

Tracer AVi

Aviation Baggage Instrumentation

v2.0

Installation Manual



Contents

Contents	i
About This Manual	1
1.0 Introduction	1
2.0 Installation	2
2.1 Unpacking and Assembly	2
2.2 Enclosure Security/Disassembly	2
2.3 Mounting the iQube and Remote Display	2
2.4 Cable Connections	2
2.5 Load Cells	2
2.6 Serial Communications	3
2.7 Core Module DIP Switches	4
2.8 Core Module Reset Procedure	4
2.9 The Power Supply	4
2.10 Fuse Replacement	4
2.11 Interface Cables	4
2.12 Replacement Parts and Drawings	5
3.0 PC Configuration	7
3.1 Introduction to VIRTUi	7
3.1.1 Authentication/Authorization System	8
3.1.2 Communication	10
3.1.3 Function Keys and Annunciators	10
3.1.4 VIRTUi Operations	10
3.1.5 Web Browser-Based Cell Status	11
3.1.6 System Requirements	11
3.2 VIRTUI Configuration	12
3.2.1 Downloading to the Tracer AVi	12
4.0 Calibration	13
5.0 Diagnostics	16
5.1 Diagnostic Tests	16
5.2 Diagnostic Setup	16
6.0 Specifications	17
Tracer AVi Limited Warranty	18



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

About This Manual

This manual is intended for use by service technicians responsible for installing and servicing the *Tracer AVi* single channel diagnostic junction box and bagwell display.



Authorized distributors and their employees can view or download this manual from the Rice Lake Weighing Systems distributor site at www.ricelake.com.

1.0 Introduction

The *Tracer AVi* system consists of three components:

- *iQube*[™], a digital programmable junction box used with an analog load cell. It outputs a serial string that can be directly input to the remote display and *VIRTUi*.
- RD-1 remote display, a .8", six-digit, seven-segment LED display.
- *VIRTUi*[™], a PC-based indicator for *iQube*. The virtual front panel consists of display and five-button keypad.

The *iQube* consists of three boards:

- The *connector board* provides the physical connections for the load cell, serial communications, and power.
- The *core module*, which plugs into the connector board, contains the *Tracer AVi*'s processor and stores configuration and calibration data for the *Tracer AVi*. The core module provides a discrete A/D input and converts the analog load cell signal to a digital serial output.
- The *7.5 VDC power supply* mounts inside the enclosure and requires a 115/230 VAC input.

Configuration

The *Tracer AVi* system can be configured by using a PC running the *VIRTUi* configuration program. This method defines the load cell connected to *iQube*, which is associated with a platform, and the platform that makes up the scale. Even though the single-channel *iQube* is just one cell, one platform, and one scale; the association of scale and platform is required because the software is also used on multiple cell and multiple platform scales.

Configuration consists of the following steps:

Define Load Cell: This is the electrical sensitivity (mV/V output) and capacity specification of the load cell. Load cell name and serial number can also be specified.



Warning

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

The *Tracer AVi* does not have an on/off switch and therefore must be installed near a power outlet that is easily accessible and in accordance with UL/CSA Safety Standards.

Define Platforms: The *iQube* board must assign a load cell to the platform.

Define System: The *iQube* board must assign the platform to the system.

Load Cell Trimming and Calibration

iQube supports calibration of multiple load cells with corner match and section match calibration.

For the single cell *iQube*, only multi-point linear calibration and theoretical calibration apply. Each type of calibration captures the initial dead load of the scale and provides a means to trim the output of the load cell.

Based on the cell capacity and sensitivity, the theoretical calibration calculates weight values based on the total signal from the cell.

Single Cell Diagnostic

Diagnostic functionality can be enabled for the *iQube* to identify abnormal load cell output. The diagnostic conditions that can be identified are open bridge open channel, drifting, peak-to-peak noise, cell at rail, and cell over/under range.

Error conditions generate a displayed error message if connected to *VIRTUi* which can be configured to email the alert message to an address.

2.0 Installation

This section describes procedures for connecting load cell, power, and serial communications cables to the *iQube*™ enclosure. Drawings and replacement parts lists are included for the service technician.



Caution

Use a wrist strap to ground yourself and protect components from electrostatic discharge (ESD) when working inside the *iQube* enclosure.

Disconnect AC power from the main module before installing remote displays.

2.1 Unpacking and Assembly

Immediately after unpacking, visually inspect the contents to ensure all components are included and undamaged. The shipping carton should contain the *iQube*, the remote display, and connection cables. If any parts were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately.

See Table 2-4 on page 4 for information on the *iQube* cables.

2.2 Enclosure Security/Disassembly

After an NTEP inspector has examined the unit, he/she will install security cables pictured in Figure 2-1. These cables prevent the *Tracer AVi* from being tampered with by an unauthorized individual. If these cables are removed, NTEP certification will become void.

If the *Tracer AVi* enclosure must be opened by an authorized technician, ensure power is disconnected, then place it on an anti-static work mat. Cut the tamper-proof cables, remove screws, and remove the enclosure's cover. An NTEP inspector will have to examine the unit and attach new security cables.



Figure 2-1. Security cables installed

2.3 Mounting the *iQube* and Remote Display

The *iQube* and remote display are two separate components. The main board is installed in the *iQube*. All components can be installed in separate locations.

The *iQube* can be placed either upright or on its side. Mounting hardware is not included in the parts kit.

2.4 Cable Connections

The single channel *iQube* provides one load cell connector, two remote display connectors, one host (PC) com port connector for connecting to the PC running *VIRTUi*, and an AC power cord.

2.5 Load Cells

The load cell wired to connector J3 in the *iQube*, is assigned a default name A1. J3 is wired to a DB-9 on the enclosure panel.

Load Cell Wiring

To attach the load cell cable to the connector board, plug the cable into external connector (see Figure 2-6 on page 6).

Wire load cell cables as shown in Table 2-1.

