

RF Service Tool Operator's Guide





COMPUTER PROCESS CONTROLS
1640 Airport Road, Suite 104
Kennesaw, GA 31044

Phone: (770) 425-2724
Fax: (770) 425-9319

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READ ALL INSTRUCTIONS CAREFULLY

If the equipment is not used in the manner specified by the manufacturer, the protection provided by the equipment may be impaired.

SAVE THIS INSTRUCTION MANUAL

This instruction manual contains important operating instructions for the Verifresh RF Sensor System.

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1 The RF Service Tool



Figure 1-1 - The RF Service Tool

The RF Service Tool (P/N 811-1000) is a device that allows you to easily troubleshoot VeriTemp sensors, VeriFresh Product Simulators, and the Receiver Bus network used to interconnect the VeriFresh Receivers, the VeriFresh Gateway, and the site controller(s). The tool uses a receiving antenna much like the one in the VeriFresh Receiver but in a portable enclosure that can be used on the store floor. The display allows you to view data from field-mounted sensors, including temperatures, sensor ID numbers, and update counts.

1.1. Powering the RF Service Tool

The RF Service Tool may be powered either by an external 9VDC adapter (supplied with the RF Service Tool) or by an internal 9V battery.

To use the RF Service Tool under battery power, open the battery door on the rear of the tool enclosure, attach a 9VDC battery to the connector, and close the battery door. Move the switch on the front of the unit to the “BATTERY POWER” position to turn it on.

To operate the RF Service Tool under external power, open the battery door and remove the battery from the unit (if one is present). Move the switch on the front of the unit to the “EXTERNAL POWER” position. Plug the adapter into the plug at the bottom of the unit.

When the unit is powered up and functional, the LCD screen will show the first screen of RF Test Mode, and the orange LED labeled STATUS (on the bottom left of the screen, just under the display) will glow orange with no flashing.

1.2. Testing RF Sensors Using the RF Service Tool

The RF Service Tool can troubleshoot problems with VeriTemp and VeriFresh Product Simulator sensors. The antenna at the top of the RF Service Tool functions in much the same way as a VeriFresh Receiver, and can read service pin transmissions, temperatures, and the states of any defrost termination, dual temp, or other digital sensors connected to its digital input.

The default mode for the RF Service Tool is the RF Test Mode. When you first power up the RF Service Tool, the screen will show the first screen of the RF Test Mode (see below).

```
RF TEST    PIN
CODE: 00000000
```

From this screen, follow the instructions below to begin testing RF Sensors.

1.2.1. Commissioning The Sensor in the RF Service Tool

The RF Service Tool may only test one RF sensor at a time. Before the tool can read any values from a sensor, that sensor must first be commissioned in the RF Service Tool, much like they must be commissioned in the VeriFresh Gateway. Only the 'service button' method of commissioning is supported by the RF Service Tool.

1. Make sure the RF Service Tool's screen shows the RF TEST screen, indicating the unit is ready to receive the service button signal.
2. Press the SERVICE button of the sensor or product simulator you wish to test. If received, the "CODE:" line of the RF Service Tool's display will show that sensor's ID number.

```
RF TEST    PIN
CODE: 000014125
```

Look for the sensor's ID label (on the exterior of the sensor housing), and verify the number shown in the "CODE:" field is the same number as the sensor. If the numbers match, the sensor has been properly commissioned. If the numbers do not match, either someone in the store was pressing a service button on a different sensor at the same time, or a sensor somewhere in the store has a stuck service button.

When the sensor has been commissioned in the RF Service Tool, it will be ready to read sensor value transmissions from that sensor.

1.2.2. RF-AV and RF-DV Test Screens

You can view the status of the analog and digital inputs for the VeriTemp sensor or Veri-Fresh Product Simulator you just commissioned in the RF-AV and RF-DV test screens. To cycle between the RF-TEST, RF-AV, and RF-DV test mode screens, press and hold the Test Mode button on the front of the unit for one second, then release. The display will cycle to the next screen when you release the button.

