

Quick Start Guide

The iQUBE³ Digital Junction Box is compatible with a variety of Rice Lake Weighing System scale platforms, load cells and remote displays. This document provides instructions for wiring and configuring the iQUBE³ and 1280 with RS 232 communication. More information about the iQUBE³ including the full Technical Manual is available at www.ricelake.com/iqube3.



Manuals are available from Rice Lake Weighing Systems at www.ricelake.com/manuals

Warranty information is available at www.ricelake.com/warranties

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1.0 Configure iQUBE³ Hardware

1.1 Identify iQUBE³ Boards, Ports and Switches

All iQUBE³ builds have one CPU Board where the serial connections, option slots, system toggle switches and the first four load cell channels are connected. For systems with more than four load cells, optional iQUBE³ four-channel boards may be added to increase load cell connectivity.

This information is also available on the label affixed to the inside cover of the iQUBE³.

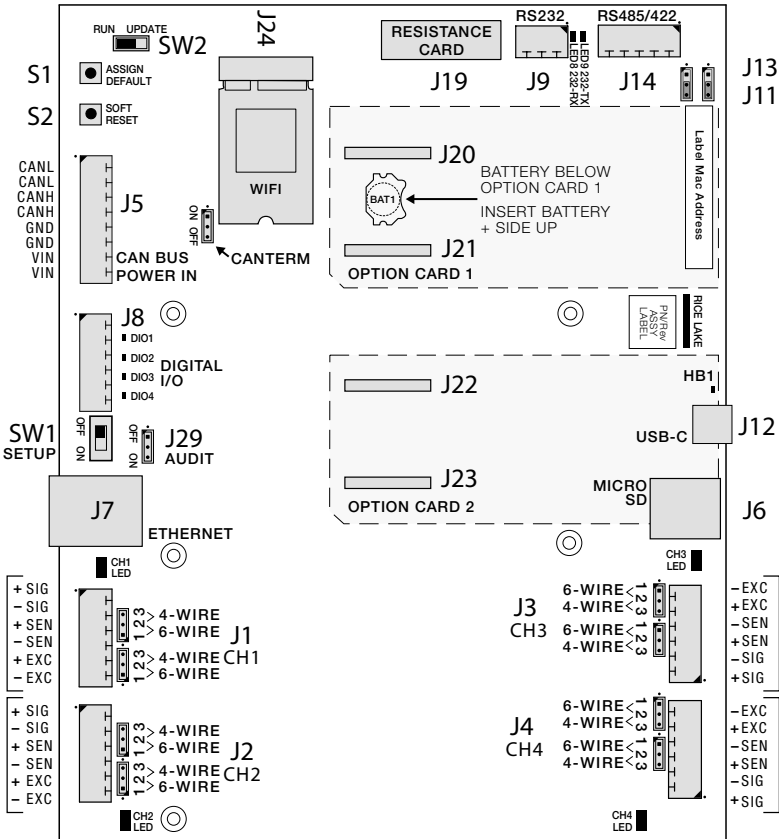


Figure 1. iQUBE³ CPU Board

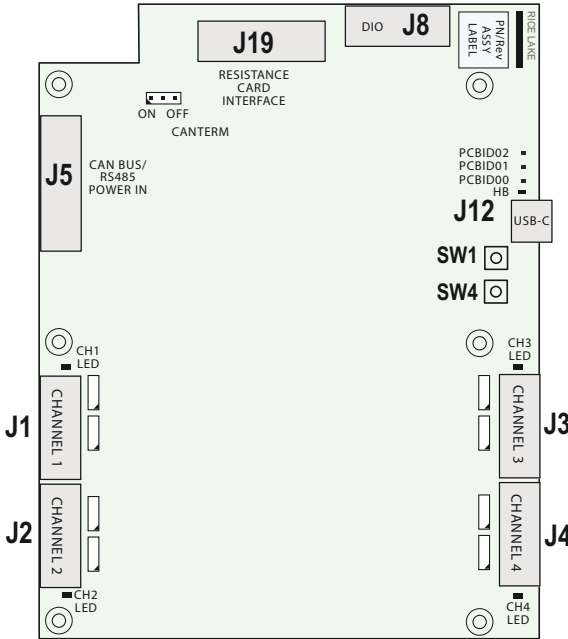


Figure 2. iQUBE³ Four-Channel Board

LEDs	CPU Board	Four-Channel Board	Function
Four-Channel Board PCBID LEDs	No	Yes	Lit LEDs signify assigned board number <ul style="list-style-type: none"> Board 1 = PCBID00 Board 2 = PCBID01 Board 3 = PCBID00 and PCBID01 Board 4 = PCBID02 Board 5 = PCBID02 and PCBID00
LED4HBEAT	Yes	Yes	LED blinks green when firmware is running
Channel LEDs	Yes	Yes	<ul style="list-style-type: none"> Only used in Weigh Mode LED lights green when Cell is assigned to a scale and connected without error LED lights red when cell is assigned to a scale with a diagnostic error LED are off when channel is not associated with any scale and/or not being used.
DIO LEDs	Yes	Yes	Lit LEDs signify DIO is active (0 VDC low state)

Table 1. iQUBE³ CPU and Four-Channel Board LEDs

iQUBE ³ J9	1280 Serial Port
Pin1 - GND	Pin1 - GND
Pin2 - RX	Pin3 - TX
Pin3 - TX	Pin2 - RX

Table 2. Wiring for RS-232

iQUBE ³ J14	1280 Serial Port
