

Testing the Functionality of RMM Modems

RefTest Documentation

Remote Monitoring Modem



Global Container Efficiency

Testing the Functionality of RMM Modems

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Testing the Functionality of RMM Modems

Introduction to RefTest and RMM Modems

Overview

Introduction

The RefTest unit provides a “plug-and-play” solution for verifying correct data transmission from the Remote Monitoring Modems (RMM) installed in reefer containers. It also tests Power Cable Transmission (PCT) as such.

This document is based on RefTest software version 1.20. It describes how to use the RefTest and provides advice on how to troubleshoot and resolve common faults.

About RMM modems

The RMM modem is manufactured by Johnson Controls (former York). It exists in different versions. It can be found as an extension to a Thermo King MPC2000 or MP-3000 controller, or as an independent unit connected to controllers of different brands. In "Identifying RMM Modems" on page 4 you find illustrations showing how the RMM modem appears in common applications.

Roles and responsibilities

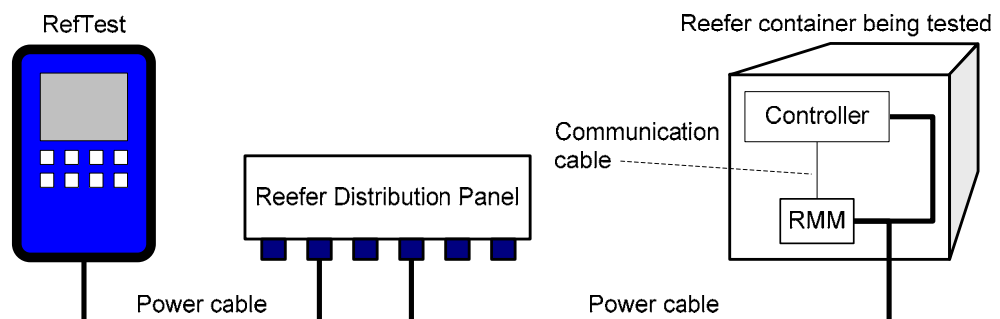
The RefTest is intended for use by technicians who are skilled in the service and operation of container refrigeration equipment.

Testing configuration

The RefTest is typically used in one of two ways:

- The unit is permanently installed and used continuously to test containers as they come and go.
- The unit is carried from location to location and used as needed.

In both cases, the basic testing configuration is as shown below, with the RefTest connected to a reefer power distribution panel. Up to 290 reefers can be connected to the RefTest in this manner.



REFCON locations

RefTest is not suitable for use where REFCON is in operation.

Testing the Functionality of RMM Modems

Identifying RMM Modems

Checking for RMMs

You must often visually determine whether or not a reefer container is equipped with a RMM modem. To do so, open the cover on the compressor-end of the container and look for an RMM.

RMM's supported

The following high data rate RMM modems manufactured by Johnson Controls are supported by the RefTest:

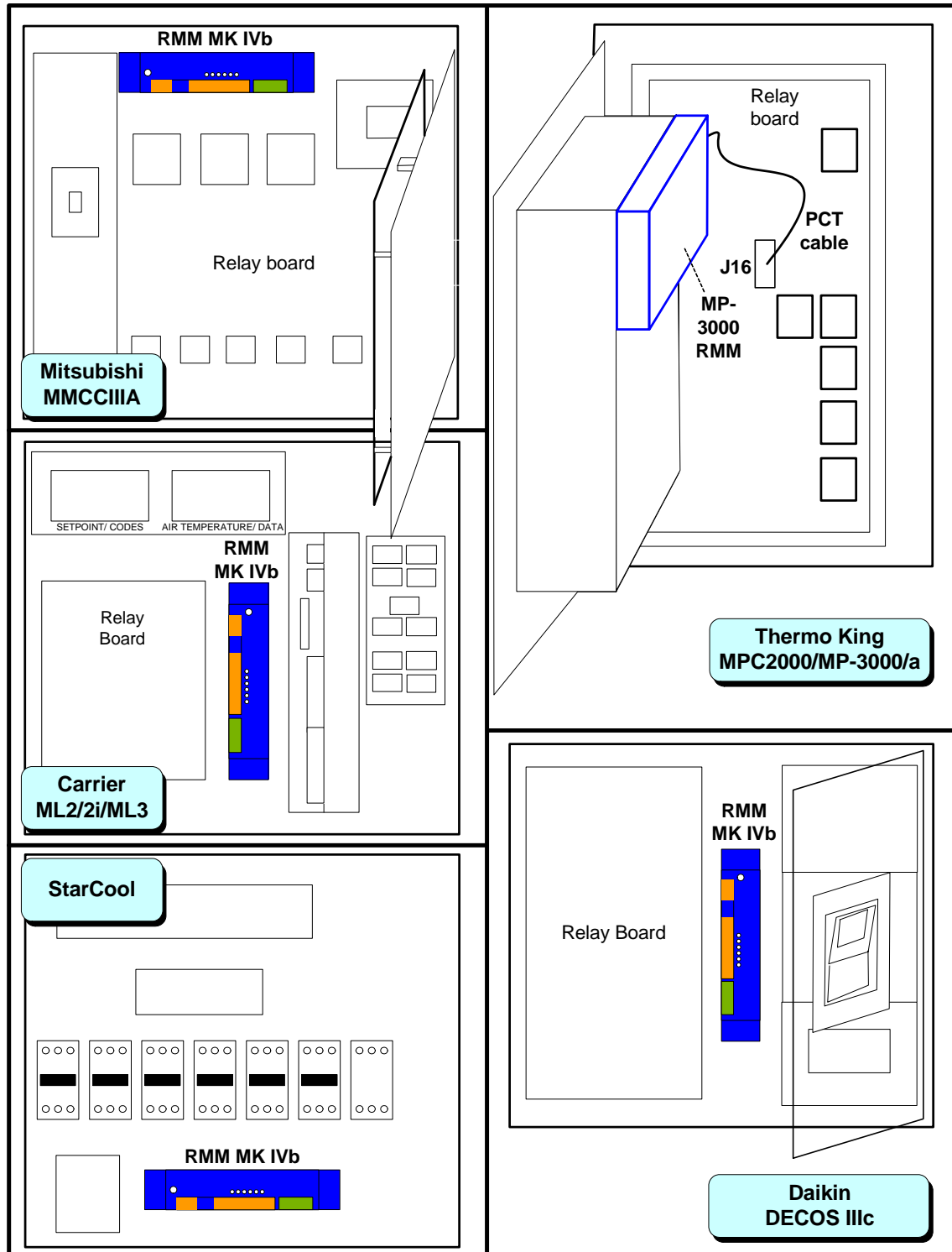
- RMM MK IVb.
- RMM MK III / sea.
- RMM MK II.
- Integrated MP-3000 RMM for Thermo King MPC2000 and MP-3000 controllers.
- Integrated RMM in Thermo King MP-4000 controller