1.2.2.1. The RF-AV Screen

```
0000014125 RF-AV
CNT:0      T:75.5
```

This screen shows the last transmitted temperature value of the sensor you commissioned, in degrees Fahrenheit. The RF Service Tool will receive each new transmission sent by the sensor and update both the temperature (shown in the 'T:' field) and the update count (shown in the 'CNT:' field). Every time the unit receives an update from the sensor, the red LED labeled "RF SIGNAL" (bottom center of the screen, just below the display) will flash once.

You can force the sensor to send an update to its temperature by pressing the service button quickly. You should see the RF SIGNAL light flash on the RF Service Tool, followed by the new temperature being displayed on the screen and the update count incrementing by one.

1.2.2.2. The RF-DV Screen

```
0000014125 RF-DV
CNT:2      D: OFF
```

This screen shows the last transmitted digital value of the spare digital output on the VeriTemp sensor or VeriFresh Product Simulator (if one is present). This will either show the OFF/ON status of the clean switch (for the VeriFresh Product Simulator and the 809-3542 or 809-3544 Veri-

Temp sensors) or the digital defrost termination sensor (for the 809-3550 and 809-3552 Veri-Temp sensors). The RF Service Tool will receive each new transmission sent by the sensor and update both the digital state (shown in the 'D:' field) and the update count (shown in the 'CNT:' field). Every time the unit receives an update from the sensor, the red LED labeled "RF SIGNAL" (bottom center of the screen, just below the display) will flash once.

1.2.3. Testing Other Sensors

To test a different sensor, simply press a service pin on the sensor you wish to test with the RF Service Tool. As long as the RF Service Tool is on one of the three screens in RF Test mode (RF TEST, RF-AV, or RV-DV), the new ID number should appear in the display, along with new analog and digital values. When the RF Service Tool receives a new service pin transmission, the update count (CNT) will reset to zero.

Be sure to verify the ID number matches the number on the sensor label.

1.2.4. Using the RF Service Tool in Troubleshooting Sensor Problems

There are many different ways the RF Service Tool can be used in installation of VeriFresh sensors or troubleshoot transmission problems. Below are some examples of useful functions and tests that can be run with the RF Sensor.

Verifying a Sensor Can Transmit. This can be performed after installation of a new sensor or with an old sensor whose value has not been updated in the site controller. Simply pressing the service button to commission the sensor in the RF Service Tool will verify the sensor's transmitter is functioning.

Verifying a Bad Clean Switch or Service Button. If pressing the service button on a sensor does not commission a sensor in the RF Service Tool, the service button may be broken. You can likewise check a clean switch button by

pressing it with the RF Service Tool on the RF-DV screen. If pressing the clean switch button does not cause an immediate transmission of the change of state to the RF Service Tool, the button may be broken.

Verifying an Open, Shorted, or Bad Sensor. You can test a sensor or product simulator's temperature sensing element from the RF Service Tool's RF-AV screen. Press the service button on the sensor and observe the temperature value that shows there. If the temperature value is much hotter or much colder than its actual temperature, the sensor will need to be replaced. It may help to temporarily install a second Veri-Temp sensor in the case to compare the values.

2 Troubleshooting RS485 I/O Networks Using The RF Service Tool

To troubleshoot problems with RS485 Network wiring or setup, the RF Service Tool has an RS485 I/O Test mode that can be used to send test transmissions through the network to see if the site controller can receive them. This mode of operation can be used for any Einstein RS485 I/O or REFLECS COM A & D networks, regardless of whether or not the system is using VeriFresh products.

The Network LED

The most useful application of the RF Service Tool on an RS485 Network is that it will tell you immediately if the network configuration is bad or good. If the RF Service Tool is detecting normal network traffic, the Network LED on the front of the tool will glow GREEN. If the RF Service Tool does not detect any traffic, the Network LED will glow RED.