Pin1 - ISOGND	Pin1 - ISOGND
Pin 2 - Not Used	Pin 4 - Not Used
Pin 3 - Not Used	Pin 5 - Not Used
Pin 4 - (Z) +	Pin 2 - RX
Pin 5 - (Y) -	Pin 3 - TX

Table 3. Wiring for RS-485 2-Wire

iQUBE ³ J14	1280 Serial Port
Pin1 - ISOGND	Pin1 - ISOGND
Pin 2 - (B) RX-	Pin 4 - CTS
Pin 3 - (A) RX+	Pin 5 - RTS
Pin 4 - (Z) TX-	Pin 2 - RX
Pin 5 - (Y) TX+	Pin 3 - TX

Table 4. Wiring for RS-485 4-Wire

Switch/Jumper	Description
SW1	OFF normal operation ON setup mode
S1	Board assignment/sequence Default system configuration
S2	Soft reset per board (not system reset) Note: If four-channel board is soft reset, CPU board must also be soft reset
J11 and J13	Serial Jumpers - During normal operation place jumper on pins 2 and 3
J29	ON enables regulatory audit trail OFF disables audit trail

Table 5. CPU Board Jumper Pin and Switch Guide

Load Cells	4-Wire	6-Wire
Pins 1 and 2 or no shunt	N/A	Yes
Pins 2 and 3	Yes	N/A

Table 6. Load Cell Sense Jumper Pins J30-33 and J15-18

Port	Connector	CPU Board	Four-Channel Board	More Information
J1- J4	Load Cell Connections	Yes	Yes	Section 1.3 on page 6
J5	Can Bus/Power Connector	Yes	Yes	Section 2.3 on page 5
J6	SD Card	Yes	No	See Technical Manual
J7	Ethernet	Yes	No	See Technical Manual
J8	Digital I/O	Yes	Yes	See Technical Manual
J9	RS232 Serial Port	Yes	No	Section 2.4 on page 9
J12	USB-C	Yes	Yes**	See Technical Manual
J14	RS485/422 Serial Port	Yes	No	See Technical Manual
J19	Resistance Card Connector	Yes	Yes	See Technical Manual
J20 - 23	Option Cards	Yes	No	See Technical Manual

**For programming purposes only

Table 7. CPU and Four-Channel Board Connections

1.2 Ground Cables to Enclosure



IMPORTANT: Except for the power cord, all cables routed through the cord grips must be shield grounded on the ground shield bracket. Remove the insulated jackets and shielding per the following instructions.

Shielding Procedure

1. Route the cables through the cord grips and the shielding clamps to determine the cable lengths required to reach the appropriate cable connectors.
2. Mark cables to remove insulated jacket as described below under Foil Shielded Cables and Braid Shielded Cables.