Continued on next page

Testing the Functionality of RMM Modems

Identifying RMM Modems, Continued

Illustration The modem can be an integrated unit (MPC2000 / MP-3000) or an independent unit attached to various controller types. This figure shows the most common examples:



Testing the Functionality of RMM Modems

Using the RefTest

Description of the RefTest

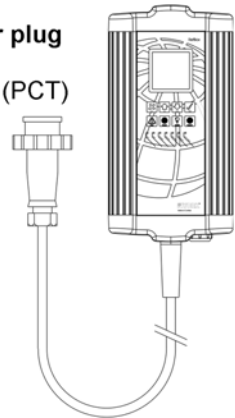
The RefTest unit

The RefTest comes ready to use in a robust weatherized housing with graphical display.

It can communicate reliably with up to 290 RMM-equipped reefer containers.

The RefTest plug connects directly to any standard container power outlet. When connected, the RefTest automatically searches for reefer containers equipped with a Remote Monitoring Modem.

3-phase power plug
Also used for communication (PCT)



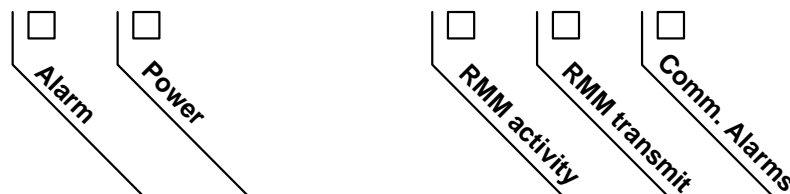
Singe master limit

The RefTest is a so-called “master” unit that controls communication on the power line. Only one master may be used on a power line at a time. Therefore,

- Do not connect two RefTests to a power line.
- Do not use RefTest together with REFCON.

RefTest LEDs

The following Light Emitting Diodes (LEDs) are found at the front of the RefTest:



They indicate the following:

LED	Meaning
Alarm	Red LED <ul style="list-style-type: none"> • Quick flashing: Alarm(s) from the attached containers. • Slow flashing: Warning(s) from the attached containers.
Power	Green LED <ul style="list-style-type: none"> • On: RefTest is operational.
RMM Activity	Green LED <ul style="list-style-type: none"> • Quick flashing: Receiving data.
RMM Transmit	Green LED <ul style="list-style-type: none"> • Quick flashing: Sending data.
Comm. Alarms	Red LED <ul style="list-style-type: none"> • On: Searching for containers. • Flashing: Communication with a container lost.

Testing the Functionality of RMM Modems

How to Use the RefTest

Basic procedure When testing reefer containers, you normally run through these steps:

Step	Action
1	Connect the RefTest to a free reefer power plug.
2	Allow all containers to log in. Depending on the number, this can take 30 minutes or more.
3	Working from a container list or manifest, verify proper operation of each container equipped with an RMM. The Prefix List is usually the fastest way to navigate to a specific container ID.
4	Make a note of any containers that fail the communication test, and of any that do not appear in the RefTest container list.
5	Consult the "Troubleshooting Guide" on page 17 to solve problems.
6	You may connect more containers to be tested. They will automatically log in and appear on the <i>Container List</i> .