16AI Virtual Board Emulation

The RF Service Tool can also simulate a single 16AI board with simulated temperature sensors attached to all the inputs. When you set the RF Service Tool to transmit in this mode, you can go to the site controller and attempt to set up the “virtual board” and view its temperature values. Generally, if you can successfully set up the RF Service Tool in this manner from the CPC site controller, then the network connection between the controller and the RF Service Tool is good.

2.1. Wiring the RS485 Network to the RF Service Tool

To use the RF Service Tool in RS485 Network test mode, you must wire the unit in-line with the network daisy chain. Choose any spot on the network where you suspect a problem in the RS485 Network wiring, and wire the RF Service Tool in series with the network. The tool can be inserted in between two devices, or it may be wired to the end of the network to test the entire daisy chain.

Wire the network into the connector at the bottom of the RF Service Tool as shown in *Figure 2-1*. Be sure to follow network polarity (wire positive to positive, negative to negative). If connected at the end of a daisy chain, it is not necessary to terminate the RF Service Tool or unterminate the last network device.

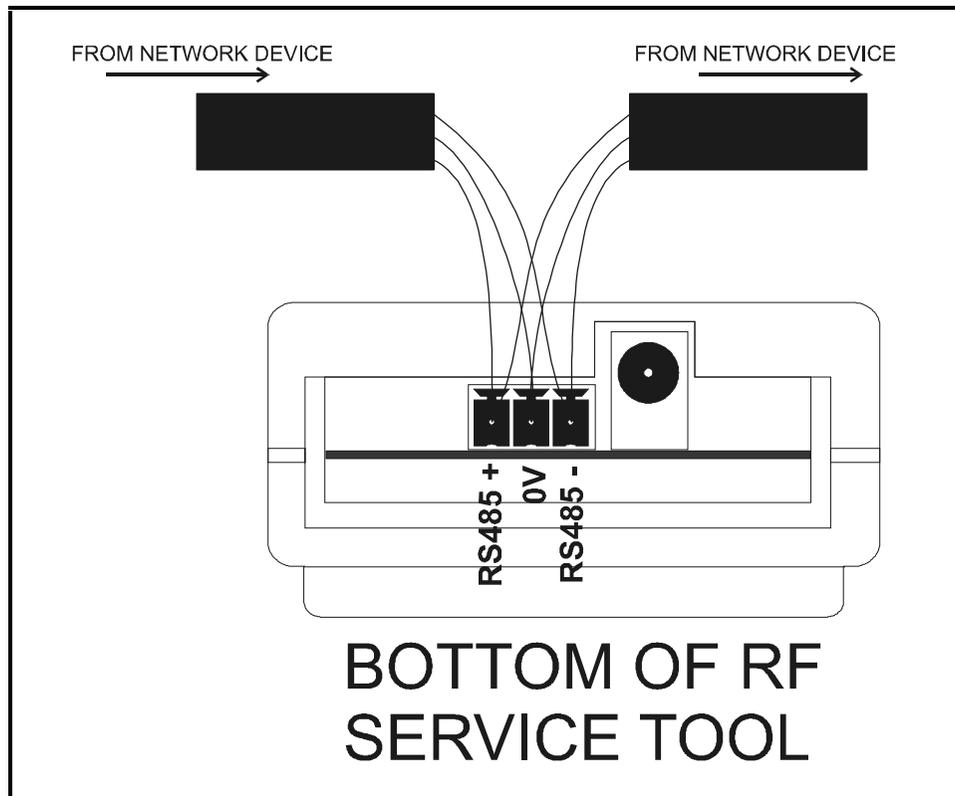


Figure 2-1 - RF Service Tool RS485 Network Wiring

2.2. Reading the Network Status

To begin viewing the network status once the RF Service Tool is properly wired, power up the device and press the Display Select button once. The 485 I/O screen will be displayed.

From this screen, allow the RF Service Tool to sit for about a minute so it can read the network status. If the network is good, the Network LED should glow GREEN almost immediately and stay GREEN. If the network is bad, the Network LED will usually remain OFF for about a minute, then glow RED.