DB-9 Pin Female Connector	On-Board Connector (J3)	Function
7	1	+SIG
3	2	-SIG
4	3	+EXC
6	4	-EXC
5	5	SHIELD

Table 2-1. Load Cell Connector Pin Assignments

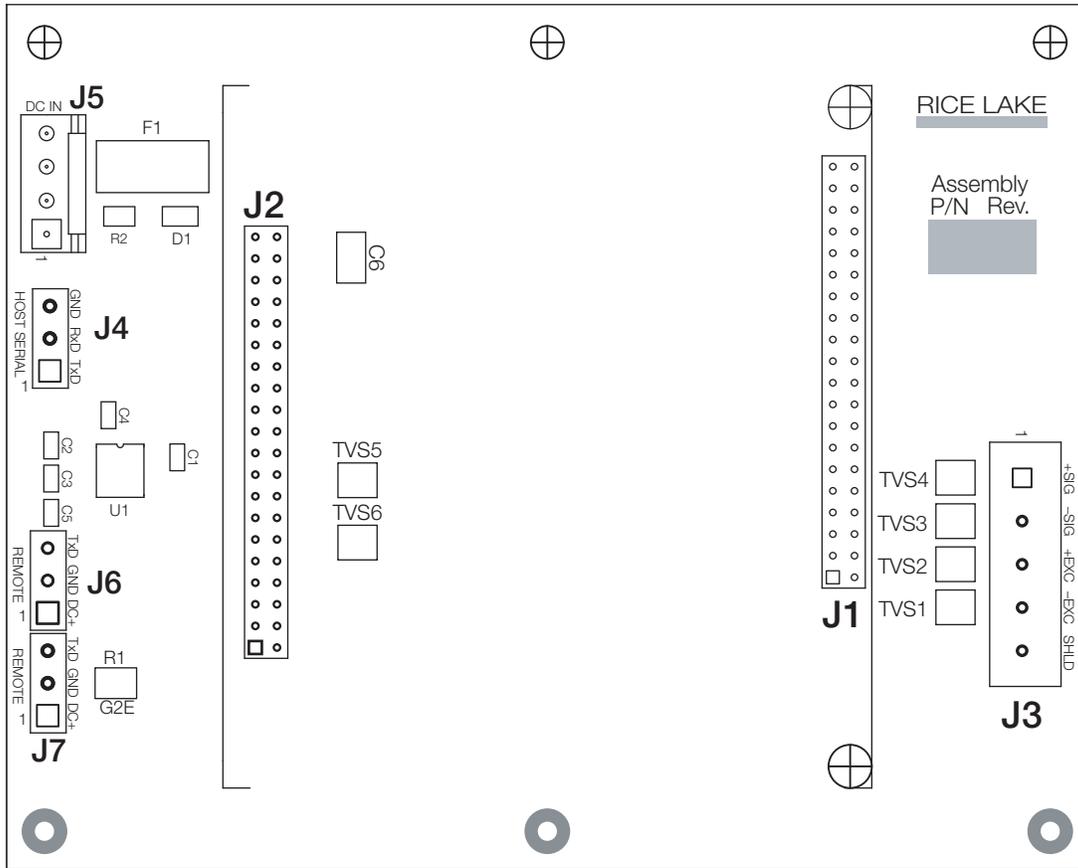


Figure 2-2. *iQube Connector Board with Core Module*

2.6 Serial Communications

The J4, J6 and J7 serial communications ports on the *iQube* connector board support communications between the *iQube* and a host device (PC and/or remote display.)

- Port J4 supports full-duplex RS-232 communications between the *iQube* unit and a host device.

Port J6 and J7 are used to connect to the remote display(s).

To attach serial communications cables, plug cable into the external DB-9 connectors labeled Remote Display.

Table 2-2 shows the pin assignments for connectors J4, J6, and J7.

Connector	DB-9 Pin	Pin	Signal
J4 (Host Com)	Male 2	1	TxD
	Male 3	2	RxD
	Male 5	3	Gnd
J6 (Remote)	Female 1	1	DC+
	Female 2	2	GnD
	Female 9	3	TxD
J7 (Remote)	Female 1	1	DC+
	Female 2	2	GnD
	Female 9	3	TxD

Table 2-2. *Serial Port Pin Assignments*

Communications Cable Distance Limitations

The maximum cable lengths that can be used for various communications types depend on a number of factors. These include: output impedance of the transmitter; electrical noise in the environment; cable capacitance, gauge, termination, and shielding.

Given that these and other factors will affect the maximum usable cable length, the following distances can be used as a general guide for *iQube* communications cabling (10 ft cable is provided):

RS-232: 50 ft (15 m)

2.7 Core Module DIP Switches

The DIP switches on the *iQube* core module must be set to configure the *iQube* as a primary or secondary unit, and to specify the type of serial communications provided by the unit. Table 2-3 lists the DIP switches and their functions.

Switch	Function	Values
1-3	Primary	OFF, OFF, OFF = PRIMARY
4	Setup enable	ON = setup enabled
5	Host communication protocol	OFF = RS-232
6	Host communication port	OFF = Port J7
7	Reserved	OFF
8	Load default	OFF

Table 2-3. Core Module DIP Switch Settings

2.8 Core Module Reset Procedure

If *VIRTUi* does not recognize the connection to the load cell, the core module may need to be reset to initialize the *iQube* firmware.

To reload the default firmware into the *iQube* core module, do the following:

1. Power-off the *iQube*. Remotely powered units can be powered off by temporarily removing fuse F1 (see Figure 2-2 on page 3).
2. Set core module DIP switch 8 ON.
3. Power-on the *iQube*.
4. Power-off the *iQube*.
5. Set DIP switch 8 OFF.
6. Power-on the *iQube*. The reset is now complete.

2.9 The Power Supply

The internal power supply provides 100-240 VAC, 50-60Hz, Output 7.5 VDC.

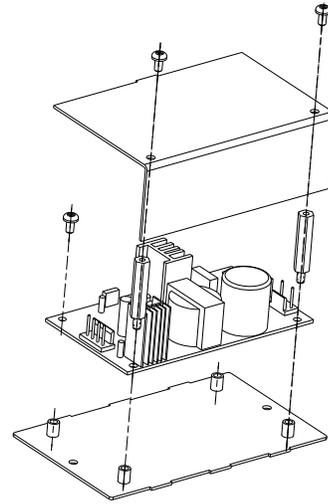


Figure 2-3. *iQube* 7.5V Power Supply

2.10 Fuse Replacement

Fuse F1 on the *iQube* connector board (see Figure 2-2 on page 3) provides protection for power supplied to the connector board and core module at connector J5. Fuse F1 is poly resettable and does not need replacement. See Section 6.0 on page 17 for complete fuse specifications.

