iQUBE®³

Digital Diagnostic Junction Box
Version 1.0

Technical Manual

Compatible with:

1280 Enterprise® Programmable HMI Indicator

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Revision History

This section tracks and describes manual revisions for awareness of major updates.

Revision	Date	Description
Rev A	March 5, 2025	Product Release

Table i. Revision History

Technical training seminars are available through Rice Lake Weighing Systems.
Course descriptions and dates can be viewed at www.ricelake.com/training
or obtained by calling 715-234-9171 and asking for the training department.

Contents

Rice Lake continually offers web-based video training on a growing selection of product-related topics at no cost. Visit www.ricelake.com/webinars

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1.0   Introduction

This manual is intended for use by service technicians responsible for installing and servicing iQUBE³ digital diagnostic junction boxes. This manual applies to Version 1.0 or later of the iQUBE³ software. For 1280 Enterprise™ Series Indicator host device applications, install firmware Version 02.08 or later.

NOTE: Install most current 1280 firmware.

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

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

1.1   Safety

Safety Definitions:

DANGER: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. Includes hazards that are exposed when guards are removed.

WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death. Includes hazards that are exposed when guards are removed.

CAUTION: Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.

IMPORTANT: Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.

General Safety
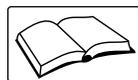
Do not operate or work on this equipment unless this manual has been read and all instructions are understood. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals.

WARNING

Failure to heed could result in serious injury or death.

Some procedures described in this manual require work inside the iQUBE³ or indicator enclosure. These procedures are to be performed by qualified service personnel only.

Do not allow minors (children) or inexperienced persons to install/operate this unit.

Do not operate without enclosure completely assembled.

Do not place fingers into slots or possible pinch points.

Do not use this product if any of the components are cracked.

Do not make alterations or modifications to the unit.

Do not remove or obscure warning labels.

Do not submerge.

Before opening the unit, ensure all power is disconnected.

The transmitter module is authorized for use only in devices where the antenna is installed at least 20 cm away from users.
The final end product must be labeled in a visible area: Contains FCC ID: R68XPICO200.
The FCC ID can be used only when all FCC compliance requirements are met.

1.2   Disposal

Product Disposal

The product must be brought to appropriate separate waste collection centers at the end of its life cycle.

Proper separate collection to recycle the product helps prevent possible negative effects on the environment and to health, and promotes the recycling of the materials. Users who dispose of the product illegally shall face administrative sanctions as provided by law.

1.3   FCC Compliance

United States

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canada

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class A prescites dans le Règlement sur le brouillage radioélectrique edicté par le ministère des Communications du Canada.

1.4   Overview

The iQUBE³ is a digital programmable junction box with advanced diagnostic and multi-scale capabilities. The iQUBE³ operates as an autonomous unit that streams data to any connected and compatible device. The iQUBE³ can be configured to support up to four individual scales plus their sum. An iQUBE³ system can be configured to read up to 24 full bridge analog load cells.

1.4.1   User Interface Options

The iQUBE³ does not have a physically integrated display. It can be configured, calibrated and monitored through:

- **1280 Enterprise Series Programmable Indicator** - Configure, calibrate, and monitor diagnostics for the iQUBE³ directly through the 1280 interface (see Section 3.0 on page 33).
- **Revolution** - Configure and calibrate the iQUBE³ through Revolution (see Section 6.0 on page 73).
- **PC Terminal** - Communicate using serial or fieldbus terminals with a PC program that is capable of sending and receiving ASCII text commands with the iQUBE³ (see Section 7.0 on page 74)

1.4.2   Diagnostics

There are three types of diagnostics:

- **System** - Always enabled. Monitors power supply and excitation voltages, as well as communication between iQUBE³ CPU and four-channel boards.
- **Cell** - Always enabled. Monitors cell connection, cell overload, and cell underload.
- **Scale / Advanced** - User enabled. Configurable parameters for monitoring zero-reference, load cell drift, peak-to-peak noise, and unbalanced load conditions.

Diagnostic information can be included in weight data or monitored on a communications channel separate from weight data. See Section 8.0 on page 88 for more information.

1.5   Hardware Configuration Options

Three types of printed circuit boards (PCB) may be combined to create an iQUBE³ build. iQUBE³ enclosures mount a maximum of four PCBs. For more information on the product build specifications, refer to the mechanical drawings and parts lists included with the shipment.

1.5.1   iQUBE³ CPU Board

An iQUBE³ system must have only one iQUBE³ CPU board. The CPU board provides:

- Four load cell input channels
- MicroSD® Card Slot
- RS-232 communications port
- RS-485 communications port
- Wired Ethernet TCP/IP communications port
- USB-C® communication port
- Two option card ports
- One digital I/O channel with four digital inputs/outputs

1.5.2   iQUBE³ Four-Channel Board

An iQUBE³ system may include up to five optional iQUBE³ four-channel boards. Each iQUBE³ four-channel Board has four load cell input channels and communicates with the iQUBE³ CPU board via a controller area network bus (CANbus) loop. If additional load cell channels are needed, additional enclosures might be needed. Additional enclosures do not need an additional iQUBE³ CPU Board. Wire the additional iQUBE³ four-channel boards into the CANbus loop.

1.5.3   Optional iQUBE³ Resistance Board

Optional iQUBE³ Resistance Boards may be added to an iQUBE³ build. Resistance boards analyze each of the load cells without disconnecting them at the platform. The iQUBE³ is able to test directly from the HMI. When used, iQUBE³ Resistance Boards are paired directly with each iQUBE³ four-channel Board and with the iQUBE³ CPU board. If resistance boards are included, all load cell channels must be connected to a resistance board.

iQUBE³ Resistance Board (Optional)
Section 2.4.3 on page 21

iQUBE³ Four-Channel Board (Up to 5, per system requirements)
Section 2.4.1 on page 19

iQUBE³ CPU Board (Required)
Section 2.4.1 on page 19
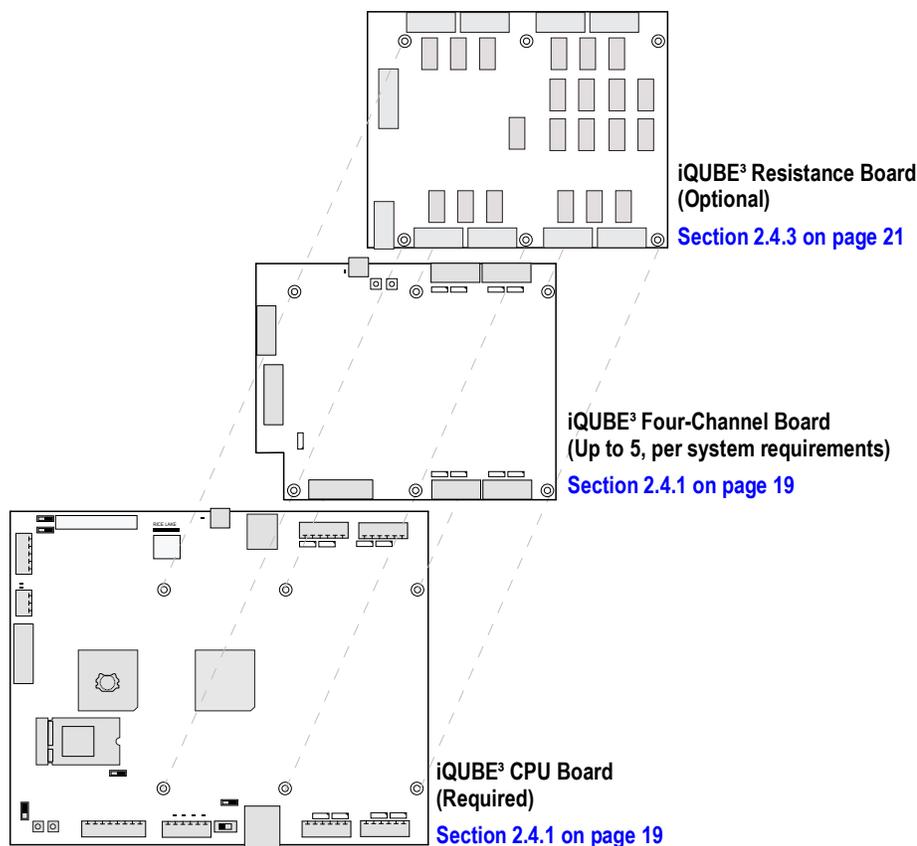
Figure 1-1. iQUBE³ Circuit Boards

1.5.4 Enclosure Options

The enclosures are available in both polycarbonate (PC) and stainless steel (SST), with or without a power supply. All models of the iQUBE³ provide cord grips for cabling into the unit.

The iQUBE³ is available in polycarbonate (PC) or stainless steel (SST) enclosures.

- Small Enclosure – accommodates up to four iQUBE³ PCBs (CPU, four-channel or resistance boards)
- Large Enclosure – accommodates up to four iQUBE³ PCBs (CPU, four-channel or resistance boards)

> *NOTE: For example, each iQUBE³ system requires one iQUBE³ CPU board and up to five iQUBE³ four-channels boards for a total of twenty-four channels (or 24 load cells). This configuration, without resistance cards, needs a minimum of two enclosures.*

1.5.5 Power Supply Options

The iQUBE³ is available configured with the following power supply options.

- Internal 115/230 VAC power supply (Figure 1-2)
- Remote 9-36 VDC power supply with transient voltage surge suppressor (Figure 1-3)
- External 115/230 VAC power supply in an fiberglass reinforced plastic (FRP) enclosure (Figure 1-4)
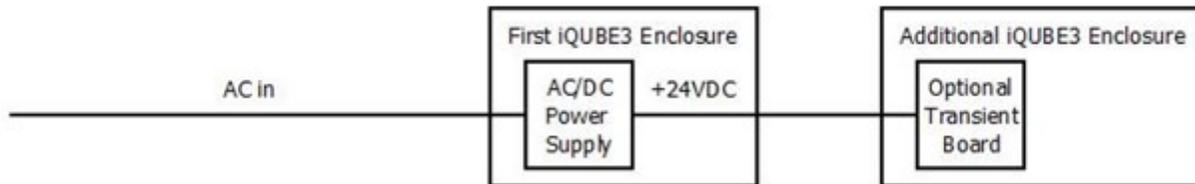
Figure 1-2. iQUBE³ with Internal 115/230 VAC power supply
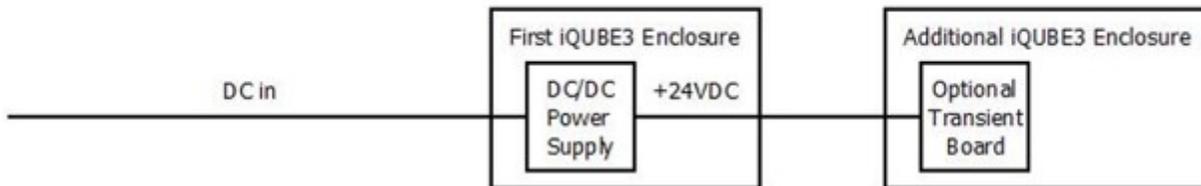
Figure 1-3. iQUBE³ with Remote 9-36 VDC power supply
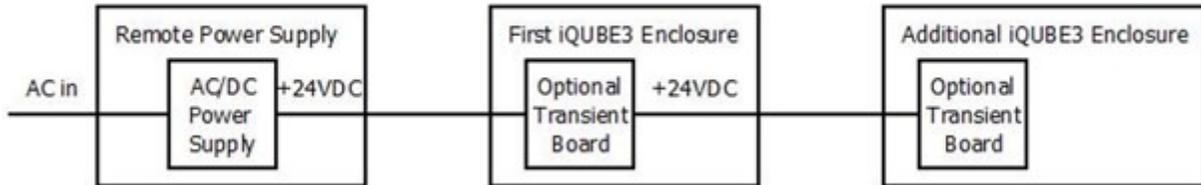
Figure 1-4. iQUBE³ with External AC/DC Power Supply

1.5.6 Options

The following option cards available to extend the communications capabilities of the iQUBE³.

- Analog output option card
- Fiber optic option card
- Four-channel relay option card
- Dual serial option card
- Fieldbus communication with SCT-2200 series
    - PROFINET
    - Profibus®
    - EtherNet/IP™
    - EtherCAT®
    - CANOPEN
    - Modbus

1.6 Supplementary Manuals

The following manuals are available for more information on products and options for the iQUBE³. All additional manuals can be found at **www.ricelake.com/manuals**.

1280 System Manuals

- 1280 Technical Manual

iQUBE³ Options

- Fiber-Optic Interface Installation Instructions
- Remote Power Supply Installation Instructions

2.0   Installation

This section describes procedures for connecting load cell, power and serial communications cables to the iQUBE³ junction box. Assembly drawings and replacement part lists for the iQUBE³ are included.

⚠️ **WARNING: Some procedures described in this manual require work inside the iQUBE³ or indicator enclosure. These procedures are to be performed by qualified service personnel only.**

Before opening the unit, ensure all power is disconnected.

Use a wrist strap for grounding and protection of components from electrostatic discharge (ESD) when working inside the iQUBE³ enclosure.

2.1   Installation Check Lists

The following check lists should be followed to ensure that the iQUBE³ is fully prepared to be connected to an indicator.

📝 *NOTE: iQUBE³ will not configure when it is an error state. All wiring must be correctly connected before configuration.*

2.1.1   Location Check List
The iQUBE³ must be located and installed in an adequate location:

___   Unpack and assemble (See Section 2.2 on page 15)
___   Enclosure dimensions (See Section 2.2.1 on page 15)
___   Mount the enclosure (See Section 2.2.3 on page 16)
___   Determine power needs (See Section 2.3 on page 16)
___   Provide transient protection (See Section 2.3.2 on page 16)
___   Determine communication distances (See Section 2.3.3 on page 17)
___   Identify Included iQUBE³ Boards (See Section 2.4 on page 17)

2.1.2   Wiring Check List

📝 *NOTE: All cables must be properly grounded (See **Section 2.5.2 on page 23**)*

Minimum Requirements

iQUBE³ will not communicate with an indicator unless the following wiring has been installed:

___   Connect power supply (See Section 2.5.3 on page 24)
___   Connect load cells (See Section 2.5.3 on page 24)
___   Connect communication (See Section 2.5.10 on page 30)

Additional Options

___   Resistance card wiring (See Section 2.5.4 on page 25)
___   Wire primary iQUBE³ CPU board to additional iQUBE³ four-channel boards

📝 *NOTE: See **Section 2.6 on page 32** for more information about specific applications.*

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2.2 Unpack and Assemble the iQUBE³

Immediately after unpacking, visually inspect the iQUBE³ and the parts list to ensure all parts are included and undamaged. If any parts were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately.

2.2.1 Enclosure Dimensions

Mount enclosure through mounting holes. Determine location of the holes using the table below. The mounting slot is 0.39 in (9.9 mm) long by .33 in (8.4 mm).

Stainless Steel Small Enclosure	
A	13.50 in (342.9 mm)
B	12.28 in (311.9 mm)
C	12.75 in (323.9 mm)
D	10.28 in (261.1 mm)
E	8.00 in (203.2 mm)
F	6.29 in (159.8 mm)
G	6.20 in (157.5 mm)
Polycarbonate Small Enclosure	
A	12.13 in (308.0 mm)
B	11.45 in (290.8 mm)
C	10.90 in (267.97 mm)
D	9.32 in (236.8 mm)
E	5.98 in (152.0 mm)
F	6.95 in (176.4 mm)
G	6.71 in (170.4 mm)
Polycarbonate Large Enclosure	
A	14.13 in (359.9 mm)
B	13.46 in (341.8 mm)
C	12.91 in (328.0 mm)
D	11.36 in (288.5 mm)
E	7.99 in (202.9 mm)
F	7.02 in (178.4 mm)
G	6.79 in (172.4 mm)

Table 2-1. iQUBE³ Dimensions
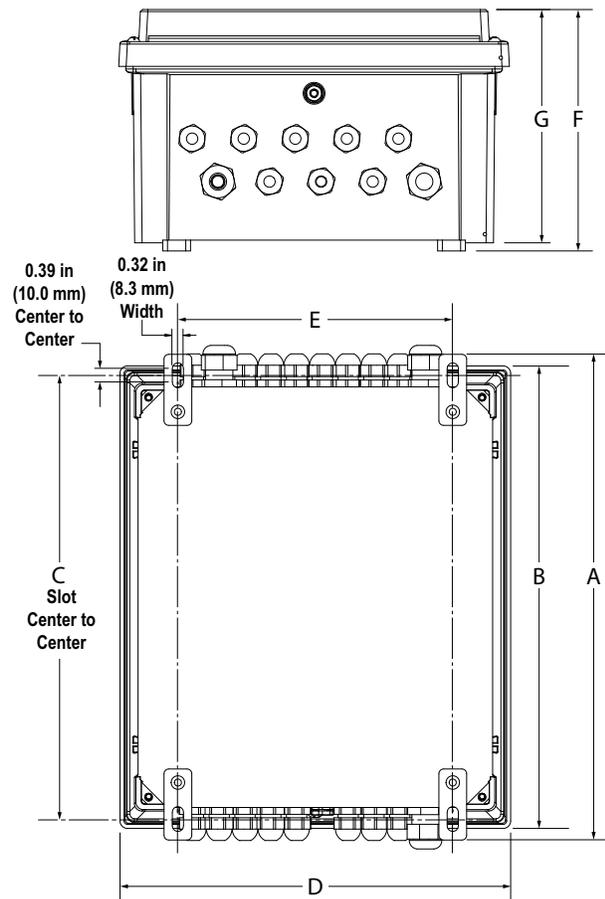
2.2.2 Torque Ratings

Refer to Table 2-2 throughout installation and use of product to maintain proper torque ratings for iQUBE³ components.

Component	Torque Rating
Cover Screw Screw SST	22 in-lb (2.5 N-m)
Cover Screw Screw PolyCarb	15 in-lb (1.7 N-m)
Power Supply Bracket	18 in-lb (2.0 N-m)
Cord Grip Nut (to enclosure)	33 in-lb (3.7 N-m)
Cord Grip Dome Nut (around cable)	22 in-lb (2.5 N-m)

Table 2-2. Component Torque Ratings

2.2.3 Mounting the Enclosure

The iQUBE³ can be mounted either vertically or horizontally to a flat surface.

If the iQUBE³ will be attached to the building surface, a power supply cord may be used for connection to the AC main supply, provided the conditions in this section are met.

UL Equipment Considerations

The iQUBE³ should not be installed as a permanent part of the building structure. This includes equipment for building-in (per UL Document 1.2.3.5). The iQUBE³ must be removable from the building surface.

UL Power Considerations

The power supply cord must not be attached to the building surface, nor run through walls, ceilings, floors and similar openings in the building structure.

Installation measures must be taken to prevent physical damage to the power supply cord. Properly route the power supply cord and position the iQUBE³ near an outlet, to allow for quick disconnect in case of an emergency.

2.3 Location Considerations

2.3.1 Power Supply

The iQUBE³ operates from +24 VDC power. It can be powered by one of three methods; internal AC/DC power supply, internal DC/DC power supply, or external remote AC/DC power supply. See for power supply wiring information.

- The internal power supply requires AC or DC power to be available at the scale depending on whether AC/DC or DC/DC is installed. It offers the greatest protection from inductive transients.
- Use the external remote +24 VDC power supply for iQUBE³ installations that do not have AC power available at the scale platform.

⚠️ *WARNING: The AC/DC Power Supply is not hot pluggable. connections to the +24 VDC are to be done with the system powered off.*

2.3.2 Transient Protection

The iQUBE³ transient protection board protects the iQUBE³ electronics from sudden, high-energy surges in voltage (transients). It is a safety feature that diverts excess energy from surges caused by lightning strikes or power fluctuations to ground, thus preventing damage to the connected components.

🛈 *IMPORTANT: Improper grounding systems can cause costly lightening damage to electronics.*

Single Point Grounding System

illustrates a generic single point grounding system.
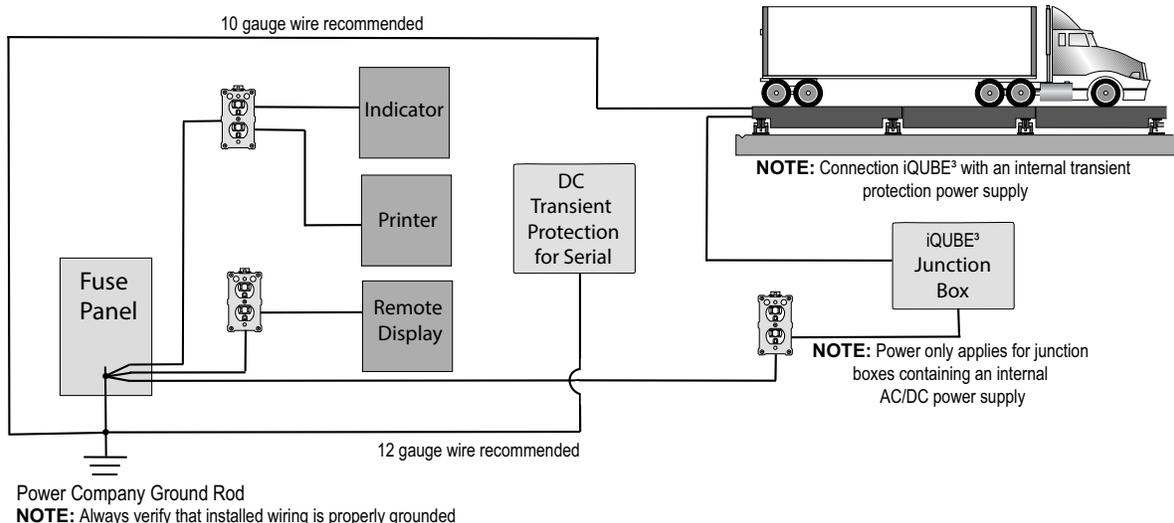
Figure 2-1. Truck Scale Single Point Grounding Example

2.3.3   Communications Cable Distance Limitations

The maximum cable lengths that can be used for the communication types from the iQUBE³ to the indicator depend on a number of factors. Use distances to inform communication methods.

- Output impedance of the transmitter
- Electrical noise in the environment
- Cable capacity, wire gauge, termination, shielding and baud rates

Use the distances in Table 2-3 as a general guide for communication cabling.

Connection Type	Distance
RS-232	10 ft @ 115,200 Baud (50 ft (15 m) @ 19,200 Baud)
RS-485	1000 ft (300 m) twisted pair cable @ 115,200 Baud
Fiber-optic	Plastic Fiber: • Low Power Mode - 170 ft (52 m) • High Power Mode - 170 ft to 500 ft (52 m to 152 m)
Ethernet Cat5e	330 ft (100 m)
USB	16.5 ft (5 m)

Table 2-3. Communication Cable Limitations

NOTE: Data rate decreases with distance.

2.3.4   CANbus Cable Distance Limitations

iQUBE³ enclosures communicate between each other with a Controller Area Network (CAN). The CANbus cable distance is the cable length measured between the iQUBE³ CPU board and the last iQUBE³ four-channel board in the CANbus loop regardless of the number of boards in the series. The iQUBE³ can be configured to run CANbus cabling a maximum distance of 1500 ft depending on sample rate (see Section 2.5.6 on page 27).

2.3.5   WiFi Distance Limitations

The maximum line of sight distance for LAN 802.11 a/b/g/n WiFi is 328 ft (100 m). This distance may be reduced by environmental obstacals and interference.

2.4   iQUBE³ Boards

The iQUBE³ boards are secured together and attached to a removable platform to allow easier access to wiring for installation. When the platform is removed, two retainer clips, attached with the hinges to the sides of the platform, extend outward to rest in the outside channel of the enclosure.

Up to three additional four-channel boards or one four-channel board and two resistance boards

Boards secured together with standoffs

Base CPU board or four-channel board

A

B

Rotate Retainer Tabs to "Removal Position" to remove or replace board stack assembly.

Rotate Retainer Tabs to "Service Position" to stop removal of board assembly from the enclosure

Retainer tab positions

B

Kickstand folded in to slide in or out of enclosure

Kickstand folded out to rest in enclosure channel

A

Figure 2-2. Kickstand and Board Mounting Location

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2.4.1   iQUBE³ CPU Board and Four-Channel Board

All iQUBE³ builds must have a base CPU Board. Additional optional iQUBE³ four-channel boards may be installed to increase connected load cells.
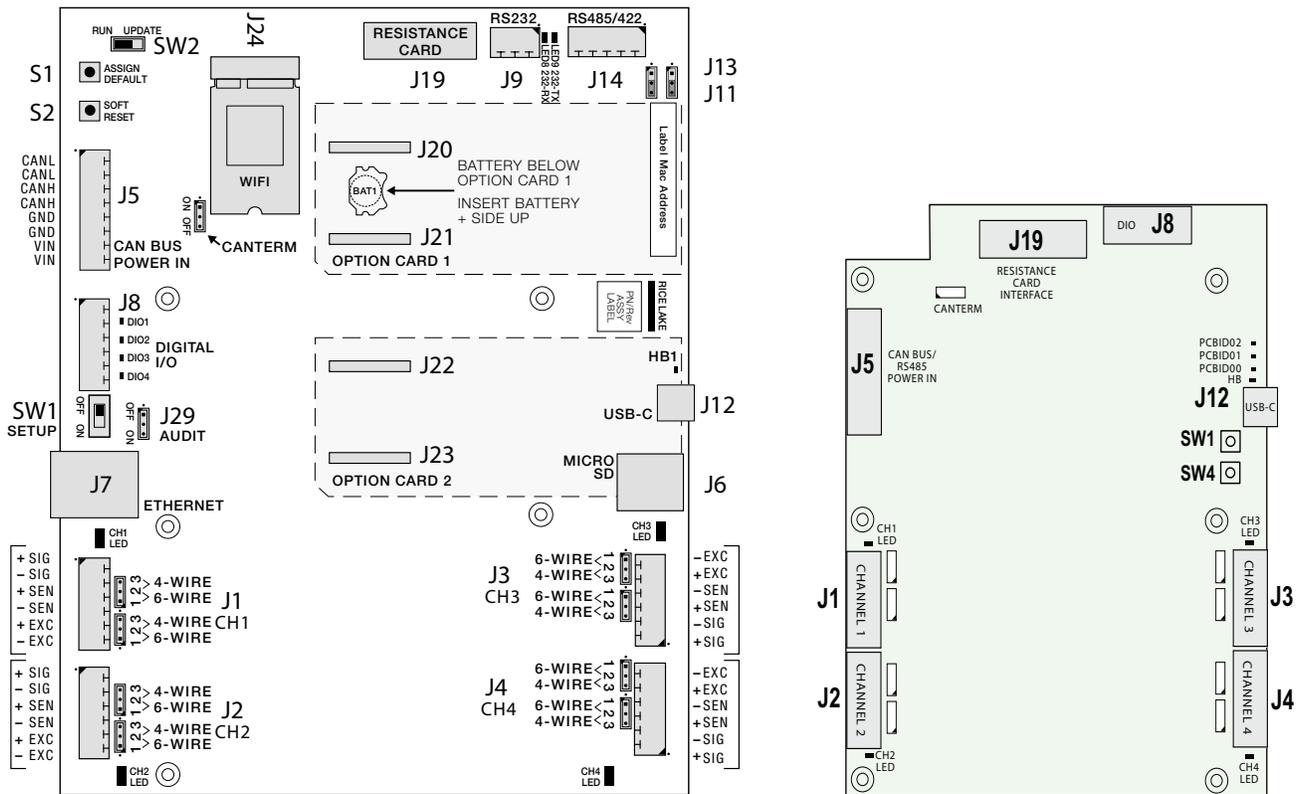
Figure 2-3. iQUBE³ CPU Board and Four-Channel Board

Port	Connector	CPU Board	Four-Channel Board	More Information
J1- J4	Load Cell Connections	Yes	Yes	Section 2.5.3 on page 24
J5	CANbus/Power Connector	Yes	Yes	Section 2.5.5 on page 26 Section 2.5.6 on page 27
J6	SD Card	Yes	No	
J7	Ethernet TCP/IP	Yes	No	Section 2.5.8 on page 28
J8	Digital I/O	Yes	Yes*	Section 2.5.9 on page 29
J9	RS232 Serial Port	Yes	No	Section 2.5.10 on page 30
J12	USB-C	Yes	Yes**	
J11 J13 J14	RS485/422 Serial Port	Yes	No	Section 2.5.10 on page 30
J19	Resistance Card Connector	Yes	Yes	Section 2.5.4 on page 25
J20 - 23	Option Cards	Yes	No	Addendums available at **www.ricelake.com/iqube3**
*For cell status only **For firmware updating purposes only				

Table 2-4. CPU and Four-Channel Board Connections

2.4.2 Quick Reference iQUBE³ Connection and LED Information

iQUBE³ J9	1280 Serial Port
Pin1 - GND	Pin1 - GND
Pin2 - RX	Pin2 - RX
Pin3 - TX	Pin3 - TX

Table 2-5. Wiring for RS-232

iQUBE³ J14	1280 Serial Port
Pin1 - ISOGND	Pin1 - ISOGND
Pin 2 - N/A	Pin 2 - N/A
Pin 3 - N/A	Pin 3 - N/A
Pin 4 - + (TX+)	Pin 4 - (Z)
Pin 5 - − (TX−)	Pin 5 - (Y)

Table 2-6. Wiring for RS-485 2-Wire

iQUBE³ J14	1280 Serial Port
Pin1 - ISOGND	Pin1 - ISOGND
Pin 2 - RX− (B)	Pin 2 - RX− (B)
Pin 3 - RX+ (A)	Pin 3 - RX+ (A)
Pin 4 - TX− (Z)	Pin 4 - TX− (Z)
Pin 5 - TX+ (Y)	Pin 5 - TX+ (Y)

Table 2-7. Wiring for RS-485 4-Wire

Pin Location	Load Cell Wiring
Pins 1 and 2 or no shunt	6-Wire
Pins 2 and 3	4-Wire

Table 2-8. Load Cell Sense Jumper Pins J30-33 and J15-18

Switch/ Jumper	Description
SW1	OFF normal operation ON setup mode
S1	Board assignment/sequence Load cell assignment System default
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
CANTERM	ON for the two endpoints OFF for midpoints

Table 2-9. CPU Board Jumper Pin and Switch Guide

Jumper or Switch	Function
SW1	Boot - Used during firmware updates
SW4	Press momentarily to perform soft reset of the four-channel board. ***Note: If four-channel board is soft reset, CPU board must also be soft reset***
CANTERM	CANbus jumper closes CANbus loop; place shunt on pins 1 and 2 of WJ1 on the last four-channel board in the series to terminate CANbus loop.

Table 2-10. iQUBE³ Four-Channel Board Jumper Pin and Switch Guide

LEDs	CPU Board	Four-Channel Board	Function
Four-Channel Board PCBID LEDs	No	Yes	Lit LEDs signify assigned board number Board 1 = PCBID00 Board 2 = PCBID01 Board 3 = PCBID00 and PCBID01 Board 4 = PCBID02 Board 5 = PCBID02 and PCBID00
HB1	Yes	Yes	LED blinks green when firmware is running
Channel LEDs	Yes	Yes	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 signifies DIO is closed
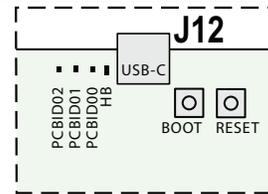
Table 2-11. CPU and Four-Channel Board LEDs

2.4.3 iQUBE³ Resistance Board Option

Optional resistance board:

- Analog load cells are wired into the iQUBE³ resistance board IN channel then analog signal is wired from the iQUBE³ resistance board OUT channels to load cell channels of the paired iQUBE³ four-channel board or iQUBE³ CPU board.
- Digital signals are sent from J2 to its paired iQUBE³ four-channel board or iQUBE³ CPU board J19 to communicate diagnostic data to the iQUBE³ CPU board through the CANbus loop.

Figure 2-4. Resistance Board
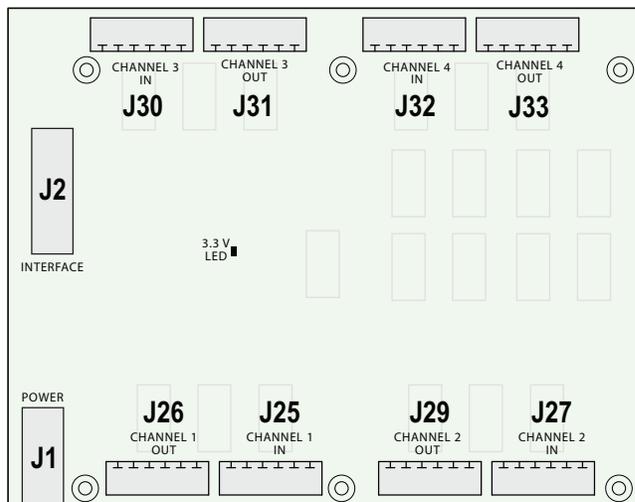
Port	Connector	More Information
J1	Power Connection	Section 2.5.3 on page 24
J2	Digital interface cable to CPU board or four-channel board	Section 2.5.5 on page 26
J26 J29 J31 J33	Out to CPU board or four-channel board	
J25 J27 J30 J32	In from load cell	

Table 2-12. Resistance Board Connections

NOTE: *iQUBE³ bridge resistance boards come standard with mating connectors and cables to/from iQUBE3 CPU and four-channel boards.*

2.5   Cable Connections

The iQUBE³ provides cord grips at the side of the enclosure for cabling into the junction box. One of the cord grips is used for the power supply. Further cord grips will be added as needed to accommodate load cell cables, serial, digital inputs and outputs, Ethernet, USB-C or the optional analog output cables. Cable plugs are included in the parts kit and must be installed in open cord grips to prevent moisture from entering the enclosure. See the following sections to install cables as required for the application. The recommended cable strip length is 0.25 in (7 mm) for all iQUBE³ connectors. See Figure 2-5 for an illustration example of cord grip locations.

🛈 *IMPORTANT: Prohibit open/bare wires outside of enclosure. Ensure stripped portion of cables are entirely inside enclosure.*

Properly seal cord grips to prevent moisture damage inside of the enclosure. Cable plugs must be installed in unused cord grips. Cord grip dome nuts, around a cable or a plug, must be torqued to 22 in-lb (2.5 N-m). The cord grip nut against the enclosure must be torqued to 33 in-lb (3.7 N-m).

⚠ *WARNING: Only connect unit to equipment certified to IEC 60950, IEC 62368, IEC 61010 or similar.*

Cord grip for load cell cable (PG-9)

Power cord (PG-11)

Cord grips for communication cables (PG-11|PG-9)
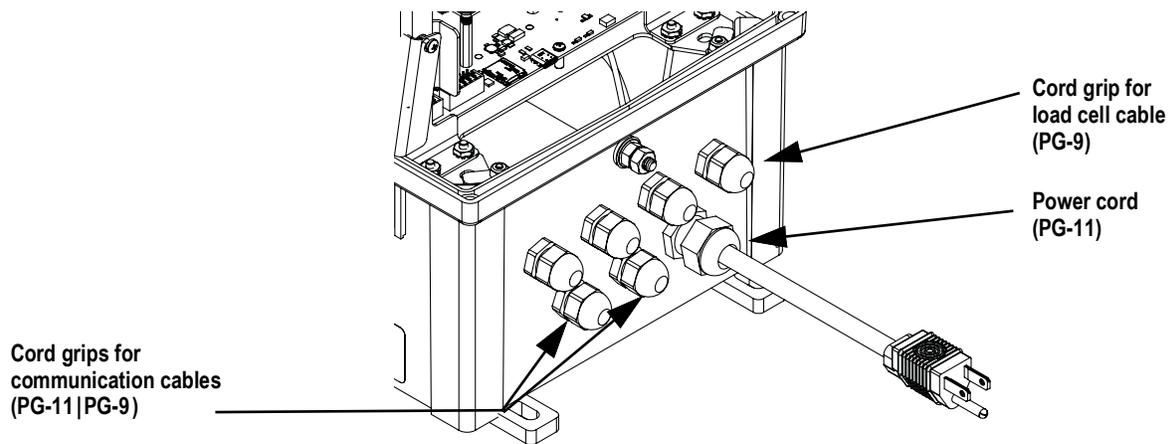
Figure 2-5. Recommended Cord Grip Assignments

📝 *NOTE: The recommended cable strip length is 0.25 in (7 mm) for all iQUBE³ connectors.*

2.5.1   Cable Diameter Ranges

Refer to Table 2-13 for minimum and maximum cable diameter sizes for use with the iQUBE³ cord grips.