If you get a RED Network LED, the most likely cause is the network path between the RF Service Tool and the site controller is broken. Check all RS485 wiring connections between the tool and the controller (including the connection to the tool itself) for disconnected wires, reversed polarities, or shorts. To determine the location of the problem, you can also re-wire the RF Service Tool to a different part of the network (e.g. closer to the site controller) to isolate the device or connection that is causing the problems.

2.2.1. Viewing 16AI Network Traffic

```
485 I/O  
CNT:0   ADDR: 1
```

To view the 16AI network traffic, navigate to the 485 I/O screen by pressing the Display Select button. From the 485 I/O screen, you can also view network traffic between the site controller and any 16AI Analog Input boards it is communicating with. The “ADDR” field displays the 16AI board number the RF Service Tool is currently listening to messages for. Press the Test Mode button to set the board number you wish to view.

When the Einstein or REFLECS controller sends a message addressed to the 16AI board number that matches the number in the “ADDR” field, the message count indicator (the field on the display labeled “CNT”) will increment. The rate of change in the message count will indicate the level of traffic that involves the chosen 16AI board.

- If the controller and the 16AI board are communicating normally, you will see the CNT field increase at a fast and steady rate (typically 40 or so per minute). This indicates the controller recognizes the 16AI as being online, and is requesting information from it.
- If the 16AI board is set up in the controller’s network configuration but is offline, the CNT field will increase at a much slower rate (a few updates at a time every 5 or so seconds). This indicates the controller is trying to re-establish contact with the board but is not receiving a response.
- If the 16AI board is NOT set up in the controller’s network configuration, you should see no activity whatsoever in the CNT field. The count should remain at zero.

2.3. Transmitting in 16AI Virtual Board Mode

To set the RF Service Tool up on the network in 16AI board emulation mode:

1. Press the Test Mode button to change the number in the “ADDR” field to a 16AI board number not used by any 16AI, 8IO, or other input device on the network.
2. When the ADDR field shows the desired board number, hold down the Test Mode button.
3. With the Test Mode button held down, press the Display Select button until the message “XMIT” appears at the top of the screen.

```
485 I/O XMIT  
CNT:0   ADDR: 1
```

4. Release the Display Select button while continuing to hold down the Test Mode button.
5. Release the Test Mode button.

Note: After following the above steps, if the screen displayed is something other than the 485 I/O screen, you may have accidentally released the Test Mode button before the Display Select button in Step 4. Press the Display Mode key a couple times until the 485 I/O screen is shown again, and repeat the process.

If successful, the display line at the top of the 485 I/O screen should show the message “XMIT,” meaning the RF Service Tool is now emulating a 16AI board with the board number shown in the ADDR field. You may now go to the CPC site controller and attempt to set up the virtual board in the controller’s Network Configuration screen(s). Add the board, and verify in the Network Status screen shows the board as on-line. Refer to your controller’s manual for instructions on how to perform these actions.

2.3.1. Virtual Board Inputs

The input values of the “virtual board” are simulated temperature values. Each point sends a fixed temperature value that is 2°F lower than the previous point, starting with 77°F on point 1, 75°F on point 2, and so on to 47°F on point 16. You may tie these points to inputs or outputs in the controller’s applications to verify the input values are being read correctly.

2.3.2. Turning Off 16AI Virtual Board Mode

To stop transmitting as a virtual 16AI:

1. Hold down the Test Mode button.
2. Press the Display Select button until the “XMIT” message disappears from the screen.
3. Release the Display Select button.
4. Release the Test Mode button.

3 Testing the Receiver Bus Network Using the RF Service Tool

The RF Service Tool has a Receiver Bus Network Test mode for troubleshooting problems with the network that connects VeriFresh Receivers with the VeriFresh Gateway. In this mode, you can view the number of receivers that are on-line, and scan the Receiver Bus Network for specific service pin transmissions.