2.11 Interface Cables

Table 2-4 lists the cables for the *iQube*.

PN	Description
50749	Cable for com port to PC
72704	RS-232/USB connector
93563	Cable for remote display

Table 2-4. *iQube* Cables

2.12 Replacement Parts and Drawings

Table 2-5 lists replacement parts for the *Tracer AVi*.

PN	Description (Quantity)
104859	Bracket, 25 Watt Power (1)
104860	Enclosure, Formed <i>iQube</i> (1)
104861	Cover, Formed <i>iQube</i>
104862	End Plate, Power Supply (1)
105068	End Plate, Labeled (1)
14839	Screw, Machined 6-32NC x 1/4 (14)
54206	Screw, Machined 6-32 x 3/8 (4)
93552	Connector board (1)
93553	<i>iQube</i> core module (1)
76556	Power supply (1)
93213	Remote display enclosure, front (1)
93214	Remote display, back (1)
93561	Remote display CPU board (1)
93215	Display lens (1)
93633	Installation manual (1)

Table 2-5. Replacement Parts

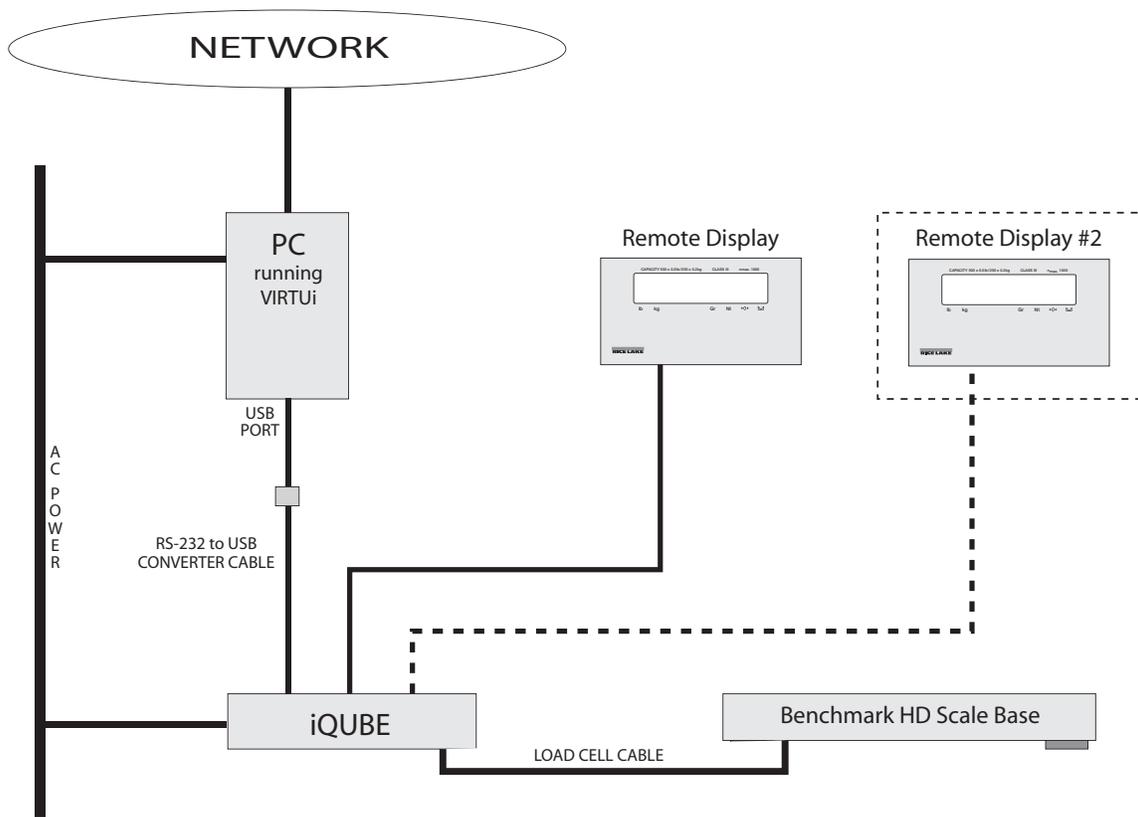


Figure 2-4. System Configuration

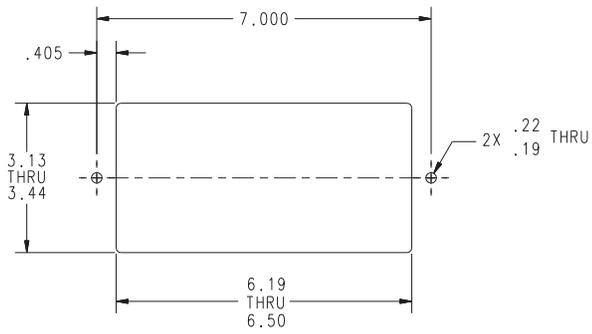


Figure 2-5. Remote Display Cutout

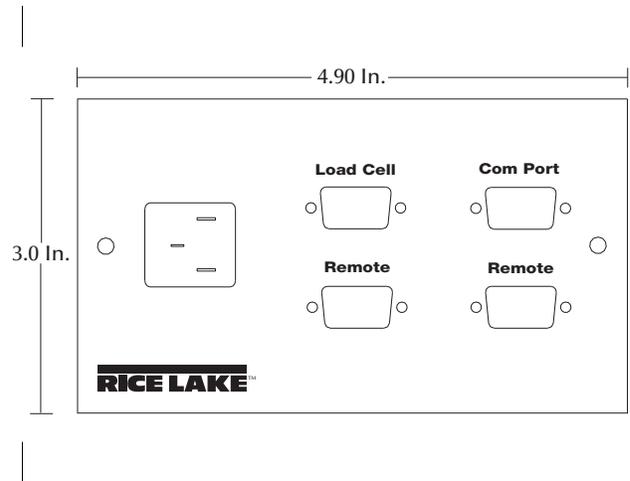


Figure 2-6. iQube Cable Connections

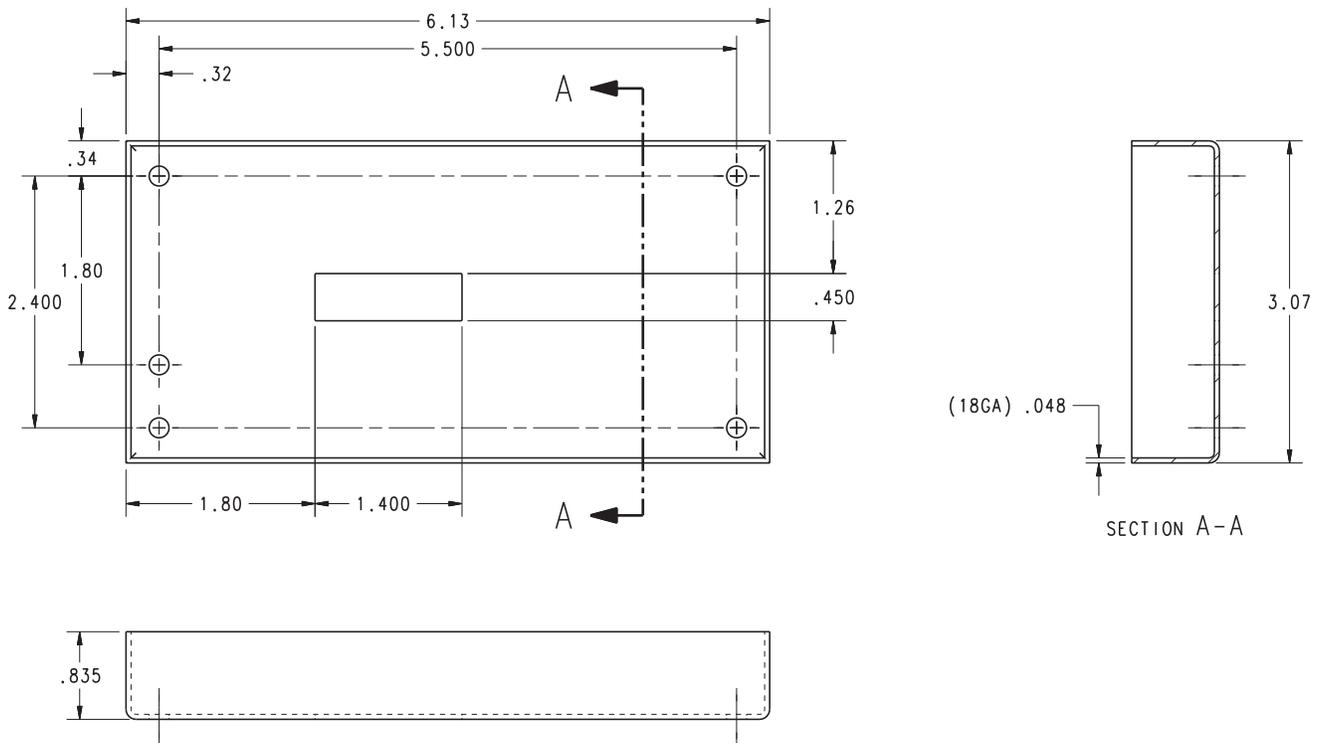


Figure 2-7. Remote Display Drawing

3.0 PC Configuration

The *iQube*™ can be configured using a PC running *VIRTUi*.

3.1 Introduction to VIRTUi

VIRTUi is a PC-based virtual indicator designed to replicate the form and function of a single function indicator. The virtual front panel consists of a display and five-button keypad. Keys are activated by a mouse click. Features included:

- Electronic data processing (EDP) port for full-duplex, RS-232 communications up to 57600 bps
- Printer port for output-only, RS-232 communications up to 57600 bps



Figure 3-1. *VIRTUi* Main Screen

VIRTUi is NTEP-Certified for Classes III and III L at 10,000 divisions

NOTES:

To send and receive commands from *VIRTUi* using HyperTerminal:

1. Open HyperTerminal on the PC
2. Connect to “localhost” on port 20355 using TCP/IP

By default, *VIRTUi* is always the top window within Windows®. This is required by NTEP to ensure the weight is visible at all times. This can be changed in the Application Settings if Legal-for-Trade requirements are **not** necessary.

Auto-Update Feature

If connected to the Internet, *VIRTUi*'s Auto-update feature will automatically download updates to the program. The auto-update feature will only function if the user is logged in to Windows as “Administrator” and/or if the user has “write” access to the application installation directory.

3.1.1 Authentication/Authorization System

The User Manager is a security feature of *VIRTU*i and is used to set up *VIRTU*i users, their “roles” and the permissions for those roles. The User Manager for authentication/authorization can be found under the File menu. After installing *VIRTU*i, the user must logon as “Administrator” to access the User Manager.

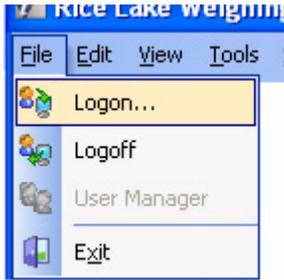


Figure 3-2. Logon



Figure 3-3. Username and Password

Certain *VIRTU*i functions can be disabled for particular users, or roles. Only the Administrator can configure the User Manager.

