The specifications of the product may be altered without notice.

Contact Information



RANGER INSTRUMENTS

Web Address: www.rangerinstruments.com