Cord Grip	Diameter Range
PG-9	0.138 - 0.315 in (3.5 - 8 mm)
PG-11	0.197 - 0.394 in (5 - 10 mm)

Table 2-13. Cord Grip Cable Diameter Ranges

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2.5.2 Cable Shield Grounding

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.
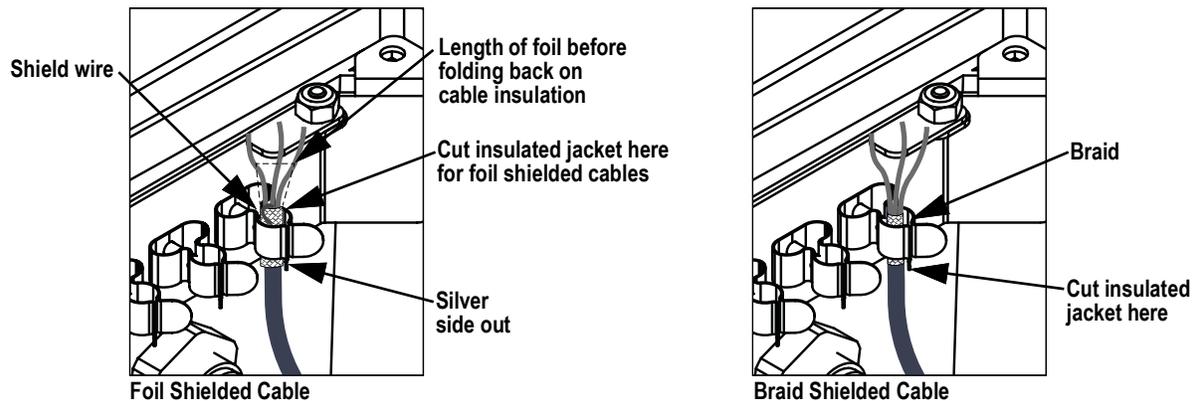
Figure 2-6. Cable Shielding

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.

Load Cell Cables

Cut the shield wire just past the grounding clamp. Shield wire function is provided by contact between the cable shield and the grounding clamp.

2.5.3   Load Cells Wired into CPU board and Four-Channel Board

If there are not resistance boards configured to the iQUBE³ build, load cells wire directly into the CPU board and the four-channel boards.

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 2.5.2 on page 23.

3. Install wires into connector.

4. Plug connector into the board.

5. Secure the load cell cables to the 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.

> *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.*

iQUBE³ CPU Board
Load Cell Channels

iQUBE³ Four-Channel Board
Load Cell Channels
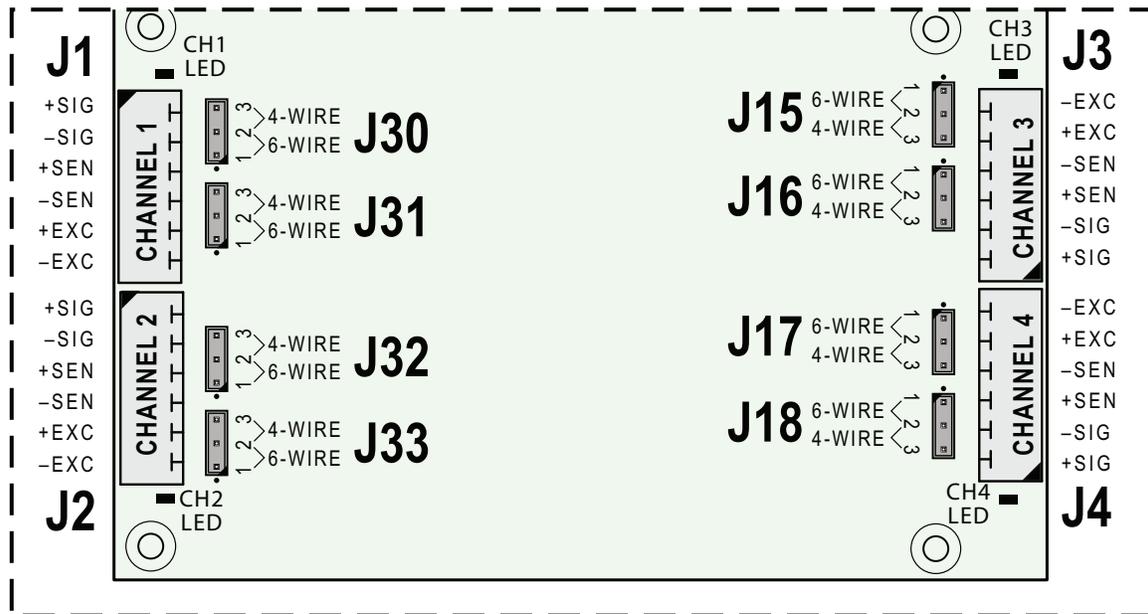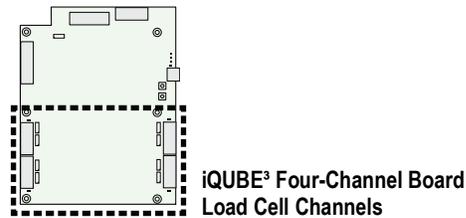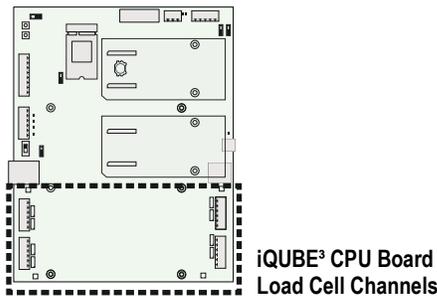
Figure 2-7. iQUBE³ CPU Board and Four-Channel Board Load Cell Jumper Pin Locations

> *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 load cell connector numbers and sense jumper 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).

While load cells can be wired to any connector on the iQUBE³ connector board, platforms defined as paired sections (including most truck scale applications) must correctly associate these pairs to ensure valid calibration and diagnostic functions.

> NOTE: See *Figure 2-7 on page 24* for CPU Board and four-channel board load cell connector locations

Load Cell Connector	iQUBE³ CPU Board	iQUBE³ Four-Channel #1	iQUBE³ Four-Channel #2	iQUBE³ Four-Channel #3	iQUBE³ Four-Channel #4	iQUBE³ 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 2-14. Cell Numbering for Multiple-Board System

2.5.4 Load Cells Wired Into Resistance Board

If resistance boards are added to the build, load cell cables connect directly to the resistance board channel in port. Then a supplied cable connects the resistance board to the iQUBE³ CPU board or four-channel board load cell channels through the channel out-port (see Figure 2-4 on page 21).
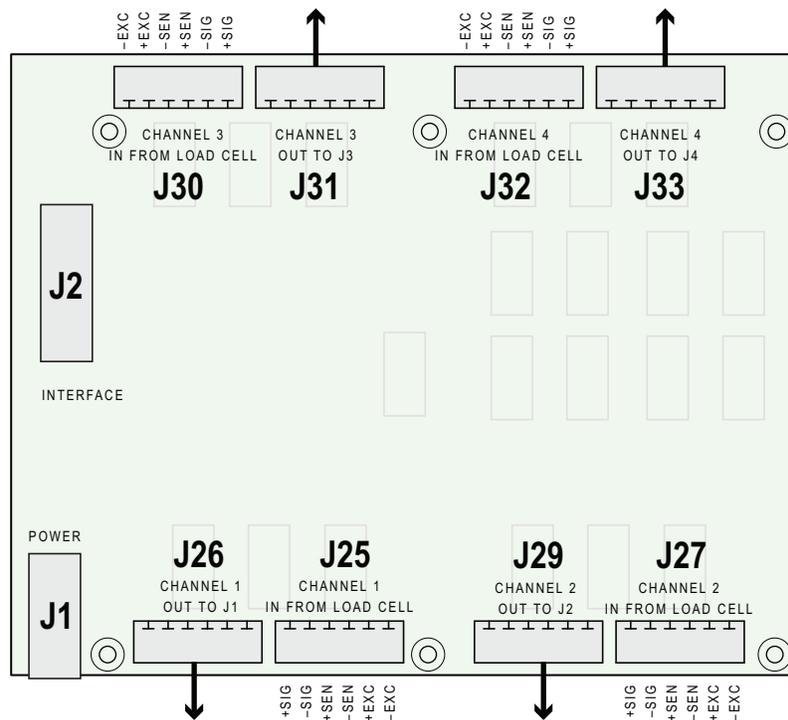
Figure 2-8. iQUBE³ Resistance Board Load Cell Wiring

Load Cell >>	Into Resistance Board >>	Out of Resistance Board >>	Into iQUBE³ CPU or Four-Channel Board
1	J25	J26	J1
2	J27	J29	J2
3	J30	J31	J3
4	J32	J33	J4

Table 2-15. Resistance Board

2.5.5   iQUBE³ Power Supply

The iQUBE³ is optionally designed around an LRS-50-24 power supply located within the enclosure. The LRS-50-24 supplies 24 V and 50 W Max. There are two options for AC/DC power both use the same power supply but one is mounted inside the device enclosure and the other powers the device remotely. The internal AC/DC converter provides transient protection without the need for a transient protection board. When using the external AC/DC converter an additional transient protection board is required protect the device.

⚠ *WARNING: Disconnect power before opening your supply enclosure.*

⚠ *CAUTION: Use a wrist strap to ground yourself and protect components from electrostatic discharge (ESD) when working with circuit boards.*

Internal AC/DC Power Supply

The internal power supply is mounted to the interior of the removable platform.
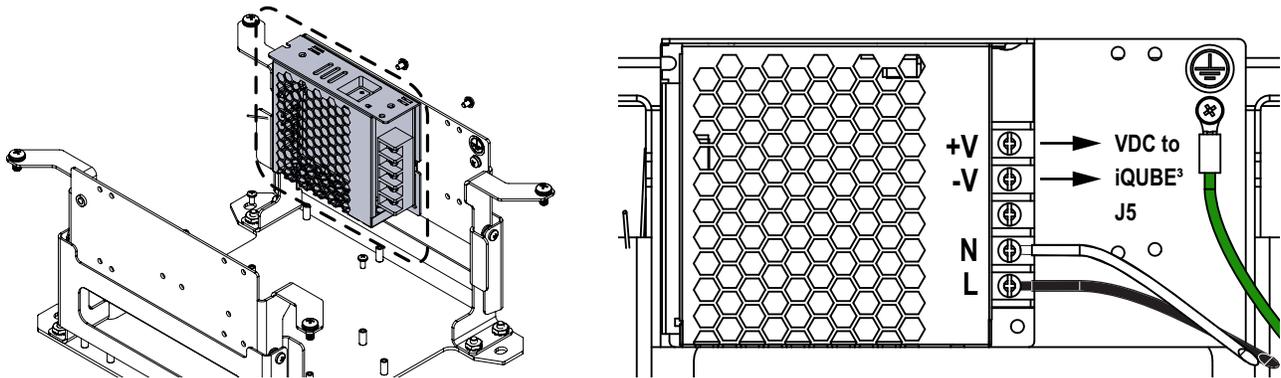
Figure 2-9. Internal Power

External AC/DC Power Supply

The external power supply enclosure is wired from the power supply to J1 of the transient board. Connect the output DC power cable from the V+ and V– terminals of J2 to the corresponding transient protection board terminals in the iQUBE³ enclosure.
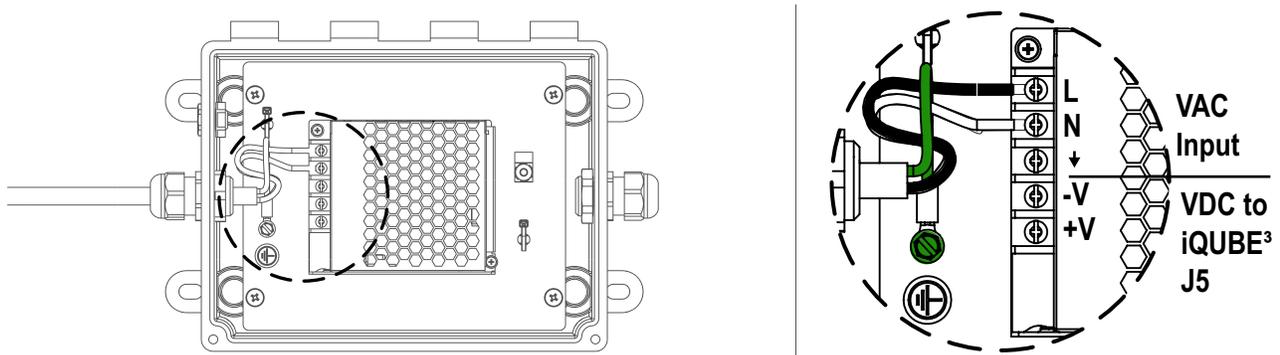
Figure 2-10. External Remote Power Supply

Transient Protection

DC current can be run directly through optional internal transient protection.

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2.5.6 Controller Area Network (CAN) Communication Between Cards

The iQUBE³ CPU board initiates a Controller Area Network (CAN) serial bus with up to five iQUBE³ four-channel boards connected sequentially via the J5 connectors on each board with either EL147 cable or CAT6 cable.
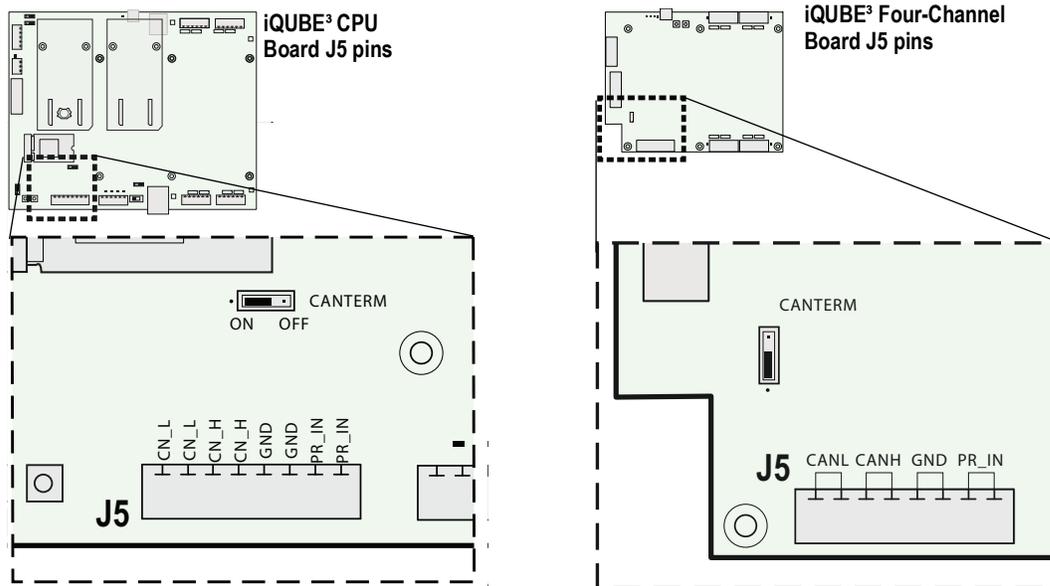
Figure 2-11. J5 Wiring

Connect the power supply to the iQUBE³ CPU board J5 board and wire J5 connectors in parallel from the iQUBE³ CPU board J5 to the J5 connector of each 4 channel iQUBE³ board.

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

Table 2-16. CPU board J5 Pin Assignments
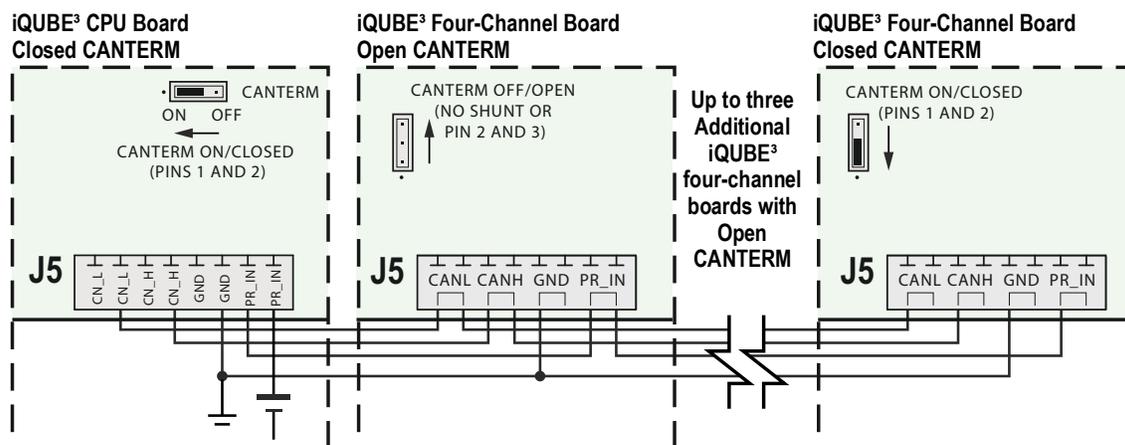
Figure 2-12. J5 CAN Serial Bus Wiring for Multiple iQUBE³ Boards

IMPORTANT: A CAN network requires proper termination. CANTERM jumpers terminates the CAN loop. Place a shunt on pins 1 and 2 of the CANTERM jumper on CPU Board and the last four-channel board in the network to properly terminate the CAN. Do not add a jumper shunt to four-channel boards between first and last boards.

2.5.7   Memory Card Slot

The memory card slot, J12 connector, accepts microSD cards and provides storage space for configuration settings and database information. The iQUBE³ comes with an 8 GB microSD card and the memory card slot supports up to a 2 TB microSD card.

NOTE: The microSD card only functions with the iQUBE³. It is not formatted in FAT32 and will not be recognized by a PC. Ensure indicator firmware versions match before transferring a microSD card from one iQUBE³ to another.

2.5.8   Ethernet TCP/IP

The iQUBE³ features Ethernet TCP/IP 10Base-T/100Base-TX communication using the J7 connector as a server.
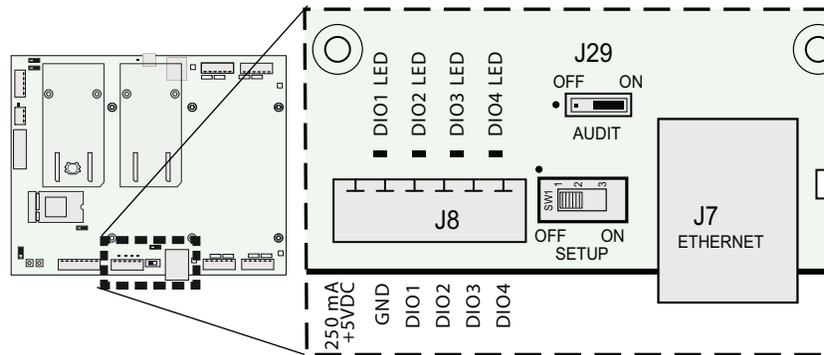
Figure 2-13. J7 Ethernet Port and J8 DIO Port

Through an Ethernet network, software applications can communicate with the iQUBE³ using the EDP command set (Section 7.0 on page 74), data can be streamed continuously from the iQUBE³, or printed on demand.

The Ethernet port supports both DHCP and manual configuration of settings such as the IP and netmask. In addition, the TCP Port number and the Default Gateway can be configured using the Ethernet sub-menu under Communications when in Setup mode.

Physical connection to the iQUBE³ Ethernet port can be made directly from a PC to the iQUBE³ (AdHoc Network), or through a network router or switch. The port supports auto-sensing MDI/MDIX cable configuration, allowing either straight-through or crossover cables to be used.

2.5.9 Digital I/O

The Digital I/O port, J8 connector (Figure 2-13 on page 28), provides a connection to both digital inputs and outputs. A J8 connector is located on both the iQUBE³ CPU board and the four-channel board.

Digital inputs can be set to provide many functions, including Print, Zero, Tare, Gross/Net, Units, Clear Tare, and Clear Consecutive Number. Digital inputs are active low (0 VDC) and inactive high (5 VDC). Use the Digital I/O menu to configure the digital inputs.

Digital outputs are used to control relays which drive other equipment. Outputs are designed to sink, rather than source current. Each output is an open collector circuit, capable of sinking 20 mA when active. Digital outputs are active when low or at 0 VDC, with reference to the 5 VDC supply.

Use the Digital I/O menu to set the function of the Digital I/O pins to SETPOINT and then use the Setpoints menu to configure the digital outputs. Two other types of outputs are available, Cell Health and Host Control. See Table 2-17 for the pin assignments for the J8 connector.

Connector	Pin	Signal
J8	1	5 VDC, 250 mA max
	2	GND
	3	DIO1
	4	DIO2
	5	DIO3
	6	DIO4

Table 2-17. J8 Pin Assignments (Digital I/O)

2.5.10 Serial Communications

Serial communications between the iQUBE³ and the host indicator or peripheral devices is provided by two permanent serial ports on the CPU board and with room for two option cards, each with two ports for a total of 6 ports. Additionally, there is a USB-C Virtual Comm Port for use as a serial device on a PC.

To attach serial communications cables, route the cable through the cord grip and wire to the connector on the CPU board. Use cable ties to secure serial cables to the inside of the enclosure.
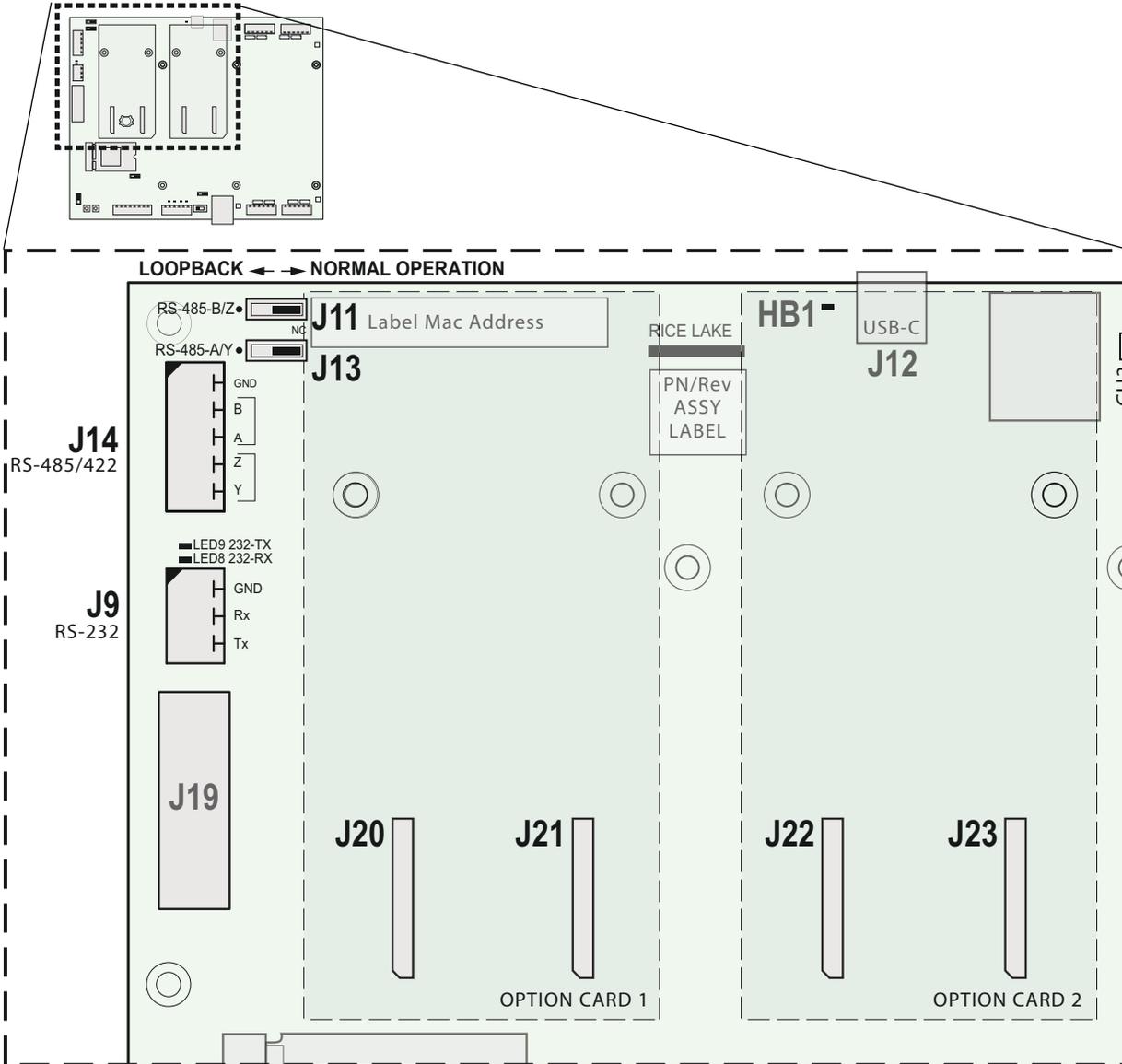
Figure 2-14. Serial Connections (Board View Rotated 90°)

J9 Wiring - RS-232

J9 Pin	Signal
1	GND
2	Rx
3	Tx

Table 2-18. Port 1: J9 RS-232 Pin Assignments

J14 Wiring

Port 2 provides RS-422 /485 full or half duplex communications.

J14 Full Duplex Pin Assignments	
ISO GND	**4-Wire Signal**
GND	GND
B	Rx–
A	Rx+
Z	Tx–
Y	Tx+

J14 Half Duplex Pin Assignments	
ISO GND	**2-Wire Signal**
GND	GND
B	No connection
A	No connection
Z	+
Y	-

Table 2-19. Port 2: J14 RS-422 / 485 Pin Assignments

IMPORTANT: *Jumper placement on J11 and J13 defines serial communication of J14. Place shunts on pins 2 and 3 for normal operation.*

2.5.11   Communications Option Cards

Two option card slots are available for communication. The Option Card 1 slot uses both J20 and J21 while Option Card 2 uses both J22 and J23 (See).

Available option cards can be used in both option card slots.

- **Dual Serial Card** - Two RS-232 or RS-422 / 485 ports
- **Fiber Optic Card** - One Fiber Optic RX/TX port
- **Four-Channel Relay Card** - Provides four normally open relay contacts.

Each option card is shipped with installation instructions specific to card. Follow general procedures for installation into iQUBE³.

⚠️ *CAUTION: Option cards are not hot-pluggable. Disconnect power to the iQUBE³ before installing option cards.*

1. Disconnect the power to the iQUBE³.
2. Loosen the top screws and remove the cover from the iQUBE³.
3. Insert plastic standoffs, included with the option card, into the mounting holes in the CPU board.
4. Carefully align the option card connector with J20/21 for slot 1 and J22/23 for slot 2 on the CPU board () and the standoffs.
5. Press down to seat the option card in the CPU board connector, then press to seat the standoffs in the option card mounting holes.
6. Make connections to the option card as required.
7. Use cable ties to secure loose cables inside the enclosure.

📝 *NOTE: The iQUBE³ automatically recognizes all installed option cards when the unit is powered on. No hardware-specific configuration is required to identify the newly installed card to the system.*

2.6   Sealing the iQUBE³ for Legal for Trade Applications

In legal for trade applications, the iQUBE³ must be sealed to prevent changes to configuration and calibration.

📝 *NOTE: Move the shunt on J29 to the OFF position to short Pins 1 and 2 to restrict access to configuration parameters.*
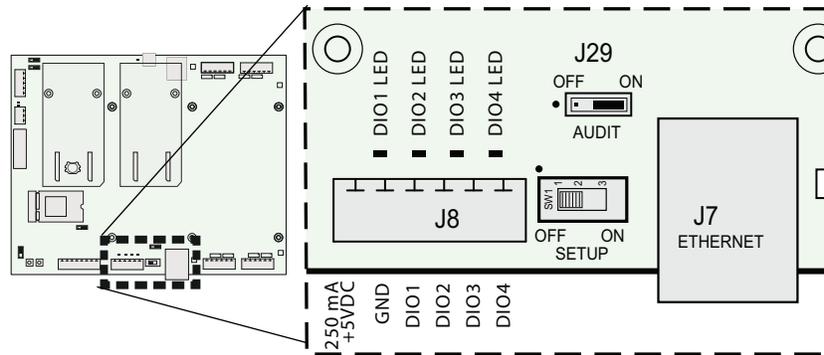
Figure 2-15. Audit Switch

Polycarbonate Enclosure

1. Install iQUBE³ cover and torque to specifications in Table 2-2 on page 15.
2. Navigate sealing wire through holes in the cover and base of the enclosure.
3. Seal wire to secure.
4. Repeat steps 2 and 3 on opposite corner.

Navigate sealing wire through holes in cover and base of enclosure

Figure 2-16. Exterior Seals

Stainless Steel Enclosure

1. Install iQUBE³ cover and torque to specifications in Table 2-2 on page 15.
2. Navigate sealing wire through holes in the drilled fillister screws.
3. Seal wire to secure.

Navigate sealing wire through holes in the drilled fillister screws

Figure 2-17. Exterior Seals

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3.0   iQUBE³ Configuration

This section describes general configuration for the iQUBE³.

Before configuring, the iQUBE³ must be wired correctly. See Section 2.1 on page 14 for installation and wiring check lists. The iQUBE³ indicator can be configured to communicate either manually by following the check list in Section 3.1 or by following steps of the the iQUBE³ Wizard.

3.1   iQUBE³ Configuration Overview

During normal operation, scale configuration data is stored in the iQUBE³. This allows the iQUBE³ to operate as an autonomous unit that digitally streams data to any connected and compatible device. The iQUBE³ configuration file can be altered using a 1280 indicator, Revolution software, or with serial commands through a command terminal.

When using a command terminal, the configuration data is altered directly in the iQUBE³ CPU board memory. However, when using an external user interface such as the 1280 indicator or Revolution software, there is not a live link between the devices. The 1280 indicator or Revolution software alters a configuration *.rev file is stored in both the user interface device and the iQUBE³. The *.rev file must be transfered manually between the two to ensure that the most up to date file is being used or altered.

IMPORTANT: Always ensure that the configuration on the user interface matches the configuration on the iQUBE³:

Before altering configuration of the iQUBE³, and

After altering any configuration on the user interface.

3.1.1 Tools that Communicate Data Between the Interface and the iQUBE³

Several actions can be used to transfer, alter or save the configuration file in the iQUBE³.

Get From iQUBE³	Send To iQUBE³
• Copies the *.rev file to the user interface to ensure that the settings being configured match file that is being configured in the user interface matches the file that was on the iQUBE³.	• When configuration changes are made using the 1280 Indicator or Revolution software, these changes are ONLY TRANSFERRED to the iQUBE3 when "Send to" is used in the 1280 or Revolution software. Until this point, the iQUBE3 still has the old configuration. • If a configuration is the same for multiple iQUBE3 scales, using Revolution software, a .rev file can be saved to a computer or flash drive for the first system. This file can be loaded into Revolution and then used to updated any number of iQUBE3 systems with that same configuration.
1280 iQUBE³ Interface **Get from iQUBE3**	**1280 iQUBE³ Interface** **Send to iQUBE3**

PC Revolution Menu

3.1.2 Get From iQUBE³

When changes are made to the configuration settings in the iQUBE³, a *Get from* iQUBE³ procedure must be performed to migrate settings to the indicator from the iQUBE³. If *Get from* iQUBE³ is not performed, scale settings do not populate in the indicator.

1. Select **Get from** iQUBE³. *Get Configuration from* iQUBE³ dialog box displays.
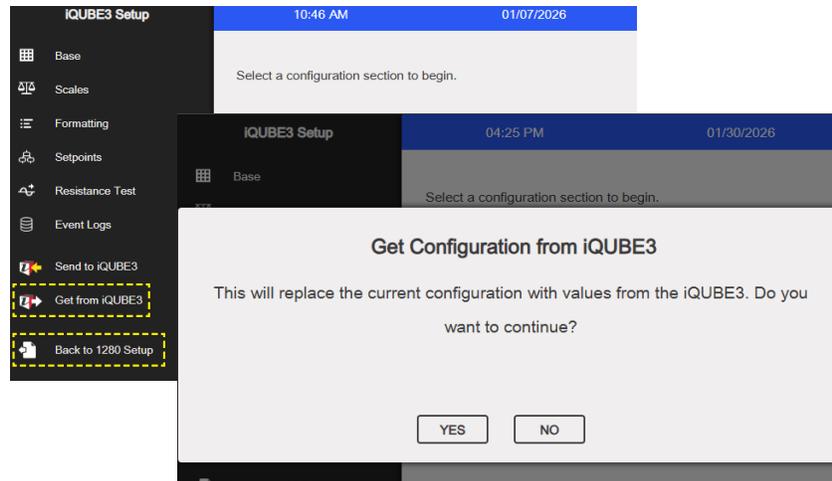
Figure 3-1. Get Configuration from iQUBE³

2. Select *Yes*. iQUBE³ sends configuration to the indicator.

3.1.3 Send to iQUBE³

When changes are made to the settings in the iQUBE³ Setup menu within the 1280, a *Send to* iQUBE³ procedure must be performed to migrate settings from the indicator to the iQUBE³ before calibrating scales.

> **IMPORTANT: If changes are made and Send to iQUBE³ is not performed, changes made to the iQUBE³ menu are not configured in the iQUBE³ and calibration can not be performed correctly.**

1. Select **Send to** iQUBE³. *Send Configuration to* iQUBE³ dialog box displays.
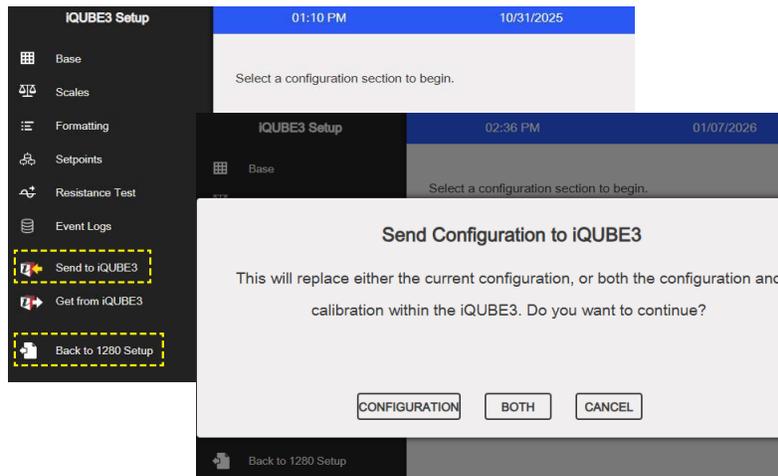
Figure 3-2. Send Configuration to iQUBE³

2. Press **CONFIGURATION** to send everything except calibration or **BOTH** to send both configuration and calibration. The selected values are sent to iQUBE³.

3. Press **Back to 1280 Setup**.

4. Press **Save and Exit** to return to the 1280 Setup into Weigh mode and save settings.

3.1.4   Example Configuration Sequences

Below are several examples of the order of operation for different configuration scenarios. These scenarios can be performed either with a 1280 or a PC with Revolution software.

Set up New iQUBE³ System

1.   Establish communication between the iQUBE³ and the interface.
2.   Perform board auto assign procedure.
3.   Set load cell capacity.
4.   Assign load cells.
5.   Configure scales.
6.   Perform **Send to** iQUBE³ procedure.
7.   Calibrate Scale.

Service Single Existing iQUBE³ System

1.   Establish communication between the iQUBE³ and the interface.
2.   Perform **Get from** iQUBE³ procedure to copy existing iQUBE³ settings into the interface.
3.   Configure scale settings.
4.   Perform **Send to** iQUBE³ procedure to send the new configuration to the iQUBE³.
5.   Calibrate Scale.

Save Scale Settings to Duplicate Over Several iQUBE³ Systems

1.   Set up or configure the initial iQUBE³ system.
2.   Perform **Get from** iQUBE³ procedure to bring iQUBE³ settings to the PC using Revolution Software.
3.   Save *.rev configuration file.
     • In Revolution, save the *.rev file into a folder on the computer.
     • On a 1280, save file onto a USB flash drive.

Load Saved Scale Configuration into iQUBE³ System from the 1280

1.   Establish communication between the iQUBE³ and the interface.
2.   Import saved *.rev file from the USB flash drive onto the 1280 indicator.
3.   Perform **Send to** iQUBE³ procedure in iQUBE³ setup to load saved settings onto the iQUBE³ system.
4.   Perform board auto assign procedure.
5.   Calibrate the scale.

Load Saved Scale Configuration into iQUBE³ System from Revolution

1.   Establish communication between the iQUBE³ and the interface.
2.   Open the saved *.rev file and navigate to **Communications > Send Configuration to Device**.
3.   Perform board auto assign procedure.
4.   Calibrate the scale.

3.2   Setup Switch (SW1)

To put iQUBE³ into setupu mode, move **SW1** to the **ON** position.

To return iQUBE³ to run mode after successful configuration, move **SW1** to the *OFF* position.
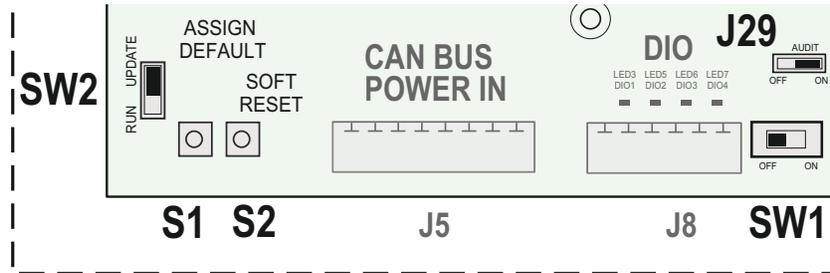
Figure 3-3. Setup SW1

3.3   Enter 1280 Configuration Menu From Weigh Mode

Enter 1280 Configuration Menu to adjust 1280 indicator settings.

