



MBS w/ Cardinal 205A

Installation & Setup Guide
Cardinal 205A Digital Indicator Panel

Columbia Machine, Inc.



Selection Screen

View Cardinal 205A Configuration

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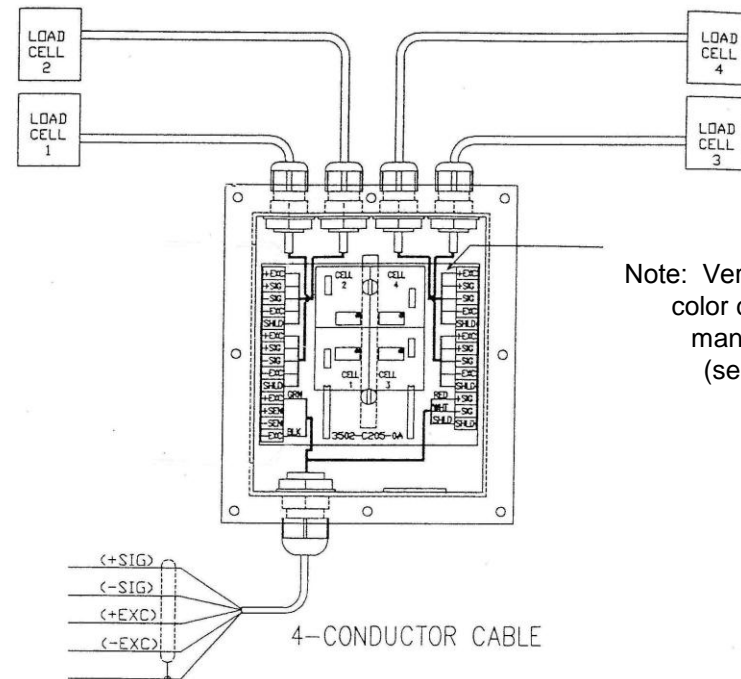
Installation: Typical Load Cell Color Code & Summing Box Board Layout



Typical "Load Cell" Color Codes
Listed by manufacturer

Manufacture	SHLD	+EXC	-EXC	+SIG	-SIG
Beowulf	SHLD	GREEN	BLACK	WHITE	RED
BLH	SHLD	GREEN	BLACK	WHITE	RED
Cardinal	SHLD	GREEN	BLACK	WHITE	RED
Electroscale	SHLD	RED	BLACK	GREEN	WHITE
HBM	SHLD	GREEN	BLACK	WHITE	RED
Interface	SHLD	RED	BLACK	GREEN	WHITE
National	SHLD	GREEN	BLACK	WHITE	RED
NCI	SHLD	RED & YEL	BLK & BLU	WHITE	GREEN
Revere	SHLD	GREEN	BLACK	WHITE	RED
Sensortronics	SHLD	RED	BLACK	GREEN	WHITE
Tedea	SHLD	GRN & BLU	BLK & BRN	RED	WHITE
Toledo	SHLD	GREEN	BLACK	WHITE	RED
Tranducer	SHLD	RED	BLACK	GREEN	WHITE
Weightronix	WHT/ORN	GREEN	BLACK	WHITE	RED

Cardinal Junction Box #3502-C208-0A, Colmac #233716
Interconnect wiring diagram for up to four (4) Load Cells



Note: Verify "Load Cell" color codes with manufacturer (see table)

To: Cardinal 205A Digital
Indicator Panel
Colmac #233715

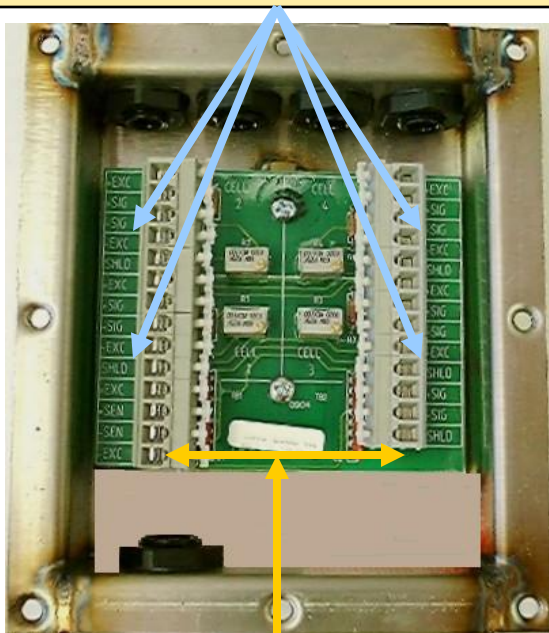
Belden Shielded Cable #8729
Colmac #234339