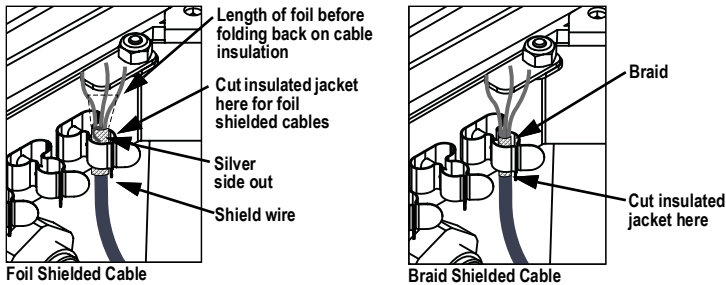


Figure 3. Cable Shielding

Foil Shielded Cables

1. Strip the insulated jacket and foil 1/2 in (15 mm) past the shielding clamp.
2. Strip another 1/2 in of the insulated jacket, leaving the foil shielding exposed.
3. Fold the foil shielding back on the cable where the cable passes through the clamp.
4. Ensure the silver (conductive) side of the foil is turned outward.
5. Wrap the shield wire around the cable, ensuring it contacts the foil where the cable passes through the clamp.
6. Press cable into shielding clamp. Ensure cable is secure and clamp is contacting the braided shielding of the cable.

Braid Shielded Cables

1. Strip the insulated jacket and braided shielding from a point just past the shielding clamp.
2. Strip another 1/2 in (15 mm) of the insulated jacket, leaving braid exposed where the cable passes through the clamp.
3. Press cable into shielding clamp. Ensure cable is secure and clamp is contacting the braided shielding of the cable.

1.3 Wire Load Cell Cables to the iQUBE³

To attach load cell cables to the CPU or four-channel board:

1. Route the cables through the cord grips of the enclosure.
2. Strip 1/4 in of insulation from the ends of the load cell wires and ground cable to enclosure as in [Section 1.2 on page 5](#).
3. Install wires into connector
4. Plug Connector into the board.
5. Secure load cell cables to enclosure with cable ties and mounts after connections are complete.

IMPORTANT: Keep exposed length of load cell cables away from any non-load cell cable such as AC cable, digital IO cables and communication cables to prevent interference.

6. Install sense shunts are correctly placed on J30-33 and J15-18 to avoid error conditions (see [Table 6 on page 4](#)).

NOTE: If load cell has 4 wires, place shunt over pins 2 and 3. If load cell has 6 wires, remove shunt or place over pins 1 and 2. Jumpers must be placed correctly over all jumpers.

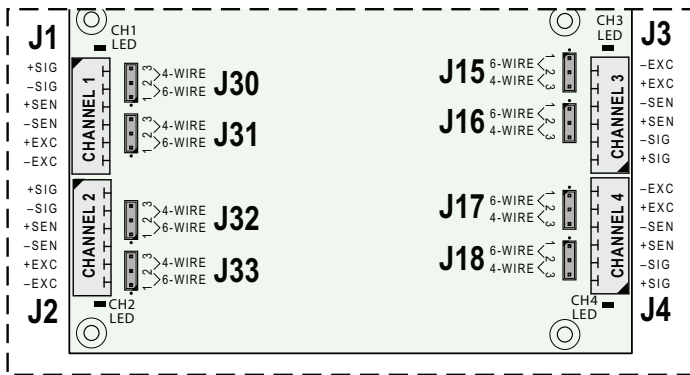


Figure 4. iQUBE³ CPU Board and Four-Channel Board Load Cell Jumper Pin Locations

NOTE: Channel LEDs light green when load cells are assigned to a scale with no errors. Channel LEDs light red when cell is assigned to a scale, but in an error state. The CPU board and the four-channel board share the same junction numbers

When load cells are wired to iQUBE³ connectors, J1-J4 are assigned by default as channels 1-4 (5-8, 9-12, 13-16, 17-20, 21-24 for four-channel boards).

Load Cell Connector	iQUBE ³ CPU Board	iQUBE ³ Four-Channel #1	iQUBE ³ Four-Channel #2	iQUBE ³ Four-Channel #3	iQUBE ³ Four-Channel #4	iQUBE ³ Four-Channel #5
J1	1	5	9	13	17	21
J2	2	6	10	14	18	22
J3	3	7	11	15	19	23
J4	4	8	12	16	20	24

Table 8. Cell Numbering for Multiple-Board System

1.4 Connect iQUBE³ to Power Supply

Connect the power supply and a single point ground to the iQUBE³ CPU board J5 board.