1. Select Main Menu button ▤ . The *Main Menu* displays.

2. Select *Configuration*. iQUBE³ *Configuration*.
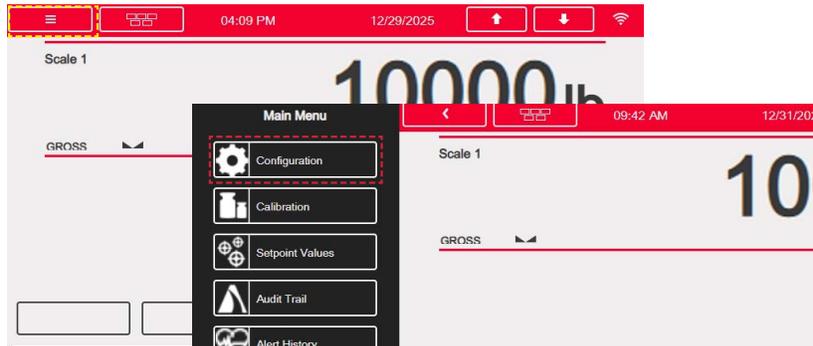
Figure 3-4. 1280 Configuration Path
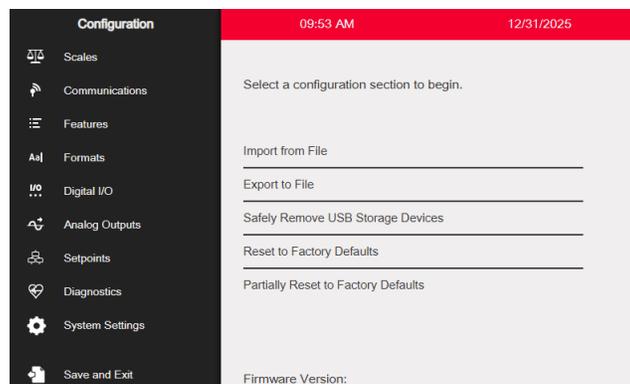
Figure 3-5. 1280 Configuration Menu

3.4 Establish Communication Between the iQUBE³ and the 1280

3.4.1 Set Up 1280 to Read iQUBE³ Scale

1. Enter 1280 Configuration Menu From Weigh Mode (Section 3.3).

2. Press ⚖ to enter the **Scales** menu.

3. Press **Format**.

4. Press the edit scale icon ✏ The **Scale Kind** menu displays.

📝 *NOTE: Scale Kind refers to the type of scale connected to the 1280.*

5. Select iQUBE³ **Scale** to set as the scale kind.

6. Select the Scale Hardware type.

📝 *NOTE: The default Scale Hardware type reads as "Connection: Port 1: Scale 1". This refers to the connected serial port and specified scale. This selection will vary if the iQUBE³ is connected to a different serial port or specified as a different scale.*

7. Press [DONE]. iQUBE³ is set as Scale 1.
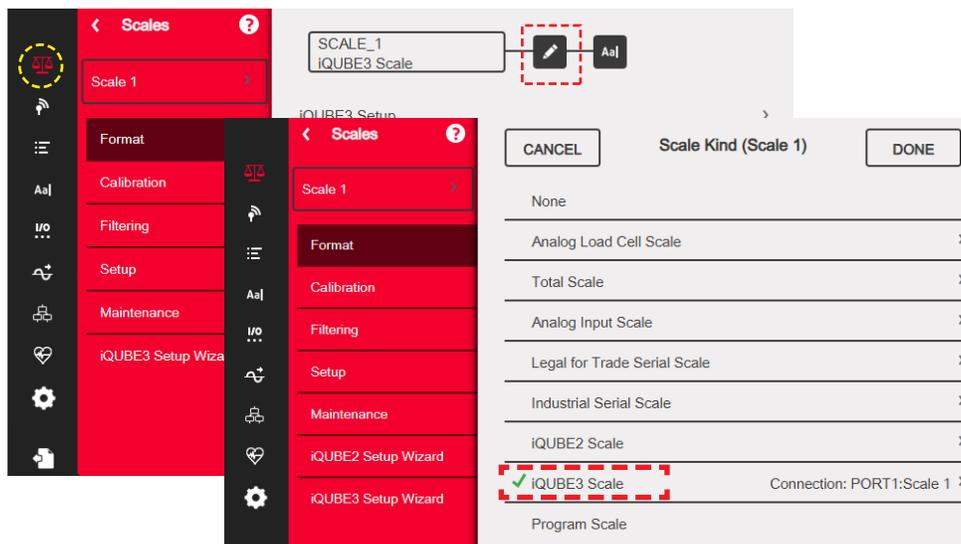
Figure 3-6. Set Up Scale

8. 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.*

3.4.2 Configure 1280 to Communicate with iQUBE³

1. Enter 1280 Configuration Menu From Weigh Mode (Section 3.3).

2. Press 📶 to enter the **Communication** menu.

3. Press **Input Type** then select iQUBE³.

4. Press [DONE].

5. Press **Port Type** then select the com port being used.

6. Press [DONE].

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> **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 menu then select the connected port from that drop down menu. The selected port's configuration settings will be displayed to the right.**
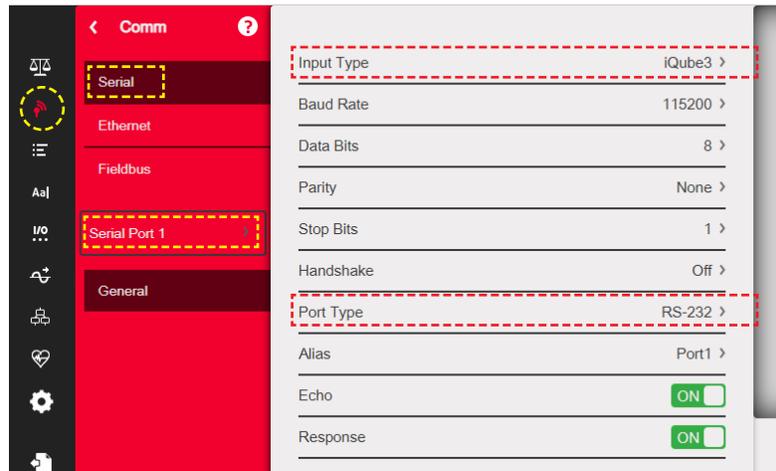
Figure 3-7. Configure Serial Port

3.4.3 Enter iQUBE³ Setup From 1280 Configuration Menu

Enter iQUBE³ Setup Menu to adjust iQUBE³ settings.

> **NOTE: Communication must be established through the 1280 menu to perform this procedure (Section 3.4.1 on page 38)**

1. Enter 1280 Configuration Menu From Weigh Mode (Section 3.3).

2. Press ⚖ to enter the *Scales* menu.
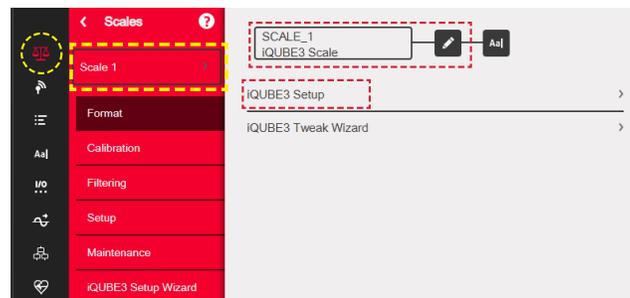
Figure 3-8. 1280 Scales Configuration Menu

3. Press iQUBE³ **Setup**. Setup dialog box displays.

4. Select **Yes**. iQUBE³ Setup displays.

3.4.4 Initiate Communication Between iQUBE³ and 1280

1. Enter iQUBE³ Setup (Section 3.4.3 on page 39).

2. Select **Test** iQUBE³ **Connection**.
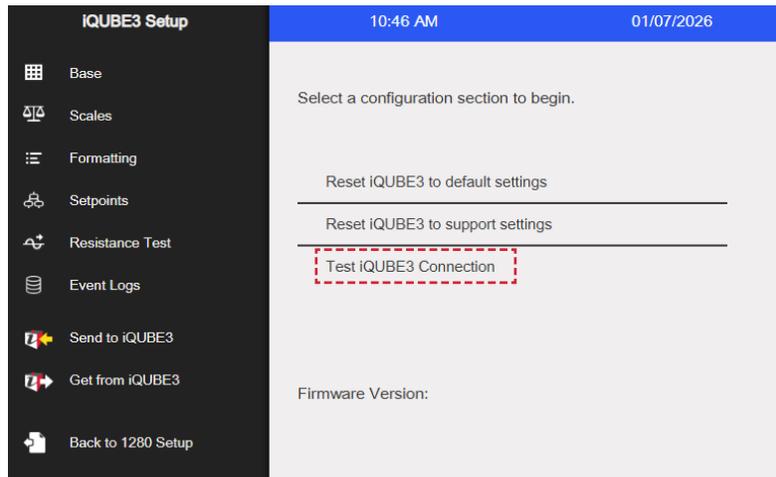
Figure 3-9. Test iQUBE³ connection

3. Press **OK** to confirm.

4. If iQUBE³ connection is successful, ***Successfully connected to*** iQUBE³ ***CPU board with serial number XXXXXX*** displays.

> NOTE: *Correct firmware version only displays when iQUBE³ is successfully connected. Serial number will match the number listed on the PN/Rev Assembly Label on the CPU board (Figure 2-3 on page 19).*

3.5 iQUBE³ Setup Wizard

The iQUBE³ setup wizard walks you through the iQUBE³ setup process. Ensure that all physical connections have been made properly (See Section 2.1 on page 14) and all communication settings in the 1280 have been properly set before attempting to use the setup wizard (See Section 3.4.1 on page 38).

1. Enter 1280 Configuration Menu From Weigh Mode (Section 3.3 on page 37).
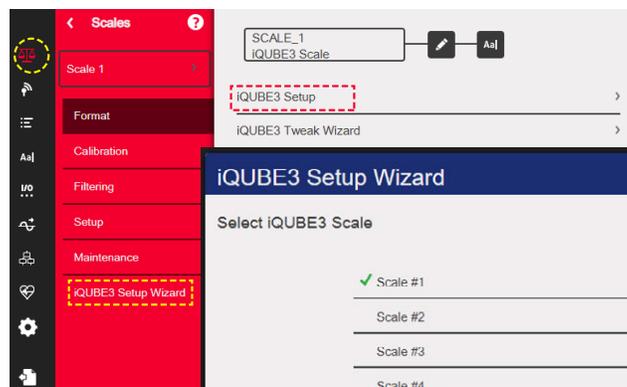
Figure 3-10. Enter Setup Wizard

2. Enter 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**.

5.   Select correct iQUBE³ Scale.
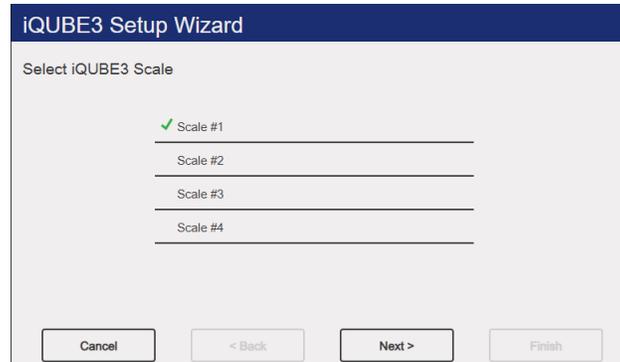
Figure 3-11. Scale

6.   Press **Next**.

7.   Choose iQUBE³ port that is being used.
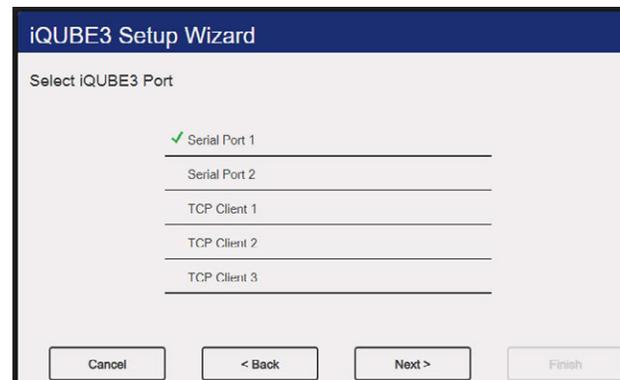
Figure 3-12. Port

8.   Press **Next**. Screen prompts selection of port type.

Figure 3-13. Port Type

If Serial connection:

9. Choose connection type. Wizard defaults to RS-232.

10. Press **Next**. Screen prompts a connection test.

Figure 3-14. Connection Successful

11. Press **OK**. Screen displays a successful connection.

12. Press **OK**. iQUBE³ Setup Wizard Displays.

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

***Return to Section 2.1.2 on page 14 and double check wiring and switches**

***Power cycle the iQUBE³**

***Begin iQUBE³ setup wizard again.**

Figure 3-15. Board Assignment

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

13. Arrange four-channel cards up or down if needed. CPU board always displays first.

14. Press **Next**. Screen displays detected load cells.

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

15. Press **Next**.

16. Enter **Factory Sensitivity** (load cell mV/V rating).

17. Press **Done**.

18. Enter **Load Cell Capacity** for all of the load cells.

19. Press **Done**. Scale Setup Options Display.

    • Continue to Section 3.5.1 on page 43 for Automatic Scale Setup
    • Continue to Section 3.5.2 on page 43 for Manual Scale Setup

3.5.1 Automatic Scale Setup Wizard

1. Select Automatic Scale Setup. iQUBE³ performs Theoretical Calibration

NOTE: Processing may take up to two minutes.

2. Press **Next. Calibration Results display.**
3. If load cell orientation is correct, press **Next.**
4. Press **Finish** to exit.

3.5.2 Manual Scale Setup Wizard

1. Select Manual Scale Setup. Load Cell Assignment displays
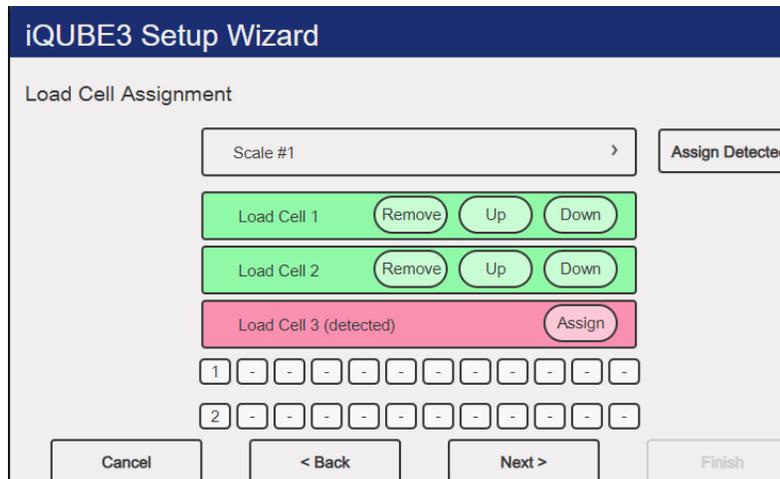
Figure 3-16. Start Auto Assign

2. Select the correct scale from drop down
3. Assign the applicable load cells.

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.

4. Press **Next**.
5. Select the Decimal Position.
6. Press **Next.**
7. Select the Display Divisions.
8. Press **Next.**
9. Select the Primary Units.
10. Press **Next.**
11. Enter the Scale Capacity.
12. Press **Next.** 1280 sends setup to iQUBE³. Calibration prompt displays.
    - **Yes** - Continue to to Calibrate.
    - **No** - Display saves configuration and returns to 1280 Configuration.
    - **Cancel** - Display returns to 1280 configuration without saving manual setup configuration.

3.6   Configure Load Cells in the iQUBE³

To manually adjust configuration, enter the iQUBE³ setup from 1280 Setup (Section 3.4.3 on page 39).

3.6.1   Auto Assign Four-Channel Boards

Perform automatic four-channel board Assignment Auto Assign Procedure.

1.   Press ⊞ . Display defaults to **Board Assignment**.

2.   Press **Start Auto Assign Procedure**. The iQUBE³ scans for four-channel boards as **In Progress** displays and displays **Done** and each found board serial number when it recognizes available four-channel boards.
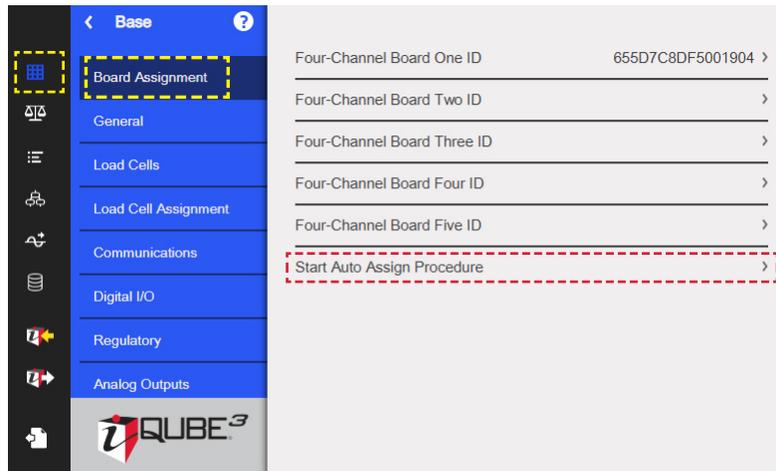
Figure 3-17. Start Auto Assign

📝 **NOTE: This only lists iQUBE3 four-channel boards, the iQUBE3 CPU board was found during Test iQUBE3 Connection in the iQUBE3 Setup procedure.**

3.6.2   Manual Four-Channel Board Assignment

Perform manual four-channel board Assignment Auto Assign Procedure

1.   Power off iQUBE³.
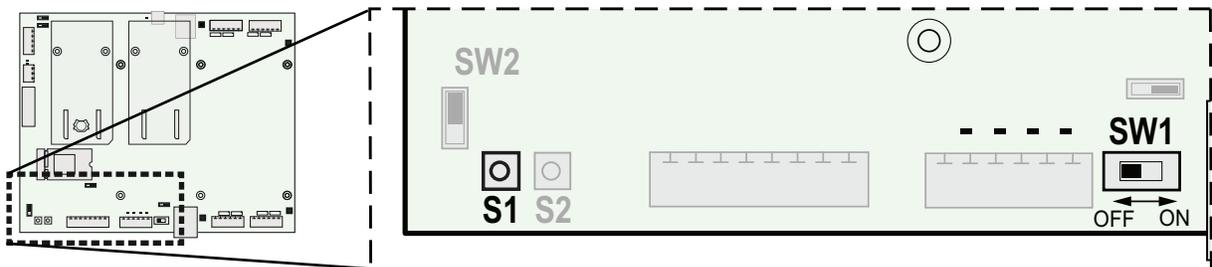
Figure 3-18. CPU Board

2.   Switch **CPU board SW1** ON.

3.   Press and hold **CPU board S1**.

4.   Power on iQUBE³.

5.   Release **CPU board S1**.

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6. All connected four-channel board PCBID LED lights begin flashing.

7. Press the ***four-channel board BOOT*** button on each iQUBE³ four-channel board in assigned order. PCBID LED lights turn off when board has been assigned.
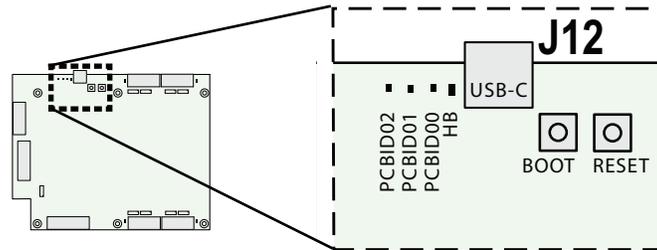
Figure 3-19. Four-Channel Board

> **NOTE: Load cell numbers are automatically assigned in the to four-channel boards based on the order that the boards are assigned. (See Table 2-14 on page 25)**

8. Momentarily press the **S1** on the iQUBE³ CPU board.

9. Switch CPU board **SW1** OFF.

3.6.3   Set Load Cell Capacity

1. Press ⊞ **Base**. ***Base Menu*** displays.

2. Select **Load Cells**. *Load Cell* menu displays.

3. Select **Capacity** and enter *Load Cell Capacity* and select **Done**.

4. Select **Factory Sensitivity** and enter specified ***Factory Sensitivity (load cell mV/V nominal value)*** and select **Done**.

5. Select **Apply to all Load Cells** to copy the cell capacity and factory sensitivity settings only to all load cells.
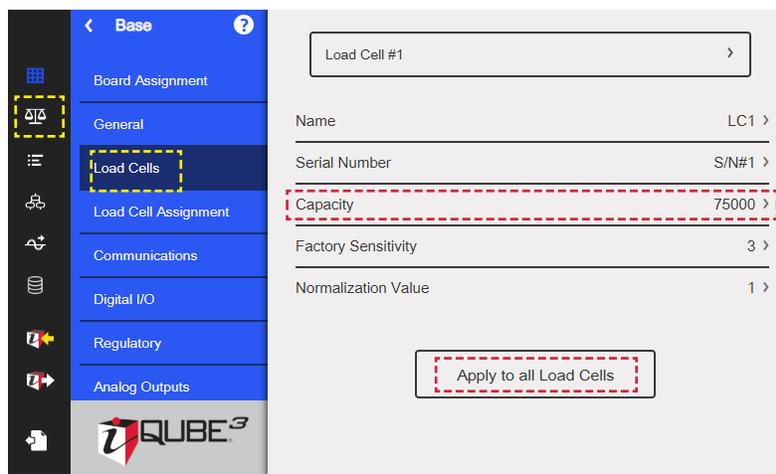
Figure 3-20. Set Load Cell Capacity

3.6.4 Assign Load Cells

1. Within iQUBE³ setup, press ⊞. Display defaults to **Board Assignment**.

2. Select **Load Cell Assignment**.

3. Select drop down and Select **Scale #1**, or the appropriate scale to be configured..

4. Press **Assign** to assign the cell to the scale.

5. Press **Up** or **Down** to arrange load cell locations.

6. Repeat **Load Cell Assignment** for Scales 2 through 4 if needed.
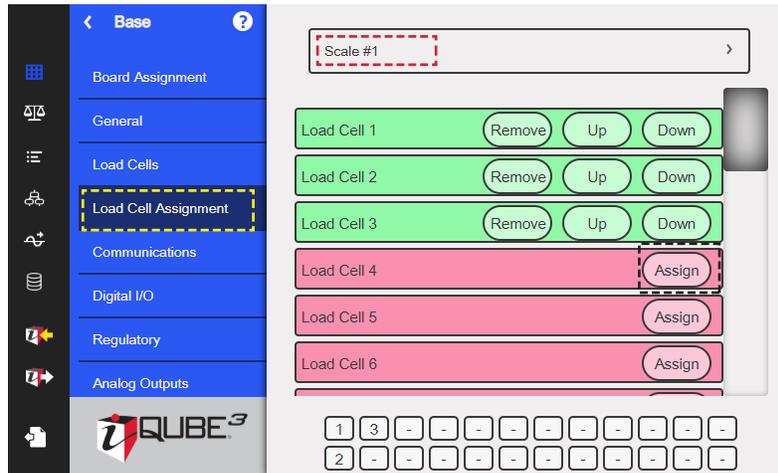
Figure 3-21. Assign Load Cells

3.6.5 Scale Configuration

1. Select Scales ⚖.

2. Select drop down and Select Scale #1.

3. Select **General** in the **Scales** menu.

4. Select and enter **Full Scale Capacity**. Select **Done**.
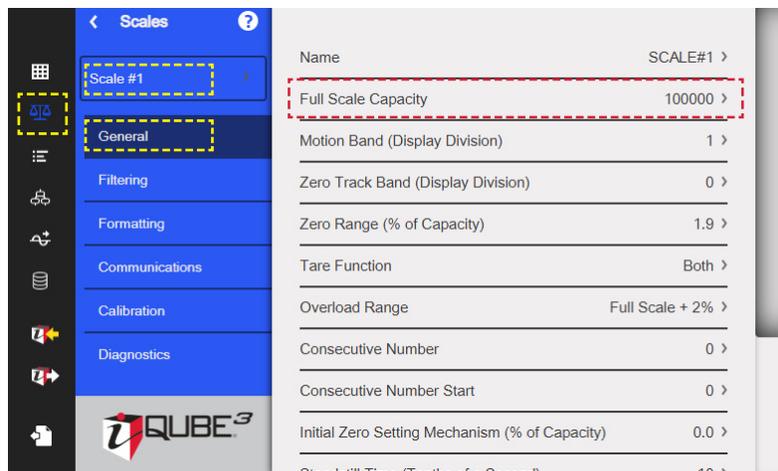
Figure 3-22. Set Scale Capacity

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5. Select **Formatting** in the *Scales* menu.

6. Select **Decimal Position** and define the specified *Decimal Position*. Press **Done**.

7. Select **Display Divisions** and select specified *Display Divisions*. Press **Done**.
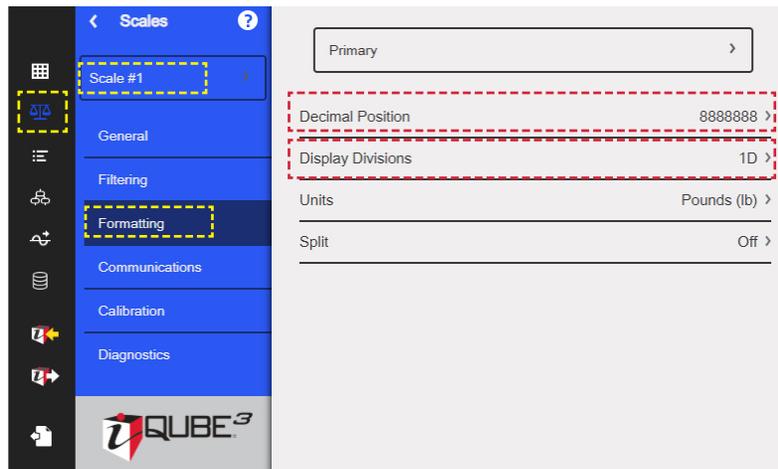
Figure 3-23. Set Unit Decimal Position

8. Repeat *Scale Configuration* for Scales 2 through 4 if needed.

3.7   CANbus Configuration

CANbus communications is the data protocol used between the CPU board and four-channel boards in an iQUBE³ system. The CANbus data rate is based on the length of cable between the CPU board and the last four-channel board in the system, along with the scale AD sample rate.

Scale AD Sample Rate	CANbus Data Rate	Maximum Cable Distance
< 60 Hz	125 kb	1500 ft
60 Hz to 120 Hz	250 kb	500 ft
> 120 Hz	1 Mb	100 ft

Table 3-1. CANbus Configuration Settings by Maximum Cable Distance and scale AD sample rate

NOTE: For more specific guidance on cable limitations and CANbus contact Rice Lake Weighing Systems Technical Support.

3.8   Scale Filtering

Scale (or digital) filtering takes a stream of sampled weight readings and mathematically modifies it to improve (stabilize) the signal.

The iQUBE³ allows selection of **Three Stage Filter**, **Adaptive Filter**, **Damping Filter**, **Kalman Filter** or **No Filtering**. Filtering should typically be configured with a filter on except in certain high speed filling applications, check weighing applications or troubleshooting diagnostic processes.

3.8.1   Three Stage Filter

A three stage digital filter is a filter composed of three individual filter stages that are connected in sequence. Stage 1 filter process the the weight readings captured, this becomes the input for the Stage 2 filter which further stabilizes the signal for the final filter (Stage 3) which further process the signal. In other words, three stage filtering combine their effects to produce a final stable weight reading. These configurable stages control the effect of a single A/D reading on the displayed weight. When an A/D reading outside of a predetermined band is encountered, the three stage filter is overridden and the display jumps directly to the new value.

Digital Filter Stages 1-3

The filter stages can each be set to a value of 1–256. The value assigned to each stage sets the number of readings received from the preceding filter stage before averaging. Setting the filter stages to 1 effectively disables the three stage filter.

A three stage average is passed to successive filtering stages for an overall filtering effect which is effectively a weighted average of the product of the values assigned to the filter stages (*Digital Filter Stage 1 x Digital Filter Stage 2 x Digital Filter Stage 3*) within a time frame corresponding to the sum of the values (*Digital Filter Stage 1 + Digital Filter Stage 2 + Digital Filter Stage 3*).

Three stage Filter Procedure

1. In *Setup* mode, set the three stage filter stage parameters (*Digital Filter Stage 1-3*) to 1.
2. Set three stage filter Threshold to **NONE**.
3. Return to *Weigh* mode.
4. Remove all weight from scale, then watch the indicator to determine the magnitude of vibration effects on the scale.
5. Record weight below which all but a few readings fall. This value is used to calculate the *three stage Threshold* parameter in step 8.

    Example – if a heavy-capacity scale (10,000 x 5 lb) produces vibration-related readings of up to 50 lb, with occasional spikes up to 75 lb, record 50 as the threshold weight value.

6. Place the indicator in *Setup* mode and set the filter stage parameters (*Digital Filter Stage 1-3*) to eliminate the vibration effects on the scale (leave *three stage filter Threshold* set to *NONE*).
7. Find the lowest effect value for the *Digital Filter Stage 1-3* parameters.

> **NOTE: If needed, the digital filter cutout sensitivity (three stage filter Sensitivity) and the digital filter cutout threshold (three stage filter Threshold) can be used to reset the three stage filter so the response to a rate change is faster.**

8. Calculate the *three stage filter Threshold* parameter value by converting the weight value recorded in step 5 to display divisions (*Threshold_Weight_Value / Display_Divisions*).

    In the example in step 5, with a threshold value of 50, and a display-division value of 5, set the three stage filter Threshold parameter to 10 display divisions.

9. Set the *three stage filter Sensitivity* parameter high enough to ignore transient peaks. Longer transients (typically caused by lower vibration frequencies) cause more consecutive out-of-band readings; set the *Adaptive Sensitivity* parameter higher to counter low frequency transients.

3.8.2   Adaptive Filter

The adaptive digital filter has two parameters, the response time and observed noise (instability): *Adaptive Sensitivity* and *Adaptive Threshold (Display Divisions)*.

Adaptive Filter Sensitivity

Adaptive Filter Sensitivity can be set to *Heavy*, *Medium* or *Light*. A *Heavy* setting results in an output which is more stable to weight changes than the *Light* setting. A *Heavy* setting also results in small changes in weight data (a few grads) on the scale base to not be seen as quickly as with the *Light* setting.

If the difference in typical subsequent weight values on the scale are only a few display divisions, use a *Light* setting. On a truck scale where the changes in subsequent weight values are 100s of display divisions, a *Heavy* setting is more appropriate.

Adaptive Threshold

Set the *Adaptive Filtering Threshold* for the amount of observed instability in the system. This parameter can be set in the range of 0–2000 and is entered as a weight value. When a new sampled weight value is acquired, the adaptive filter compares the new value to the previous (filtered) output value.

If the difference between the new value and the previous output value is greater than the *Adaptive Filtering Threshold* parameter the adaptive filter is reset to the new weight value.

If the difference between the new value and the previous output value is less than the *Adaptive Filtering Threshold* parameter, the two values are averaged together using a weighted average. The weighted average is based on the amount of time the system has been stable, and selected *Adaptive Filter Sensitivity* sensitivity.

With the *Adaptive Filtering Threshold* set at zero, determine the amount of instability present. Enter this amount of weight instability to set the threshold of the adaptive filter. The adaptive filter is set to *OFF*, the *Adaptive Filtering Threshold* parameter is set to zero.

3.8.3   Damping Filter

The damping filter is a simple filter which adjusts the amount of time it takes for a change in weight to be processed through the scale. The *Damping Value* parameter is a time interval specified in tenths of a second (10 = 1 second). This *Damping Value* is used to determine the amount of time it takes for the scale to reach its final weight output. When *Damping Value* is set to ten, a transition from 0 lb to 500 lb on the scale takes one second. The closer the weight gets to its final amount, the slower the weight changes on the display.
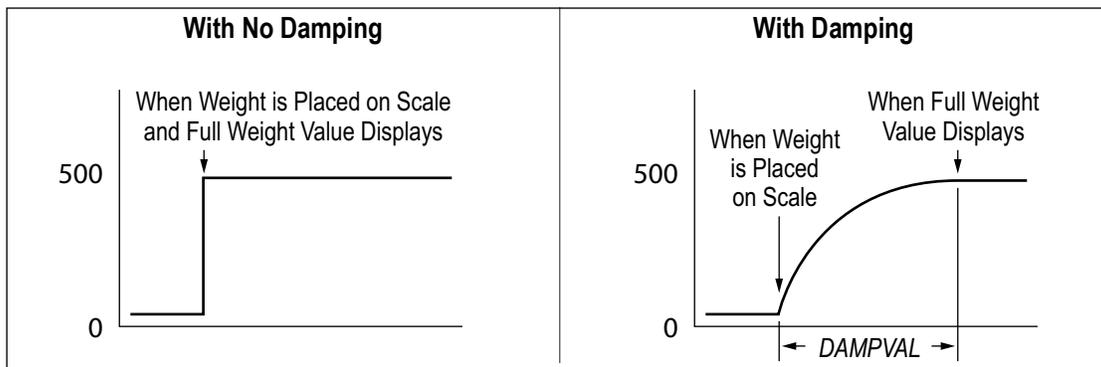
Figure 3-24. 500 lb Displayed Weight Progression

3.8.4 Kalman Filter

The Kalman filter is an algorithm based filter that calculates an accurate and stable weight by estimating multiple types of system noise. The three algorithm variables that can be adjusted in the iQUBE³ are the **Kalman Q**, the **Kalman R**, and the **Kalman Threshold**.

- The **Kalman Q** parameter is an average estimation of how much process noise needs to be filtered out of the final weighment. Process noise is the state of constant noise such as vibration and electronic signal interference. *The default setting is 0.005. Increase this number to compensate for more process noise.*

- The **Kalman R** parameter is an average estimation of how much observation noise needs to be filtered out of the final weighment. Observation noise is the noise that comes with the weight measurement itself such as weight instability. *The default setting is 10. Increase this number to compensate for more observation noise.*

- The **Kalman Threshold** is the weight at which the Kalman filter begins be utilized. The default setting is 10.

3.8.5 RattleTrap

RattleTrap filtering uses a vibration-dampening algorithm to automatically provide the best features of digital filtering. It is particularly effective for eliminating vibration effects or mechanical interference from nearby machinery. Using RattleTrap filtering can automatically eliminate environmental influences, but usually increase response time over standard digital filtering. If RattleTrap is set to on, sensitivity and threshold parameter settings are ignored.

3.9 Gravity Compensation

Gravity Compensation allows for calibrating in one geographic location for use in a different geographic location. Gravity Compensation can be set to On, Off, or Factor.

- The **On** gravity compensation setting calculates gravity compensation with origin and destination latitude and elevation information.

- The **Factor** gravity compensation setting uses the origin and destination gravity factors to find gravity compensation.

NOTE: To find the local gravity, enter the latitude and elevation into the International Gravity Formula. Listed are links to websites that can be used to determine local latitude and elevation. Please note these website addresses are provided for reference only and may change.

Map Coordinates uses Google maps to find latitude and elevation: www.mapcoordinates.net/

Once local latitude and altitude have been determined, use the following link to calculate local gravity http://www.sensorsone.com/local-gravity-calculator/

IMPORTANT: The gravity correction function has not been evaluated by an approvals agency, therefore it is up to the authorized scale dealer to ensure the device is accurate at the intended point of use.

4.0   iQUBE³ Calibration

Each calibration completely overwrites any previous calibration settings.