Installation: Load Cell Summing Box to Cardinal 205A Digital Indicator Panel



Load Cell Summing Box

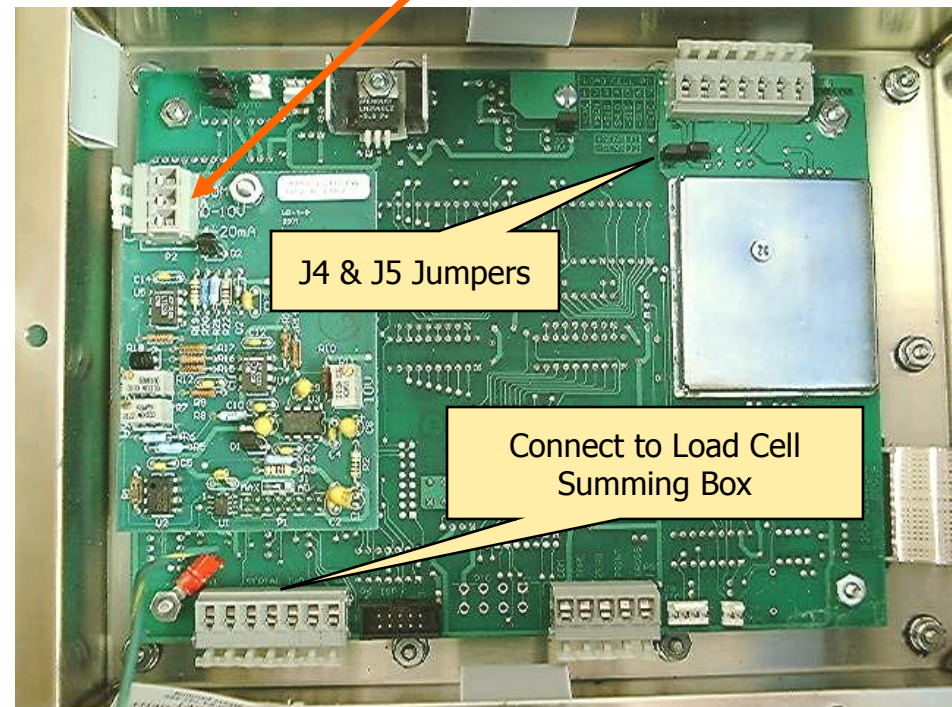
Connections for up to four (4) Load Cells



Connections to Cardinal 205A Indicator Box

Cardinal 205A Indicator Panel

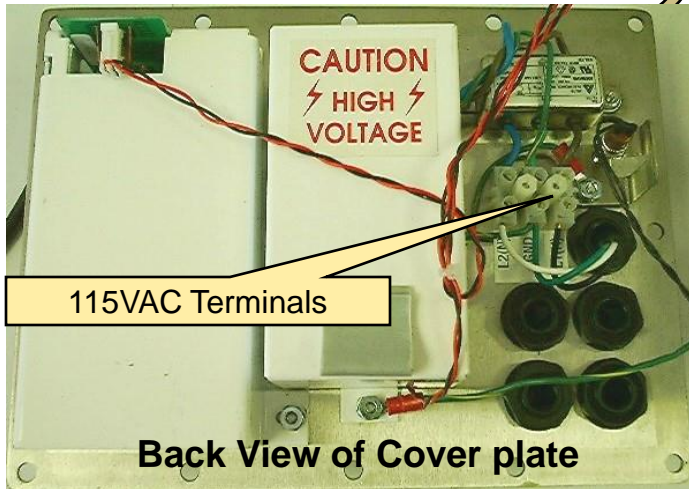
Connection to Analog Input Card in MBS Panel



Installation: Load Cell Summing Box to Cardinal 205A Digital Indicator Panel



Cardinal 205A Indicator Panel



⌘ INSTALLATION

1. Mount Cardinal Indicator Panel in a convenient location.
2. Connect 115VAC supply wires from MBS Batching PLC Panel to black cable Cardinal 205A Indicator Box. Recommend cutting plug off end of cable, and hardwire directly.