The Network LED

The most useful application of this tool is that it will tell you immediately whether the Receiver Bus network configuration is bad or good. If the RF Service Tool is detecting normal network traffic, the Network LED on the front of the tool will glow GREEN. If the RF Service Tool does not detect any traffic, the Network LED will glow RED.

Receiver Online Status

When the RF Service Tool is connected to a Receiver Bus network, it can find every VeriFresh Receiver connected to the network and show you whether the receiver is on-line or off-line.

Sensor Value and Service Pin Transmission Monitoring

The RF Service Tool has a “listen” mode that will count the number of sensor value updates sent from the VeriFresh Receivers to the VeriFresh Gateway. In this mode, you can also test whether individual sensors are capable of transmitting to a receiver on the network by pressing the sensor’s service pin.

3.1. Wiring the RF Service Tool to the Receiver Bus Network

To use the RF Service Tool in Receiver Bus Network test mode, you must wire the unit in-line with the network daisy chain. Choose any spot on the network where you suspect a problem in the Receiver Bus Network wiring, and wire the RF Service Tool in series with the network. The tool can be inserted in between two devices, or it may be wired to the end of the network to test the entire daisy chain.

Wire the network into the connector at the bottom of the RF Service Tool as shown in *Figure 2-1*. Be sure to follow network polarity (wire positive to positive, negative to negative). If connected at the end of a daisy chain, it is not necessary to terminate the RF Service Tool or unterminate the last network device.

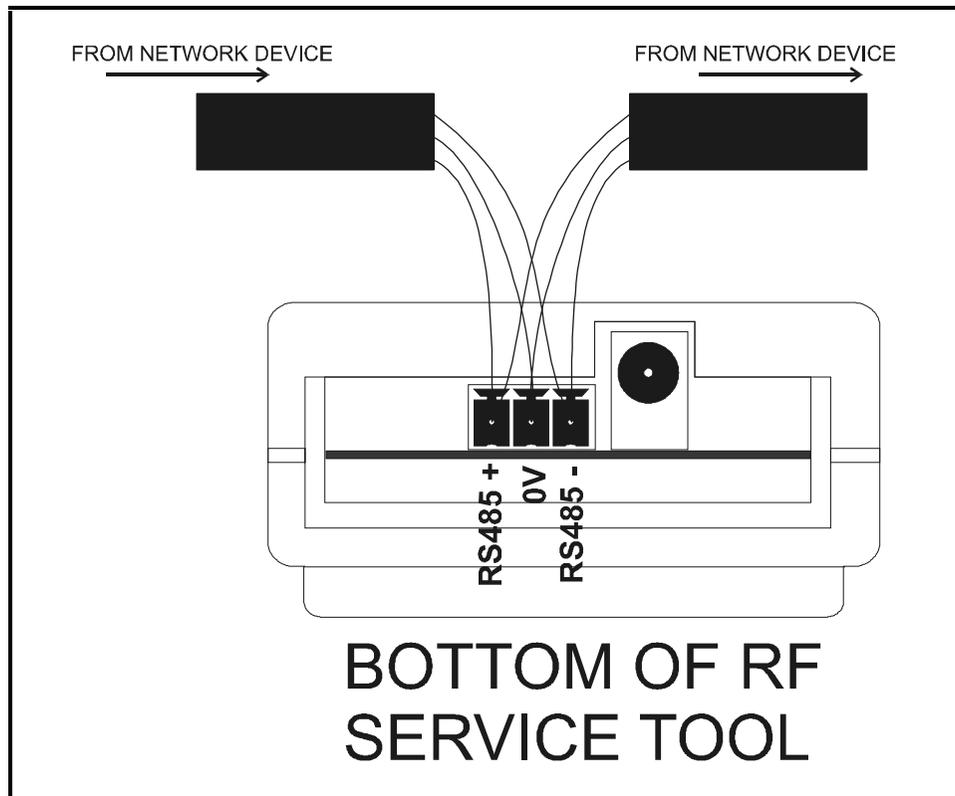


Figure 3-1 - RF Service Tool Receiver Bus Network Wiring

3.2. Reading the Network Status

To begin viewing the network status once the RF Service Tool is properly wired, power up the device and press the Display Select button twice. The 485 RCVR BUS screen will be displayed.

```

485 RCVR BUS BAT
ALL:0      ID: 0
  