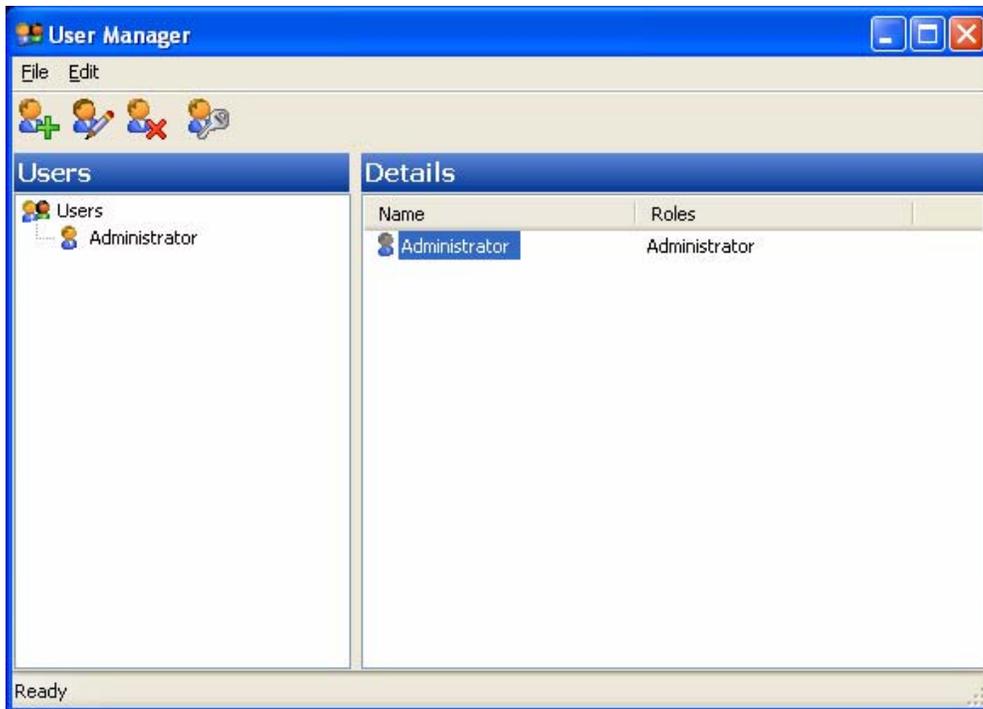
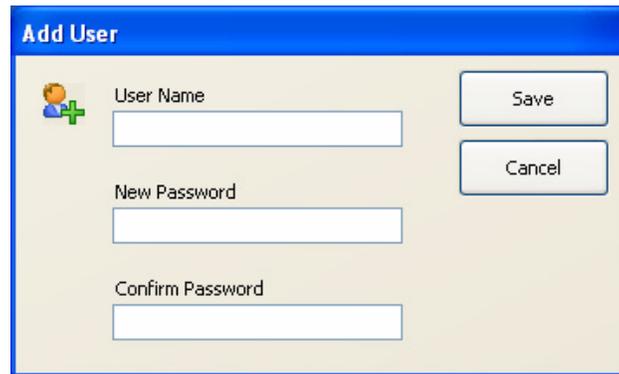


Figure 3-4. User Manager

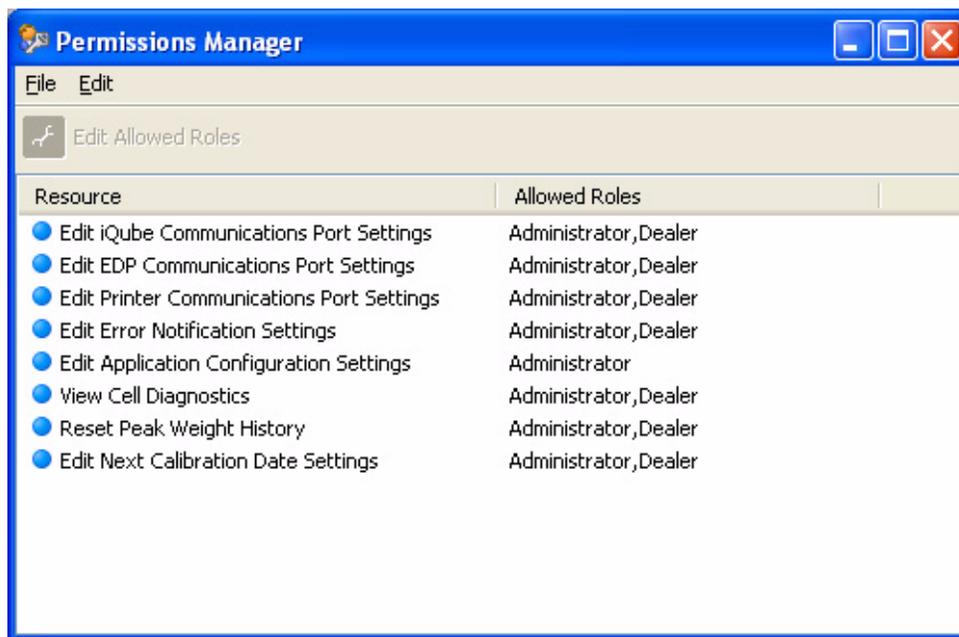
To add a new user, a user name and password must be configured.



The 'Add User' dialog box features a blue title bar with the text 'Add User' and a small icon of a person with a plus sign. Below the title bar, there are three text input fields: 'User Name', 'New Password', and 'Confirm Password'. To the right of these fields are two buttons: 'Save' and 'Cancel'.

Figure 3-5. Add User

Using the Permissions Manager, resources and allowed roles can be configured for each role.



The 'Permissions Manager' window has a blue title bar with the text 'Permissions Manager' and standard window control buttons. Below the title bar is a menu bar with 'File' and 'Edit'. A toolbar contains an icon of a wrench and the text 'Edit Allowed Roles'. The main area is a table with two columns: 'Resource' and 'Allowed Roles'. The table contains eight rows of data, each with a blue circular icon to the left of the resource name.

Resource	Allowed Roles
• Edit iQube Communications Port Settings	Administrator, Dealer
• Edit EDP Communications Port Settings	Administrator, Dealer
• Edit Printer Communications Port Settings	Administrator, Dealer
• Edit Error Notification Settings	Administrator, Dealer
• Edit Application Configuration Settings	Administrator
• View Cell Diagnostics	Administrator, Dealer
• Reset Peak Weight History	Administrator, Dealer
• Edit Next Calibration Date Settings	Administrator, Dealer

Figure 3-6. Permissions Manager

3.1.2 Communication

The steps in this section summarize how to configure *VIRTUi* to communicate with the *iQube* and a remote display.

1. With the PC and *iQube* connected and the *VIRTUi* program running, select *Communications Settings* from the *Settings* menu.
2. Select *iQube Port* in the left section of the screen under the *Communications* folder.
3. Mark the *Streaming Port* checkbox, shown in *Figure 3-6*, and click *Save*.
4. Select *Stream* format in the left section of the screen under the *Communications* folder
5. Select *Rice Lake Extended* from the drop-down box and click *Save*.