Typical MBS Panel

2 (115VAC -)
1AA (115VAC +)
GND

Cable on Cardinal Indicator Panel

L2 (Neutral (blue)
L1 (Hot) (brown)
GND (ground) (green/yellow)

3. Connect all Load Cell cables to Load Cell Summing Box.

+ Excitation	+ Signal	Shield
- Excitation	- Signal	
4. Connect the shielded cable between the Load Cell Summing box and the Cardinal 205A Indicator Panel

+ Excitation	+ Signal	Shield
- Excitation	- Signal	

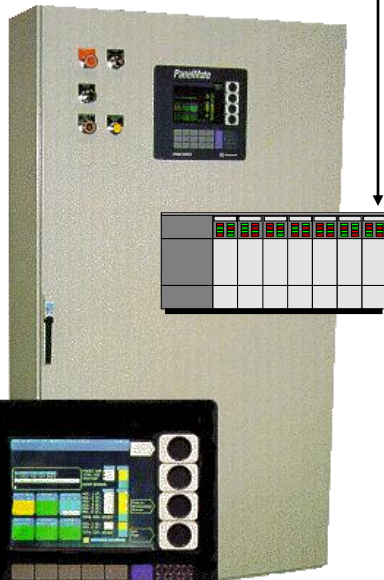
Installation: Cardinal 205A Digital Indicator Panel to MBS Control Panel



Cardinal 205A Indicator Panel



MBS Control Panel



⌘ Installation - continued

5. Connect the shielded cable (Belden 8729) between the Cardinal 205A Indicator Panel and the MBS Control Panel (analog input module).

⌘ For Aggregate by weigh: Cardinal 205A (P2)

Earth Ground (Shielded)
COM Common
4-20mA 4-20mA or 0-20mA

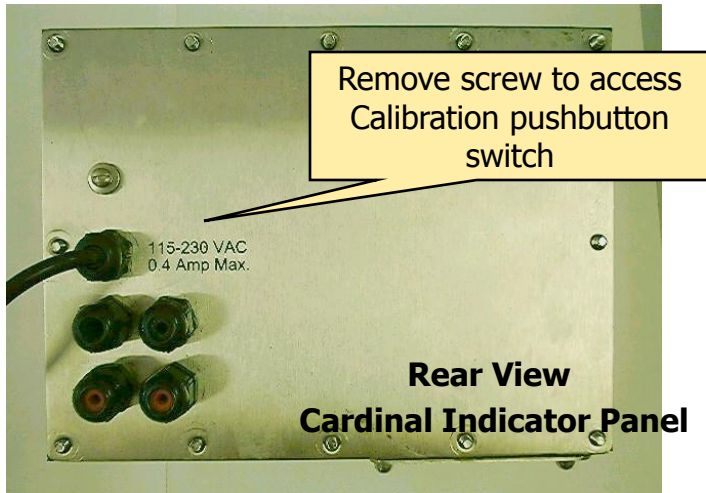
⌘ For Cement by weigh: Cardinal 205A (P2)

Earth Ground (Shielded)
COM Common
4-20mA 4-20mA or 0-20mA

[Click Here to return to Selection Screen](#)



Keyboard Functions: Cardinal 205A Calibration



Calibration Pushbutton Switch – to access this pushbutton, remove access screw on rear panel cover.

To activate Set-up mode, press calibration switch once, and "SETUP" will be displayed. To exit Set-up mode, power-down or while at "SETUP", use the *UP Arrow key.