J5 Pin	J5 Pin	Signal
1	CN_L	OPEN
2	CN_L	To optional four-channel board
3	CN_H	OPEN
4	CN_H	To optional four-channel board
5	GND	Power supply V-
6	GND	To optional four-channel board
7	PR_IN	Power Supply V+
8	PR_IN	To optional four-channel board

Table 9. CPU board J5 Pin Assignments

1.5 Wire Multiple iQUBE³ Boards Together

- Connect up to five iQUBE³ four-channel boards sequentially via the J5 connectors on each board with either EL147 cable or CAT6 cable.
- Wire J5 connectors in parallel from the iQUBE³ CPU board J5 to the J5 connector of each four-channel iQUBE³ board. [Figure 5](#) displays an example for wiring multiple iQUBE³ boards.
- Parallel: CN_L to CN_L, CN_H to CN_H, GND to GND, PR_IN to PR_IN
- Place shunt over pins 1 and 2 of the CANTERM jumper of the first and last boards in the sequence. Remove CANTERM jumper from all boards in between the first and last board.

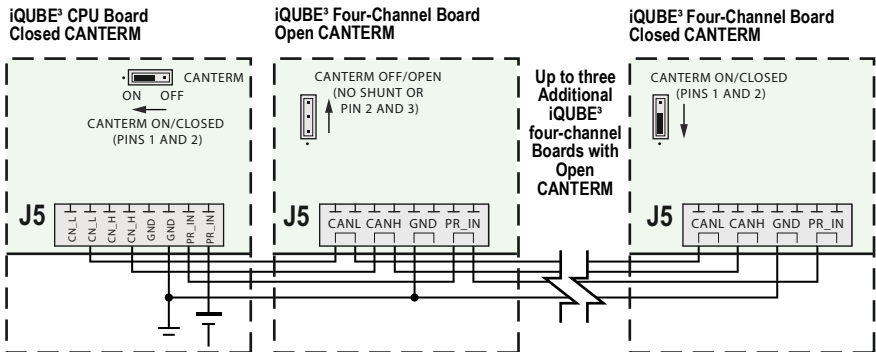


Figure 5. J5 CANBUS Wiring

1.6 Wire Serial RS-232 Connection between iQUBE³ and Indicator


Wire an RS-232 connection from the 1280 serial port to the J9 serial port pin (see Table 10 and Figure 1 on page 2).

J9 Pin	Signal
1	GND
2	Rx
3	Tx


Table 10. Port 1: J9 RS-232 Pin Assignments

2.0 Configure iQUBE³ Firmware

2.1 Enter 1280 Configuration Mode from Weigh Mode

1. Press  in upper right corner of the 1280 Weigh Mode screen.
2. Press **Configuration** to enter 1280 Configuration mode.



2.2 Configure 1280 to Communicate with iQUBE³

1. Enter **1280 Configuration Mode** (see Section 2.1).
2. Press  **Communication** to enter the **Communication** menu.
3. Select **Input Type**. **Input Type** options display.
4. Select iQUBE³ and press **DONE**.
5. Select **Port Type**. **Port Type** options display.
6. Select **RS-232** and press **DONE**.



NOTE: Serial Port 1 is the default displayed menu choice. If the iQUBE³ is connected to a different serial port, select the Serial Port 1 drop-down in the 1280 Communication menu and then select the connected port. The selected port's configuration settings will be displayed to the right.

2.3 Configure iQUBE³ Scale in 1280

1. Enter 1280 Configuration Mode (see Section 2.1).
2. Press  **Scales**. **Format** interface displays.
3. Press the edit scale icon  at the top of the screen. **Scale Kind** menu displays.
4. Select **iQUBE³ Scale**. **Select Scale Hardware** options displays.
5. Select **Connection : Port1 : Scale1**.




NOTE: The default Scale Hardware type reads as "Connection: Port 1: Scale 1". This refers to the connected serial port and specified scale. Select connected 1280 serial port.

6. Press **DONE**. iQUBE³ is set as Scale 1.
7. Press **DONE** again. iQUBE³ **Setup** menu displays.



NOTE: See the 1280 Technical Manual for more information on scale setup. Settings can be made to the iQUBE³ independently of setting it as the scale kind. The 1280 must be set to the iQUBE³ scale kind for the indicator to read weight from the iQUBE³.