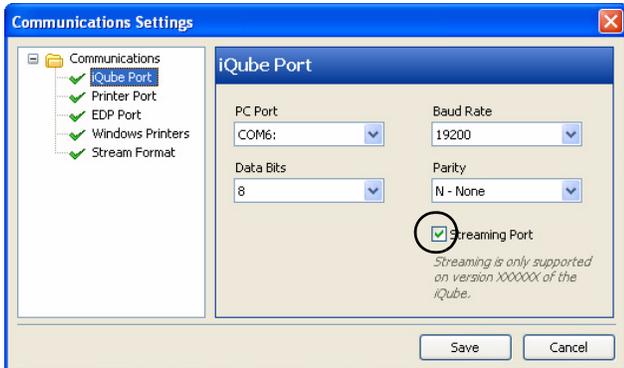


Figure 3-7. *iQube Port*

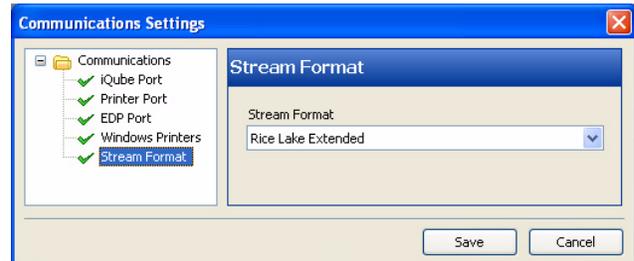


Figure 3-8. *Stream Format*

3.1.3 Function Keys and Annunciators

Function keys and annunciators are summarized in this section.

Function Keys

The function keys below perform the front panel functions via the computer keyboard:

Key	F5	F6	F7	F8	F9
Function	Zero	Gross/Net	Tare	Units	Print

Table 3-1. *Function Keys*

Annunciators

The *VIRTUi* display uses a set of eight annunciators to provide additional information about the value being displayed:

- **Gross and Net** annunciators are lit to show whether the display weight is a gross or net weight
- **Center of Zero:** Gross weight is within 0.25 graduations of zero. This annunciator lights when the scale is zeroed
- **Standstill:** Scale is at standstill or within the specified motion band. Some operations, including tare functions and printing, can only be done when the standstill symbol is shown
- The display units can also be set to **short tons (tn)**, **metric tons (t)**, or **NONE** (no units information displayed). The lb and kg annunciators default as primary and secondary unit annunciators. Changing unit annunciators under the *Settings* menu will also change the annunciators on the *VIRTUi* display.

3.1.4 VIRTUi Operations

This section summarizes the basic operations of *VIRTUi*.

Toggle Gross/Net Mode

Press the **Gross/Net** key to switch the display mode between **Gross** and **Net**. If a tare value has been entered or acquired, the net value is the gross weight minus the tare. **Gross** mode is shown by the **Gross** annunciator; **Net** mode is shown by the **Net** annunciator.

Zero Scale

1. In gross mode, remove all weight from the scale and wait for the standstill annunciator.
2. Press the Zero key. The Center of Zero annunciator lights to indicate the scale is zeroed.

Acquire Tare

1. Place container on scale and wait for standstill annunciator.
2. Press the TARE key to acquire the tare weight of the container. The indicator switches to net mode.

Remove Stored Tare Value

1. Remove all weight from the scale and wait for the standstill annunciator.
2. Press the TARE key. The indicator switches to gross mode, indicating the tare value has been removed.

Print Ticket

1. Wait for standstill annunciator.
2. Press the Print key to send data to the serial port.

3.1.5 Web Browser-Based Cell Status

iQube load cell status can be reported via a standard web browser. A “http://localhost:5050” URL is used to view the status page. “Http” must be included as it is not inferred, and “localhost” can be replaced with the appropriate IP address or domain name.

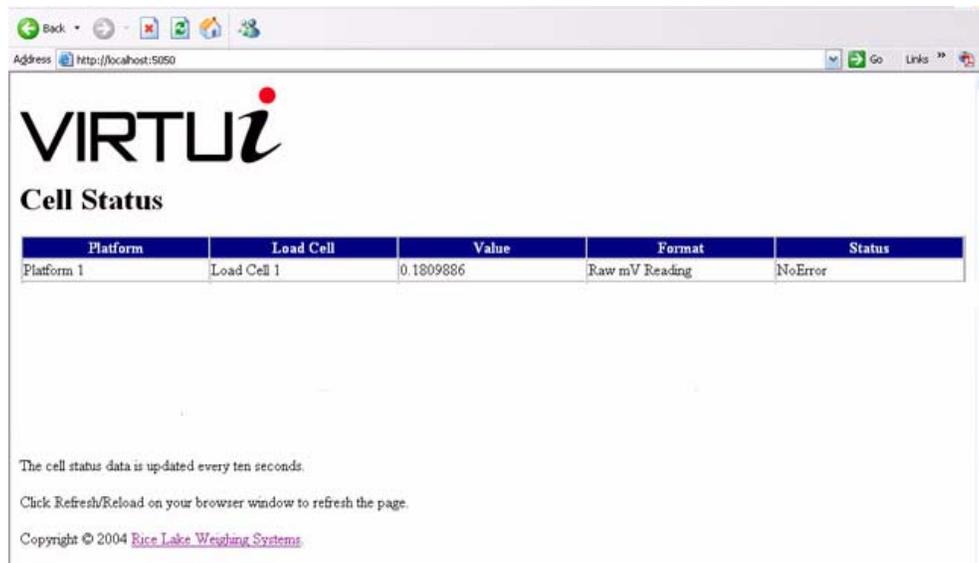


Figure 3-9. Cell Status

3.1.6 System Requirements

Minimum

- Windows 98 or greater
- Internet Explorer 5.5 or greater
- .NET Framework 1.1
- 64 MB RAM
- 30 MB free hard drive space
- Serial port connection for connection to *iQube*

Additional serial ports are required for connection to printers/remote displays.

Recommended

- Windows 2000 or greater
- Internet Explorer 6.0 SP1
- .Net Framework 1.1
- 128 MB RAM
- 30 MB free hard drive space
- Serial port for connection to *iQube*

Additional serial ports are required for connection to printers/remote displays.

3.2 VIRTUI Configuration

VIRTUI can be used to set *iQube* configuration parameters. When configuration is complete, data is downloaded to the *iQube*.