4.1   Standard Calibration

1. Enter 1280 Configuration Mode. ()

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>.**
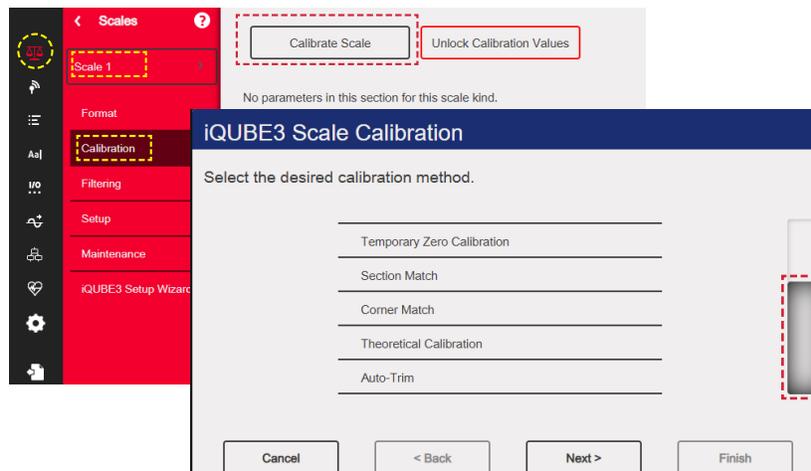
Figure 4-1. iQUBE³ Scale Calibration Menu

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.
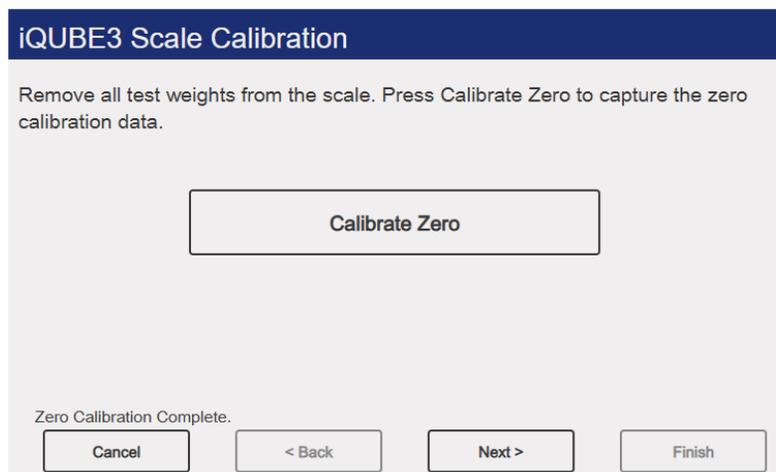
Figure 4-2. Calibrate Zero

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.

Figure 4-3. Calibrate Span

14. Press **Next>**. Calibration Results Display.

Figure 4-4. Calibration Results

15. Proceed to Section 4.4 on page 58.

4.2   Corner Match Calibration

1. Enter 1280 Configuration Mode. (Section 3.3 on page 37)

2. Press ⚖ **Scales.** *Format* interface displays.

3. Select **Calibration***. Calibration Screen* displays.

4. Press **Calibrate Scale**. iQUBE³ *Scale Calibration* menu displays.

5. Scroll to bottom of the calibration list.

6. Select *Corner Match* and press **Next>.**
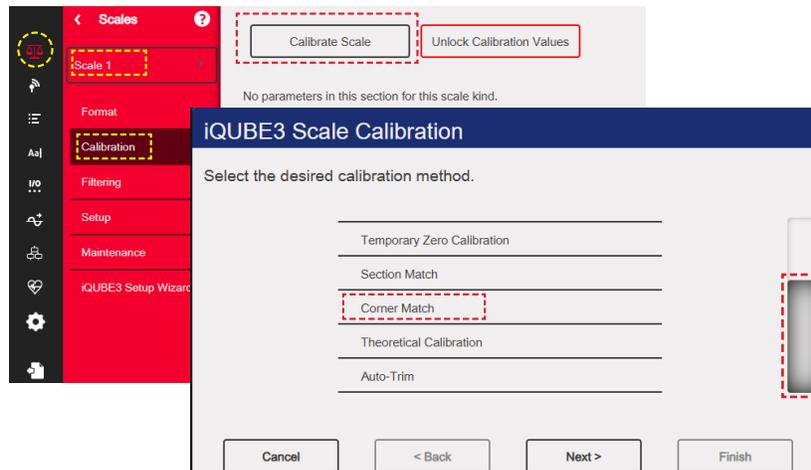
Figure 4-5. iQUBE³ Scale Calibration Menu

7. Remove all test weights from the scale. Press *Calibrate Zero* to capture the zero calibration data. *Zero Calibration Complete* displays when the indicator has captured zero.
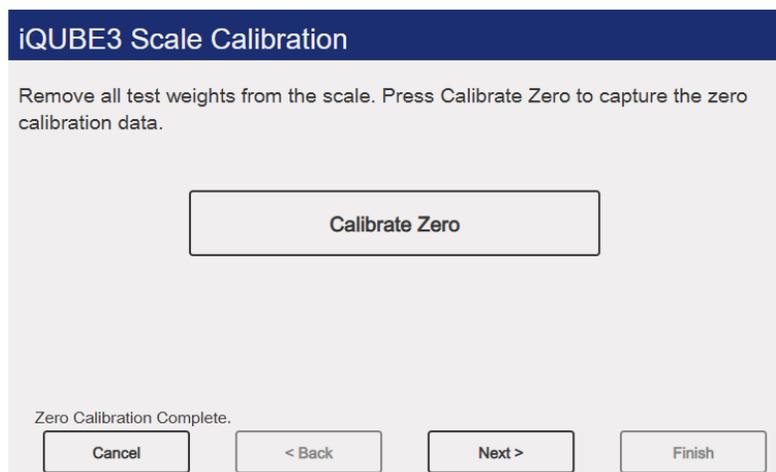
Figure 4-6. Scale Calibration

8. Press **Next>**. Prompt to enter calibration weight displays.

Figure 4-7. Scale Calibration

9. Press 123... ***Calibration Weight*** entry prompt displays.
10. Enter the calibration weight for the test weight and press **DONE**.
11. Press **Next>**. Prompt to place calibration weight displays.

Figure 4-8. Scale Calibration

12. Place calibration weight over corner that corresponds with the current load cell (highlighted with a red box).
13. Press ***Calibrate Corner***. Display proceeds to next load cell.
14. Repeat steps 12 and 13 until all load cells have been calibrated.
15. Press **Next>**. Calibration Results Display.
16. Proceed to Section 4.4 on page 58.

4.3   Auto-Trim Calibration

1. Enter 1280 Configuration Mode. (Section 3.3 on page 37)

2. Press ⚖ **Scales.** *Format* interface displays.

3. Select **Calibration***. Calibration Screen* displays.

4. Press **Calibrate Scale**. iQUBE³ *Scale Calibration* menu displays.

5. Scroll to bottom of the calibration list.

6. Select *Auto-Trim* and press **Next>.**
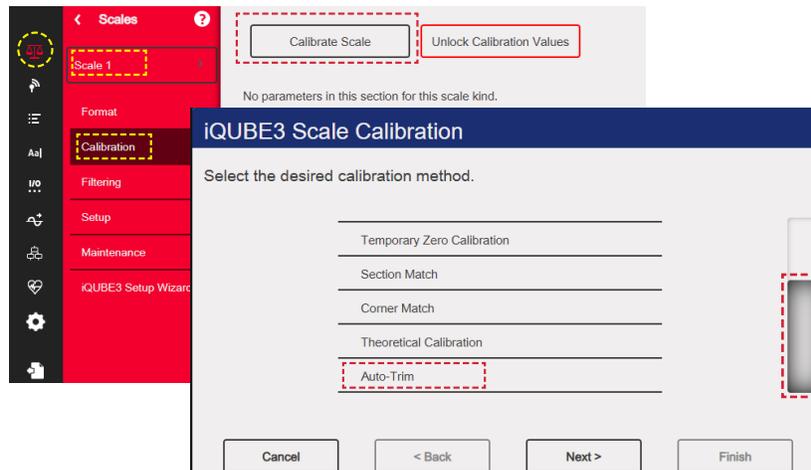
Figure 4-9. iQUBE³ Scale Calibration Menu

7. Remove all test weights from the scale. Press **Calibrate Zero** to capture the zero calibration data. **Zero Calibration Complete** displays when the indicator has captured zero.
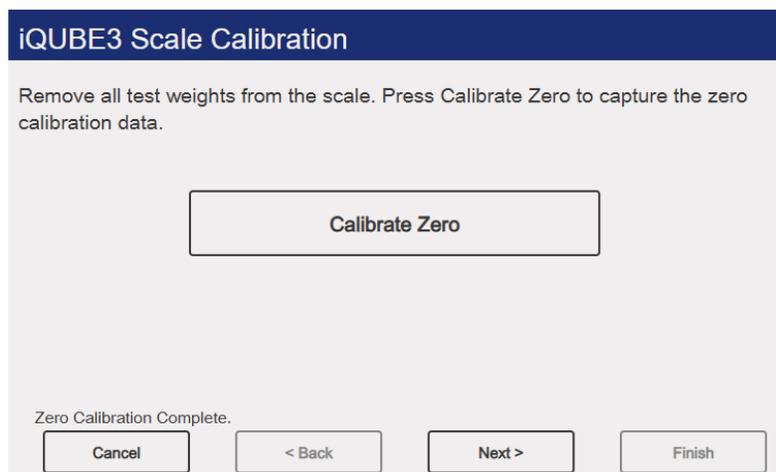
Figure 4-10. Calibrate Zero

8. Press **Next>**. Prompt to place weight cart displays.

9. Follow instructions on the display.
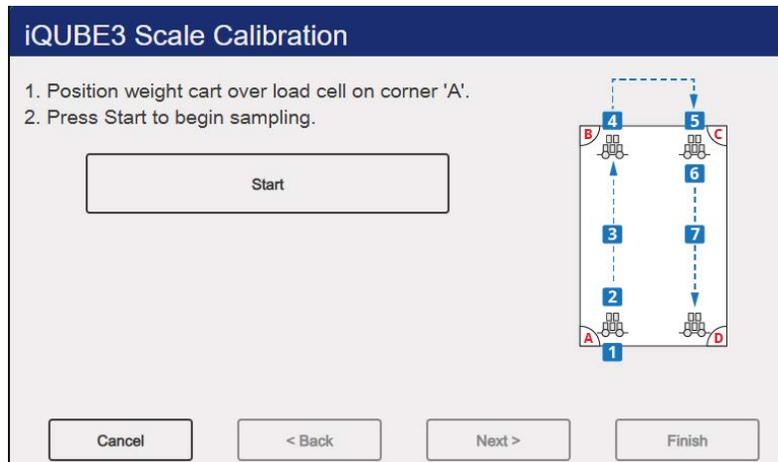
Figure 4-11. Start Auto-Trim
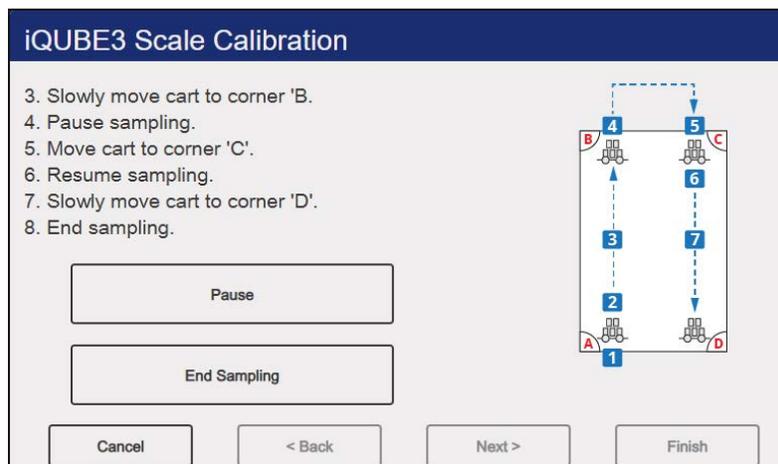
Figure 4-12. Move Weight Cart
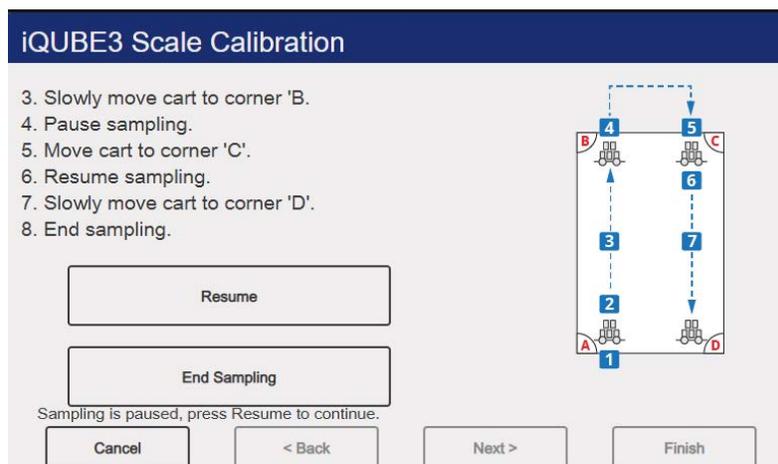
Figure 4-13. End Sampling

NOTE: Leave Calibration weight on platform over the last corner (D) calibrated.
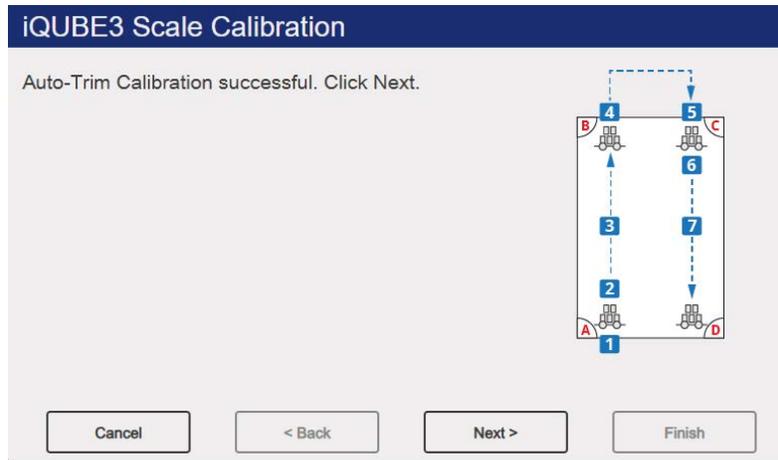
Figure 4-14. Auto-Trim Calibration Successful

10. Press **Next>**. Prompt to enter calibration weight displays.
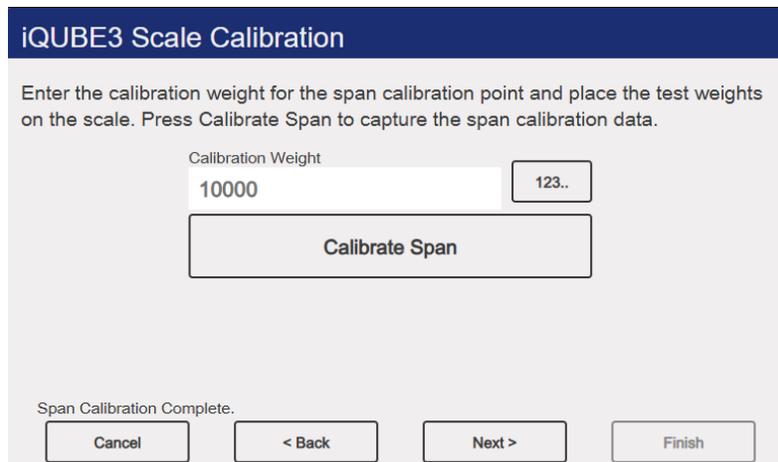
Figure 4-15. Enter Calibration Weight

11. Press 123... *Calibration Weight* entry prompt displays.
12. Enter the calibration weight for the test weight and press **DONE**.
13. Press *Calibrate Span*. Indicator calibrates Span.
14. Press **Next>**.

4.4 Calibration Results and Resistance Tests

After span calibration has completed,

1. *Calibration Results* displays after span calibration has completed.

Figure 4-16. Scale Calibration

2. Remove test weight.

3. Press **Next>**.
   - If resistance boards are installed, *Resistance: Load Cell* prompt displays. (Figure 4-17 on page 58)
   - If resistance boards are not installed, go to Step 7 on page 58
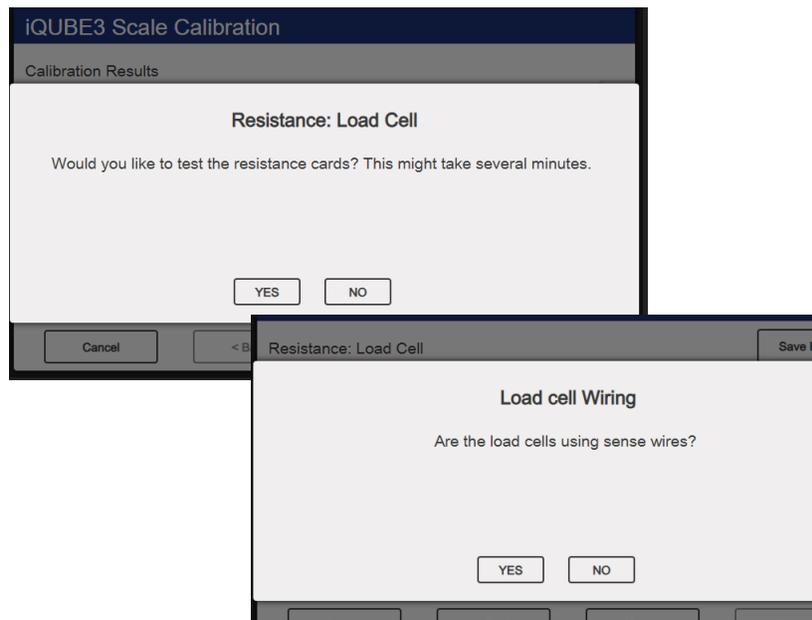
Figure 4-17. iQUBE³ Scale Calibration Menu

4. Press **YES** to test resistance cards. *Load cell Wiring* prompt displays.

5. Select **NO** if load cells are 4-wire. Select **YES** if load cells are 6-wire. Indicator performs resistance test and displays resistance values.

6. Press **Next>**. *Calibration Complete* Displays.

7. Select *Finish to Return to the Scale Setup*.

8. Select **Save and Exit.** Weigh mode displays.

5.0   iQUBE³ Menu Glossary

5.1   iQUBE³ Setup Menu
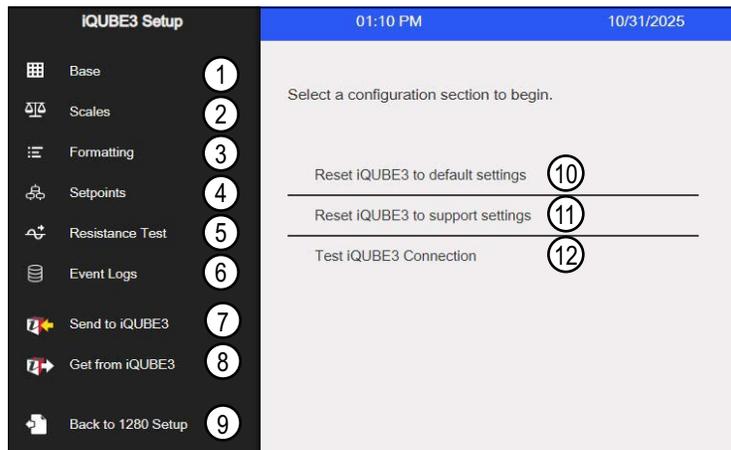
Figure 5-1. 1280 iQUBE³ Setup Menu

Item No.	Description
1	Base – used for assignment of board IDs, time and date format, load cell settings and assignment, ports and digital I/O setup and diagnostics
2	Scales – used for the setup of scale parameters required for iQUBE³ operation (Section 5.4 on page 67)
3	Formatting – used to set print and stream formats, up to six formats may be set (Section 5.4.3 on page 69)
4	Setpoints – used to setup four setpoints to work with the iQUBE³
5	Resistance Test
6	Event Logs
7	Send to Device – used to send configuration and calibration settings to the iQUBE³
8	Get from Device – used to upload configuration settings from the connected iQUBE³, replacing the current iQUBE³ settings within the 1280
9	Back to 1280 Setup – Returns the display to the 1280 setup screen
10	Resets all iQUBE³ settings to default values within the 1280. Requires a *Send to Device* if resetting the iQUBE³ to default values is desired
11	Resets all iQUBE³ settings to default values within the 1280, with the exception of the primary/secondary board ID's and Addresses. Requires a *Send to Device* if resetting the iQUBE³ to default values is desired
12	Verifies that a connection to the iQUBE³ board can be made

Table 5-1. iQUBE³ Setup Menu

NOTE: During setup for all parameters, select `CANCEL` **to leave the current parameter without saving.**

5.2   Base Setup Menu

Select Base ⊞.
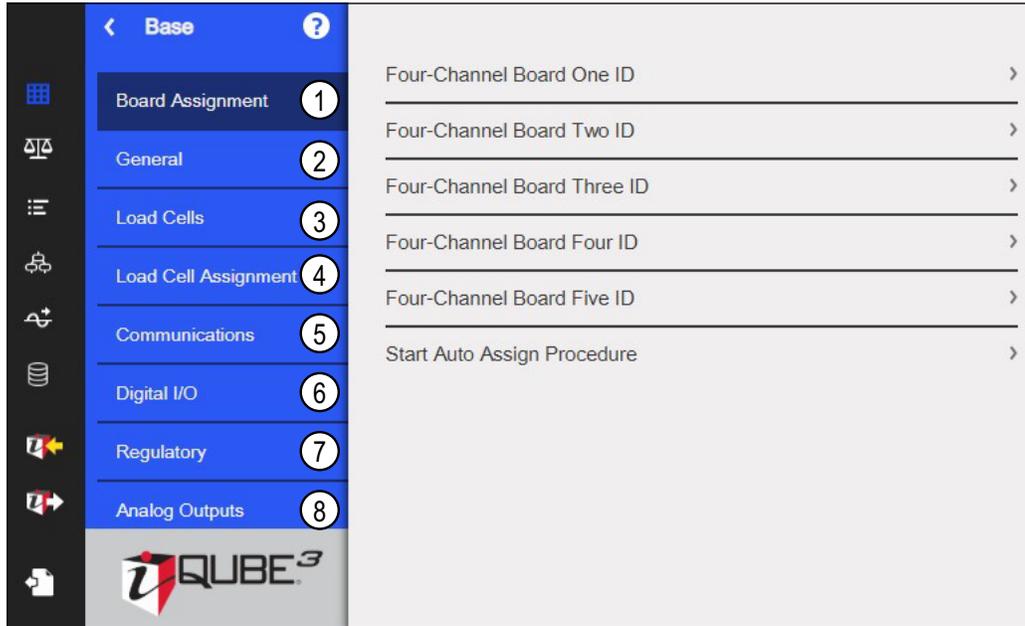
Figure 5-2. iQUBE³ Base Menul

Item No.	Description
1	Board Assignment – set the secondary boards, one through five, with IDs (Section 5.2.1)
2	General – set the date/time format and separator and the ADC Update (sample) rate - applies to all scales (Section 5.2.2 on page 61)
3	Load Cells – configure the parameters for each load cell (Section 5.2.3 on page 61)
4	Load Cell Assignment – select scale and assign load cells (Section 5.2.4 on page 62)
5	Communications – select ports and setup port parameters (Section 5.2.5 on page 63)
6	Digital I/O – select digital I/O and set parameters (Section 5.2.6 on page 65)
7	Regulatory – select governing regulatory body (Section 5.2.7 on page 66)
8	Analog Outputs – configure the parameters for the two optional analog output boards.

Table 5-2. Base Menu Parameters

5.2.1   Board Assignment Menu Parameters

Parameter	Default	Description
Four-Channel Board IDs	Auto Assigned	Displays auto Assigned Board ID when board is configured
Start Auto Assign Procedure		Initiates a search for four-channel boards

Table 5-3. Board Assignment Menu Parameters

5.2.2   General Menu Parameters

Parameter	Default	Description
Warmup Delay	0	Select a time in minutes for iQUBE³ to warm up before providing weight values - 0-10
Sample Rate	12.5 Hz	Select an ADC sample rate in HZ – 2.5, 5, 6.25, 7.5,10, 12.5, 15, 25, 30, 50, 60, 100, 120, 500
Date Format	MMDDYY	Select a format – MMDDYY, DDMMYY, YYMMDD, YYDDMM
Date Separator	Slash (/)	Select a date separator – Slash (/), Dash (-), Semi-colon (;), Dot (.)
Time Format	12 Hour	Select 12 hour or 24 hour
Time Separator	Colon (:)	Select a time separator – Colon (:), Comma (,), Dot (.)
Audit Agency	NTEP	Audit trail display agency format; *Settings: NTEP, Measurement Canada, None, OIML*
Persistent Tare	Off	Tare persists through a power cycle; *Settings: Off, On*
UID	1	Specify the up to 8-Character Unit ID for the iQUBE³
Gravity Compensation	Off	Enables location gravity compensation; *Settings:* **Off** *(default)* – gravity compensation disabled *On* – calculates gravity compensation using the origin and destination latitudes and elevations *Factor* – uses origin and destination gravity factors to find gravity compensation
Destination Elevation	345	Destination elevation (in meters) for gravity compensation *Enter value: -9999–9999* **Only displays if Gravity Compensation parameter is set to **On**
Destination Latitude	45	Destination latitude (to nearest degree) for gravity compensation; *Enter value: 0–90* **Only displays if Gravity Compensation parameter is set to **On**
Origin Elevation	345	Origin elevation (in meters) for gravity compensation; *Enter value: -9999–9999* **Only displays if Gravity Compensation parameter is set to **On**
Origin Latitude	45	Origin latitude (to nearest degree) for gravity compensation; *Enter value: 0–90* **Only displays if Gravity Compensation parameter is set to **On**
Destination Gravity Compensation	9.80665	Destination gravity factor (in m/s²) for gravity compensation; *Enter value: 9.00000–9.99999* **Only displays if Gravity Compensation parameter is set to **Factor**
Gravity Compensation	9.80665	Origin gravity factor (in m/s²) for gravity compensation; *Enter value: 9.00000–9.99999* **Only displays if Gravity Compensation parameter is set to **Factor**

Table 5-4. General Menu Parameters

5.2.3   Load Cell Parameters

Parameter	Default	Description
Name	LCx	Specify an up to 16-character alphanumeric name for the load cell
Serial Number	SN#x	Specify an up to 16-character alphanumeric serial number for the load cell
Capacity	75000	Specify the full scale capacity of the load cell
Factory Sensitivity	3	Specify the factory supplied mV/V sensitivity of the load cell. Used for Theoretical Calibration only
Normalization Value	1	Specify the trim factor is used to trim the load cell. This value is initially set as part of a section or corner calibration, or during calibration tweaking. Adjusting this value manually will affect calibration.

Table 5-5. Load Cell Parameters

5.2.4 Load Cell Assignment
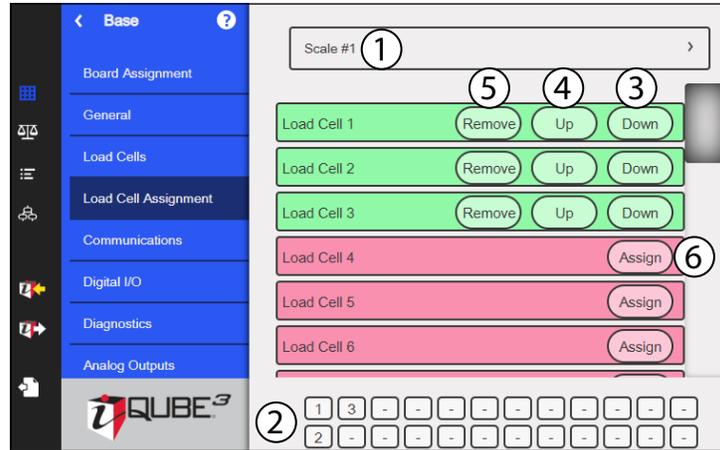
Figure 5-3. Load Cell Assignment Display

Item No.	Parameter	Description
1	Scale Selection	Use the drop down arrow to select the scale
2	Load Cell Location	Illustrates the position of the load cells. These can be changed by using the load cell up/down buttons
3	Down Button	Move the load cell down in the load cell
4	Up Button	Move load cell up in load cell order. The up button moves the load cell up in the list/order but it may move the load cell up or to the left within the graphical load cell layout depending on its starting position
5	Remove Button	Remove the load cell from the selected scale
6	Assign Button	Assign the load cell to the selected scale

Table 5-6. Load Cell Assignment

5.2.5 Communication

The Communication menu changes with the specified method of communication. To set the communication ports:

1. Select **Communication**.
2. Select a comm port from the drop down list.
3. Select each parameter and enter the required information.
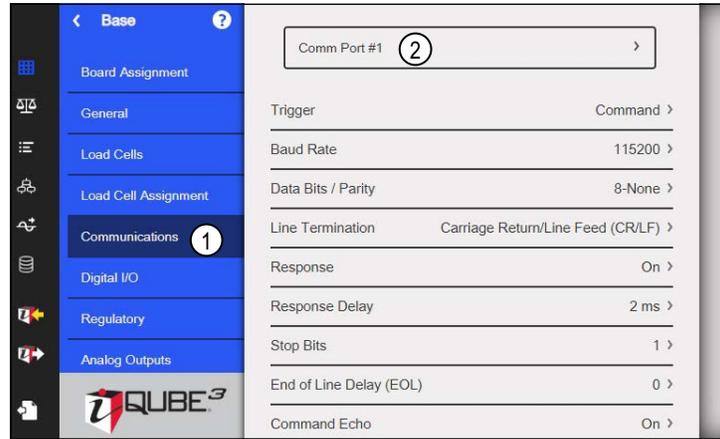
Figure 5-4. Communication Display

Serial Menu Parameters

Comm Port numbers in the drop down menu correspond with the following communication modes:

COM Port	J9 - RS232	J14 - RS422	Option Card Slot 1		Option Card Slot 2	
			Dual Serial Board	**Fiber Board**	**Dual Serial Board**	**Fiber Board**
1	✓	—	—	—	—	—
2	—	✓	—	—	—	—
3		—	✓	✓	—	—
4		—	✓	—	—	—
5		—	—	—	✓	✓
6		—	—	—	✓	—

Table 5-7. Comm Port Number Designation Table

Refer to Figure 2-14 on page 30 for serial port locations.

Port	Parameter	Default	Description
Comm Port #1 RS-232	Trigger	Command	Sets the input trigger type; *Settings:* *Command – Allows operation of EDP commands and printing*
	Baud Rate	115200	Sets the transmission speed for the port; *Settings: 9600, 19200, 28800, 38400, 57600, 115200, 230400, 450000, 460800*
	Data Bits / Parity	8NONE	Sets the number of Data Bits and type of Parity used by the port; *Settings: 8NONE, 8EVEN, 8ODD, 7EVEN, 7ODD*
	Line Termination	CR/LF	Sets the termination character for data sent from the port; *Settings: CR/LF, CR*
	Response	On	Specifies if the port transmits replies to serial commands; *Settings: On, Off*
	Response Delay	2	Sets the delay time between receiving a command and sending its response in milliseconds; *Settings: 2 to 10.*
	Stop Bits	1	Sets the number of stop bits used by the port; *Settings: 1, 2*
	End of Line Delay	0	Sets the delay period from when a formatted line is terminated to the beginning of the next formatted serial output (0.1-second intervals); *Enter value: 0–255*
	Command Echo	On	Specifies if characters received by the port are echoed back to the sending unit; *Settings: On, Off*

Table 5-8. Serial Menu Parameters

Port	Parameter	Default	Description
Comm Port #2 RS-485	Trigger	Command	Sets the input trigger type; *Settings:* *Command – Allows operation of EDP commands and printing* *Fieldbus – Configures the port to operate for Fieldbus; Automatically configures all port parameters for Fieldbus and hides the port parameters in the menu*
	Baud Rate	115200	Sets the transmission speed for the port; *Settings: 9600, 19200, 28800, 38400, 57600, 115200, 230400, 450000, 460800*
	Data Bits / Parity	8NONE	Sets the number of Data Bits and type of Parity used by the port; *Settings: 8NONE, 8EVEN, 8ODD, 7EVEN, 7ODD*
	Line Termination	CR/LF	Sets the termination character for data sent from the port; *Settings: CR/LF, CR*
	Response	On	Specifies if the port transmits replies to serial commands; *Settings: On, Off*
	Response Delay	2	Sets the delay time between receiving a command and sending its response in milliseconds; *Settings: 2 to 10.*
	Stop Bits	1	Sets the number of stop bits used by the port; *Settings: 1, 2*
	End of Line Delay	0	Sets the delay period from when a formatted line is terminated to the beginning of the next formatted serial output (0.1-second intervals); *Enter value: 0–255*
	RS485 Address	0	Specifies address used to connect to the port; Must be set to 0 for RS-422; *Settings: 0–255,*
	RS485 Duplex	FULL	Specifies FULL (4-wire) or HALF (2-wire) duplex mode for the port; *Settings: FULL, HALF*
	Command Echo	On	Specifies if characters received by the port are echoed back to the sending unit; *Settings: On, Off*
Comm Port #3-6	Trigger	Command	Sets the input trigger type; *Settings:* *Command – Allows operation of EDP commands and printing* *Fieldbus – Configures the port to operate for Fieldbus; Automatically configures all port parameters for Fieldbus and hides the port parameters in the menu*
	Port Type	RS232	Sets the Port Type; *Settings: **RS232**, RS485*
	Baud Rate	115200	Sets the transmission speed for the port; *Settings: 9600, 19200, 28800, 38400, 57600, 115200, 230400, 450000, 460800*
	Data Bits / Parity	8NONE	Sets the number of Data Bits and type of Parity used by the port; *Settings: 8NONE, 8EVEN, 8ODD, 7EVEN, 7ODD*
	Line Termination	CR/LF	Sets the termination character for data sent from the port; *Settings: CR/LF, CR*
	Response	On	Specifies if the port transmits replies to serial commands; *Settings: On, Off*
	Response Delay	2	Sets the delay time between receiving a command and sending its response in milliseconds; *Settings: 2 to 10.*
	Stop Bits	1	Sets the number of stop bits used by the port; *Settings: 1, 2*
	End of Line Delay	0	Sets the delay period from when a formatted line is terminated to the beginning of the next formatted serial output (0.1-second intervals); *Enter value: 0–255*
	RS485 Address	0	Specifies address used to connect to the port; Must be set to 0 for RS-422; *Settings: 0–255,*
	RS485 Duplex	FULL	Specifies FULL (4-wire) or HALF (2-wire) duplex mode for the port; *Settings: FULL, HALF*
	Command Echo	On	Specifies if characters received by the port are echoed back to the sending unit; *Settings: On, Off*

Table 5-8. Serial Menu Parameters (Continued)

WiFi Menu Parameters

Parameter	Default	Description
Trigger	Command	Sets the input trigger type; *Settings:* *Command – Allows operation of EDP commands and printing*
Enabled	OFF	Enables the wireless module ; *Settings: **OFF**, WiFi*
MAC ID	00:00:00:00:00:00	Displays the WiFi MAC address (read only): *00:00:00:00:00:00*
Response	On	Specifies if the port transmits replies to serial commands; *Settings: On, Off*
Line Termination	CR/LF	Sets the termination character for data sent from the port; *Settings: CR/LF, CR*
End of Line Delay	0	Sets the delay period from when a formatted line is terminated to the beginning of the next formatted serial output (0.1-second intervals); *Enter value: 0–255*

Table 5-9. WiFi Menu Parameters

RICE LAKE
WEIGHING SYSTEMS

Parameter	Default	Description
Command Echo	On	Specifies if characters received by the port are echoed back to the sending unit; *Settings: On, Off*

Table 5-9. WiFi Menu Parameters (Continued)

Ethernet Menu Parameters

Parameter	Default	Description
Enabled	On	Enables Ethernet communications; *Settings: Off, On*
DHCP	On	Dynamic Host Configuration Protocol (static allocation of IP address when OFF); *Settings: On, Off*
IP Address	0.0.0.0	IP Address; *Enter value: 0.0.0.0*
Subnet Mask	255.255.255.0	Subnet Mask; *Enter value: 255.255.255.0*
Gateway	0.0.0.0	Default Gateway; *Enter value: 0.0.0.0*
MAC ID	00:00:00:00:00:00	Displays the Ethernet MAC address (read only): *00:00:00:00:00:00*

Table 5-10. Ethernet Menu Parameters

TCP Server

Parameter	Default	Description
Trigger	Command	Sets the input trigger type; *Settings:* *Command – Allows operation of EDP commands and printing*
Hostname	(blank by default)	Specifies a 0 to 30 character name for the TCP Server; blank by default
Port	10001	Specifies the port the TCP Server will be listening on; *Settings: 1025 to 65535, 10001*
Echo	On	Specifies if characters received by the port are echoed back to the sending unit; *Settings: On, Off*
Response	On	Specifies if the port transmits replies to serial commands; *Settings: On, Off*
Line Termination	CR/LF	Sets the termination character for data sent from the port; *Settings: CR/LF, CR*

Table 5-11. TCP Server Menu Parameters

USB Menu Parameters

Parameter	Default	Description
Trigger	Command	Sets the input trigger type; *Settings:* *Command – Allows operation of EDP commands and printing*
Line Termination	CR/LF	Sets the termination character for data sent from the port; *Settings: CR/LF, CR*
End of Line Delay	0	Sets the delay period from when a formatted line is terminated to the beginning of the next formatted serial output (0.1-second intervals); *Enter value: 0–255*
Echo	On	Specifies if characters received by the port are echoed back to the sending unit; *Settings: On, Off*
Response	On	Specifies if the port transmits replies to serial commands; *Settings: On, Off*

Table 5-12. USB Menu Parameters

5.2.6   Digital I/O

Parameter	Default	Description
Digital I/O Bit 1-4		Select from drop down menu
Function	Off	Specifies the mode and function of the digital I/O pins; *Settings: Off, Zero, Gross/Net, Tare, Units, Print, Setpoint, Clear Consecutive Number, Clear Tare, Cell Health, Host Control*
Source	Off	Scale Source; Scale #1 to 5

Table 5-13. Digital I/O Menu Parameters

5.2.7 Regulatory

Specifies the regulatory agency having jurisdiction over the scale site; the value specified for this parameter affects the function of the front panel tare and zero keys; Settings: NTEP (default), OIML, Measurement Canada, Australia, Industrial, None

- OIML, NTEP, Measurement Canada and Australia modes allow a tare to be acquired at a weight greater than zero; None allows tares to be acquired at any weight value

- OIML, NTEP, Measurement Canada and Australia modes allow a tare to be cleared only if the gross weight is at no load; None allows tares to be cleared at any weight value

- NTEP, OIML and Australia modes allow a new tare to be acquired even if a tare is already present; In Measurement Canada mode, the previous tare must be cleared before a new tare can be acquired

- None, NTEP and Measurement Canada modes allow the scale to be zeroed in either gross or net mode as long as the current weight is within the specified Zero Range (%); In OIML and Australia modes, the scale must be in gross mode before it can be zeroed; pressing the ZERO key in net mode clears the tare

- Australia mode does not display capacity and count-by with the weight value

- Industrial provides a set of sub-parameters to allow customization of tare, clear and print functions in non-Legal for Trade scale installations

Mode	Parameter	Default	Description
Industrial	Auto-Zero Tracking on Net Zero	No	Perform auto zero tracking on net zero; Settings: No, Yes
	Allow CLR key to clear tare/accumulator	Yes	Allow clear key to clear tare or accumulator when displayed; Settings: Yes, No
	Always Allow Keyed Tare	Yes	Always allow keyed tare; Settings: Yes, No
	Allow Manual Clear Tare	Yes	Allow manual clearing of the tare value; Settings: Yes), No
	Multiple Tare Action	Replace	Replaces existing tare when the tare key is pressed; Settings: Replace, Remove, No Action
	Allow Total Scale to Display Negative	No	Allow total scale to display negative value; Settings: No, Yes
	Allow Negative Tare	No	Allow negative or zero tare; Settings: No, Yes
	Zero Base for Overload	Calibrated	Zero base for overload calculation; Settings: Calibrated, Scale
	Add PT to Keyed Tare Print	Yes	Add preset tare (PT) to keyed tare print; Settings: Yes, No
	Allow Print in Motion	No	Allow print while in motion; Settings: No, Yes
	Round Keyed Tare	Yes	Rounds tare at keyed tare; Settings: Yes, No
	Round Pushbutton Tare	No	Rounds tare at pushbutton tare; Settings No, Yes
	Tare in Motion	No	Allow tare in motion; Settings: No, Yes
	Underload	20	Underload weight value in display divisions; Enter value: 1–9999999
	Zero in Motion	No	Allow scale to be zeroed while in motion; Settings: No, Yes
	Remove Tare on Zero	No	Remove tare on zero; Settings: No, Yes

Table 5-14. Regulatory Menu Parameters

5.3 Analog Outputs

The iQUBE³ recognizes the installed option card and auto-populates the menu.