ENTER/TARE key – to display current value of parameter

***UP** Arrow key – to change parameter value

UNITS key – to move cursor to change digit of parameter value

ENTER key – to accept edits and go to next parameter



[Click Here to return to Selection Screen](#)



Calibration Procedure: Cardinal 205A Digital Indicator

TO SET-UP FULL SCALE VALUE AND CALIBRATE CARDINAL SCALE MODEL 205A WEIGHT INDICATOR FOLLOW THE STEPS BELOW:

1. Activate the Set-up Mode by removing the access screw on the rear panel of the indicator and pressing the Calibration Pushbutton inside the panel.” **SETUP** ” will be displayed.
2. Press the Tare/Enter button on the front of the panel until “ **CAP** “ is displayed.
3. Press the Tare/Enter button once more and the current full scale value will be displayed.
4. Using the Up Arrow to change the value of the blinking digit and the Units button to move the cursor to the right, enter the new full scale value. Then press the Tare/Enter button to accept.
5. Press the Calibration Pushbutton on the rear of panel until “ **dAC** “ appears in the display.
6. Press the Tare/Enter button once and “ **Lo =** “ will be displayed
7. Press the Tare/Enter button once more and the current value will be displayed.
8. Using the Up Arrow and the Units button enter a “ **0** “ ,then press the Tare/Enter button to accept and “ **Hi =** “ will be displayed.



Calibration Procedure: Cardinal 205A Digital Indicator

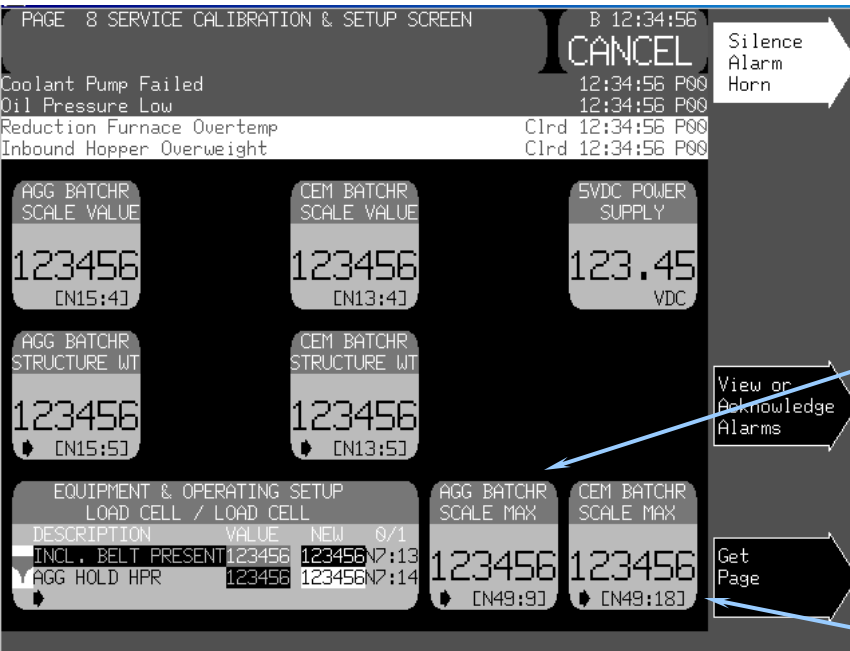


9. Press the Tare/Enter button once and the current **Hi** value will be displayed.
10. Using the Up Arrow to change the value of the blinking digit and the Units button to move the cursor to the right, enter the new full scale value. Then press the Tare/Enter button to accept.
11. Press the Calibration Pushbutton on the rear of panel until “ **CAL** “ appears in the display.
12. Press the Tare/Enter button and “ **CAL 1=** “ will be displayed. With no weight on the batcher, press Tare/Enter again and the current value will be displayed. Using the Up Arrow and the Units button enter a “ 0 “, then press the Tare/Enter button to accept.
13. The screen will show a series of dashes then display “ **CAL 2=** “. Press the Tare/Enter button once more and the current value will be displayed. Place a known weight on the batcher and using the Up Arrow and the Units button enter that known weight in the display and press the Tare/Enter button to accept.
14. The screen will show a series of dashes then display “ **Sio** “.
15. The calibration is now finished. To exit the Set-Up mode, power down or while at “ **SET-UP** “ press the Up Arrow button.