2.4 Run iQUBE³ Setup Wizard

1. Enter 1280 Configuration Mode (see [Section 2.1 on page 8](#)).
2. Press  **Scales** to enter the **Scales** menu.
3. Select **iQUBE³ Setup Wizard**. Warning Dialog box displays.



IMPORTANT: This wizard is intended for initial setup of an iQUBE³. Configuration settings **WILL BE OVERWRITTEN** during this procedure.

4. Press **OK**. **Select iQUBE³ Scale** displays.
5. Select correct iQUBE³ scale and press **Next**. **Select iQUBE³ Port** displays.
6. Select the 1280 port that the iQUBE³ is connected to and press **Next**. **Select iQUBE³ Port Type** displays.
7. Select connection type and press **Next**. Screen prompts a connection test.
8. Press **OK**. Screen displays If iQUBE³ connection is successful, **Successfully connected to iQUBE³ CPU board with serial number XXXXXX** displays.
9. Press **OK**. iQUBE³ **Board Assignment** displays.



IMPORTANT: Configuration cannot continue until iQUBE³ is connected. If connection is not successful,

- Return to [Section 1.0 on page 2](#) and double check wiring and switches
- Power cycle the iQUBE³
- Begin iQUBE³ setup wizard again.



NOTE: Screen displays available four-channel boards. A green check mark signifies that a resistance card is present.

10. Arrange four-channel cards up or down if needed. CPU board always displays first.
11. Press **Next**. Screen displays detected load cells.



NOTE: If load cells are not found, check to ensure load cell wiring is correct, and restart Setup Wizard.

12. Press **Next**. **Factory Sensitivity (load cell mV/V rating)** displays.
13. Enter load cell mV/V rating and press **Next**. **Load Cell Capacity** displays.
14. Enter load cell capacity for all load cells and press **Done**. **Scale Setup Options** displays.
 - For theoretical calibration, select **Automatic Setup** and follow prompts.
 - For full setup, select **Manual Scale Setup**. **Load Cell Assignments** Displays. Proceed to step 15.
15. Select correct scale from drop down menu.
16. Select assign on all load cells to be assigned to selected scale.





NOTE: Load cells found are referenced by (detected) in brackets. Assign the load cells individually, or select **Assign Detected**, which assigns all load cells detected.

17. Press **Next**. **Decimal Positions** displays.
18. Select decimal position and press **Next**. **Display Divisions** displays.
19. Select display divisions and press **Next**. **Primary Units** displays.
20. Select primary units and press **Next**. **Scale Capacity** displays.
21. Enter scale capacity and press **Next**. **Calibration** Prompt displays.
 - **Yes** - Continue to [Section 3.0 on page 10](#) to Calibrate.
 - **No** - Display saves configuration and returns to 1280 Configuration.
 - **Cancel** - Display returns to 1280 configuration without saving manual setup configuration.

3.0 Perform Standard Calibration

Each calibration completely overwrites any previous calibration settings.

1. Enter 1280 Configuration Mode (see [Section 2.1](#)).
2. Press  **Scales. Format** interface displays.
3. Select **Calibration. Calibration Screen** displays.
4. Press **Calibrate Scale. iQUBE³ Scale Calibration** menu displays.
5. Select **Standard Calibration** and press **Next>**.
6. Select **Chains/Hooks are NOT used during calibration** and press **Next>**.
7. Remove all test weights from the scale.
8. Press **Calibrate Zero. Zero Calibration Complete** displays.
9. Press **Next>. Calibrate Span** prompt displays.
10. Press **123... Calibration Weight** entry prompt displays.
11. Enter the calibration weight for the test weight and press **DONE**.
12. Place test weight on the scale.
13. Press **Calibrate Span**. Indicator calibrates Span.
14. Press **Next>. Calibration Results** display.
15. Remove test weights and press **Next>**.
 - If resistance boards are not installed, go to [Step 20](#).
16. If resistance boards are installed, **Resistance: Load Cell** prompt displays.
17. Press **YES** to test resistance cards. **Load cell Wiring** prompt displays.
18. Select **NO** if load cells are 4-wire. Select **YES** if load cells are 6-wire. Indicator performs resistance test and displays resistance values.
 - Select **All Readings** to see more resistance test results for any load cell. Select **<Back** to return to results.
 - Select **Save Results** to save the results of the resistance test to the database.
19. Press **Next>. Calibration Complete** Displays.
20. Select **Finish to Return to the Scale Setup**.
21. Press  **Save and Exit**. Indicator returns to **Weigh Mode**.