Parameter	Description
Error Action	Specifies how the analog output responds to system error conditions; Settings: **Full Scale** (default) – Set to full scale (10 V or 20 mA) Hold – Holds current value Zero Scale – Sets to zero value (0 V, 0 mA or 4 mA)
Maximum	Specifies the maximum weight value tracked by the analog output; Enter value: ±9999999.0, **10000.0** (default)
Minimum	Specifies the minimum weight value tracked by the analog output; Enter value: ±9999999.0, **0.0** (default)
Mode	Specifies the weight data, gross or net, tracked by the analog output when the Source parameter is assigned to a scale; Settings: **Gross** (default), Net
Output	Specifies the type/range of the output; Settings: **0-10V** (default), 0-20MA, 4-20MA

Table 5-15. Analog Output Parameters

RICE LAKE
WEIGHING SYSTEMS

Parameter	Description
Source	Specifies the scale tracked by the analog output; Settings: *Scale 1* (default), Scale 2, Scale 3, Scale 4, Scale 5
Tweak Span	Adjusts the offset of the analog output span value; Enter value: 0–65535, *59515* (default)
Tweak Zero	Adjusts the offset of the analog output zero value; Enter value: 0–65535, *0* (default)

Table 5-15. Analog Output Parameters (Continued)

5.4 Scales

Select Scales ⚖.

Press the drop down menu to select a scale to configure (#1 to #4 or Total Scale).
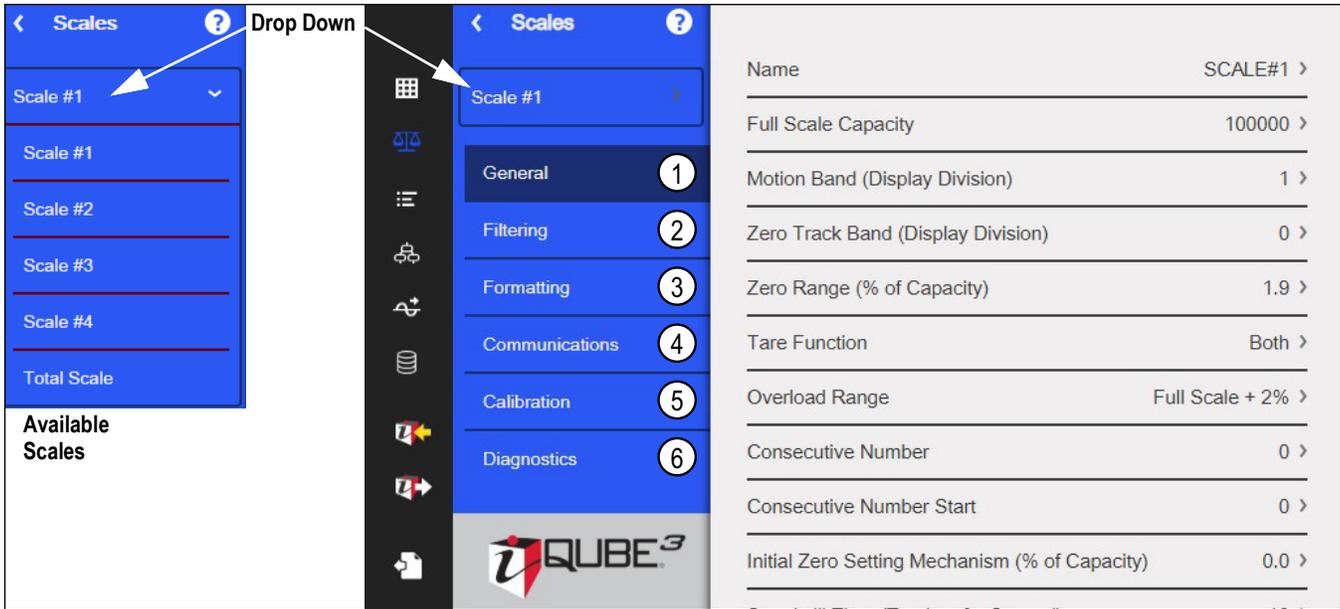
Figure 5-5. iQUBE³ Scale Menu

Item No.	Description
1	General – set scale specific parameters (Table 5.4.1 on page 68)
2	Filtering – (Table 5.4.2 on page 68)
3	Formatting – (Section 5.4.3 on page 69)
4	Communications – (Section 5.4.4 on page 70)
5	Calibration – (Section 5.4.5 on page 70)
6	Diagnostics – (Section 5.4.6 on page 70)

Table 5-16. Base Menu Parameters

5.4.1   General

Parameter	Default	Description
Name	Scale#s	Enter a different name for the scale using displayed keyboard; SCALE#*0* to 24 alphanumeric characters
Full Scale Capacity	100000	Specifies the full scale capacity (in weight) of the scale; Settings: 0.0000001 - 9999999.0
Motion Band (Display Division)	1	Set the level at which scale motion is detected; *1* (Default), 0-100 display divisions • If motion is not detected for the standstill time or longer, the standstill icon displays; • If set to 0, the standstill icon is on at all times and operations including zero, print, and tare are performed regardless of scale motion; *If set to 0, it is not Legal for Trade certified*
Zero Track Band (Display Division)	0	Value that can automatically be tracked off to return the scale to zero; *Settings: 0.0-100.0 display divisions*
Zero Range (% of Capacity)	1.9	Specifies the percent of capacity at which the scale can be zeroed; 0-100, 1.9 (default)
Tare Function	Both	Specifies Tare trigger; ***Both*** (default), Push Button Tare, Keyed, No Tare
Overload Range	Full Scale + 2%	Specifies value, in a percentage/display division above capacity, at which the display blanks and the out-of-range error message is displayed; *Settings: Full Scale + 2%, Full Scale + 1 Div, Full Scale + 9 Div, Full Scale*
Consecutive Number	0	Value is incremented following each print operation that includes <CN> in the ticket format. When reset, it is set to a value specified in the Consecutive Numbering Start parameter; *Settings: 0 - 9999999*
Consecutive Number Start	0	Start value of the next print when it is reset. *Settings: 0 - 9999999*
Initial Zero Setting Mechanism (% of Capacity)	0	Specifies the percent of scale capacity that can be initially zeroed upon scale start up; *Settings: 0-100*
Standstill Time (Tenths of a Second)	10	The time a scale has to be within the Motion Band before the scale is considered stable (in 0.1 second intervals); *Settings: 0-600*
Tank Cell Emulation Count (> 0 to enable)		Number of times the threshold must be reached before system captures an emulation sample; Value of 0 disables tank cell emulation
Tank Cell Emulation Threshold (% of Cap)	80%	Weight expressed as a percentage of scale capacity at which the next sample is captured
Tank Cell Emulation Reset (% of Cap)	10%	Weight expressed as a percentage of scale capacity that the same must fall below before next sample is captured
Tank Cell Emulation Value		When selected shows the current Tank Cell emulation values; See Section 9.2.4 on page 96 for more information on Tank Cell Emulation

Table 5-17. Scale General Parameter Functions

5.4.2   Filtering

Parameter	Default	Description
Filter Select	Three Stage	Sets the filter type to be used; *Settings:* ***Three Stage*** *(default)* – Digital Rolling Average Filter; Uses Digital Filter Stage 1-3, Three Stage Filter Sensitivity and Three Stage Filter Threshold *Adaptive* – Adaptive Filter (*Section 16.8.2 on page 143*); Uses Adaptive Filter Sensitivity and Adaptive Filter Threshold *Damping* – Damping Filter (*Section 16.8.3 on page 143*); Uses Damping Value *Kalman* *None* – No filtering
Three Stage Filter One	4	Sets first digital filtering rate in A/D conversions per update; *Settings: 1, 2, 4, 8, 16, 32, 64, 128, 256*
Three Stage Filter Two	4	Sets second digital filtering rate in A/D conversions per update; *Settings: 1, 2, 4, 8, 16, 32, 64, 128, 256*
Three Stage Filter Three	4	Sets third digital filtering rate in A/D conversions per update; *Settings: 1, 2, 4, 8, 16, 32, 64, 128, 256*
Three Stage Filter Sensitivity	2 Consecutive values	Sets number of consecutive A/D readings which must fall outside the filter threshold before filtering is suspended; *Settings: 2 Consecutive values, 4 Consecutive values, 8 Consecutive values, 16 Consecutive values, 32 Consecutive values, 64 Consecutive values, 128 Consecutive values*
Three Stage Filter Threshold	None	Sets a threshold value in display divisions when the number of consecutive A/D readings specified in the filter Sensitivity falls outside of this threshold value when compared to the output of the filter; filtering is suspended and the A/D value is sent straight through the filter; *Settings: None, 2D, 5D, 10D, 20D, 50D, 100D, 200D, 250D*

Table 5-18. Scale Filtering Parameter Functions

RICE LAKE
WEIGHING SYSTEMS

Parameter	Default	Description
Adaptive Sensitivity	Light	Controls the stability and response time of the scale; *Settings:* *Light – Fastest response to small weight changes, but less stable* *Medium – Has a quicker response time than heavy, but more stable than light* *Heavy – Results in an output which is more stable but settles slowly; small changes in weight data (a few grads) on the scale base are not seen quickly*
Adaptive Threshold	0	Sets digital filter cutout threshold; Weight change exceeding threshold resets the filtered values; Must be set above the noise distrubances in the system; *Filtering is suspended if the threshold is set to 0*
Damping Value	10	Sets the damping time constant (in 0.1 sec intervals); *Enter value: 1–2560*
Kalman Q	0.005	Sets the average estimation of how much process noise needs to be filtered out of the final weighment; *Settings: 0.0001 - 2.0*
Kalman R	10	Sets the average estimation of how much observation noise needs to be filtered out of the final weighment; *Settings: 0.01 - 30.0*
Kalman Threshold	10	Sets the weight at which the Kalman filter begins be utilized; *Settings: 0 - 2000*
Rattletrap	Off	Enables RattleTrap filtering; Effective at eliminating vibration effects, environmental influences and mechanical interference from nearby machinery, may increase response time over standard digital filtering; *Settings: Off, On*

Table 5-18. Scale Filtering Parameter Functions (Continued)

5.4.3   Formatting

Press the drop down menu to select a unit type to configure (Primary, Secondary, or Tertiary)
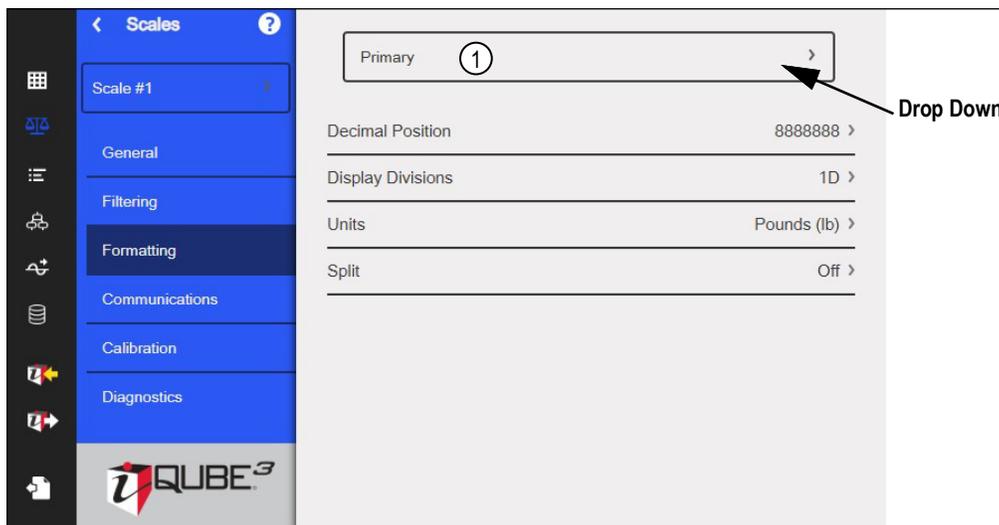
Figure 5-6. iQUBE³ Scale Menu

Parameter	Default	Description
Decimal Position	8888888	Number of decimal places or fixed zeros for unit; *Settings: 8888800, 8888880, 8888888, 888888.8, 88888.88, 8888.888, 888.8888, 88.88888*
Display Divisions	1	Select the division that the scale counts by as the load changes; Settings: *1, 2, 5*
Units	Pounds (lb)	Select the units displayed or printed along with the scale weight; Settings Pounds (lb), Kilograms (kg), Grams (g), Ounces (oz), Short Ton (tn), Metric Ton (t)
Split	None	Split modes allows the iQUBE³ to have more than one level of precision depending on the load • **None** - Scale uses configured decimal position and display divisions only; Range settings below do not display • **Multi-Range** - Provides two or three ranges, each extending to the maximum capacity specified for each range; the scale display division changes as the applied weight increses, but does not reset to lower display divisions until the scale returns to center of zero. • **Multi-Interval** - Divides the scale capacity into two or three partial weighing intervals, each with different display divisions; the intervals extend to the maximum capacity specified for each interval; the display division changes with both increasing and decreasing loads.

Table 5-19. Scale Formatting Parameter Functions

Parameter	Default	Description
Range 1	0	Low-range capacity of the scale in primary units
Range 1 Decimal Position	8888888	Number of decimal places or fixed zeros for Range 1; *Settings: 8888800, 8888880, 8888888, 888888.8, 88888.88, 8888.888, 888.8888, 88.88888*
Range 1 Display Division	1	Division that the scale countys by in Range 1; Settings: *1, 2, 5*
Range 2	0	Mid-range capacity of the scale in primary units
Range 2 Decimal Position	8888888	Number of decimal places or fixed zeros for Range 2; *Settings: 8888800, 8888880, 8888888, 888888.8, 88888.88, 8888.888, 888.8888, 88.88888*
Range 2 Display Division	1	Division that the scale countys by in Range 2; Settings: *1, 2, 5*

Table 5-19. Scale Formatting Parameter Functions (Continued)

5.4.4 Communications

Outputs are configured in the Formats Menu ()

Parameter	Default	Description
Gross Print Format	FMT1	Select the data format that is printed when the Print key is pressed, a KPRINT command is received or when the setpoint push-print operation is performed while scale is in Gross mode; *Settings: FMT1 - FMT6*
Net Print Format	FMT2	Select the data format that is printed when the print key is pressed, a KPRINT command is received or when the setpoint push-print operation is are performed while scale is in Net mode; *Settings: FMT1 - FMT6*
Print Destination	None	Port that the iQUBE³ sends the Gross or Net print format to; *Settings: RS-232 (Port 1), RS-485 (Port 2), TCP Command Server, USB, WiFi, Optional Serial Card 1 Channel 1 (Port 3), Optional Serial Card 1 Channel 2 (Port 4), Optional Serial Card 2 Channel 1 (Port 5), Optional Serial Card 2 Channel 2 (Port 6), None*
Print Destination 2	None	Secondary port that the iQUBE³ sends the Gross or Net print format to; *Settings: RS-232 (Port 1), RS-485 (Port 2), TCP Command Server, USB, WiFi, Optional Serial Card 1 Channel 1 (Port 3), Optional Serial Card 1 Channel 2 (Port 4), Optional Serial Card 2 Channel 1 (Port 5), Optional Serial Card 2 Channel 2 (Port 6), None*
Stream Format	FMT4	Select the data format of the stream frame; *Settings: FMT1 - FMT6*
Stream Destination	None	Port that the iQUBE³ sends the stream to; *Settings: RS-232 (Port 1), RS-485 (Port 2), TCP Command Server, USB, WiFi, Optional Serial Card 1 Channel 1 (Port 3), Optional Serial Card 1 Channel 2 (Port 4), Optional Serial Card 2 Channel 1 (Port 5), Optional Serial Card 2 Channel 2 (Port 6), None*
Stream Destination 2	None	Secondary port that the iQUBE³ sends the stream to; *Settings: RS-232 (Port 1), RS-485 (Port 2), TCP Command Server, USB, WiFi, Optional Serial Card 1 Channel 1 (Port 3), Optional Serial Card 1 Channel 2 (Port 4), Optional Serial Card 2 Channel 1 (Port 5), Optional Serial Card 2 Channel 2 (Port 6), None*
Poll Format	FMT1	Select the data format of the Polling Format; *Settings: FMT1 - FMT6*
Setpoint Print Format	FMT1	Select the data format that is printed when the Setpoint is reached; *Settings: FMT1 - FMT6*

Table 5-20. Scale Communications Parameter Functions

5.4.5 Calibration

Parameter	Description
Calibration Weight	Sets the test weight value for the span calibration
Linear Point 1-5 Weight	Sets the test weight value for the linear calibration point
Linear Point 1-5 Counts	Displays the raw count value at the linear point weight; A linear calibration generates this raw count value; Manually changing this count value changes the linear point weight and negates the linear calibration for the point

Table 5-21. General Parameter Functions

5.4.6 Diagnostics

Parameter	Default	Description
Overload	100	Overload point (% of capacity)
Underload	10	Underload point (% of capacity)
Cell Noise Diagnostics	Off	**Off** or on
Peak to Peak Load Cell Noise	10	Sets peak to peak noise threshold for all scales (in μV)

Table 5-22. Scale Diagnostic Parameter Functions

RICE LAKE
WEIGHING SYSTEMS

Parameter	Default	Description
Cell Noise Time	10	Sets peak to peak noise timer (seconds)
Cell Balance Diagnostics	Off	**Off** or on
Cell Balance Range	5	Sets load cell balance range (% of capacity)
Cell Balance Threshold	10	Sets load cell balance threshold (% of capacity)
Cell Drift Diagnostics	Off	**Off** or on
Cell Drift Theshold	2	Sets load cell drift threshold (% of capacity)
Cell Drift Range	2	Sets load cell drift range (% of capacity)
Cell Drift Time	10	Sets load cell drift timer (seconds)
Zero Reference Diagnostics	Off	**Off** or on
Zero Reference Threshold	10	Sets zero reference threshold (% of capacity)
Zero Reference Range	2	Sets zero reference range (% of capacity)
Zero Reference Time	10	Sets zero reference timer (seconds)
Weighment Threshold	1000	Sets the weight value that when exceeded counts as a weighment; Settings: 0.0 - 9999999.0

Table 5-22. Scale Diagnostic Parameter Functions (Continued)

5.5 Formats

Formats are assigned to destinations in the Formatting menu (See)
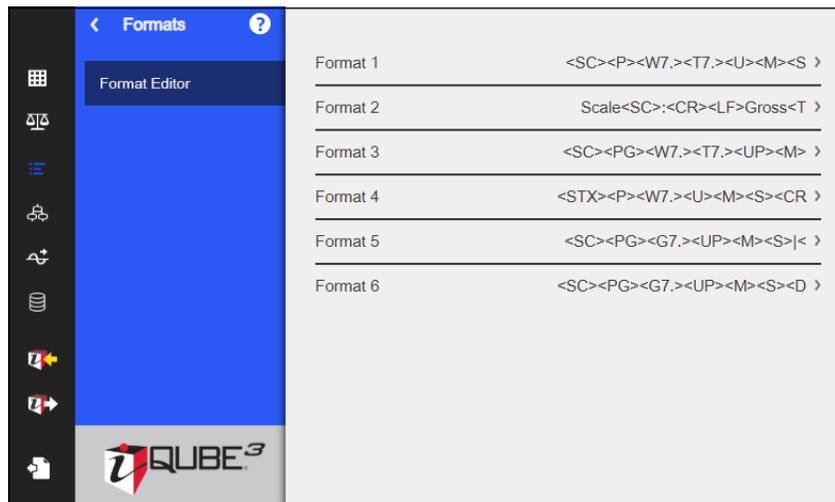
Figure 5-7. iQUBE³ Scale Menu

Parameter	Default
Format 1	<SC><P><W7.>< T7.><U><M><SPLIT><S><D>
Format 2	Scale<SC>:<CR><LF>Gross<TAB><G/P><CR><LF>Net<TAB><N/P><CR><LF>Tare<TAB><T/P><CR><LF>
Format 3	<SC><PG><W7.>< T7.><UP><M><S><D>
Format 4	<STX><P><W7.><U><M><S><CR><LF>
Format 5	<SC><PG><G7.><UP><M><S>|< T7.>|
Format 6	<SC><PG><G7.><UP><M><S><D> DIO:<DIO><CR><LF>

Table 5-23. Format Editor Functions

5.6   Setpoints

Figure 5-8. iQUBE³ Setpoints

Parameter	Default	Description
Kind	Off	**Off** **Gross** performs functions based on the gross weight; the target weight entered is considered a positive gross weight **Net** performs functions based on the net weight; the target weight entered is considered a positive net weight value
Source	Scale 1	Select Scale 1–5
Target	0	Enter Target Weight; *Settings: 0.0 - 9999999.0*
Trip	Higher	Specifies if the setpoint is satisfied when the weight is higher or lower than the setpoint value, within a band established around the value or outside of the band. In a batch sequence with: • *Higher – the associated digital output is active until the setpoint value is exceeded* • *Lower – the output is active until the weight goes below the setpoint value* • *Inband – the setpoint is satisfied when the weight is within a band established around the value* • *Outband – the setpoint is satisfied when the weight is outside a band established around the value, excluding the value*
Band Value	0	When **Trip** is set to **Inband** or **Outband**, this specifies a weight equal to half the band width; the band established around the setpoint value is **Value ± Band Value**; enter value
Hysteresis	0	When **Trip** is set to **Higher** or **Lower,** specifies a band around the setpoint value which must be exceeded before a setpoint which is off can trip on again; enter value
Preact	Off	Preact helps compensate for material in a free-fall state to ensure targets are met; *Setting: Off, On*
Preact Value	0	Specifies the preact value for setpoints with Preact Type set to On; depending on the Trip setting specified for the setpoint, it is adjusted up or down by the Preact Adjust value; enter value: range is ±0–999999
Push Print	Off	Specifies parameter to perform print • *Off – no print performed* • *On – performs a print operation when the setpoint is satisfied* • *Wait Standstill – after setpoint is satisfied, waits until no motion is detected to print*
Digital Output Slot	None	Slot number for the Digital I/O bit associated with the setpoint; Select Slot 0–2, **None**
Digital Output	0	The Digital I/O bit associated with the setpoint, after a slot is selected; **0** (default)
Sense	Normal	Specifies whether the digital output is active; **Normal** (default), Inverted
Enabled	On	Turns the setpoint **On** (default) or Off
Alias	SETPTx	Enter a name for the setpoint; *Settings: 0 to 8 characters*

Table 5-24. iQUBE³ Setpoints Menu Parameters

6.0   Revolution

The Revolution utility provides a suite of functions used to support configuration, calibration, customization and backup of the iQUBE³ configuration and calibration settings.

Hardware and Software Requirements

- Minimum system requirements: 1.0 GHz Intel compatible processor, 1GB RAM, 850 MB disk space (32 bit) or 2 GB disk space (64 bit).
- Recommended system: 1.0+ GHz Intel compatible processor, 2+ GB RAM, 4+ GB disk space

Revolution runs on most Windows® operating systems, including Windows 7 SP1, Windows 8.1 and Windows 11 (both 32-bit and 64-bit architectures are supported).

6.1   Connecting to the iQUBE³

Connect to the iQUBE³3 using a RS232 serial connection, the USB-C Virtual Comm Port, or the TCP Server over Ethernet. Configure the communications type and settings in the Options menu. To open the connection to the iQUBE³, click the **Connect** toolbar button or select **Connect** in the **Communications** menu.

Downloading to the Indicator

The ***Send Configuration to Device*** function in the Revolution Communications menu allows a Revolution configuration file (with or without scale calibration data) or ticket formats to be sent/downloaded to a connected indicator in *Setup* mode.

The ***Send Section to Device*** function in the Communications menu allows the download of only the currently displayed object, such as a scale configuration.

Because less data is transferred using the ***Send Section to Device***, it is typically faster than a full configuration download, but there is an increased possibility the download fails due to dependencies on other objects. If the download fails, try performing a complete download using the ***Send Configuration to Device*** function*.*

Uploading Configuration to Revolution

The ***Get Configuration from Device*** function in the Revolution Communications menu allows the existing configuration of a connected indicator to be saved to a file on the PC. Once saved, the configuration file provides a backup which can be quickly restored to the indicator if needed. Alternatively, the file can be edited within Revolution and sent back to the indicator.

6.2   Saving and Transferring Data

📝 *NOTE: Revolution has a module to save and transfer data. It is the preferred method over using ProComm or Hyper Terminal.*

6.2.1   Saving Indicator Data to a PC

Configuration data can be saved to a computer connected to the selected port. The PC must be running a communications program such as *PROCOMMPLUS*®.

When configuring the indicator, ensure the values set for the baud and bits parameters on the serial menu match the baud rate, bits and parity settings configured for the serial port on the PC.

To save all configuration data, first put the communications program into data capture mode, then place the indicator in *Setup* mode and send the DUMPALL command to the indicator. The iQUBE³ responds by sending all configuration parameters to the PC as ASCII-formatted text.

6.2.2   Downloading Configuration Data from PC to iQUBE³

Configuration data saved on a PC or disc can be downloaded from the PC to the iQUBE³. This procedure is useful when a number of iQUBE³ with similar configurations are set up or when an indicator is replaced.

To download configuration data, connect the PC to the selected port as described in Section 6.2.1. Place the indicator in *Setup* mode and use the PC communications software to send the saved configuration data to the indicator. When transfer is complete, calibrate the indicator as described in Section 6.0 on page 75.

7.0 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. This section describes the serial command set and procedures for saving and transferring data using the communication ports.

When the iQUBE³ processes a command, it either responds with a value (for reporting commands, or when querying parameter settings), or with the message *OK*. The *OK* response verifies the command was received and has been executed. If the command is unrecognized, the iQUBE³ responds with *?? invalid command*. If the command cannot be executed in the current mode, the iQUBE³ responds with *?? invalid mode*. If the command is recognized, but the value is out of range or an invalid type, the iQUBE³ responds with *??* followed by the type and the range.

7.1 Weigh Mode Commands

These commands function in *Weigh* mode. Non-weight-related commands also work in *Setup* mode.

Command	Description	Values
EX	Stops all serial data streams	--
P	Returns a single poll frame using the configured poll format for each configured scale	--
RS	Resets the software to restart all processes.	Soft reset; Used to reset the indicator without resetting the configuration to the factory defaults
S	Returns a single stream frame using the currently configured stream format for each configured scale	--
SC.CONSNUM#x	Current consecutive number for the scale	0 to 9999999 **(0);** can be checked in weigh mode, but not changed in weigh mode
SC.EX#x	Start streaming for a single scale	OK or ??
SC.GROSSNET#x	Toggle gross/net mode for scale	--
SC.GROSS#s	Set scale to gross mode.	--
SC.NET#s	Set scale to net mode	--
SC.P#x	Returns one frame of polling format for a scale	--
SC.PRINT#x	Perform print operation for a scale	--
SC.S#x	Returns one frame of stream format for a scale	--
SC.SX#x	Stop streaming for a single scale	*OK or ??;* An EX command sent while in setup mode does not take effect until the indicator is returned to weigh mode
SC.UNITS#x	Toggle primary/secondary/tertiary units.	--
SC.PRI#x	Set scale to primary units	--
SC.SEC#x	Set scale to secondary units	--
SC.TER#x	Set scale to tertiary units	--
SC.SETTARE#x=v	Perform keyed tare operation; sets the tare for scale x to value v	0 to scale capacity; 0 clears tare
SC.TARE#x	Perform push button tare operation	--
SC.CLRTARE#x	Perform clear tare operation	--
SC.ZERO#x	Perform zero operation	--
SD	Set or Return the current system date	*MMDDYY, DDMMYY, YYMMDD,* or *YYDDMM*; enter six-digit date using the year-month-day order specified for the DATEFMT parameter, using only the last two digits of the year; the current system date is returned by only sending SD
ST	Set or Return the current system time	*hhmm* (enter using 24-hour format); the current system time is returned by only sending ST
STS	Set or Return the current system time with seconds	*hhmmss* (enter using 24-hour format); the current system time with seconds is returned by only sending STS
SX	Starts all serial data streams	--
UID	Unit ID	0 to 8 alphanumeric characters **(default = 1)**;can be checked in weigh mode, but not changed in weigh mode

Table 7-1. Weigh Mode Commands

Command	Description	Values
XG#*x*	Returns the gross weight in current units	nnnnnnnnn UU
XGP#*x*	Returns the gross weight in primary units	
XGS#*x*	Returns the gross weight in secondary units	
XGT#*x*	Returns the gross weight in tertiary units	
XN#*x*	Returns the net weight in current units	nnnnnnnnn UU
XNP#*x*	Returns the net weight in primary units	
XNS#*x*	Returns the net weight in secondary units	
XNT#*x*	Returns the net weight in tertiary units	
XT#*x*	Returns the tare weight in current units	nnnnnnnnn UU
XTP#*x*	Returns the tare weight in primary units	
XTS#*x*	Returns the tare weight in secondary units	
XTT#*x*	Returns the tare weight in tertiary units	
For commands ending with #*x*, x is the scale number (1-5); For commands ending with #*p*, p is the port number (1-6)		

Table 7-1. Weigh Mode Commands (Continued)

7.2   Reporting Commands

Reporting commands send specific information to the communications port. The commands listed in Table 7-2 can be used in either *Setup* mode or *Weigh* mode.

Command	Function
BUILD	Return version information including build number of CPU board.
DUMPALL	Returns all configuration parameters.
DUMPVERSIONS	Returns the firmware version of the CPU and any connected four-channel boards. CPU V0.00.00 iQUBE³ FCB1 V0.00.00
DUMPBUILDS	Returns the firmware version and build number of the CPU and any connected four-channel boards. CPU V0.00.00 : Build 00 FCB1 V0.00.00 : Build 00
DUMPAUDIT	Returns audit trail information.
LRVERSION	Returns the legally relevant firmware version
FIELDBUS.VERSION	Returns version of the fieldbus module, if connected
HARDWARE	Returns the option card(s) installed.
SERIAL_NUMBER	Returns serial number of CPU board.
SPDUMP	Returns setpoint parameter values.
HWSUPPORT	Returns the CPU board part number.
VERSION	Returns firmware version information.
WHOAMI	Returns information about iQube3.

Table 7-2. Reporting Commands

7.3   Parameter Setting Commands

Parameter setting commands allow the current value for a configuration parameter to be displayed or changed.

Current configuration parameter settings can be displayed in *Setup* mode or *Weigh* mode using the following syntax:

command<ENTER>

Most parameter values can be changed in *Setup* mode only; setpoint parameters listed in Table 7-9 on page 79 can be changed when in normal *Weigh* mode.

Use the following command syntax when changing parameter values: command=value<ENTER>, where **value** is either a number or a parameter value. Use no spaces before or after the equal (=) sign. If an incorrect command is typed or an invalid value is specified, the indicator returns **??** followed by the error message.

Example: to set the motion band parameter on Scale #1 to 5 divisions, type the following:

SC.MOTBAND#1=5<ENTER>

To return a list of the available values for parameters with specific values, enter the command and equal sign, followed by a question mark (command=?<ENTER>). The indicator must be in *Setup* mode to use this function.

After changes are made to configuration parameters using EDP commands, use the **KSAVEEXIT** command to commit the changes to memory and return to weigh mode.

7.3.1   General Parameter Commands

Command	Description	Value (default)
DATEFMT	Date format	**(MMDDYY)**, DDMMYY, YYMMDD, YYDDMM
DATESEP	Date separator	**(SLASH)**, DASH, SEMI, DOT
TIMEFMT	Time format	**(12HOUR)**, 24HOUR
TIMESEP	Time separator	**(COLON)**, COMMA, DOT
DEST.ELEV.LOC	Scale destination elevation (only significant if LOCALE set to ON)	-9999 to 9999 **(345)**
DEST.GRAV.LOC	Destination gravity factor (only significant if LOCALE is set to FACTOR)	9 to 9.99999 **(9.80665)**
DEST.LAT.LOC	Scale destination latitude (only significant if LOCALE is set to ON)	0 to 90 **(45)**
ELEV.LOC	Scale origin elevation (only significant if LOCALE is set to ON)	-9999 to 9999 **(345)**
GRAV.LOC	Origin gravity factor (only significant if LOCALE is set to FACTOR)	9 to 9.99999 **(9.80665)**
LAT.LOC	Scale origin latitude (only significant if LOCALE is set to ON)	0 to 90 **(45)**
LOCALE	Type of gravitation correction	ON, FACTOR, **(OFF)**
PERSISTENTTARE	Tare value is saved (persisted) over a power cycle	ON, **(OFF)**
CANRATE	Data rate (bits per second) for the CAN communications between the CPU and four-channel boards	**(125KB)**, 250KB, 500KB, 1MB
SMPRAT	Scale sample rate	2.5HZ, 5HZ, 6.25HZ, 7.5HZ, 10HZ, **(12.5HZ)**, 15HZ, 25HZ, 30HZ, 50HZ, 60HZ, 100HZ, 120HZ, 500HZ
WARMUP	Time that scale delays providing weight after startup (in minutes)	**(0)** to 10

Table 7-3. General System Parameter Commands (applies to all scales)

7.3.2   Regulatory Parameter Commands

The following commands can be used to configure iQUBE³ parameters related to regulatory settings.