PLC Maximum Weight Reference: Service Calibration & Setup Screen



Note: references Allen Bradley locations, others PLC references will vary.

- TO ENTER THE MAXIMUM WEIGHT VALUES INTO THE PLC FOLLOW THE STEPS BELOW:
 1. Refer to the **Service Calibration & Setup Screen** on the MBS Panelmate.
 2. Enter the AGGREGATE MAXIMUM WEIGHT into **Agg. Batcher Scale Max** template. This value is the same value that was entered into the CARDINAL “CAP” PARAMETER (Full Scale Value).
 3. The weight shown in **Actual Aggregate Weight** template should equal weight in the batcher.
 4. Enter the CEMENT MAXIMUM WEIGHT into **Cem. Batcher Scale Max** template. This value is the same value that was entered into the CARDINAL “CAP” PARAMETER (Full Scale Value).
 5. The weight shown in **Actual Cement Weight** template should equal weight in the batcher.



Initial Setup: Cardinal 205A Digital Indicator

TO SET-UP CARDINAL SCALE MODEL 205 WEIGHT INDICATOR FOR THE FIRST TIME - FOLLOW THE STEPS BELOW:

1. Power up Cardinal Digital Display Indicator
 - The display will turn on with “205 1.0” which is the model number and firmware version.
(Note: Firmware version may change as newer models are released)
 - If the analog input is too low – error of **Err AL** will display
 - If the analog input is too high – error of **Err AH** will display
 - Version 10 (1.0) fixed an earlier feature that would not allow entering Set UP mode if these errors are active.
 - Unit will not enter CAL mode if there is an analog fault.

To step through the major sections of Setup use the back **Pb**.

To Step through the parameters use the front **Pb**.

ENTER/TARE key will display current value.

***/UP ARROW** key will change value.

ENTER/TARE key will accept value and display the next parameter.

If on a parameter display, the ***/UP ARROW** key will step back to the previous parameter.

2. JUMPERS: If using a four (4) wire load cell which is normal, install plug-in jumpers at **J4 & J5**.

These jumpers attach Sense leads to Excitation leads. (Jumpers are next to EXC/SEN/SIG connectors, and usually are in place from the Cardinal factory).





Initial Setup: Cardinal 205A Digital Indicator

Setup

SETUP			YES no
1.	USA		YES no
2.	Lft	Legal for Trade	yes NO
3.	Unit 1	Weighing Unit 1	0=none 1=tons 2=grams 3=LBS * 4=oz 5=kilos 6=tons 7=lb/oz * Calibrate in this unit
4.	Int	Interval Setting	(GRAD) Legal for Trade 1, 2, 5, 10, 20, 50 Not Legal 1 to 99 1
5.	dPP	Decimal Point	0
6.	CAP	Capacity	(FULL SCALE) Enter Full Scale Value
7.	Unit 2	Weighing Unit 2	0=none 1=tons 2=grams 3=LBS 4=oz 5=kilos 6=tons 7=lb/oz Note: Unit 2 must be different from Unit 1
8.	trA	Zero Tracking Range	0=off .5, 1 to 9





Initial Setup: Cardinal 205A Digital Indicator

Setup continued

9.	trL	4% Zero Range	YES no
10.	PUO	Power Up Zero	yes NO enter value
11.	SLEEP		YES no
12.	A oFF	Auto Off	0=disable
13.	CLtAr	Clear Tare	yes NO





Initial Setup: Cardinal 205A Digital Indicator

A-d

A-d			YES no
1.	dFLt	Digital Filtering 0=Disabled	1=Minimal 2=Moderate 3=Custom F Filter Level = 20 b Break Range = 25 Note: Use <u>option 3</u> for Mixer on loadcells
2	Sr UnS SC	Sample Rate 0 to 99 Motion Range 0 to 99 Stable Count 3 to 255	2 for Batcher/Weighbelt, 1 for Mixer 3 3 Applies to Print only
CAL			YES no
		YES enters calibration mode If NOT Calibrating, select NO, then return to CAL when ready to calibrate	
	Cal1	First weight	
	Cal2	Second Weight	