To configure the *iQube* using VIRTUI:

1. With the PC and *iQube* connected and the VIRTUI program running, select *iQube Configuration* from the *Settings* menu.



Figure 3-10. VIRTUI Tracer AVi Display

2. Select the **Cells** display. Use this display to select the load cell used in the *Tracer AVi* system by checking the box to the left of the cell. Enter load cell data such as factory sensitivity, serial number, and capacity on the General Information sheet for the cell.
3. Select the **Platforms** display. The cell that was checked on the **Cells** screen is now listed as Available Load Cell for the *iQube*.
4. Click on **Platform 1**.
5. Double-click on the load cell to move the cell into the Assigned Load Cell column for Platform 1. As the cell is added to the Assigned Cell column, a Section Format Diagram is displayed at the bottom of the screen.
6. Select the **Systems** display.
7. Click on **System 1**.
8. Platform 1 is now shown in the Assigned Platforms field. Click the **Platform 1** box to assign Platform 1 to System 1. Use the General display to enter scale system parameters.

3.2.1 Downloading to the Tracer AVi

Once configuration is complete, you must download the configuration data from the PC to the *iQube*.

1. Select *Send Configuration* to write the values to the *iQube*.
2. Click **Begin** to initiate the download. Downloading may take up to 30 seconds.

4.0 Calibration

VIRTUi Calibration

With the *iQube* connected to a PC running the *VIRTUi* program, do the following:

1. From the *Settings* menu, select *Calibration* then *Multi-Point*.

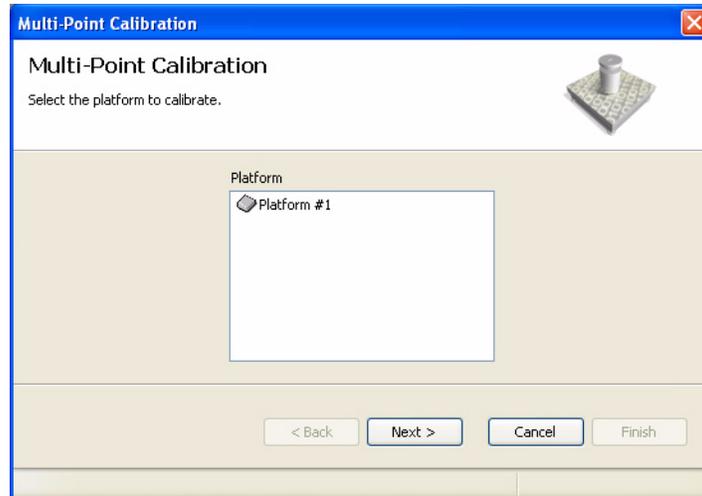


Figure 4-1. Platform Selection

2. Remove all weight from the scale platform. Click on **Calibrate**. The word *Transmitting* is displayed while the zero value is calculated. This process can last up to 45 seconds.

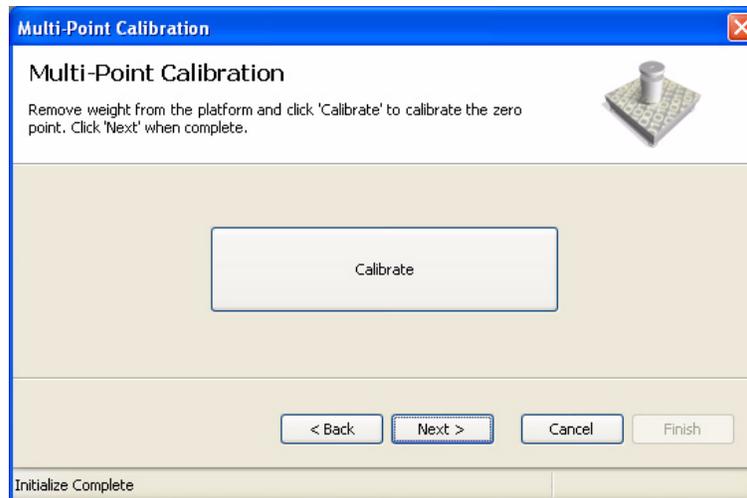


Figure 4-2. Calibration

3. Enter the test weight value in the *Calibration Weight* field. You are now ready to measure the load cell output using the Multi-Point procedure.

- Place the test weight over the cell to be measured.

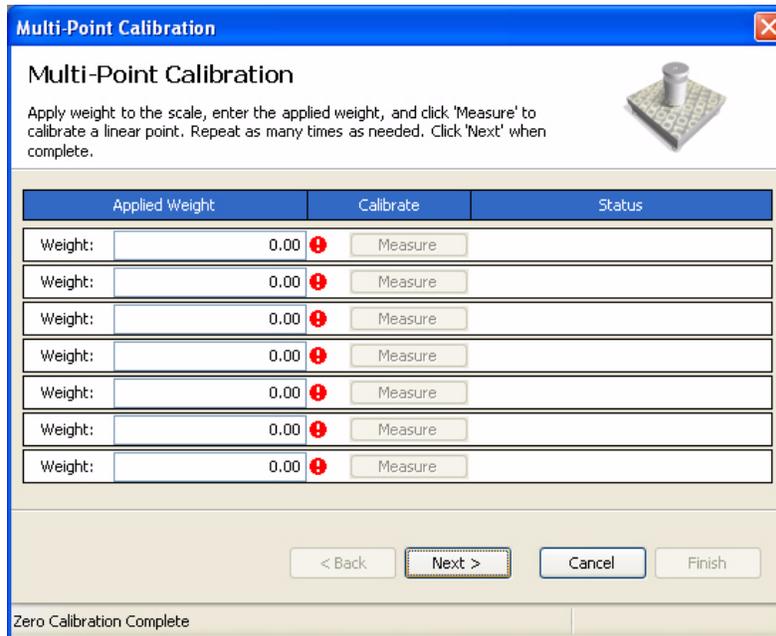


Figure 4-3. Multi-Point Calibration

- Click the first Measure box.