4.0 Serial Commands

The iQUBE³ indicator can be controlled by a personal computer connected to one of the indicator communication ports. Control is provided by a set of commands which return and change setup parameters, and perform reporting functions. The commands provide the capability to pull data from the iQUBE³ using a personal computer. Refer to the iQUBE³ Technical Manual or contact your dealer for more information.

5.0 Diagnostic Functions

5.1 Board Error LED

Cell status LEDs next to each load cell connector indicate status of connected load cells.

LED Color	Meaning
Green	Load cell good
Red	Load cell error
Off	Disabled/load cell not assigned to a scale

Table 11. Load Cell LED Status Indications

5.2 Diagnostic Functions

The iQUBE³ provides three types of diagnostic functions:

- **System diagnostics** monitor the power supply, excitation voltages and communications between primary and secondary boards. System diagnostics are always enabled and are only query commands. There are no parameter setting commands.
- **Cell diagnostics** monitor cell connection, cell overload, and cell under-load conditions; Cell diagnostics are enabled for all cells that are assigned to a scale.
- **Scale diagnostics** provide control parameters to allow configuration for specific scale applications and must be explicitly enabled. Scale diagnostic commands provide monitoring for zero reference, cell drift, peak-to-peak noise, and unbalanced load conditions.

A diagnostic code token <D> is included in FMT1, FMT3 and FMT6 data formats. When a diagnostic code is generated, the related query command below can be used to retrieve additional information about the error.



NOTE: Using the query command for a given error also clears the diagnostic flag for that error. Once cleared, that data is no longer available.

Refer to the iQUBE³ Technical Manual or contact your dealer for more information about fixing diagnostic errors.

<D>	Error Type	Function	Query Command
P	Power supply	System	DIA.PS
S	Secondary communication	System	DIA.MSCONNECT
E	Excitation	System	DIA.PSEXC
C	Cell connection	Cell	DIA.CELLCONNECT
V	Overloaded cell	Cell	DIA.OVERLOAD
U	Underloaded cell	Cell	DIA.UNDERLOAD
R	Zero reference	Scale	DIA.ZREF
D	Drift	Scale	DIA.DRIFT
N	Peak noise	Scale	DIA.NOISE
L	Unbalanced cell	Scale	DIA.UNBAL
—	All		DIA.FLAGS
—	All		DIA.CLEAR

Table 12. Diagnostic Command Summary

6.0 Specifications

Voltage Input:

AC voltage: 100 to 240 VAC; 50/60 Hz
DC voltage: 9 to 36 VDC

Analog Signal Input Range:

-51 to +51 mV

Analog Signal Sensitivity:

0.3 μ V/grad at 30 Hz
0.5 μ V/grad at 100 Hz
1.2 μ V/grad at 500 Hz

A/D Sampling Rate:

12.5 to 500 Hz (selectable)
12.5 Hz (Default)

Digital I/O:

Four per card, for push-button operation,
setpoint control or cell status
24 mA per DIO at 5V

Communication Ports:

RS-232/RS-422/485
USB-C
Ethernet TCP/IP, wired standard
Ethernet TCP/IP, optional wireless

Load Cell Inputs:

Connect up to 24 load cells (four, per board)

Load Cell Excitation:

3.3 VDC, 38 mA maximum per channel
Up to 24 x 350 ohm load cells

Rating/Material:

Polycarbonate (NEMA Type 4X) enclosure
Stainless steel (NEMA Type 4X) enclosure
with hinged cover

Temperature:

Certified: 14 °F to 104 °F (-10 °C to 40 °C)
Operating: -40°F to 140 °F (-40 °C to 60 °C)
Storage: -40°F to 158 °F (-40 °C to 70 °C)

Maximum Current Load for Fully Loaded System

+24V	1A
120VAC	0.36A
240VAC	0.22 A

Temperature:

Certified: 14 °F to 104 °F (-10 °C to 40 °C)
Operating: -40°F to 140 °F (-40 °C to 60 °C)
Storage: -40°F to 140 °F (-40 °C to 60 °C)

Warranty:

Two-year limited

Approvals:

NTEP 25-041
Measurement Canada Pending
UL Pending



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