```

From this screen, allow the RF Service Tool to sit for about a minute so it can read the network status. If the network is good, the Network LED should glow GREEN almost immediately and stay GREEN. If the network is bad, the Network LED will usually remain OFF for about a minute, then glow RED.

If you get a RED Network LED, the most likely cause is the network path between the RF Service Tool and the VeriFresh Gateway is broken. Check all wiring connections between the tool and the Gateway (including the connection to the tool itself) for disconnected wires, reversed polarities, or shorts. To determine the location of the problem, you can also re-wire the

RF Service Tool to a different part of the network (e.g. closer to the Gateway) to isolate the device or connection that is causing the problems.

3.3. Viewing Network Status of VeriFresh Receivers

To analyze the network for all on-line VeriFresh Receivers, power up the RF Service Tool and press the Display Select button twice to navigate to the 485 RCVR screen (shown).

```
485 RCVR BUS
ALL:0      ID: 0
```

From this screen, press the Test Mode button once. The screen display will change so the top line says “RF RECEIVERS:”. The bottom line of the screen should show a row of numbers that correspond to the network ID numbers of all VeriFresh Receivers currently communicating on the network. For example, if you have four receivers on the Receiver Bus Network numbered 1, 2, 3, and 4, and they are all communicating correctly, you will see the numbers 1 through 4 on the screen, as shown:

```
RF RECEIVERS
1 2 3 4
```

If there are one or more receivers on the network whose numbers do not appear on this screen, that receiver is off-line. Check network and power connections to the VeriFresh Receiver, or replace the receiver if found to be defective.

To exit this screen and return to the 485 RCVR BUS screen, press the Test Mode button again.

the service pin transmission, the RF Service Tool will commission the sensor, reset the ID number

3.4. Monitoring Sensor Activity on the Receiver Bus Network

Though the RF Service Tool can be used to directly receive signal transmissions from VeriTemp and VeriFresh sensors, it is also useful to analyze the Receiver Bus network to verify the sensor transmissions are being received by the VeriFresh receivers and passing them along to the VeriFresh Gateway. This type of analysis may be done from the 485 RCVR BUS screen.

```
485 RCVR BUS
ALL:0      ID: 0
```

The 485 RCVR BUS screen shows two values: an ALL value, and an ID value.

3.4.1. The ALL Value

The ALL value is a count of how many sensor value transmissions have come across the Receiver Bus network. When the RF Service Tool is connected to an active Receiver Bus network, you should see this count increase. The rate of increase will depend on the number of sensors you have on your network.

The ALL value may only be set to zero by turning the RF Service Tool OFF and then ON again.

3.4.2. The ID Value

The ID value is a count of how many transmissions have been received across the Receiver Bus network that match the ID number of the sensor whose service pin was pressed most recently.

To begin monitoring transmissions of a particular sensor’s value across the Receiver Bus network, press the service pin of any sensor within range of a receiver on the network to select a sensor to monitor. If a receiver received to 0, and begin counting the transmissions from this sensor.

Every time the commissioned sensor broadcasts the value of its temperature sensor or digital input, the ID number will increase by one. If a sensor is getting good reception, you should see this count increment at a regular interval equivalent to the sensor's transmission rate (usually every 3 minutes, but possibly more or less depending on the sensor model and on how many receivers in the store simultaneously pick up the transmission).

At any time while the RF Service Tool is displaying the 485 RCVR BUS screen, you can choose another sensor to analyze by pressing its service pin. The ID count will return to zero and begin counting only the newly commissioned sensor's transmissions.