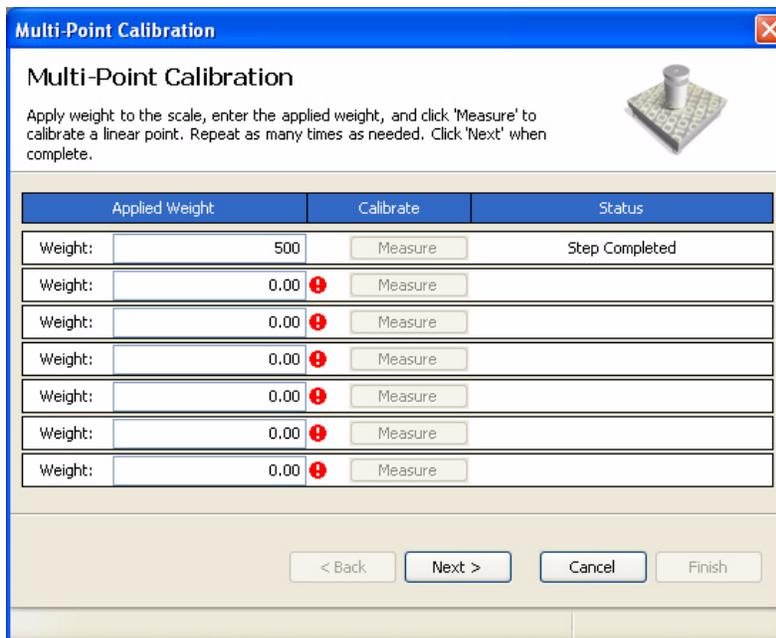


Figure 4-4. Step Complete

6. Click **Finish**. Multi-Point automatically calculates the load cell trim factor.

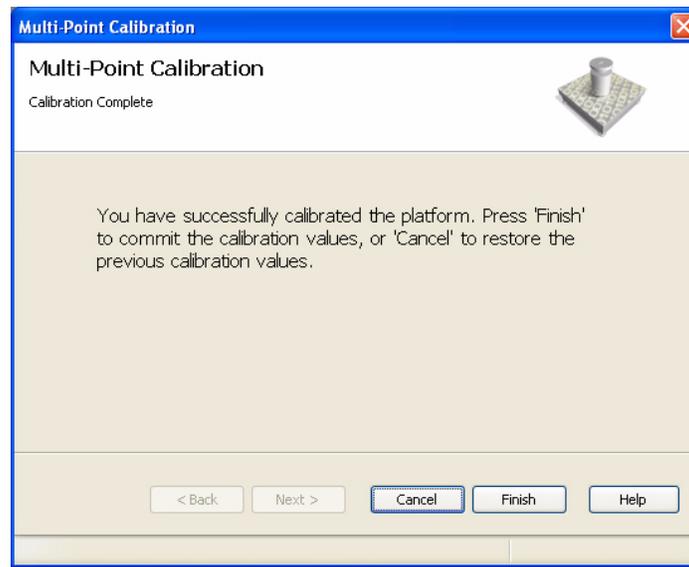


Figure 4-5. Calibration Complete

7. Click **Exit**.

iQube calibration is complete. You can view the active status of the cell, platform, or system by returning to the *Tools* menu and selecting *Cell Diagnostic Monitor*. Click on the **Auto Refresh** box to automatically update the readings from the *iQube*.

5.0 Diagnostics

5.1 Diagnostic Tests

The *iQube* provides a number of diagnostic tests, including boundary, weighing, and system tests.

5.2 Diagnostic Setup

Parameters associated with each of the *iQube*'s diagnostic tests can be set using *VIRTUi*.

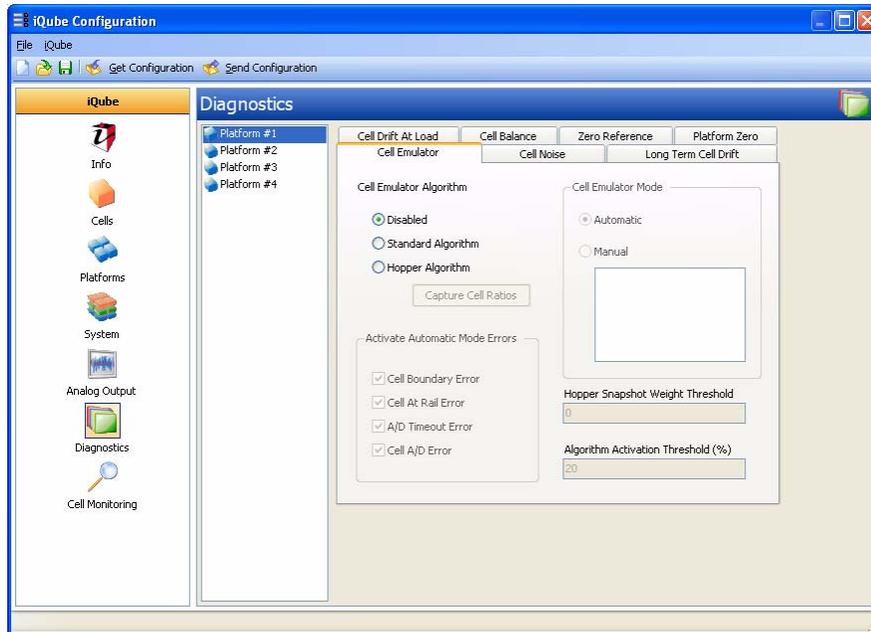


Figure 5-1. VIRTUi Diagnostic Setup Display

6.0 Specifications

Power

Auto-Ranging Input 100-240 VAC, 50-60 Hz
1-channel, 350 Ω load cell 75 mA (0.563 W)

A/D Specifications

Excitation Voltage 4 VDC (+4V and ground, single-sided)
Analog Signal Input Range -11.7 mV to +27.3 mV
A/D Sample Rate 15 Hz

Serial Communications

J4 Port Full duplex RS-232
J6 Port Simplex RS-232
J7 Port Simplex RS-232

Environmental

Operating Temperature -10 to +40°C (14 to 104°F)
Storage Temperature -10 to +70°C (14 to 158°F)
Humidity 0-95% relative humidity

Weight

1.5 lbs

Enclosure

Enclosure Dimensions 4.9" W x 3.0" H

Certifications and Approvals



NTEP
CoC Number 03-032
Accuracy Class III/IIIL n_{max} : 10 000

Tracer AVi Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for two years.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

- Upon discovery by Buyer of such nonconformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, *Protecting Your Components From Static Damage in Shipment*, available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

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