Command	Description	Value (default)
AUDAGNCY	Governing agency for scale audit	NONE, CANADA, OIML, AUSTRALIA **(NTEP)**
REG.AZTNET	Perform AZT on Net value	**(NO)** , YES
REG.KTARE	Always allow keyed tare	NO, **(YES)**
REG.MANUALCLEARTARE	Allows manual clearing of the tare value	NO, **(YES)**
REG.MTARE	Multiple tare action	**(REPLACE)**, REMOVE, NOTHING
REG.NEGTOTAL	Allow total scale to display negative value	**(NO)** , YES
REG.NTARE	Allow negative tare	**(NO)** , YES
REG.OVRBASE	Zero base for overload calculation	**(CALIB)**, SCALE
REG.PRINTPT	Add PT to keyed tare print	NO, **(YES)**

Table 7-4. Regulatory Parameter Commands (applies to all scales)

RICE LAKE
WEIGHING SYSTEMS

Command	Description	Value (default)
REG.PRTMOT	Allow print while in motion	**(NO)** , YES
REG.PRTEMUL	Allow printing with an emulated cell	**(NO)** , YES
REG.RKTARE	Round the Keyed Tare	NO, **(YES)**
REG.RTARE	Round the Pushbutton Tare	NO, **(YES)**
REG.TAREINMOTION	Allows Tare in Motion	**(NO)** , YES
REG.UNDERLOAD	Underload weight value in display divisions	1 to 9999999; **(9999999)**
REG.ZEROINMOTION	Allows scale to be zeroed while in motion	**(NO)** , YES
REG.ZTARE	Remove tare on ZERO	**(NO)** , YES
REGULAT	Regulatory mode	**(NTEP)**, CANADA, INDUST, NONE, OIML, AUSTRALIA
REG.* commands are only significant when REGULAT is set to INDUST		

Table 7-4. Regulatory Parameter Commands (applies to all scales) (Continued)

7.3.3 Communication Commands

The following commands can be used to configure the RS232 and RS422/485 port communication parameters.

- Valid port values (p) are, 1 and 2 = CPU, 3 and 4 = option card 1, 5 and 6 = option card 2.

Command	Description	Value (Default)
EDP.ADDRESS#p	RS485 Address (Ports 2-6 only); if 0 port is RS422, If >0, port is RS485	0 to 255 **(0)**
EDP.BAUD#p	Baud rate	9600, 19200, 28800, 38400, 57600, **(115200)**, 230400, 450000, 460800
EDP.BITS#p	Data bits	**(8NONE)**, 8EVEN, 8ODD, 7EVEN, 7ODD
EDP.DUPLEX#p	422/485 port duplex value (Ports 2-6 only)	**(FULL)**, HALF
EDP.ECHO#p	Echo data received	**(ON)**, OFF
EDP.EOLDLY#p	End of line delay (in 0.1 second intervals)	0 to 225 **(0)**
EDP.RESPONSE#p	Enable response to serial commands	**(ON)**, OFF
EDP.STOPBITS#p	Number of stop bits	**(1)**, 2
EDP.TERMIN#p	Line termination	**(CR/LF)**, CR
EDP.TRIGGER#p	Port trigger / input type (FLDBUS for ports 2-6 only)	**(CMD)**, FLDBUS
EDP.TYPE#p	Port 1 only RS232, Port 2 only RS422/485, Ports 3-6 RS232 by default, can be set to RS485	RS232, RS485
EDP.RSPDLY#p	Port response delay (in milliseconds)	2 to 10 ms **(2)**

Table 7-5. Serial Communication Parameter Commands

The following commands can be used to configure USB virtual comm port communication parameters

Command	Description	Value (Default)
USB.ECHO	USB port echo	**(ON)**, OFF
USB.EOLDLY	USB port end of line delay (in 0.1 second intervals)	0 to 225 **(0)**
USB.LINETERM	USB line termination	**(CR/LF)**, CR
USB.RESPONSE	USB port enable response	**(ON)**, OFF
USB.TRIGGER	USB port trigger / input type	**(CMD)**

Table 7-6. USB Communication Parameter Commands

The following commands can be used to configure Ethernet and WiFi port communication parameters

Command	Description	Value (Default)
Wired Ethernet		
WIRED.DHCP	Ethernet DHCP enabled	**(ON)**, OFF
WIRED.ENABLED	Ethernet enabled	**(ON)**, OFF
WIRED.GATEWAY	Ethernet gateway IP address	0.0.0.0
WIRED.IPADDR	Ethernet IP address	0.0.0.0
WIRED.MACID	Ethernet MAC ID (read only)	00:00:00:00:00:00
WIRED.SUBNET	Ethernet subnet IP	255.255.255.0
WiFi		
WIFI.MACID	MAC addresses for WiFi (read only)	00:00:00:00:00:00
WIFI.ECHO	Echo data received	**(ON)**, OFF
WIFI.ENABLED	Enable WiFi	**(OFF)**, WIFI
WIFI.EOLDLY	End of line delay (in 0.1 seconds	0 to 255 **(0)**
WIFI.RESPONSE	Enable response to serial commands	**(ON)**, OFF
WIFI.TERMIN	Line termination	**(CR/LF)**, CR
WIFI.TRIGGER	Port trigger / Input type	**(CMD)**
TCP Command Server		
TCPS.ECHO	Command server echo enabled	**(OFF)**, ON
TCPS.HOSTNAME	Command server host name	0 to 30 alphanumeric characters **(0)**
TCPS.LINETERM	Command server line termination	**(CR/LF)**, CR
TCPS.PORT	Command server port	1025 to 65535 **(10001)**
TCPS.RESPONSE	Command server response enable	**(ON)**, OFF
TCPS.TRIGGER	Command server trigger / Input type	**(CMD)**

Table 7-7. Ethernet/WiFi Parameter Commands

7.3.4 Digital Input/Output Commands

The following commands can be used to configure iQUBE³ parameters related to digital inputs and outputs.

- Valid slot values (s) are, 0 = main board, 1 = option card 1, 2 = option card 2.
- Valid bit values (b) are, 1 = DIO1, 2 = DIO2, 3 = DIO3, or 4 = DIO4

Command	Description	Value (Default)
DIO.b#s	Set the function of digital I/O bit	**(OFF),** PRINT, ZERO, TARE, UNITS, CLRTAR, NT/GRS, CLRCN, SETPNT, CELHLTH, HOSTCTL
DIO.SCALE.b#s	Digital I/O bit scale number (for input functions only)	**(OFF)**, 1, 2, 3, 4, 5
DIN#s	Read digital inputs.	
DOFF.0#s	Turn off all digital outputs for slot s	
DOFF.b#s	Turn off digital output bit b	
DON.0#s	Turn on all digital outputs for slot s	
DON.b#s	Turn on digital output bit b	

Table 7-8. Digital I/O Parameter Commands

7.3.5 Setpoint Commands

The following commands can be used to configure iQUBE³ setpoints.

- Valid setpoint numbers (s) are 1 to 4.

Command	Description	Value (Default)
SP.ALIAS#s	Setpoint name	0 to 8 alphanumeric characters **(SETPTs)**
SP.BANDVAL#s	In and out band setpoint trip value	0 to 9999999 **(0)**
SP.DIGOUT#s	Digital output bit of setpoint (DIO.p#s must be set to SETPNT)	**(NONE)**, 1, 2, 3, 4
SP.DSLOT#s	Slot of the DIGOUT bit to use	**(NONE)**, 0, 1, 2
SP.ENABLE#s	Enable setpoint	**(ON)**, OFF
SP.HYSTER#s	Hysteresis value	0 to 9999999 **(0)**
SP.KIND#s	Setpoint kind	**(OFF)**, GROSS, NET
SP.PREACT#s	Enable setpoint preact	**(OFF)**, ON
SP.PREVAL#s	Value of setpoint preact	0 to 9999999 **(0)**
SP.PSHPRINT#s	Push print	**(OFF)**, ON, WAITSS
SP.SENSE#s	Setpoint digital output sense	**(NORMAL)**, INVERT
SP.SOURCE#s	Setpoint scale source	**(SCALE1)**, SCALE2, SCALE3, SCALE4, SCALE5
SP.TRIP#s	Setpoint trip mode	**(HIGHER)**, LOWER, INBAND, OUTBAND
SP.VALUE#s	Setpoint value	0 to 9999999 **(0)**

Table 7-9. Setpoints Parameter Commands

7.3.6 Fieldbus Parameters

The following commands can be used to configure fieldbus parameter settings.

Command	Description	Value (Default)
FIELDBUS.AUTOIP	Automatically get network parameters from the network (DHCP)	**(OFF),** ON
FIELDBUS.CANOPEN.NETWORKRATE	CANopen network node rate	10 KB, 20KB, 50KB, 100KB, 125KB, 250KB, 500KB, 800KB, **(1MB)**
FIELDBUS.CANOPEN.NODE	CANopen node address	1-128, **(1)**
FIELDBUS.DEVICENET.NETWORKRATE	DeviceNet network node rate	125KB, 250KB, **(500KB)**
FIELDBUS.DEVICENET.NODE	DeviceNet node address	1-64, **(1)**
FIELDBUS.ETHERNET_IP.GATEWAY	EtherNet/IP gateway; disabled if Auto IP is ON	**(0.0.0.0)**
FIELDBUS.ETHERNET_IP.IPADDR	EtherNet/IP IP address; disabled if Auto IP is ON	**(0.0.0.0)**
FIELDBUS.ETHERNET_IP.SUBNET	EtherNet/IP subnet; disabled if Auto IP is ON	**(255.255.255.0)**
FIELDBUS.MODBUS.GATEWAY	Modbus TCP gateway; disabled if Auto IP is ON	**(0.0.0.0)**
FIELDBUS.MODBUS.IPADDR	Modbus TCP IP address; disabled if Auto IP is ON	**(0.0.0.0)**
FIELDBUS.MODBUS.SUBNET	Modbus TCP subnet; disabled if Auto IP is ON	**(255.255.255.0)**
FIELDBUS.NETWORK	Fieldbus network protocol	**(ETHERNET_IP)**, MODBUS, PROFIBUS, PROFINET, CANOPEN, DEVICENET, ETHERCAT
FIELDBUS.PROFIBUS.NODE	PROFIBUS node address	1-126, **(1)**
FIELDBUS.PROFINET.GATEWAY	PROFINET gateway; disabled if Auto IP is ON	**(0.0.0.0)**
FIELDBUS.PROFINET.IPADDR	PROFINET IP address; disabled if Auto IP is ON	**(0.0.0.0)**
FIELDBUS.PROFINET.SUBNET	PROFINET subnet; disabled if Auto IP is ON	**(255.255.255.0)**
FIELDBUS.SWAP	Byte or Word swap, Both enables Byte and Word	**(NONE)**, BYTE, WORD, BOTH

Table 7-10. Fieldbus Parameter Commands

7.4   Reset Configuration Command

The following command can be used to reset the configuration parameters of the iQUBE³.

Command	Function
RESETCONFIGURATION	Restores all configuration parameters to default values (*Setup* mode only)

Table 7-11. Reset Configuration Command

NOTE: All scale calibration settings are lost when the RESETCONFIGURATION command is run.

7.5   Scale Parameter Setting Commands

Scale parameter setting commands configure parameters that apply to the individual iQUBE³ scales. Settings must be set for each scale.

- Maximum number of configurable load cell based scales is 4; All parameters can be set for scales 1 through 4
- Scale 5 is a total scale; Scale 5 can only be configured with commands that are signified with an *

7.5.1   Scale Setup Parameters

- Valid scale numbers (s) are 1 to 5
- Scale 5 (total scale) can only be configured with commands that are signified with an *

Command	Description	Value (Default)
SC.INITIALZERO#s	Scale initial zero range (in percent of scale capacity)	0 to 100 **(0)**
SC.MAX_DATE#s	Returns the date of the Max Weighment (read only)	
SC.MAX_WEIGHT#s	Returns the value of the Max Weighment (read only)	
SC.MOTBAND#s	Scale motion band (in divisions)	1 to 100 **(1)**
*SC.NAME#s	Scale name	0 to 24 alphanumeric characters **(SCALE#x)**
SC.NCELLS#s	List of cells in the scale (1-24)	**(NONE)** or a comma-delimited list of cells such as "1,2,3,4"
*SC.NSCALES#5	List of scales to be totaled (1 - 4)	**(NONE)** or a comma-delimited list of cells such as "1,2,3,4"
SC.NUMWEIGH#s	Returns the number of weighments that exceeded the value set by the Weighment Threshold (read only)	
*SC.OVERLOAD#s	Scale overload valuse	**(FS+2%)**, FS+1D, FS+9D, FS
SC.SSTIME#s	Scale standstill time (in 0.1 second intervals)	0 to 60 **(10)**
*SC.TAREFN#s	Set the type of Tare allowed for the scale	**(BOTH)**, NOTARE, PBTARE, KEYED
SC.WMTTHRH#s	Set the Weighment Threshold value used by the SC.NUMWEIGH counter	0.0 to 9999999.0 **(1000)**
SC.ZRANGE#s	Scale zero range (in percent of scale capacity)	0 to 100 **(1.9)**
SC.ZTRKBND#s	Scale zero tracking band (in divisions)	0 to 100 **(0)**

Table 7-12. Scale Setup Parameter Commands

7.5.2   Load Cell Configuration Parameters

- Valid load cell numbers (c) are 1 to 24

Command	Description	Value (Default)
LC.CAPACITY#c	Set load cell capacity for selected cell	0 - 1000000 **(75000)**
LC.ID#c	ID or name for selected cell	0-16 alphanumeric characters **(LCx)**
LC.SENS#c	Factory sensitivity of the load cell in mV/V	0.1-10.0 **(3)**
LC.TRIM#c	Load cell's normalization (trim) value	0-5 **(1)**
LC.SRLNUM#c	Serial number for the load cell	0-16 alphanumeric characters **(S/N#x)**

Table 7-13. Load Cell Configuration Parameter Commands

7.5.3   Four-Channel Board Set-up Commands

The following commands can be used to configure identity and assign iQUBE³ four-channel boards

Command	Function
FCB.AUTOID	Automatically scan for connected four-channel boards and assign IDs. *NOTE: FCB.AUTOID will detect the boards that are present and will be assigned in the order they respond. So this will be a random order. This is only something that you would want to do upon initial setup. (unless you actually wanted to change the board order).* *NOTE: There is currently no command to retrieve all board ids at once. You can query them individually with the FCB.ID parameters.*
FCB.ID#b	Sets or returns the 10 character ID number of the four-channel board 1-5
FCB.PBASSIGNID.CANCEL	Cancel push button four-channel board assignment process.
FCB.PBASSIGNID.FINISH	Finish push button four-channel board assignment process.
FCB.PBASSIGNID.START	Start push button four-channel board assignment process; puts the four-channel boards into a mode where it is waiting for you to press the SW1 button (labeled BOOT). The PCBID0-2 LEDs flash green. Then push the SW1 on each board in the order you want them assigned.

Table 7-14. Four-Channel Board Set-up Commands

7.5.4   Split Mode Parameters

• Valid scale numbers(s) for split mode are 1 to 4

Command	Description	Value (Default)
SC.RANGE1#s	Range 1 Capacity	0 to 9999999 **(0)**
SC.RANGE1.FMT#s	Range 1 Format	88.88881, 88.88882, 88.88885, 888.8881, 888.8882, 888.8885, 8888.881, 8888.882, 8888.885, 88888.81, 88888.82, 88888.85, 888888.1, 888888.2, 888888.5, **(8888881)**, 8888882, 8888885, 8888810, 8888820, 8888850, 8888100, 8888200, 8888500
SC.RANGE2#s	Range 2 Capacity	0 to 9999999 **(0)**
SC.RANGE2.FMT#s	Range 2 Format	88.88881, 88.88882, 88.88885, 888.8881, 888.8882, 888.8885, 8888.881, 8888.882, 8888.885, 88888.81, 88888.82, 88888.85, 888888.1, 888888.2, 888888.5, **(8888881)**, 8888882, 8888885, 8888810, 8888820, 8888850, 8888100, 8888200, 8888500
SC.SPLIT#s	MRMI type	MULTIRANGE, MULTIINTERVAL, **(OFF)**

Table 7-15. Split Mode Parameter Commands

7.5.5   Stream, Print and Polling Format Parameters

• Valid scale numbers (s) are 1 to 5

Command	Description	Value (Default)
SC.GFMT#s	Demand Gross format	**(FMT1)**, FMT2, FMT3, FMT4, FMT5, FMT6
SC.NFMT#s	Demand Net format	FMT1, **(FMT2)**, FMT3, FMT4, FMT5, FMT6
SC.SPFMT#s	Setpoint print format	**(FMT1)**, FMT2, FMT3, FMT4, FMT5, FMT6
SC.P#s	Return one frame of polling format for a scale	
SC.PFMT#s	Polling format	**(FMT1)**, FMT2, FMT3, FMT4, FMT5, FMT6
SC.PRNDEST#s	Demand data format output destination 1	RS232, RS485, TCPS, USB, WIFIBT, SRLCRD1, SRLCRD2, SRLCRD3, SRLCRD4, **(NONE)**
SC.PRNDEST2#s	Demand data format output destination 2	RS232, RS485, TCPS, USB, WIFIBT, SRLCRD1, SRLCRD2, SRLCRD3, SRLCRD4, **(NONE)**
SC.S#s	Return one frame of stream format for a scale	
SC.SFMT#s	Stream format	FMT1, FMT2, FMT3, **(FMT4)**, FMT5, FMT6
SC.STREAM#s	Stream data format output destination 1	RS232, RS485, TCPS, USB, WIFIBT, SRLCRD1, SRLCRD2, SRLCRD3, SRLCRD4, **(NONE)**
SC.STREAM2#s	Stream data format output destination 2	RS232, RS485, TCPS, USB, WIFIBT, SRLCRD1, SRLCRD2, SRLCRD3, SRLCRD4, **(NONE)**
Stream Formats		
Command	**Default Value**	

Table 7-16. Stream, Print and Polling Format Parameter Commands

Command	Description	Value (Default)
FMT1	\<SC>\<P>\<W7.>\<T7.>\<U>\<M>\<SPLIT>\<S>\<D>	
FMT2	Scale\<SC>:\<CR>\<LF>Gross\<TAB>\<G/P>\<CR>\<LF>Net\<TAB>\<N/P>\<CR>\<LF>Tare\<TAB>\<T/P>\<CR>\<LF>	
FMT3	\<SC>\<PG>\<W7.>\<T7.>\<UP>\<M>\<S>\<D>	
FMT4	\<STX>\<P>\<W7.>\<U>\<M>\<S>\<CR>\<LF>	
FMT5	\<SC>\<PG>\<G7.>\<UP>\<M>\<S>|\<T7.>	
FMT6	\<SC>\<PG>\<G7.>\<UP>\<M>\<S>\<D> DIO:\<DIO>\<CR>\<LF>	

Table 7-16. Stream, Print and Polling Format Parameter Commands (Continued)

7.5.6 Unit Setting Parameters

The following commands can be used to configure the units used by each scale.

- Valid scale numbers (s) are 1 to 4
- Scale 5 (total scale) can only be configured with commands that are signified with a *

Command	Description	Value (Default)
*SC.CAPACITY#s	Scale Capacity	0.000001 to 9999999.0 (**100000**)
*SC.CONSTUP#s	Constant number the consecutive number is reset to when reset by command or digital input	0 to 9999999 (**0**)
SC.CUNITS#s	Custom units name	0 to 2 characters
SC.CUNITSMULT#s	Custom units multiplier	0.0000001 to 9999999.0 (**1**)
*SC.PRI.FMT#s	Primary units format	88.88881, 88.88882, 88.88885, 888.8881, 888.8882, 888.8885, 8888.881, 8888.882, 8888.885, 88888.81, 88888.82, 88888.85, 888888.1, 888888.2, 888888.5, (**8888881**), 8888882, 8888885, 8888810, 8888820, 8888850, 8888100, 8888200, 8888500
*SC.PRI.UNITS#s	Primary units	(**LB**), KG, OZ, TN, T, G
*SC.SEC.ENABLED#s	Enable secondary units	OFF, (**ON**)
*SC.SEC.FMT#s	Secondary units format	88.88881, 88.88882, 88.88885, 888.8881, 888.8882, 888.8885, 8888.881, 8888.882, 8888.885, 88888.81, 88888.82, 88888.85, 888888.1, 888888.2, (**888888.5**), 8888881, 8888882, 8888885, 8888810, 8888820, 8888850, 8888100, 8888200, 8888500
*SC.SEC.UNITS#s	Secondary units	LB, (**KG**), OZ, TN, T,G, CUSTOM
*SC.TER.ENABLED#s	Enable tertiary units	(**OFF**), ON
*SC.TER.FMT#s	Teriary units format	88.88881, 88.88882, 88.88885, 888.8881, 888.8882, 888.8885, 8888.881, 8888.882, 8888.885, 88888.81, 88888.82, 88888.85, 888888.1, 888888.2, (**888888.5**), 8888881, 8888882, 8888885, 8888810, 8888820, 8888850, 8888100, 8888200, 8888500
*SC.TER.UNITS#s	Tertiary units	LB, (**KG**), OZ, TN, T,G, CUSTOM
*SC.TOTAL.DP.MATCH.SOURCE#5	Match total scale decimal point of total scale to source scales (Scale 5 ONLY)	(**NO**), YES
*SC.TOTAL.SUM.INTERNAL.RESOLUTION#5	Match internal resolution of total scale to source scales (Scale 5 ONLY)	(**NO**), YES

Table 7-17. Units Parameter Setting Commands

RICE LAKE
WEIGHING SYSTEMS

7.5.7 Scale Filtering Parameters

The following commands can be used to configure the filter parameters used by each scale.

- Valid scale numbers (s) are 1 to 4

Command	Description	Value (Default)
SC.ADSENSITIVITY#s	Adaptive A-B Filter Sensitivity	MEDIUM, HEAVY **(LIGHT)**
SC.ADTHRESHOLD#s	Adaptive A-B Filter Threshold	0 to 2000 **(10)**
SC.DAMPINGVALUE#s	Damping filter value (in 0.1 second intervals)	1 to 2560 **(10)**
SC.DFSENS#s	Averaging filter sensitivity	**(2OUT)**, 4OUT, 8OUT, 16OUT, 32OUT, 64OUT, 128OUT
SC.DFTHRH#s	Averaging filter threshold	**(NONE)**, 2D, 5D, 10D, 20D, 50D, 100D, 200D, 250D
SC.DIGFLTR1#s	Averaging filter stage one	1, 2, **(4)**, 8, 16, 32, 64, 128, 256
SC.DIGFLTR2#s	Averaging filter stage two	1, 2, **(4)**, 8, 16, 32, 64, 128, 256
SC.DIGFLTR3#s	Averaging filter stage three	1, 2, **(4)**, 8, 16, 32, 64, 128, 256
SC.FILTERSELECT#s	Filter type	**(AVERAGE)**, ADAPTIVE, DAMPING, KALMAN, RAW)
SC.KALMANQ#s	Kalman filter Q value	0.0001 to 2.0 **(0.005)**
SC.KALMANR#s	Kalman filter R value	0.001 to 30.0 **(10)**
SC.KALMANTHRESH#s	Kalman filter threshold value	0 to 2000 **(10)**
SC.RATLTRAP#s	Enable rattletrap filter	**(OFF)**, ON

Table 7-18. Filter Parameter Setting Commands

7.5.8 Calibration Commands

The following commands can be used to calibrate scales and return information related to scale calibration.

- Valid scale numbers (s) are 1 to 4

Command	Description	Value (Default)
SC.AUTOSETUP	Automatically setup scale for all connected load cells and perform theoretic calibration.	
SC.AUTOTRIM.CANCEL#s	Cancel auto trim process.	
SC.AUTOTRIM.PAUSE#s	Pause gathering data for the auto trim process.	
SC.AUTOTRIM.RESUME#s	Resume gathering data for the auto trim process.	
SC.AUTOTRIM.START#s	Start gathering data for the auto trim process.	
SC.AUTOTRIM.STOP#s	Stop gathering data for the auto trim process.	
SC.CAL0#s	Perform zero calibration (corner or section match)	
SC.CALn#s	Calibration step n. n is 1..24	
SC.CAL.CORNERTWEAK#s	Perform tweak adjustment after corner match calibration	
SC.CAL.SCALETWEAK#s	Perform whole scale tweak	
SC.CAL.SECTIONTWEAK#s	Perform twean adjustment after section match calibration	
SC.CALSPAN#s	Perform span calibration for section/corner match calbration types	
SC.CALTYPE#s	Scale calibration type	**(STANDARD)** CORNERMATCH, SECTIONMATCH
SC.REZERO#x	Rezero	
SC.THEORETIC#s	Perform theoretical calibration for scale	
SC.THEORETIC.DEADLOAD#s	Perform theoretical calibration where the span weight is provided and dead load is theoretically calculated	
SC.LASTZERO#x	Last zero	
SC.LC.CD#s	Zero calibration counts value	0 to 402653160 **(8388367)**
SC.LC.CW#s	Span calibration counts value	0 to 402653160 **(10560545)**
SC.NORM	Perform the Normalization process where the Trim Values for each cell are calculated for the Corner and Section Match calibration types.	
SC.SAMPLEp#s	Calibration count samples from all cells (p = point 0-24)	Comma-delimited string

Table 7-19. Calibration Commands

Command	Description	Value (Default)
SC.TEMPZERO#s	Temp zero	
SC.WEIGHT#s	Get live calibration weight from scale s	
SC.WLIN.Cp#s	Calibrate linearization point p. (p = point 1-5)	
SC.WLIN.Fp#s	Linear point calibration counts (p = point 1-5)	0 to 402653160 **(0)**
SC.WLIN.Vp#s	Linear point calibration weight value (p = point 1-5)	0 to 9999999 **(0)**
SC.WSPAN#s	Perform span calibration for standard calibrations.	
SC.WZERO#s	Perform zero calibration for standard calibration	
SC.WVAL#s	Standard calibration weight value	0.00000001 to 9999999 **(10000)**

Table 7-19. Calibration Commands

7.6   Analog Output Configuration Commands

The following commands can be used to configure analog output parameters.

Command	Description	Values
ALG.SOURCE#*s*	Analog output source	**SCALE1** (default), SCALE2, SCALE3, SCALE4, SCALE5
ALG.MODE#*s*	Mode	**GROSS** (default), NET
ALG.OUTPUT#*s*	Type of output	**0-10V** (default), 0-20MA, 4-20MA
ALG.ERRACT#*s*	Error action	**FULLSC** (default), HOLD, ZEROSC
ALG.MIN#*s*	Minimum value tracked	±9999999.0, **0.0** (default)
ALG.MAX#*s*	Maximum value tracked	±9999999.0, **10000.0** (default)
ALG.TWZERO#*s*	Adjusts the offset of the analog output zero value	0–65535, **0** (default)
ALG.TWSPAN#*s*	Adjusts the offset of the analog output span value	0–65535, **59515** (default)
For commands ending with #*s*, s is the slot number assigned to the analog output		

Table 7-20. Analog Output Configuration Commands

7.7   Diagnostics and Troubleshooting Commands

The following commands can be used to diagnose and troubleshoot system, scale, resistance board and load cell issues.

7.7.1   System Diagnostics Commands

Command	Description
DIA.CELLCONNECT	Query cell connection error
DIA.CLEAR	Clear all diagnostic flags
DIA.DRIFT	Query drift error
DIA.FLAGS	Show all diagnostic flags
DIA.MSCONNECT	Query secondary board connect error
DIA.NOISE	Query noise error
DIA.OVERLOAD	Query cell overload error
DIA.PS	Query power supply error
DIA.PSEXC	Query excitation error
DIA.UNBAL	Query unbalanced error
DIA.UNDERLOAD	Query cell under-load error
DIA.ZREF	Query zero reference error

Table 7-21. System Diagnostic Commands

RICE LAKE
WEIGHING SYSTEMS

7.7.2   Scale Diagnostics Configuration Commands

The following commands can be used to set the live diagnostics parameters for individual scales to help diagnose scale issues.

- Valid scale numbers (s) are 1 to 4.

Command	Description	Value (Default)
SC.DIA.DRIFT#s	Enable diagnostic drift	(OFF), ON
SC.DIA.DRIFT.RANGE#s	Diagnostic drift (in percent of scale capacity)	0 to 100 (2)
SC.DIA.DRIFT.THRESH#s	Diagnostic drift threshold (in percent of scale capacity	0 to 100 (2)
SC.DIA.DRIFT.TIME#s	Diagnostic drift time (in seconds)	0 to 300 (10)
SC.DIA.NOISE#s	Enable diagnostic noise	(OFF), ON
SC.DIA.NOISE.THRESH#s	Diagnostic noise threshold (in µV)	0 to 1000 (10)
SC.DIA.NOISE.TIME#s	Diagnostic noise time (in seconds)	0 to 300 (10)
SC.DIA.OVERLOAD#s	Diagnostic cell overload (in percent of individual cell capacity)	0 to 100 (100)
SC.DIA.UNBAL#s	Enable diagnostics unbalanced	(OFF), ON
SC.DIA.UNBAL.RANGE#s	Diagnostic unbalanced range (in percent of scale capacity)	0 to 100 (5)
SC.DIA.UNBAL.THRESH#s	Diagnostic unbalanced threshold (in percent of individual cell capacity)	0 to 100 (10)
SC.DIA.UNDERLOAD#s	Diagnostics cell underload (in percent of individual cell capacity)	0 to 100 (10)
SC.DIA.ZREF#s	Enable diagnostic zero reference	(OFF), ON
SC.DIA.ZREF.RANGE#s	Diagnostic zero reference range (in percent of scale capacity)	0 to 100 (2)
SC.DIA.ZREF.THRESH#s	Diagnostic zero reference threshold (in percent of scale capacity)	0 to 100 (10)
SC.DIA.ZREF.TIME#s	Diagnostic zero reference time (in seconds)	0 to 60 (10)

Table 7-22. Scale Diagnostic Configuration Commands

7.7.3   Resistance Card Diagnostics Commands

Command	Description
RESISTANCECARDSCAN	Scan and report connected resistance cards.
RT.ALL	Initiate resistance test for all four-channels on each configured board. Returns an immediate response. "OK" if the test is initiated, "?? Resistance Test already in progress" if a test is already running.
RT.FCB#n	Initiate resistance test for all four-channels of the requested board. 0 = CPU, 1..5 = four-channel board. Same response as RT.ALL
RT.INCLUDESENSE	directs the firmware to include/exclude the sense measurements
RT.LC#n	Initiate resistance test for a single load cell. Same response as RT.ALL
RT.RESULTS	request results of the last resistance test. The response will be terminated with an "OK".
RT.SC#n	Initiate resistance test for all load cells assigned to a single scale. Same response as RT.ALL
RT.STATUS	get status of any current resistance test. Possible values are "In Progress", "Terminating", or "Complete".
RT.SAVE	Save the results of the last resistance test
RT.TERMINATE	request termination of currently running resistance test. Possible responses are "OK" indicating that the current test will be terminated, "?? No Resistance Test in progress" if there is no test to terminate

Table 7-23. Resistance Card Diagnostics Commands

7.7.4   Load Cell Diagnostics Commands

The following commands can be used to read diagnostic data from load cells.

- Valid scale numbers (s) are 1 to 4
- Valid load cell numbers (c) are 1 to 24.

Command	Description
LC.CDMV#c	Read corrected dead load mV value.
LC.CMV#c	Read corrected mV value.
LC.COUNTS#c	Read trimmed, zero referenced counts.
LC.RCOUNTS#c	Read raw counts.
LC.RMV#c	Read raw mV value.
LC.WEIGHT#c	Read gross weight for cell.
LOADCELLSCAN	Report connected load cells.
SC.LCCDMV#s	Read dead load mV values for all cells assigned to a scale.
SC.LCCMV#s	Read corrected mV values for all cells assigned to a scale.
SC.LCCOUNTS#s	Read trimmed, zero referenced counts for all cells assigned to a scale.
SC.LCRCOUNTS#s	Read raw counts for all cells assigned to a scale.
SC.LCRMV#s	Read raw mV valus for all cells assigned to a scale.
SC.LCWEIGHT#s	Get weight for all cells assigned to a scale.

Table 7-24. Load Cell Diagnostic Commands

7.7.5   Load Cell Emulation Commands

The following commands can be used emulate load cells.

- Valid scale numbers (s) are 1 to 4
- Valid load cell numbers (c) are 1 to 24.

Command	Description	
SC.EMULSNAP.COUNT#s		0
SC.EMULSNAP.THRESET#s		10
SC.EMULSNAP.THRESH#s		80
SC.COUNTS#s	Gather trimmed, zero referenced counts for each load cell assigned to a scale	
SC.EMULSNAP#s	Query load cell values for emulation snapshot	
SC.ESNAP#s	Capture emulation snapshot	
SC.SIM#s=c	Emulate load cell.	

Table 7-25. Load Cell Emulation Commands

7.8   Stored Database Commands

There are three databases maintained on the iQUBE³.

Command	Function
DB.DIA.DELETE=n	Deletes "n" oldest records from the Diagnostics database
DB.DIA.DETAILS=n	Returns diagnostic record "n"
DB.DIA.RECORDCOUNT	Returns number of records in the diagnostics database
DB.OU.DELETE=n	Deletes "n" oldest records from the Overload/Underload database
DB.OU.DETAILS=n	Returns record "n" stored in the Overload/Underload database
DB.OU.RECORDCOUNT	Returns number of records in the Overload/Underload database
RT.DELETE=n	Deletes "n" oldest records in the records database
RT.DETAILS=n	Returns resistance test measurements from "n" record in the database
RT.HEADER=n	Returns record "n" in the database
RT.RECORDCOUNT	Returns number of records in the resistance test database

Table 7-26. Stored Database Commands

8.0   Diagnostics

The advanced diagnostic capabilities of the iQUBE³ include power supply and excitation voltage monitoring, load cell connection faults, cell overload or under-load, unbalanced load, load cell drift, load cell peak-to-peak noise and zero reference. Diagnostic flexibility allows for simple configuration and the ability to include the diagnostics in the weight data or to monitor diagnostics on a separate communication port from weight data.

Load Cell Status

The iQUBE³ CPU board provides bi-color cell status LEDs next to each load cell connector. These LEDs indicate the 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 8-1. Load Cell LED Status Indications

8.1   Diagnostic Functions

The iQUBE³ provides three types of diagnostic functions: system, cell, and scale diagnostics.

- System diagnostics monitor the power supply and excitation voltages and communications between primary and secondary boards. System diagnostics are always enabled.
- 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.

8.1.1   Diagnostic Error Detection

Diagnostics generate a code that can be included in any of the six available data formats, FMT1 through FMT6. By default, the diagnostic code token, <D>, is included in FMT1, FMT3 and FMT6. While a failure in a scale system may generate several error conditions, only the most critical diagnostic code is shown at one time. Table 8-2 shows the diagnostic codes for the various error types, in priority order.

Diagnostic Code <D>	Error Type	Associated Query Command
P	Power supply	DIA.PS
S	Secondary communication	DIA.MSCONNECT
E	Excitation	DIA.PSEXC
C	Cell connection	DIA.CELLCONNECT
R	Zero reference	DIA.ZREF
V	Overloaded cell	DIA.OVERLOAD
D	Drift	DIA.DRIFT
U	Underloaded cell	DIA.UNDERLOAD
N	Peak noise	DIA.NOISE
L	Unbalanced cell	DIA.UNBAL
<space>	No error	—

Table 8-2. Diagnostic Codes and Query Commands

8.1.2   Retrieving Diagnostic Data

Table 8-2 also lists the diagnostic query commands associated with each of the diagnostic codes. When a diagnostic code is generated, the related query command 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.

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8.2   Diagnostic Commands

Table 8-3 summarizes the diagnostic commands available for the iQUBE³, including query commands, parameter-setting commands, and the values that can be assigned by the parameter-setting commands. The diagnostic commands are described in detail in the following sections.

<D>	Error Type	Query Command	Parameter Setting Commands	Parameter Values	
				Default	Value Range
P	Power supply	DIA.PS	—	—	—
S	Secondary communication	DIA.MSCONNECT	—	—	—
E	Excitation	DIA.PSEXC	—	—	—
C	Cell connection	DIA.CELLCONNECT	—	—	—
V	Overloaded cell	DIA.OVERLOAD	SC.DIA.OVERLOAD.#s	100	–100 – 150 (percent of cell)
U	Underloaded cell	DIA.UNDERLOAD	SC.DIA.UNDERLOAD.#s	10	-100.00 – 100.00 (percent)
R	Zero reference	DIA.ZREF	SC.DIA.ZREF.#s	OFF	OFF, ON
			SC.DIA.ZREF.RANGE.#s	2	-100.00 – 100.00 (percent)
			SC.DIA.ZREF.THRESH.#s	10	-100.00 – 100.00 (percent)
			SC.DIA.ZREF.TIME.#s	10	1 – 60 (seconds)
D	Drift	DIA.DRIFT	SC.DIA.DRIFT.#s	OFF	OFF, ON
			SC.DIA.DRIFT.RANGE.#s	2	-100.00 – 100.00 (percent)
			SC.DIA.DRIFT.THRESH.#s	2	-100.00 – 100.00 (percent)
			SC.DIA.DRIFT.TIME.#s	10	1 – 300 (seconds)
N	Peak noise	DIA.NOISE	SC.DIA.NOISE.#s	OFF	OFF, ON
			DIA.NOISE.THRESH.#s	10.00	0.01 – 1000 (mV)
			SC.DIA.NOISE.TIME.#s	10	1 – 300 (seconds)
L	Unbalanced cell	DIA.UNBAL	SC.DIA.UNBAL.#s	OFF	OFF, ON
			SC.DIA.UNBAL.RANGE.#s	5	-100.00 – 100.00 (percent)
			SC.DIA.UNBAL.THRESH.#s	10	-100.00 – 100.00 (percent)
—	All	DIA.FLAGS	—	—	—
—	All	DIA.CLEAR	—	—	—

Table 8-3. Diagnostic Command Summary

8.2.1   System Diagnostic Commands

System diagnostic commands consist of query commands only; there are no parameter-setting commands. System diagnostics are always enabled.