CAL





Initial Setup: Cardinal 205A Digital Indicator

Sio

	Sio	Serial input/output	YES NO
		(not being used at this time)	
Print	Print	(Not being used at this time)	YES NO
ESPAn	Span	Fine Span Adjustment	NO
		(Not being used at this time)	





Initial Setup: Cardinal 205A Digital Indicator

dAC

dAC		Digital to Analog Converter	YES no
1.	Lo	Weight in pounds that outputs 4ma. Lower weights all output 4 ma -99999 to 999999 0 uses the Net/Gross key to change to negative Set to below zero value. Display will show lower values.	
2.	Hi	Maximum weight – will output 20ma. Higher weights all output 20ma. Set to Capacity (Full Scale) value. Display will still show higher value. Full Scale Note: Hi must be changed to FULL SCALE	
3.	oUt	Max output in volts 0.01 to 10.00 Weights >= Hi will output this value. For 20ma, set to 10.00	
4.	Adj Hi	Allows for pot adjustment Set dac output to oUt level.	
5.	Adj Lo	Sets dac output to zero.	



Trouble-Shooting: Cardinal 205A Digital Indicator Panel



BEFORE YOU CALL FOR SERVICE

The 205/210 indicators have been designed to provide you with years of trouble-free operation. However, should you experience a problem, please refer to the troubleshooting guide below before you call for service. The following describes several types of symptoms along with suggested remedies.

PROBLEM

Display does not turn on AC operation:

POSSIBLE SOLUTIONS

Is the AC power cord fully inserted into the wall receptacle? Check wall receptacle for proper AC power. Try another electrical appliance in the same receptacle, does it work? Check the circuit breaker. Has there been power failure?

Battery operation:

Check if battery is installed and correctly. Is battery discharged - replace or recharge.

Incorrect weight displayed

Has the instrument been calibrated? Insure that the scale platform isn't touching an adjacent object. Check the load cell connector wiring. If using four (4) wire load cells, insure the sense lead jumpers (J4 & J5) are installed. Have proper operation procedures been followed?

Trouble-Shooting: Cardinal 205A Digital Indicator Panel



Trouble-shooting, continued

PROBLEM

Indicator will not display weight

The printer prints but does not use the Print Tab Settings or test ticket

POSSIBLE SOLUTIONS

Refer to Error Codes section and make certain that the "oCAP" message is not displayed. If so, and scale is not loaded, perform the calibration sequence.

The print tab setting or visual ticket format must be selected prior to printing the ticket. To select the ticket format prior to prints a beginning the weighing operation:

1. Press the **ASTERISK** key then the **PRINT** key. The display will change to the "Prt=".
2. Press the **ENTER** key to show the current value.
3. If the value displayed is acceptable, press the **ENTER** key again to save it.
4. If the displayed value is incorrect (or another ticket format is desired), use the numeric keys to enter the new value, then press the **ENTER** key to save it.

Trouble-Shooting: Cardinal 205A Digital Indicator Panel



Trouble-shooting, continued

PROBLEM

The printer prints but does not use the Print Tab Settings or prints the ticket.

POSSIBLE SOLUTIONS

To select the ticket format just prior to printing the ticket:

1. Press the desired format number.
2. Pressing the **PRINT** key.

Allowable values for ticket formats are:

- 0 = print tab settings
- 1 = visual ticket format 1
- 2 = visual ticket format 2

NOTE! When a print format is selected (by either method), it will remain active until changed by the operator.

Trouble-Shooting: Cardinal 205A Digital Indicator Panel



Trouble-shooting, continued

PROBLEM

Check for wiring errors
defective analog card
Logic addressing

POSSIBLE SOLUTIONS

The DAC Adj HI and Adj Lo can be used to check the 4-20ma signal from the Cardinal's analog board to the PLC.

This verifies that wiring is correct, that the analog cards are healthy, or logic addressing and scaling are correct.