> NOTE: For data formats that include the <S> status token, some system diagnostic errors also set the status to I (invalid).

Power Supply Error, <D> = P

The power supply diagnostic flag is set when any CPU board in the system has a power supply fault (input voltage less than 10.0 VDC or greater than 29.0 VDC).

Use the DIA.PS query command to retrieve diagnostic information for P-type error conditions.

> *Query Command Example:*

DIA.PS
SC2; SC3;

The iQUBE³ responds to the DIA.PS query command with SC2; SC3, indicating that the board affected by the power supply error is common to both Scale 2 (SC2) and Scale 3.

Secondary Communication Error, <D> = S

The secondary communication diagnostic flag is set when any configured four-channel board loses communication with the primary CPU board.

> *Query Command Example:*

DIA.MSCONNECT
S1 121A295A;

The query response indicates that the first four-channel board (**S1**), with board ID 121A295A, has lost connection to the primary unit.

Excitation Voltage Error, <D> = E

The excitation diagnostic flag is set when any board in the system has an excitation voltage fault (excitation voltage below 3.1 VDC).

> *Query Command Example:*

DIA.PSEXC
SC3;

The query response SC3 indicates the excitation voltage for a board used by Scale 3 has fallen below 3.1V.

8.2.2   Cell Diagnostic Commands

Cell connection diagnostics are enabled when a cell is assigned to a scale.

Cell Connection Error, <D> = C

The cell connection diagnostic flag is set when one or more load cell wires is disconnected.

> NOTE: For data formats that include the <S> status token, a cell connection error also sets the status to I (invalid).

> *Query Command Example:*

DIA.CELLCONNECT
SC1 3;

The query response indicates that one or more wires of cell 3 on Scale 1 are disconnected.

Cell Overload Error, <D> = V

The overloaded cell diagnostic flag is set when the cell output exceeds a specified percentage of full scale cell output set for the scale.

Query Command Example:

DIA.OVERLOAD
SC1 100.0% 4:15.233;

The cell overload query, DIA.OVERLOAD, returns information including the affected scale number (SC1), the cell overload threshold (100% of full-scale output), the affected cell number (4:), and the millivolts value of the overload error (15.233 mV).

Threshold Setting Command Example:

The cell overload threshold can be set using the SCs.DIA.OVERLOAD command. Specify the percentage of full-scale output that will trigger the overload error condition.

SC1.DIA.OVERLOAD=90

The example above sets the overload threshold for Scale 1 to 90% of full-scale output. The threshold can be set to any value from –100 to +100%; the default value is 100%.

> *NOTE: The millivolts value of load cell full-scale output can be calculated by multiplying the sensitivity (mV/V) value for the load cell by the excitation voltage of the iQUBE³ (5 volts). The default sensitivity value is 3.0 mV/V; the default full-scale output is therefore 9.9 mV (3.0 mV/V * 3.3 V). Use the LCc.SENS command (where c is the load cell number) to determine the configured load cell sensitivity.*

Cell Under-load Error, <D> = U

The underloaded cell diagnostic flag is set when the cell output falls below the percentage of full scale cell output set for the scale.

Query Command Example:

DIA.UNDERLOAD
SC1 10.0% 3:-2.236;

The cell under-load query, DIA.UNDERLOAD, returns information including the affected scale number (SC1), the cell under-load threshold (10% of full-scale output), the affected cell number (3:), and the millivolts value of the under-load error (–2.236 mV).

Threshold Setting Command Example:

The cell under-load threshold can be set using the SCs.DIA.UNDERLOAD command. Specify the percentage of full-scale output that will trigger the under-load error condition.

SC1.DIA.OVERLOAD=15

The example above sets the under-load threshold for Scale 1 to 15% of full-scale output. The threshold can be set to any value from –100 to +100 percent; the default value is 10 percent.

8.2.3 Scale Diagnostic Commands

Scale diagnostic commands are dependent on scale configuration and must be explicitly enabled for each scale. Each of the scale diagnostic commands use two or three parameters to set the values used to trigger the associated diagnostic flag.

Cell Mate Relationships

Cell mates to a given load cell are those cells that are adjacent to the cell. In the platform illustration below, LC2 and LC3 are cell mates to LC1; LC2, LC3, and LC6 are cell mates to LC4.
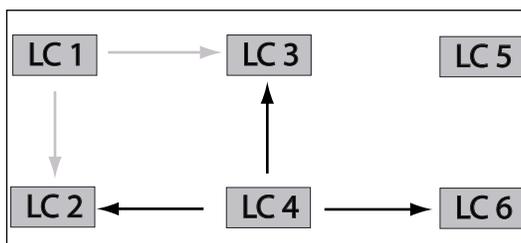

Figure 8-1. Cell Mate Relationships

Zero Reference Error, <D> = R

The zero reference diagnostic flag is set when at least one load cell has returned within the configured range. All load cells that remain outside the range are flagged with the zero reference error.

Query Command Example:

DIA.ZREF
SC1 2.0% 4:3.2;

The zero reference query above, DIA.ZREF, returns information including the scale number (SC1), the value set as the zero reference range (as a percentage of scale capacity), and the approximate weight value (3.2) returned for a load cell (4) that exceeds the specified range.

Parameter Setting Commands Example:

SC1.DIA.ZREF=ON

Enables the zero reference diagnostic test for Scale 1.

SC1.DIA.ZREF.RANGE=4

Sets the range, as a percentage of scale capacity, of acceptable values for the zero reference diagnostic test to 4% of scale capacity. (That is, the zero reference test will generate errors for weight values exceeding 4% of scale capacity.) The default value is 2 (2%); allowed values are 0–100.

SC1.DIA.ZREF.THRESH=5

*Sets the threshold for **disabling** the zero reference diagnostic test to 5% of scale capacity. (That is, the zero reference test is not run after the scale has reached 5% of capacity.) The default value is 10 (10%); allowed values are –100 to 100.*

SC1.DIA.ZREF.TIME=15

Sets the number of seconds to wait before running the zero reference test, after a cell exceeds the specified range value, to 15 seconds. The default value is 10 (10 seconds); allowed values are 0–60 seconds.

Cell Drift Error, <D> = D

The drift diagnostic is used principally for tank and hopper scales that never reach zero.

Query Command Example:

DIA.DRIFT
SC1 2.0% 4:429.4;

The cell drift query above, DIA.DRIFT, returns information including the scale number (SC1), the allowed drift range (2.0% of scale capacity), and the amount of drift, in microvolts, seen by a load cell (4:) that exceeded the specified drift range (429.4 μV).

Parameter Setting Commands Example:

SC1.DIA.DRIFT=ON

Enables the cell drift diagnostic test for Scale 1.

SC1.DIA.DRIFT.RANGE=5

Sets the allowed difference in weight, as a percentage of total scale capacity, between the current value on the scale and the value when the previous drift test was run to 5% of scale capacity. The default value is 2 (2%); allowed values are 0–100.

SC1.DIA.DRIFT.THRESH=5

Sets the threshold for running the cell drift diagnostic test to 5% of scale capacity. (That is, the test for cell drift is not made until the scale reaches 5% of capacity.) The default value is 2 (2%); allowed values are 0–100.

SC1.DIA.DRIFT.TIME=15

Sets the number of seconds to wait between successive cell drift diagnostic tests to 15 seconds. The default value is 10 (10 seconds); allowed values are 0–300 seconds.

Cell Noise Error, <D> = N

The noise diagnostic flag is set when a single cell experiences noise greater than the configured noise threshold.

> *Query Command Example:*

DIA.NOISE
SC1 1.00 1:1.10 3:1.08;

The cell noise query above, DIA.NOISE, returns information including the scale number (SC1), the value set as the system noise threshold (1.00 μV), and the noise values of two cells (1: and 3:) that exceed the threshold (1.10 and 1.08 μV).

> *Parameter Setting Commands Example:*

SC1.DIA.NOISE=ON

> *Enables the peak-to-peak noise diagnostic test for Scale 1.*

DIA.NOISE.THRESH=20

> *Sets the maximum allowable noise threshold to 20 microvolts (μV). The default value is 10 (10 μV); allowed values are 0.01–1000 μV.*

NOTE: Only one noise threshold value can be specified for the entire system. All load cells use the same threshold value regardless of which scale they are attached to.

SC1.DIA.NOISE.TIME=15

> *Sets the number of seconds to wait between successive noise diagnostic tests to 15 seconds. The default value is 10 (10 seconds); allowed values are 0–300 seconds.*

Unbalanced Load Error, <D> = L

The unbalanced load diagnostic flag is set when the scale load is not evenly distributed between the load cells. The error can be caused by unbalanced loading of the scale or by non-linear weight distribution caused by scale binding.

> *Query Command Example:*

> *Given a scale, SC1, with a capacity of 120,000 lb:*

DIA.UNBAL
SC1 5.0% 1:17760.0 2:4500.0;

The unbalanced load query above, DIA.UNBAL, returns information including the scale number (SC1), the range of allowed weight variation between cells (5% of scale capacity), and the weight values of cells exceeding the specified range. In this example, the 5% range allowed represents 6000 lb (120000 x 0.05), but cells 1 and 2 exceed that range (17760.0 – 4500.0 = 13260.0).

> *Parameter Setting Commands Example:*

SC1.DIA.UNBAL=ON

> *Enables the unbalanced load diagnostic test for Scale 1.*

SC1.DIA.UNBAL.RANGE=10

> *Sets the allowed difference in weight between load cells to 10% of scale capacity. The default value is 5 (5%); allowed values are 5–75.*

SC1.DIA.UNBAL.THRESH=15

> *Sets the threshold for running the unbalanced diagnostic test to 15% of scale capacity. (That is, the test for an unbalanced load is not made until the scale reaches 15% of capacity.) The default value is 10 (10%); allowed values are 0–50.*

8.2.4   Diagnostic Flag Commands

When data is streamed from the iQUBE³, the <D> diagnostic code field shows only the highest priority error. The DIA.FLAGS command can be used to show all errors present in the system.

The DIA.FLAGS command returns either an *OK* (no error) response or a scale name followed by a hexadecimal value. The hexadecimal value shows the bits set on for all errors present on that scale.

Table 8-4 lists the mask bits set for each diagnostic error condition. Table 8-5 shows the bits and their associated error conditions as they appear in the hexadecimal value returned by the DIA.FLAGS commands.

For example, if the DIA.FLAGS command returns the following:

DIA.FLAGS=SC2 0x28; SC4 0x20;

Referring to Table 8-5 shows that an overload condition (V) exists on both Scale 2 and Scale 4 (0x20), with a cell connection error (C) also on Scale 2 (0x08).

Because the diagnostic code (<D>) returned from the iQUBE³ shows only the highest priority error, only the cell connection error (C) would appear in the data.

Mask Bit	<D>	Error Type
—	' '	OK
0x001	P	Power supply error
0x002	S	Secondary connection error
0x004	E	Excitation error
0x008	C	Cell connection error
0x010	R	Zero reference
0x020	V	Cell overload
0x040	D	Cell drift
0x080	U	Cell under-load
0x100	N	Peak-to-peak noise
0x200	L	Unbalanced load

Table 8-4. Mask Bits and Codes for Diagnostic Errors

0x100–0x800				0x010–0x080				0x001–0x008			
8	4	2	1	8	4	2	1	8	4	2	1
—	—	L	N	U	D	V	R	C	E	S	P

Table 8-5. Diagnostic Flag Mask Bits

The DIA.CLEAR command clears all diagnostic flags. The completed command responds with an *OK*.

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9.0   Maintenance and Troubleshooting

9.1   Additional Helpful Settings

9.1.1   Add Diagnostics Softkey

The diagnostics softkey is a shortcut created for the 1280 indicator weigh mode screen that, when pressed, displays the diagnostics page of the configuration menu. To add the diagnostics softkey:

1. Enter the configuration menu and Select ☰ . **Softkeys** displays.
2. Select add softkey icon to create new softkey.
3. Scroll down to select **Diagnostics**.
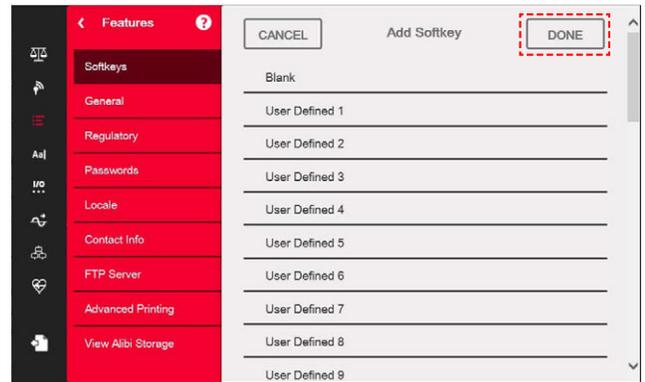
4. Scroll up to select **Done**.
5. Select **Save and Exit.**

9.2   Cell Emulation

Cell emulation allows the output of a failed load cell to be emulated by using the remaining cells in the system to estimate the value of the failed cell. The calculation of the emulation value depends the calibration type used to calibrate the scale. The performance of the emulation for the three calibration types: **2-POINT**, **CORNERMATCH** and **SECTIONMATCH** may vary drastically by application. The following guidelines are presented to help select the proper calibration type and get the best possible performance from your scale if emulation is being used.

> *NOTE: Cell emulation is not Legal for Trade.*
> *Only 1 cell may be emulated per iQUBE³ Scale.*

9.2.1   Section Match

Section match calibration is used primarily on truck scales. Truck scales use the concept of sections to describe a scale. A section is a pair of cells directly across from each other on the scale. In load cells 1 and 2, 3 and 4 and 5 and 6 make up the three sections of the scale. The trimming/calibration process requires trimming the scale one section at a time, therefore three calibration measurements should be made. One between cells 1 and 2, one between cells 3 and 4 and one between 5 and 6.

Section match works best when both cells in a section have the same capacity and sensitivity and the load on the scale will normally be placed along the center line of the scale (with respect to the two cells in a section).

Emulation performance on section match type scales is highly dependent on the ability of the operator to position the center of gravity of the load along the center line of the scale.
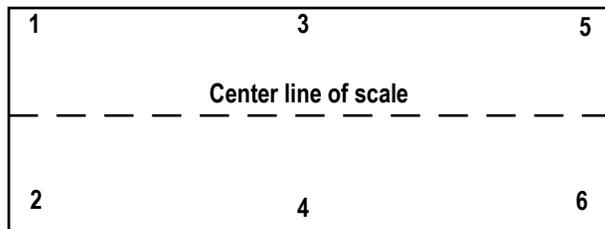
Figure 9-1. Example of scale sections

9.2.2 Corner Match

Corner match calibration can be used on any scale base with two or more cells. It is increasingly effective as the number of load cells in the system increases. Trimming/calibrating the scale requires one measurement for each load cell in the system with the weight placed directly over the load cell to be trimmed.

Corner match works best on truck scales with 8 or more load cells and on rectangular or odd-shaped bases where the typical load on the scale cannot be easily centered with respect to all load cells on the system.

Corner match type scales provide the best emulation performance on bases with a larger number of cells (e.g., truck scales with 8 or more cells). On smaller bases with 5 or fewer cells, it provides the best average emulation performance when the center of gravity for the load cannot be easily centered with respect to all the load cells in the system (e.g., loads with small footprints on a large base).

9.2.3 2-Point

2-point calibration can be used on any scale base when no trimming is needed. Calibration requires only a zero and span measurement.

2-point is the only calibration type that can be used on single load cell or pre-trimmed (analog J-Box) type scales. On multi-cell systems, 2-point works best on bases where the load's center of gravity will normally be centered with respect to all load cells. This is especially true for tank and hopper scales.

2-point emulation is not allowed on scales defined by a single load cell or bases with a single load cell or pre-trimmed (analog Junction Box). On multi-cell systems, emulation performance is highly dependent on the ability to center the load with respect to all the load cells in the system. In general, the closer the load footprint size is to the size of the deck, the better the emulation performance will be.

9.2.4 Tank Cell Emulation

The iQUBE³ assumes a truck scale application. If the the below settings are configured the iQUBE³ assumes a tank cell application. See for menu options.

Setting	Minimum	Recommended
Tank Cell Emulation Count	10	50
Tank Cell Emulation Threshold	50%	80%
Tank Cell Emulation Reset		10%
Tank Cell Emulation Value	Populates automatically when above settings are configured	

Table 9-1.

1. When a load cell error occurs press the **Diagnostic** Softkey to view the diagnostic screen.

2. Used the up and down arrows to navigate to the load cell with the error.

3. Press the **Cell Emulation** softkey to simulate that load cell.

📝 NOTE: Only 1 cell may be emulated per iQUBE³ Scale.

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9.2.5   iQUBE³ System Current Draw

The following tables show the 24VDC current requirements for the iQUBE³ CPU board and communication option cards. Current is measured at the PCB input connector. System current draw is the sum of the individual current requirements.

CPU Board Loads	Current Draw
Nominal CPU board load	62.7 mA
Per 350 Ω load cell	1.2 mA
Per 700 Ω load cell	0.6 mA
Per summed platform (4 x 350Ω load cells)	67.5 mA
Per summed platform (4 x 700Ω load cells)	65.1 mA
Per summed platform (16 x 350Ω load cells)	81.9 mA
Per summed platform (16 x 700Ω load cells)	72.3 mA

Table 9-2. CPU Board Current Draw

Four-Channel Board Loads	Current Draw
Nominal four-channel board load	32 mA
Per 350 Ω load cell	1.2 mA
Per 700 Ω load cell	0.6 mA
Per summed platform (4 x 350Ω load cells)	36.8 mA
Per summed platform (4 x 700Ω load cells)	34.4 mA
Per summed platform (16 x 350Ω load cells)	51.2 mA
Per summed platform (16 x 700Ω load cells)	41.6 mA

Table 9-3. Four-Channel Board Current Draw

Description	Current Draw
WiFi Module Option	12.3 mA
Fiber Optic Option	8.3 mA
Analog Option	27 mA
Serial Option	5 mA
Relay Option	21 mA
iQUBE³ Resistance Measurement Option	75 mA

Table 9-4. Communications Option Card Current Draw

A fully loaded system with a CPU board, five four-channel boards, 6 resistace cards, one WiFi module and two analog cards would be calculated as follows:

- 1 x CPU board @ 81.9 mA each = 81.9 mA
- 1 x WiFi module @ 12.3 mA each = 12.3 mA
- 2 x Analog option card @ 27 mA each = 54 mA
- 6 x Resistance card @ 75 mA each = 450 mA
- 5 x four-channel boards @ 51.2 mA each = 256 mA

The sum of these current requirements:

$$81.9 \text{ mA} + 12.3 \text{ mA} + 54 \text{ mA} + 450 \text{ mA} + 256 \text{ mA} = 854.2 \text{ mA}$$

9.2.6 System Voltage Drop

Once the current draw of the system is calculated, the voltage input to an externally-powered iQUBE³ system can also be calculated.

The primary sources of voltage drop in an externally powered iQUBE³ system are the transient boards and the power cable. Both voltage drops are directly proportional to the current draw of the system being powered.

Transient Board Voltage Drop

The inductive chokes on the transient boards have a resistance value of 0.08Ω. With two chokes per board (voltage source and return path), the effective resistance per board is 0.16Ω.

Current Load	Transient Board Voltage Drop
1.0 A	0.16 V
1.5 A	0.24 V
2.0 A	0.32 V
2.5 A	0.40 V
3.0 A	0.48V

Table 9-5. Transient Board Voltage Drop

Power Cable Voltage Drop

Power cable voltage drop is a function of the type of cable used and the length of the cable run.

Stranded Wire Gauge	Ω per Foot
20	0.01015
18	0.00639
16	0.00402

Table 9-6. Common Cable Resistance Values

NOTE: The run length includes both the supply and return lengths. Cable resistance is also a function of temperature. Values given assume an ambient temperature of 25°C (77°F).

Voltage Drop Example

Using the total system current draw from the truck scale current draw example above (), the voltage drop for an externally-powered system can be calculated.

Given that the current draw is 0.8272A (827.2 mA); the power cable is 20-gauge stranded wire; and the iQUBE³ at the scale is located 200' from the 24 VDC supply in the scale house, three voltage drops can be calculated:

- Power cable voltage drop: 0.8272A x 0.01015W/ft x (2 x 200ft) = 3.358V
- iQUBE³ transient board voltage drop: 0.8272A x 0.16W = 0.132V

Total voltage drop is: 3.358V + 0.132V = 3.490V

Effective power supply voltage seen at the iQUBE³ is then: 24V – 3.490V = 20.510V

This voltage is acceptable, but the power cable voltage drop could be cut in half by using two 20-gauge wires for the supply and return cable runs.

9.3   Updating Board Firmware

9.3.1   CPU Board Firmware Update Using Revolution

1. Connect the computer to the iQUBE³ CPU board using a USB-C cable into J12 (See Figure 2-3 on page 19).
2. Open Revolution.
3. Select **File**, then **New**.
4. Select the iQUBE³ module.
5. On the CPU board, flip the SW2 switch to the UPDATE position (see Figure 2-3 on page 19).
6. Apply power to the iQUBE³.
7. On Revolution, select the **Update CPU Firmware** button and follow the instructions displayed.
8. Disconnect the USB-C cable once the firmware update is complete.
9. On the CPU board, flip the SW3 switch to the RUN position.
10. Power cycle iQUBE³.

9.3.2   Four-Channel Board Firmware Update

Revolution is not needed to update the four-channel board firmware.

1. With the iQUBE³ off, connect the computer to the four-channel board with a USB-C cable into J12. The four-channel board powers up using power from the USB-C.
2. Hold BOOT (SW1) and short press RESET (SW4) on the four-channel board. Release the BOOT (SW1) switch. A drive folder displays on the computer.
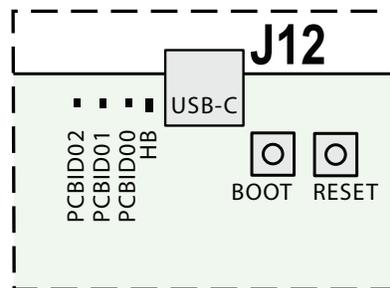

Figure 9-2. Four-Channel Board LEDs, J12 port, BOOT (SW1) and RESET (SW4) Button Locations

3. Delete the old firmware inside of the drive folder.
4. Download the new firmware from the Rice Lake website.
5. Drag and drop the new firmware from the downloaded folder into the drive folder.
6. After the file copies to the drive folder, disconnect the USB-C cable.

9.4 Default CPU Board

With the iQUBE3 powered up:

1. Place the setup switch (SW1) to the ON position.
2. Press and hold the Assign/Default button (S1). Channel status LEDs flash three times and remain lit.
3. Release S1. Channel status LEDs go out. Configuration is now reset to default values.
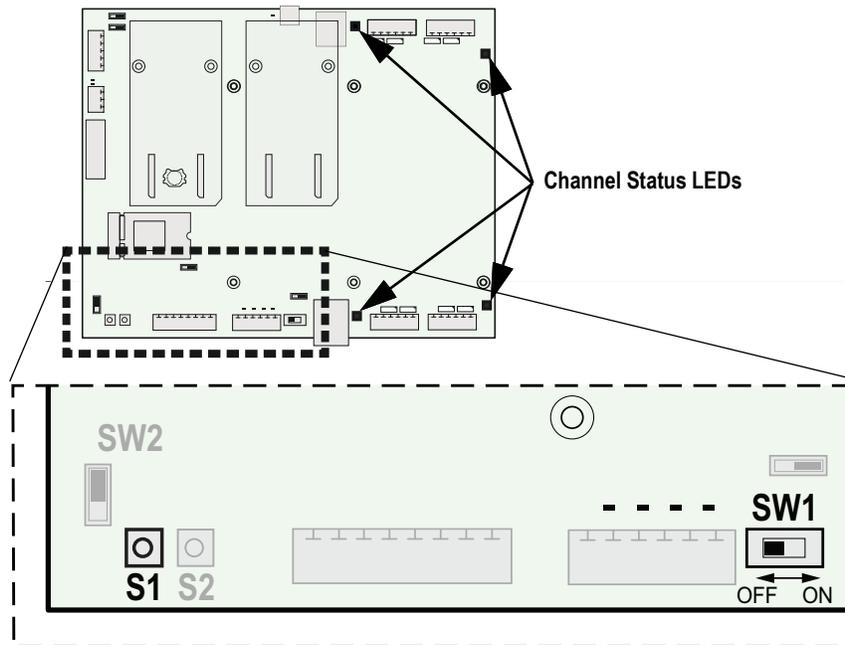4. Place the setup switch (SW1) to the OFF position.

Figure 9-3. Setup Switches

10.0 Replacement Parts

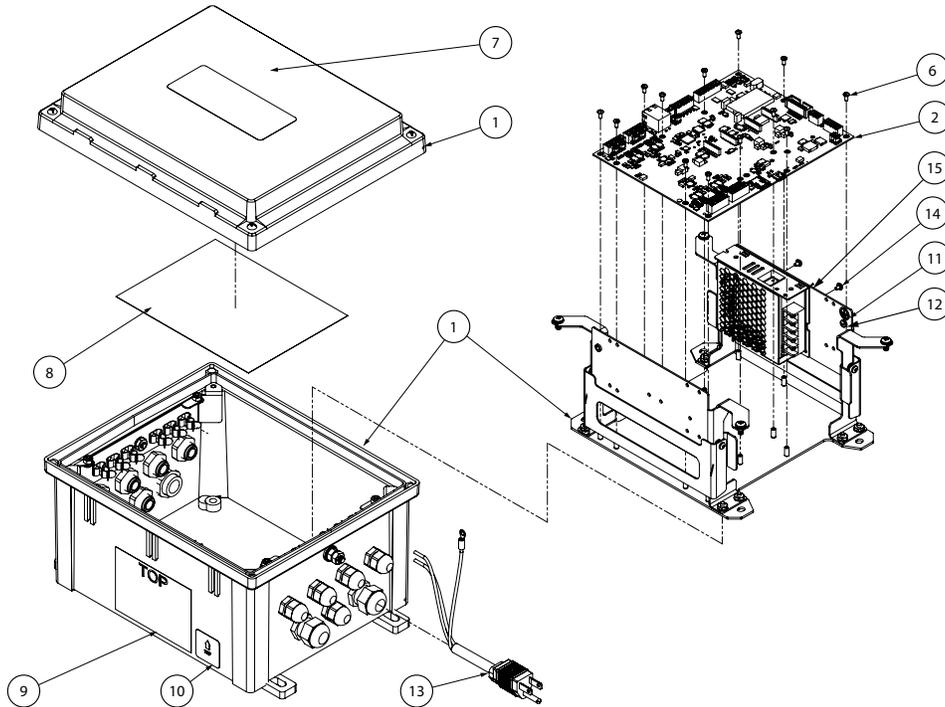## 10.1 Replacement Parts for iQUBE³ with Internal AC Power Supply

Figure 10-1. Small Polycarbonate, 115 VAC, Four-Channel iQUBE³ (PN227157 See Table 10-1 on page 103)
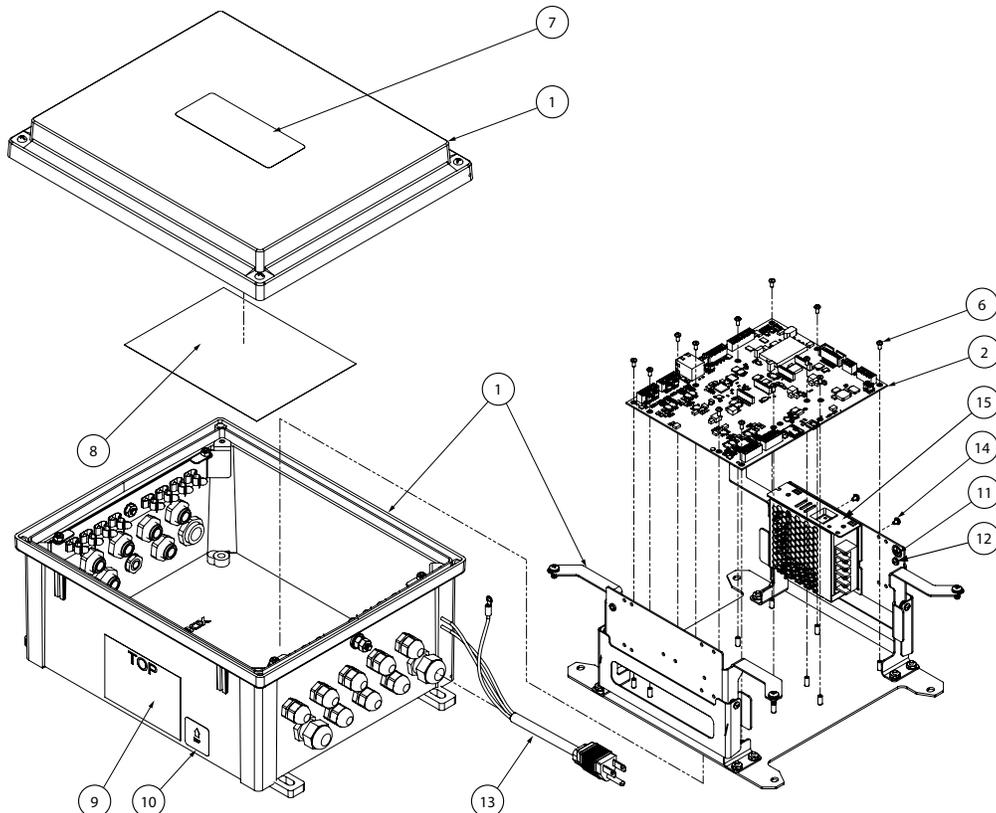
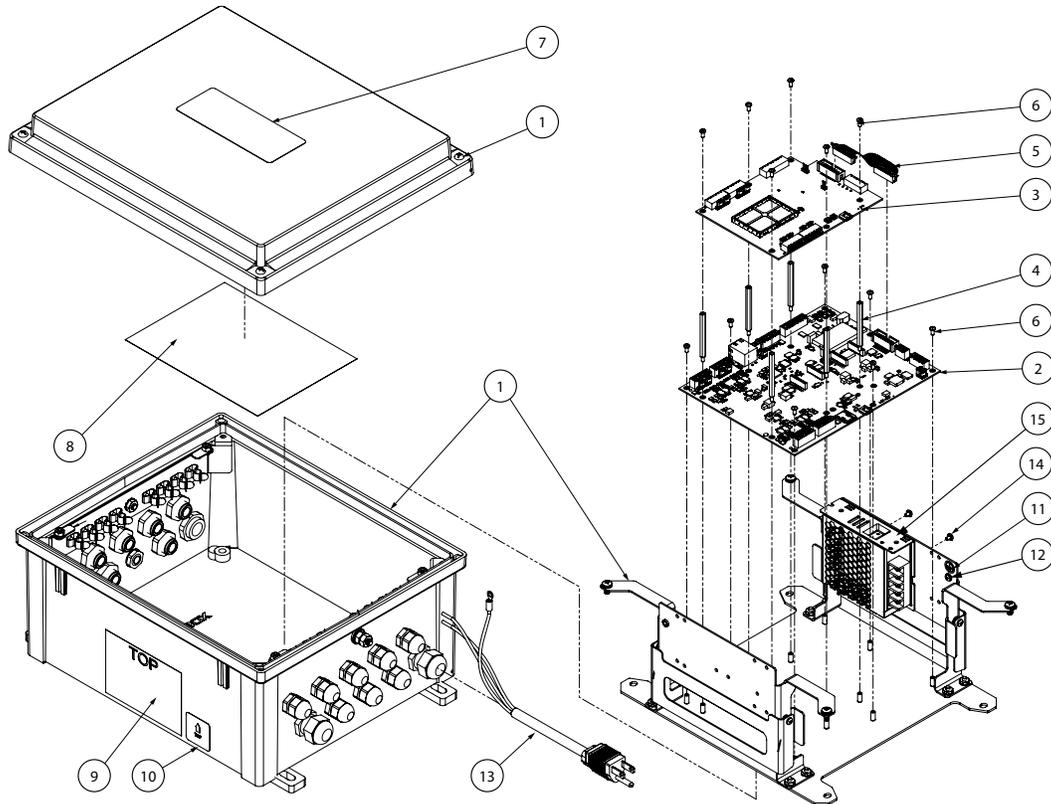*Figure 10-2. Large Polycarbonate, 115 VAC, Four-Channel iQUBE³ (PN227158 See Table 10-1 on page 103)*

Figure 10-3. Large Polycarbonate, 115 VAC, 8-Channel iQUBE³ (PN227159 See Table 10-1 on page 103)

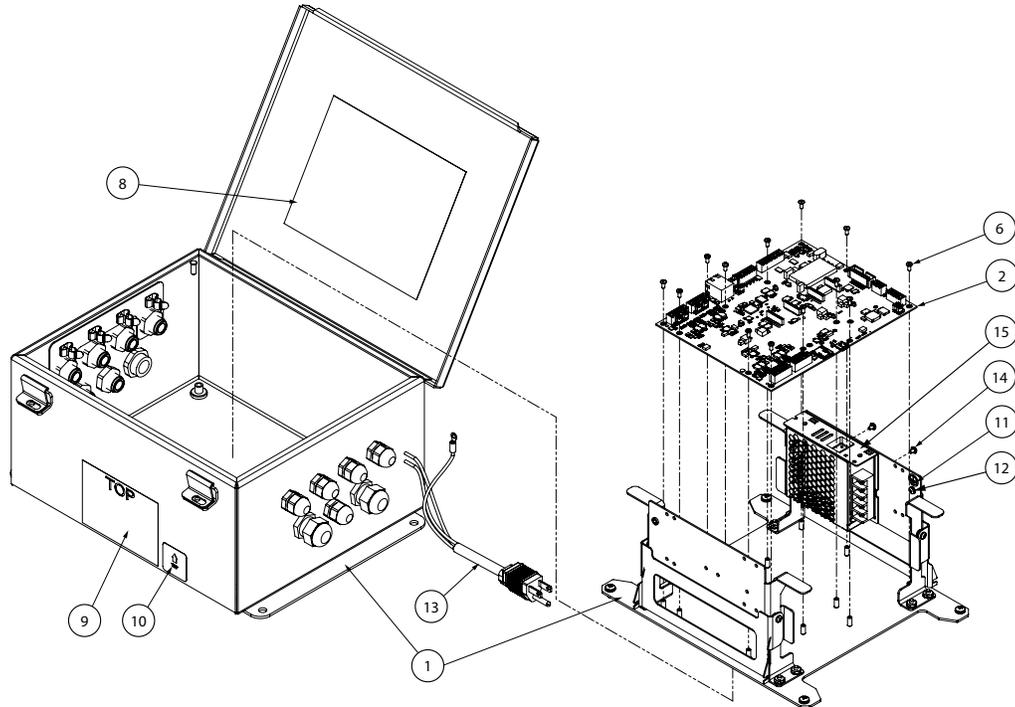*Figure 10-4. Stainless Steel, 115 VAC, Four-Channel iQUBE³ (PN227160 See Table 10-1 on page 103)*

		227157 Figure 10-1 on page 101	227158 Figure 10-2 on page 101	227159 Figure 10-3 on page 102	227160 Figure 10-4 on page 102
	Channels	4	4	8	4
	Enclosure	Poly	Poly	Poly	SST
	Size	Small	Large	Large	Small
	Power	AC	AC	AC	AC
Part	**Description**				
1	227452	Enclosure, Base Assembly, iQUBE3, Polycarbonate, Small (Figure 10-13 on page 110)	1	N/A	N/A	N/A
	227454	Enclosure, Base Assembly, iQUBE3, Polycarbonate, Large (Figure 10-14 on page 110)	N/A	1	1	N/A
	227790	Enclosure, Base Assembly, iQUBE3, PC, 10 in x 12 in, SST (Figure 10-15 on page 111)	N/A	N/A	N/A	1
2	231373	iQUBE³ CPU Board, Four-channel with cables and connectors	1	1	1	1
3	227169	iQUBE³ 4-channel Board, Four-channel with cables and connectors	N/A	N/A	1	N/A
4	226488	Standoff, Male-Fem 4-40 UNC x 1-15/16 Steel Zinc Clean Chrome Plated	N/A	N/A	6	N/A
5	212423	Cable Assembly, Ribbon, Host to Resistance Board	N/A	N/A	1	N/A
6	14825	Screw, Machine 4-40 UNC x 1/4 Pan Head Phillips Flat SST	13	13	13	13
7	226554	Label, iQUBE³ 5 X 2 in On Clear Adhesive	1	1	1	1
8	226555	Label, iQUBE³ Connection Information	1	1	1	1
11	16892	Label, Ground Protective Earth Adhesive IEC 60417-5019	1	1	1	1
12	14839	Screw, Mach 6-32 NC x 1/4 Phillips Pan Head Internal Tooth Lock Washer SEMS Steel Zinc Plated	1	1	1	1
13	180842	Power Cord Assembly, 120 VAC NEMA 5-15P Plug to Blunt #8 Eye Terminal on Green/Yellow Wire	1	1	1	1
14	199474	Screw, Mach M3-0.5 x 5 Phillips Pan Head Zinc Finish Steel External Tooth Washer SEMS Machine Screw	2	2	2	1
15	219056	Power Supply, 24 V, 50 W, 2.08 A, Universal AC Input, 100-240 VAC	1	1	1	1

Table 10-1. 115 VAC Internal Power Supply iQUBE³ Parts

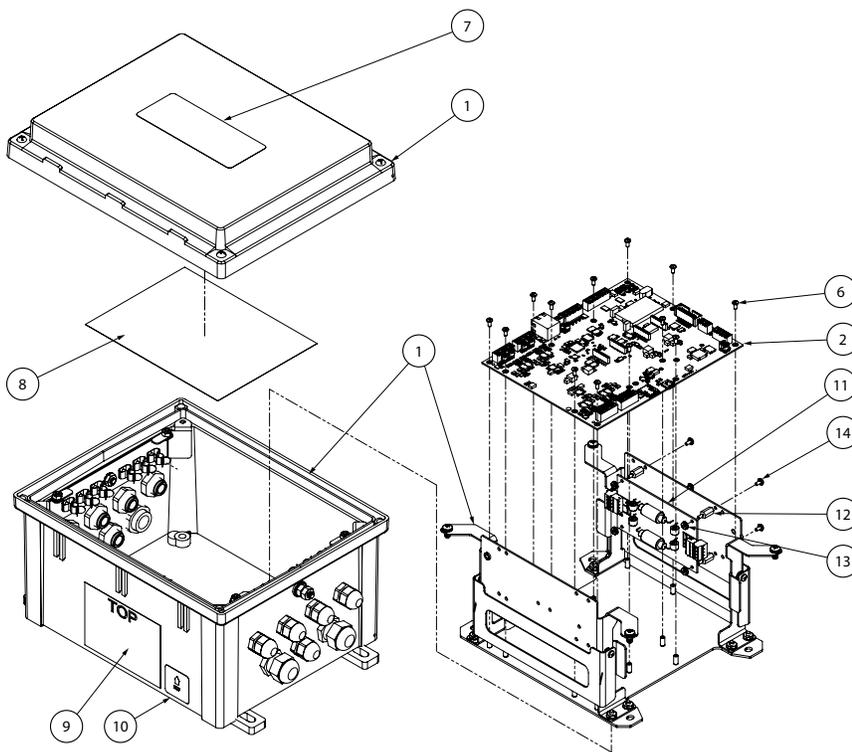## 10.2   Replacement Parts for iQUBE³ with Transient Protection

Figure 10-5. Small Polycarbonate, 9-36 VDC, Transient Voltage Four-Channel iQUBE³ (PN227165 See Table 10-2 on page 106)
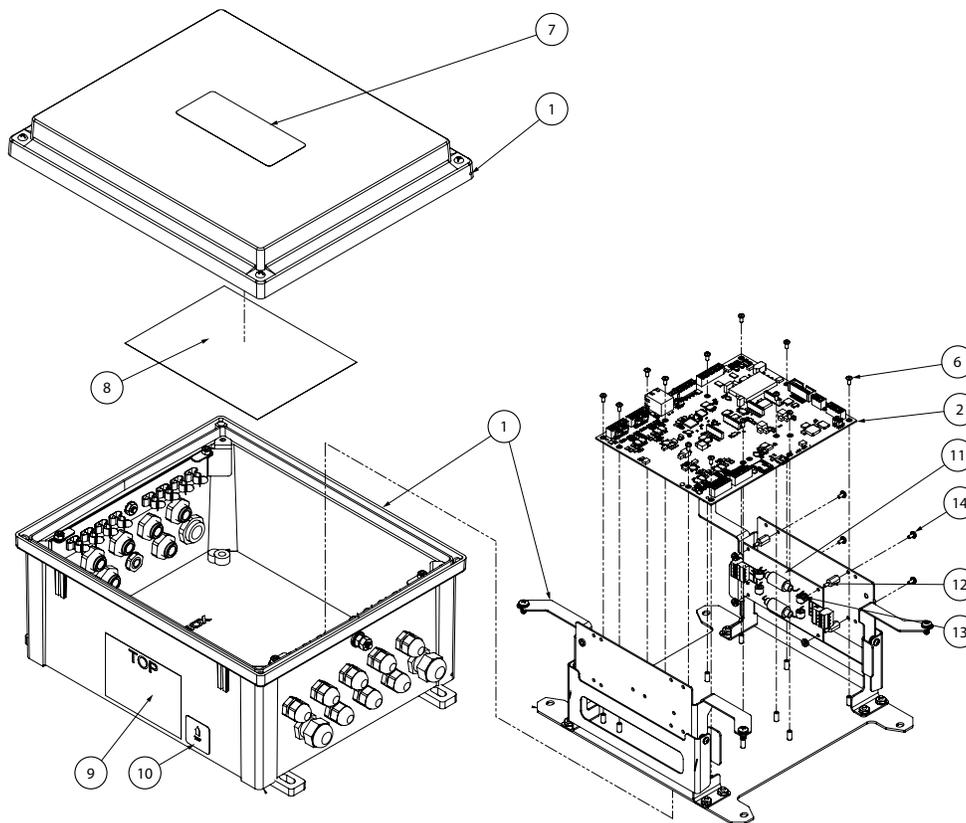

Figure 10-6. Large Polycarbonate, 9-36 VDC, Transient Voltage Four-Channel iQUBE³ (PN227166 See Table 10-2 on page 106)

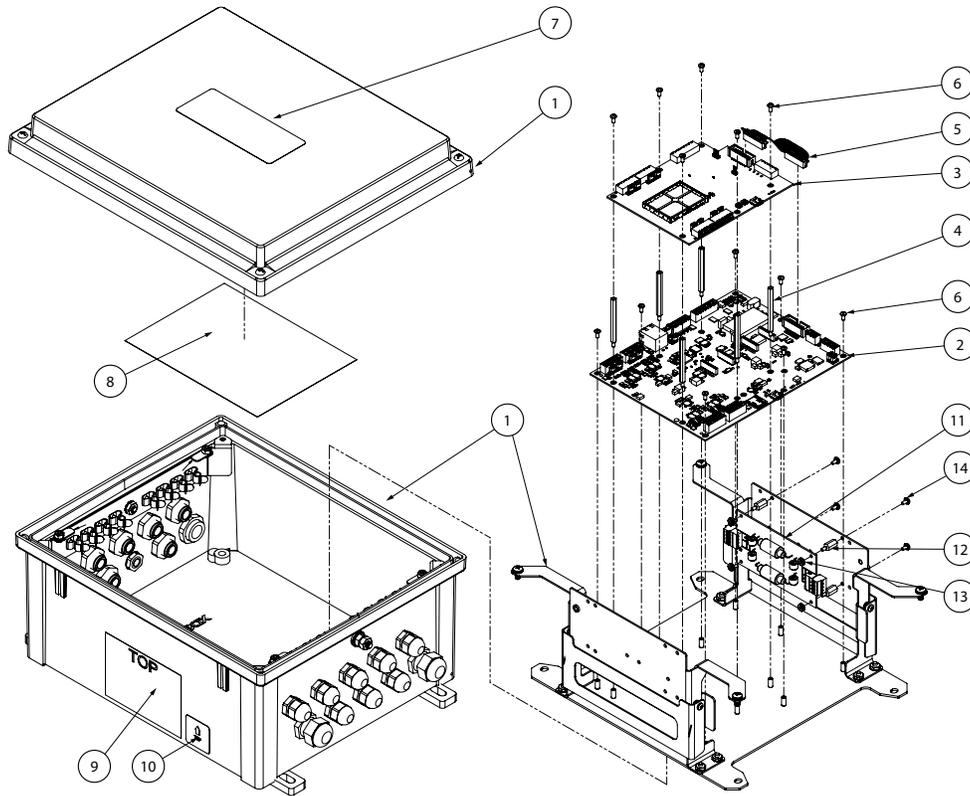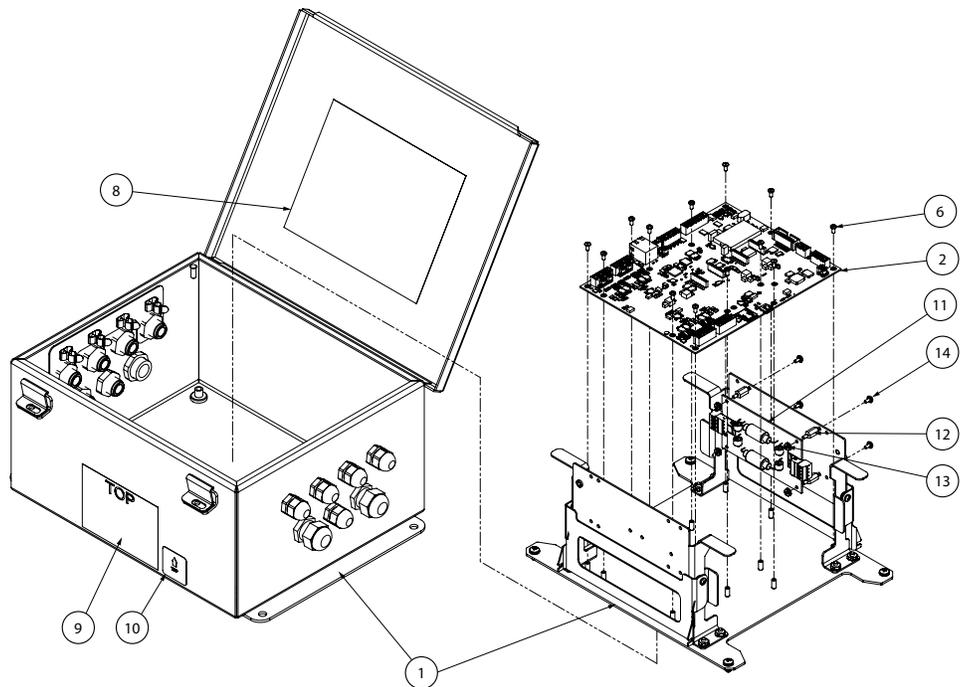*Figure 10-7. Large Polycarbonate, 9-36 VDC, Transient Voltage 8 Channel iQUBE³ (PN227159 See Table 10-2 on page 106)*

Figure 10-8. Stainless Steel, 9-36 VDC, Transient Voltage Four-Channel iQUBE³ (PN227160 See Table 10-2 on page 106)

			227165 Figure 10-5 on page 104	227166 Figure 10-6 on page 104	227167 Figure 10-7 on page 105	227168 Figure 10-8 on page 105
	Channels		4	4	8	4
	Enclosure		Poly	Poly	Poly	SST
	Size		Small	Large	Large	Small
	Power		TRN	TRN	TRN	TRN
	Part	**Description**				
1	227452	Enclosure, Base Assembly, iQUBE3, Polycarbonate, Small (Figure 10-13 on page 110)	1	N/A	N/A	N/A
	227454	Enclosure, Base Assembly, iQUBE3, Polycarbonate, Large (Figure 10-14 on page 110)	N/A	1	1	N/A
	227790	Enclosure, Base Assembly, iQUBE3, PC, 10 in x 12 in, SST (Figure 10-15 on page 111)	N/A	N/A	N/A	1
2	231373	iQUBE³ CPU Board, Four-channel with cables and connectors	1	1	1	1
3	227169	iQUBE³ 4-channel Board, Four-channel with cables and connectors	N/A	N/A	1	N/A
4	226488	Standoff, Male-Fem 4-40 UNC x 1-15/16 Steel Zinc Clean Chrome plated	N/A	N/A	6	N/A
5	212423	Cable Assembly, Ribbon, Host to Resistance Board	N/A	N/A	1	N/A
6	14825	Screw, Machine 4-40 UNC x 1/4 Pan Head Phillips Flat SST	13	13	13	13
7	226554	Label, iQUBE³ 5 X 2 in On Clear Adhesive	1	1	1	1
8	226555	Label, iQUBE³ Connection Information	1	1	1	1
11	109396	Board, Transient Protection, ROHS Compliant	1	1	1	1
12	31596	Standoff, Male-Fem 4-40 UNC x 7/16 1/4 HEX Steel	4	4	4	4
13	14618	Nut, K-Lock 4-40 UNC Steel Zinc Plated	4	4	4	4
14	14822	Screw, Mach 4-40 NC x 1/4 Phillips Pan Head Internal Tooth Lock Washer SEMS Steel Zinc Plated	4	4	4	4

Table 10-2. 9-36 VDC, Transient Voltage iQUBE³ Parts List

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10.3 Replacement Parts for iQUBE³ without Power Supply or Transient Protection

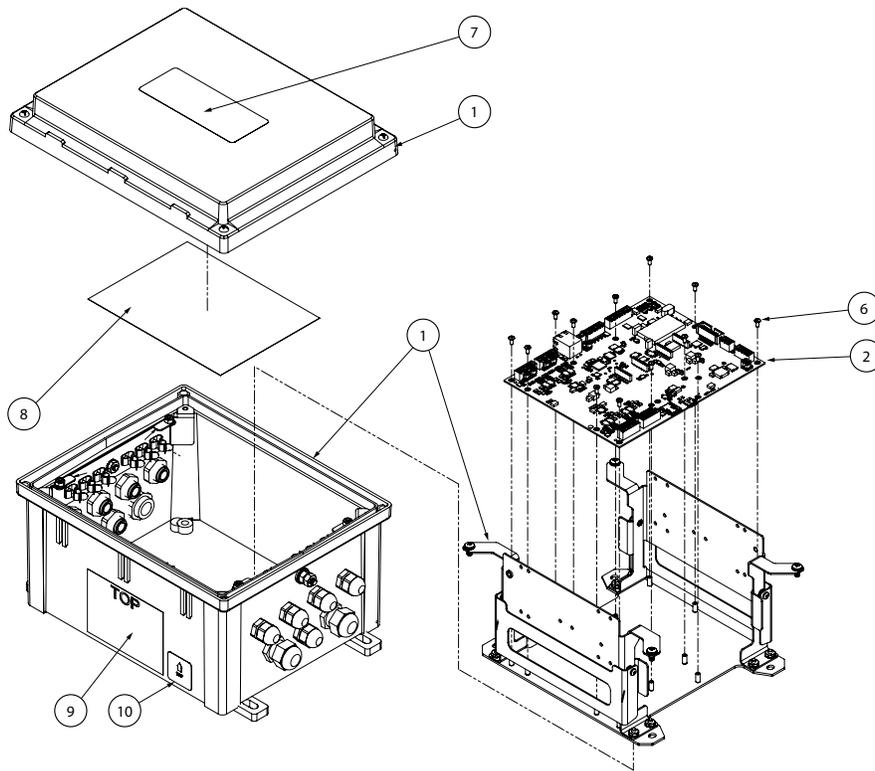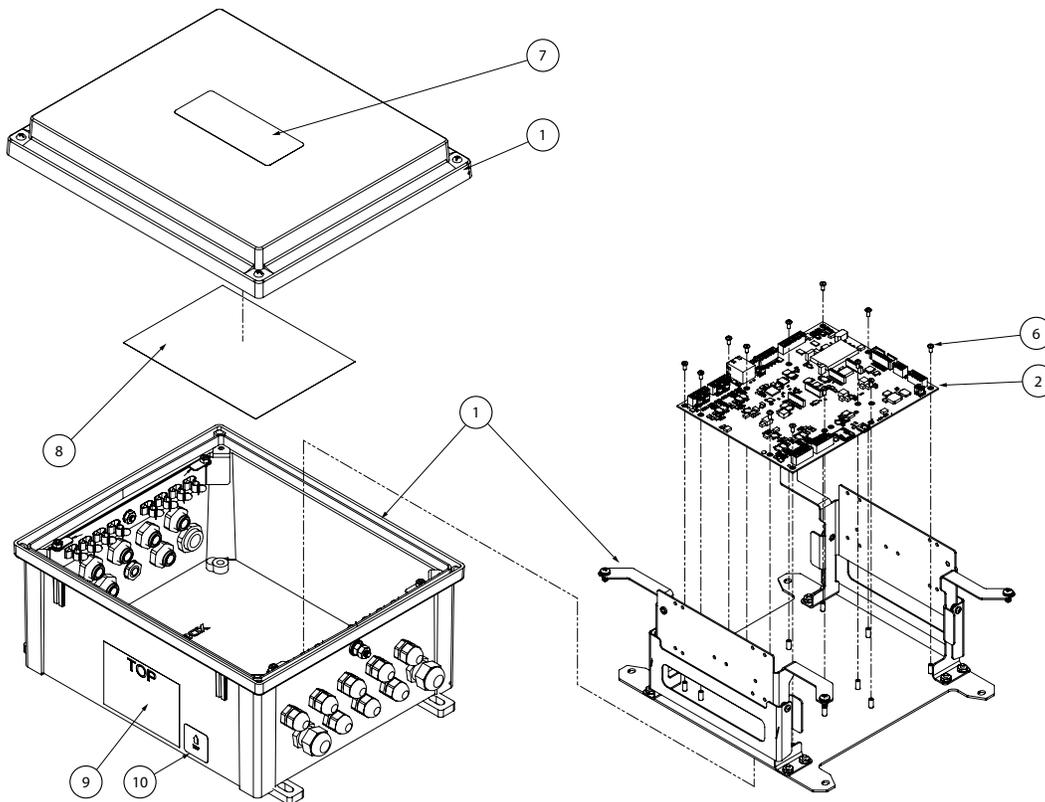*Figure 10-9. Small Polycarbonate, External Power Supply, Four-Channel iQUBE³ (PN227161 See Table 10-3 on page 109)*

Figure 10-10. Large Polycarbonate, External Power Supply, Four-Channel iQUBE³ (PN227162 See Table 10-3 on page 109)
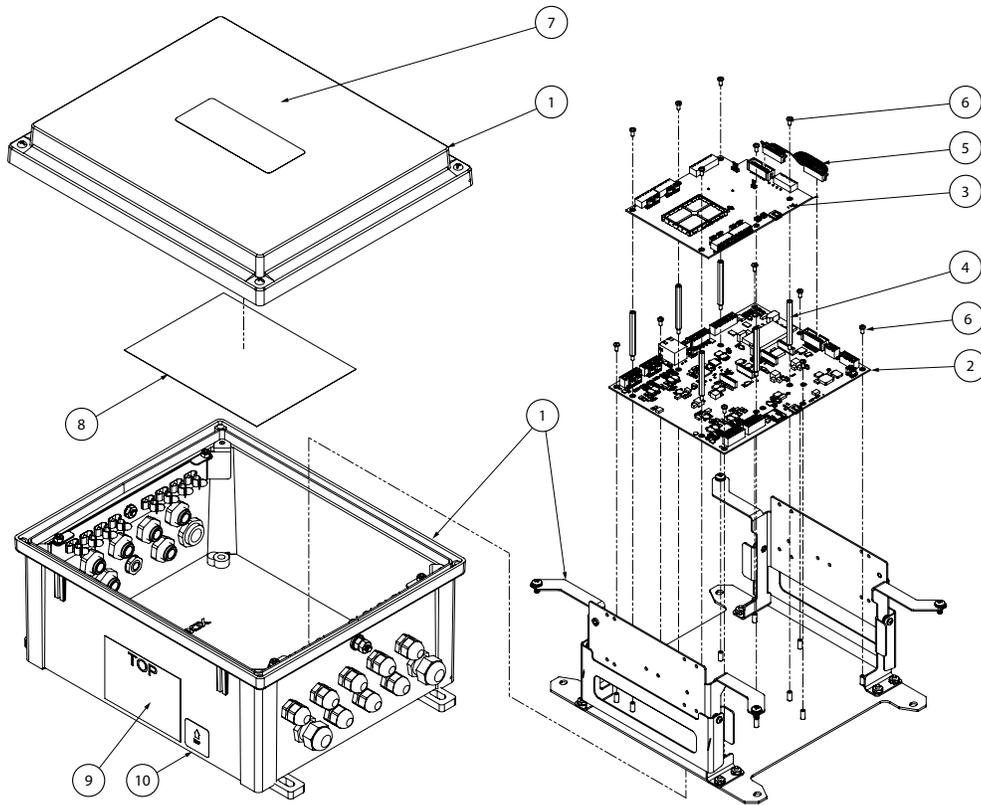
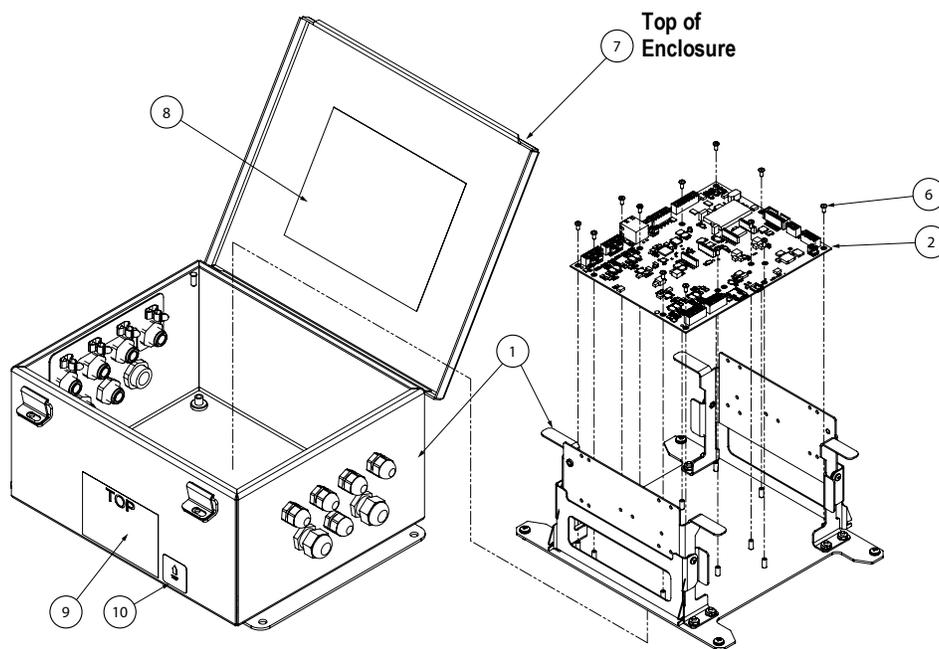*Figure 10-11. Large Polycarbonate, External Power Supply, 8 Channel iQUBE³ (PN227163 See Table 10-3 on page 109)*

Figure 10-12. Stainless Steel, External Power Supply, Four-Channel iQUBE³ (PN227164 See Table 10-3 on page 109)

	Part	Description	227161 Figure 10-9 on page 107	227162 Figure 10-10 on page 107	227163 Figure 10-11 on page 108	227164 Figure 10-12 on page 108
		Channels	4	4	8	4
		Enclosure	Poly	Poly	Poly	SST
		Size	Small	Large	Large	Small
		Power	External	External	External	External
1	227452	Enclosure, Base Assembly, iQUBE3, Polycarbonate, Small (Figure 10-13 on page 110)	1	N/A	N/A	N/A
	227454	Enclosure, Base Assembly, iQUBE3, Polycarbonate, Large (Figure 10-14 on page 110)	N/A	1	1	N/A
	227790	Enclosure, Base Assembly, iQUBE3, PC, 10 in x 12 in, SST (Figure 10-15 on page 111)	N/A	N/A	N/A	1
2	231373	iQUBE³ CPU Board, Four-channel with cables and connectors	1	1	1	1
3	227169	iQUBE³ 4-channel Board, Four-channel with cables and connectors	N/A	N/A	1	N/A
4	226488	Standoff, Male-Fem 4-40 UNC x 1-15/16 Steel Zinc Clean Chrome plated	N/A	N/A	6	N/A
5	212423	Cable Assembly, Ribbon, Host to Resistance Board	N/A	N/A	1	N/A
6	14825	Screw, Machine 4-40 UNC x 1/4 Pan Head Phillips Flat SST	13	13	13	13
7	226554	Label, iQUBE³ 5 X 2 in On Clear Adhesive	1	1	1	1
8	226555	Label, iQUBE³ Connection Information	1	1	1	1

Table 10-3. External Power Supply, iQUBE³ Parts
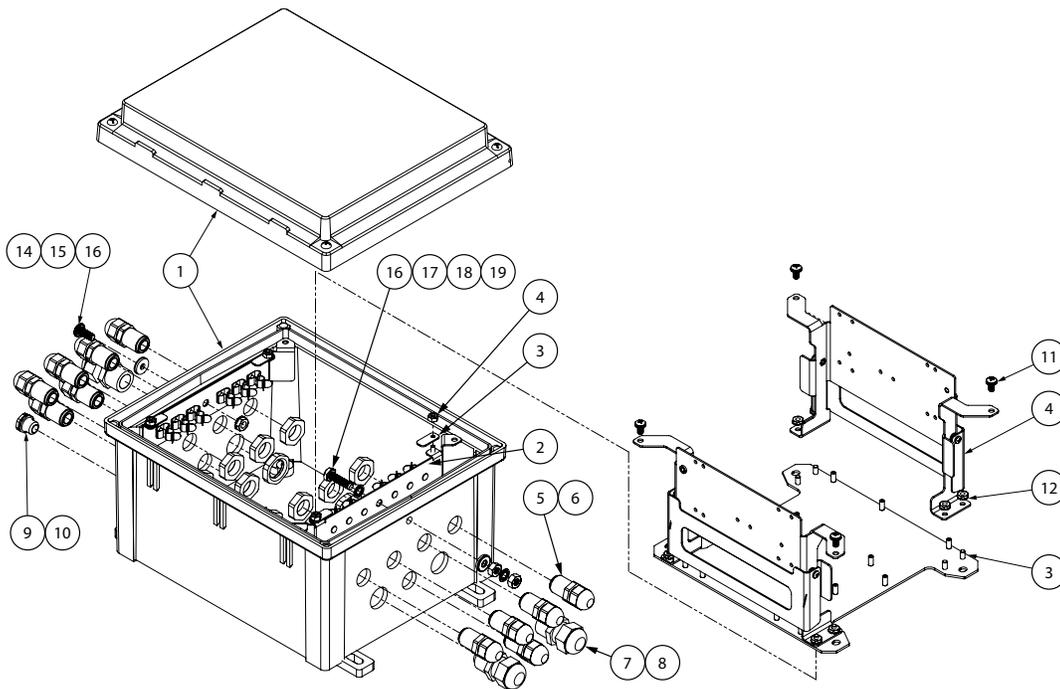
10.4 Enclosure Replacement Parts

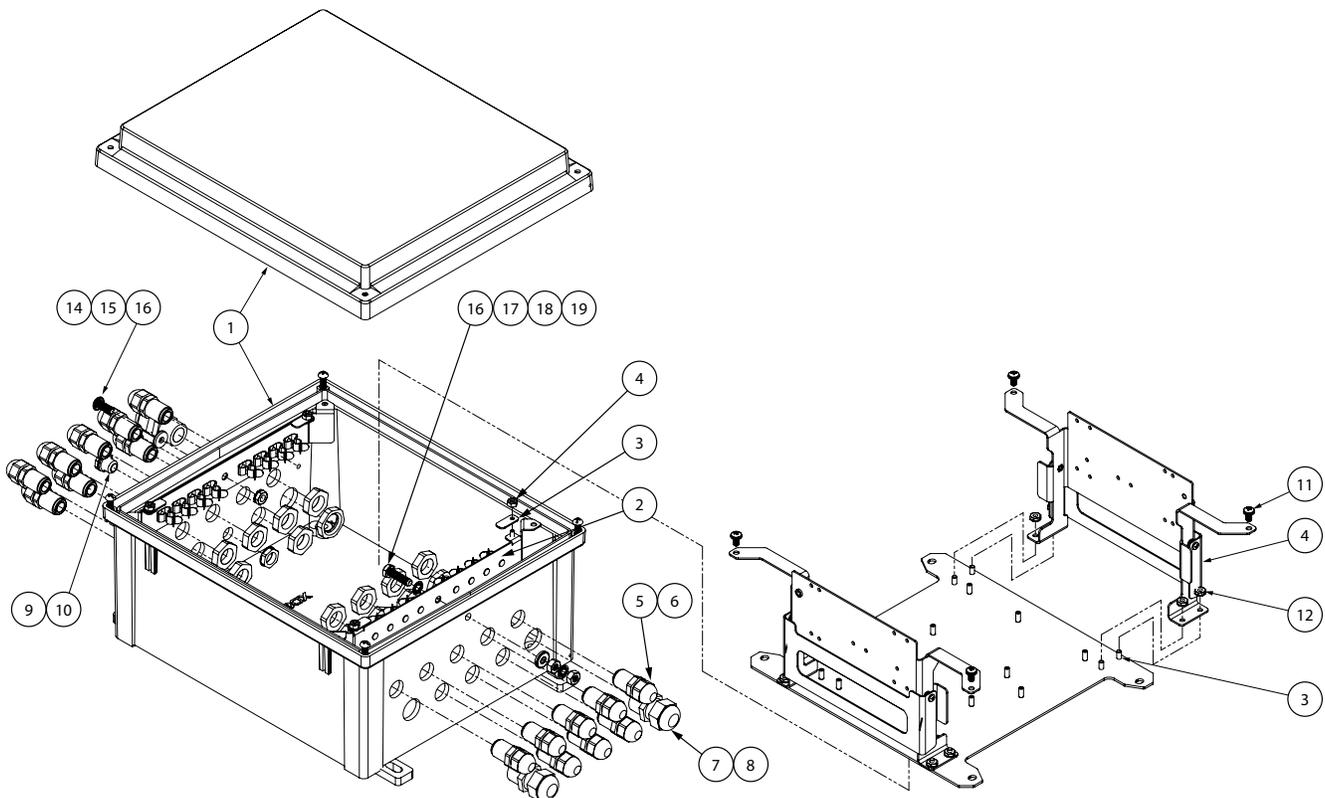*Figure 10-13. Small Polycarbonate Enclosure Parts (See Table 10-4 on page 112)*
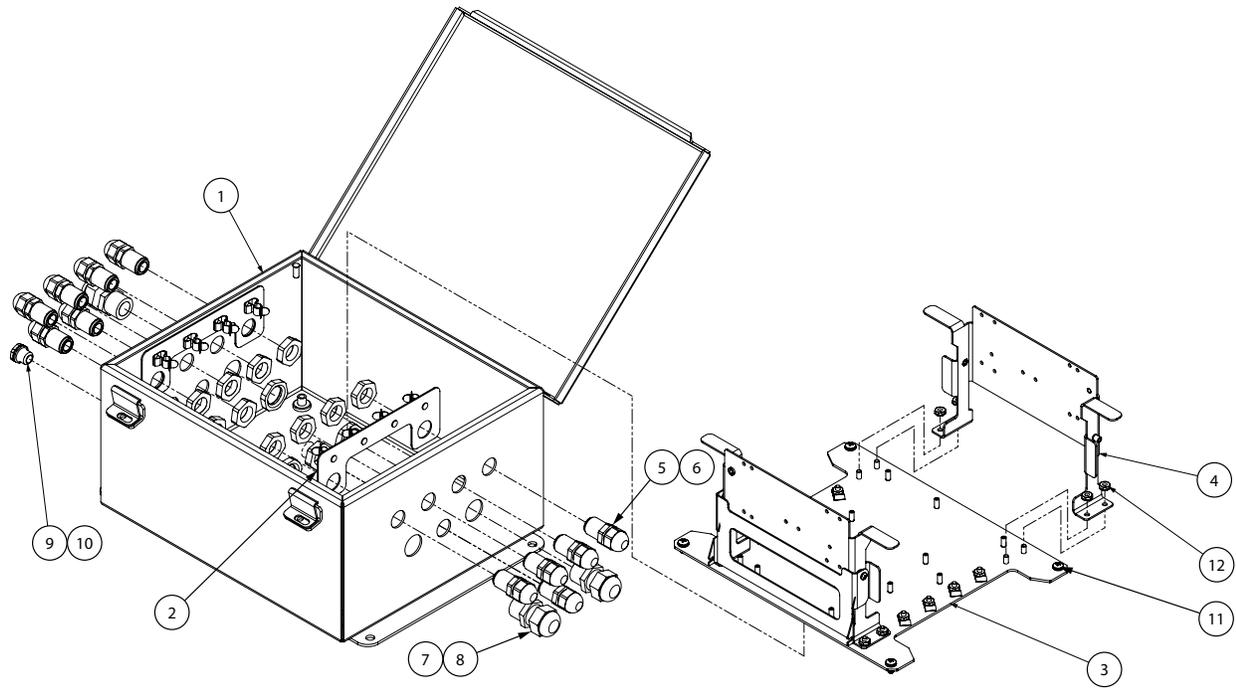

Figure 10-14. Large Polycarbonate Enclosure Parts

Figure 10-15. Stainless Steel Enclosure Parts

		Description	Quantity		
			Polycarbonate, Small Figure 10-13 on page 110	**Polycarbonate, Large** Figure 10-14 on page 110	**Stainless Steel** Figure 10-15 on page 111
1	225386	Enclosure, iQUBE3 Truck Scale, Machined, Polycarbonate, Small, W/4 Screws	1	N/A	N/A
	227456	Enclosure, iQUBE3 Truck Scale, Machined, Polycarbonate, Large, W/4 Screws	N/A	1	N/A
	227737	Enclosure, Truck Scale, iQUBE, Machining Stainless Steel Hoffman 12 x 10 x 6	N/A	N/A	1
2	223940	Ground Shield Bracket, iQUBE3 Cable Mounting	2	N/A	N/A
	227459	Ground Shield Bracket, Cable Mounting, Large iQUBE3	N/A	2	N/A
	227765	Ground Shield Bracket, Cable Mounting, 10 in x 12 in SST iQUBE3	N/A	N/A	2
3	215755	Component Plate, iQUBE3 9.00 x 7.72	1	N/A	N/A
	227457	Component Plate, iQUBE3 11.00 x 9.60	N/A	1	N/A
	227738	Component Plate, Junction Box, iQUBE3, 8-7/8 x 11 in Aluminum	N/A	N/A	1
4	231031	Mounting Bracket Assembly, Power Supply Bracket With Kickstand Bracket, For Small Polycarbonate Enclosure, iQUBE3	2	N/A	N/A
	231032	Mounting Bracket Assembly, Power Supply Bracket With Kickstand Bracket, For Large Polycarbonate Enclosure, iQUBE3	N/A	2	N/A
	227739	Mounting Bracket Assembly, Power Supply Bracket with Kickstand Bracket, for Stainless Steel Enclosure, iQUBE³	N/A	N/A	2
5	15655	Cord Grip, 3/8 NPT	11	16	11
6	15656	Lock Nut, 3/8 NPT	11	16	11
7	15628	Cord Grip, 1/2 NPT Black Clamping Range = 0.197 - 0.472	3	3	3
8	15630	Lock Nut, 1/2-NPT Plastic	3	3	3
9	88733	Vent, Breather Sealed Gortex Membrane Black Plastic	1	1	1
10	88734	Nut, Breather Vent M12 x 1 Thread	1	1	1
11	109526	Screw, Mach 10-32 NF x 3/8 PPH Internal Tooth Washer SEMS ZI	4	4	4
12	14626	Nut, K-Lock 8-32 UNC Steel Zinc Plated	8	8	16
13	58248	Nut, Nyloc 6-32 UNC Steel Zinc Plated	4	4	N/A
14	226522	Screw,Mach 1/4-20 x 5/8, Phillips Pan Head, 18-8 SST Passivated	1	1	N/A
15	34711	Nut, K-Lock 1/4-20 UNC Steel Zinc Plated	1	1	N/A
16	44676	Washer, Bonded Sealing SST 1/4 ID x 5/8 OD	2	2	N/A
17	226521	Bolt, 1/4-20NC x 1 HEX Head Bronze	1	1	N/A
18	14637	Nut, 1/4-20NC HEX Bronze Width Across, Flats=7/16, Thickness=7/32	2	2	N/A
19	31546	Washer, Lock 1/4 Internal Tooth SST	2	2	N/A
20	229378	Retainer Clip, Travel Stop for iQUBE3 Internal Assembly	4	4	N/A

Table 10-4. Enclosure Parts List

RICE LAKE
WEIGHING SYSTEMS

11.0 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 uV/grad at 30 Hz
0.5 uV/grad at 100 Hz
1.2 uV/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