Note: For our applications the DAC Hi setting must be equal to the "CAP" parameter (full scale) setting. If not equal, the output of the Cardinal's analog signals will be altered. On initial set up, the DAC Hi usually defaults to the CAP number. But if later adjustments are made, the DAC Hi value should be checked.

[Click Here to return to
Selection Screen](#)

Error Messages: Cardinal 205A Error Codes



ERROR CODES

The 205/210 indicators are equipped with software that indicates when an error in the operation takes place. The following lists the error codes displayed by the 205/210 along with their meaning. Should you encounter an error code, please refer to this list for the cause.

CALbtn (Calibration Button)

CALbtn will be displayed (until the condition changes), on power-up if the calibration switch is pressed in by the operator, the calibration access screw is the wrong length and is depressing the switch, the switch is disconnected from the PC board, or the switch is defective.

CORRECTIVE ACTION: Release the switch. Insure correct screw (#10 x ½ Stainless Steel fillister head) was installed for the calibration access screw. Referring to Figure No. 6, make sure calibration switch cable is plugged into P7 on the PC board. Replace calibration switch assembly. Consult your scale service provider.

ConFiG (Configuration)

E2PROM checksum failure. Indicates improper stored calibration data, calibration is necessary.

CORRECTIVE ACTION: Recalibrate with calibrated test weight.

Error Messages: Cardinal 205A Error Codes



ERROR CODES , continued

Error

An invalid keypad entry was attempted:

- A. **PRINT** key pressed with a negative weight.
 - B. **TARE** key pressed to enter a push button tare value of a negative value.
 - C. **ENTER** key pressed to enter a tare weight value that exceeds the scale capacity.
 - D. **ENTER** key pressed to enter a tare weight value that is inconsistent with the scale division value (i.e. attempt to enter a tare of 123 with scale divisions of 5).
 - E. **ZERO** key pressed when the gross weight is outside the scale zero weight range.
 - F. **lb/kg** key pressed to change to kg when the kg tare weight value exceeds 4 digits in length.
- CORRECTIVE ACTION: Determine which of the reasons for the error display is applicable and take the appropriate corrective action.

ErrAh (Analog Error High)

1. The load cell input is above the range of the indicator.

CORRECTIVE ACTION: Check for improper load cell wiring, excessive load, and for output of 1 to 40mV.

2. Load cell or circuit failure.

CORRECTIVE ACTION: Consult your scale service provider.



Error Messages: Cardinal 205A Error Codes

ERROR CODES, continued

ErrAL (Analog Error Low)

1. The load cell input is below the range of the indicator.

CORRECTIVE ACTION: Check for improper load cell wiring and for output of 1 to 40mV.

2. Load cell or circuit failure.

CORRECTIVE ACTION: Consult your scale service provider.

Err1

A program checksum mismatch has been detected.

CORRECTIVE ACTION: Consult your scale service provider.

Err3

Internal RAM failure.

CORRECTIVE ACTION: Consult your scale service provider.

HuH?

UNITS key pressed in an attempt to perform a “unit” conversion that is not allowed.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

Error Messages: Cardinal 205A Error Codes



ERROR CODES, contined

notArE

NET key pressed with no stored tare weight value.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

OCAP (Over Capacity)

The load on the scale exceeds the scale capacity plus nine (9) divisions.

CORRECTIVE ACTION: Remove the over capacity load from the scale platform. May indicate miscalibration.

-oF- (Overflow)

The indicator is attempting to display a positive number greater than six (6) digits in length or a negative number of more than five (5) digits.

CORRECTIVE ACTION: Return to Gross Weight mode and review Tare value. May indicate miscalibration.



Error Messages: Cardinal 205A Error Codes

ERROR CODES, continued

toobIG

UNITS key pressed in an attempt to perform a “unit” conversion where the interval would have been greater than 50.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

UnStb (Unstable)

Motion is present when trying to power up, print, zero or perform a push button tare function.

CORRECTIVE ACTION: Wait for a stable weight display (*STABLE* annunciator on) before performing any of these operations.