Using the RefTest menu and keypad

The menu provides access to all of the RefTest's functions and displays. The *Main Menu* is the starting point. The menu branches as shown on page 8.

The " ▶ " cursor indicates the selected line in the display.

The [Up] and [Down] keys are used to move the cursor up and down. The [Enter] key is used to activate the option currently marked by the cursor.

The [Esc] key is used to step back one level in the menu tree, or to cancel a setting change.

The [Alarm] key opens the *Alarm List* screen, see "Alarm list" on page 10.

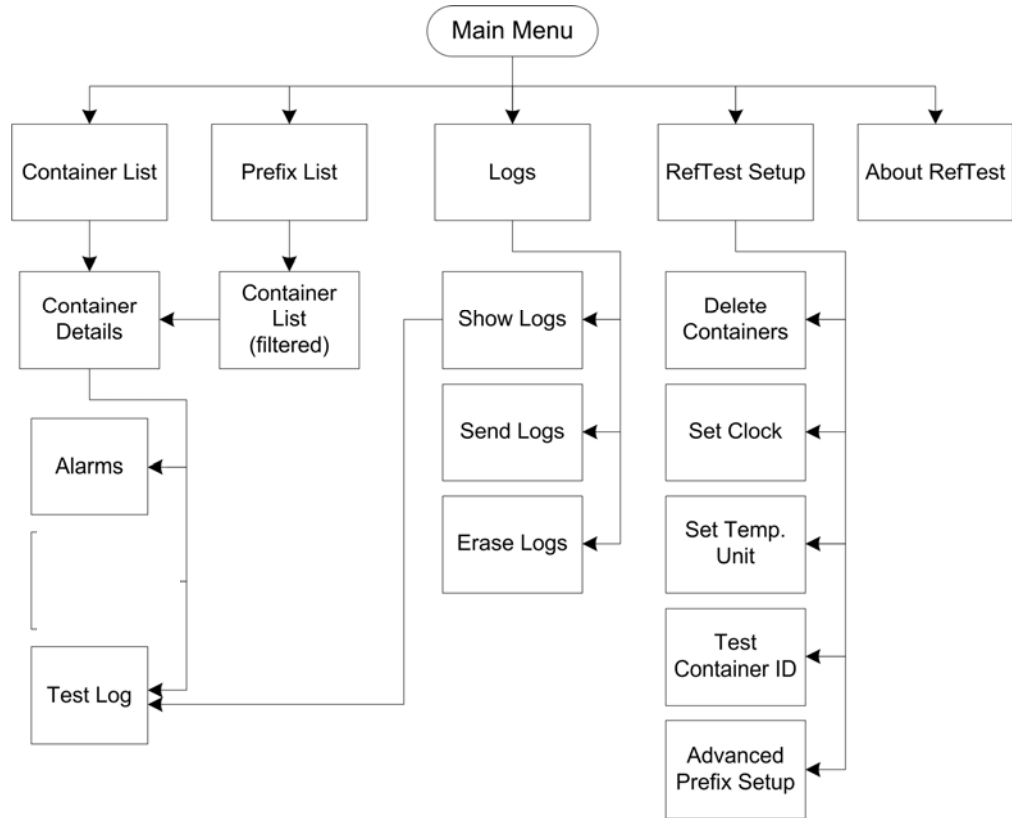
The [Contrast] keys and the [Backlight] key adjust the display for different lighting conditions.

Testing the Functionality of RMM Modems

RefTest Menu Overview

Menu diagram

The menu structure is shown below. Detailed descriptions are found on the following pages.



Testing the Functionality of RMM Modems

RefTest Menu Details

Main menu

The *Main Menu* is displayed when RefTest is powered on. The current time is shown in the second line.

Container List

- This item displays reefer container IDs in alphanumeric order. See "Container list" on page 9.

Prefix List

- This item groups containers by prefixes for easier navigation. See "Prefix list" on page 11.

Logs

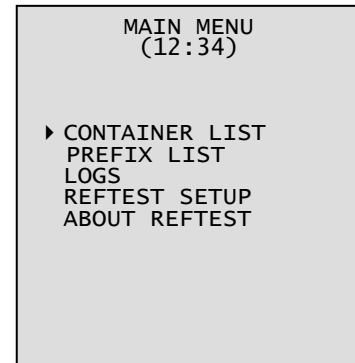
- This item provides options for viewing, transferring, and deleting test logs. See "Logs menu" on page 11.

RefTest Setup

- This item provides options for refreshing the container list and selecting user preferences. See "RefTest setup" on page 13.

About RefTest

- This item displays RefTest version and contact information. See "About RefTest" on page 16.



Container list

The *Container List* displays the IDs of all connected and communicating containers. The number of containers is shown in the second line. The list is sorted alphabetically by container prefix. Within each prefix, containers are sorted numerically from low to high.

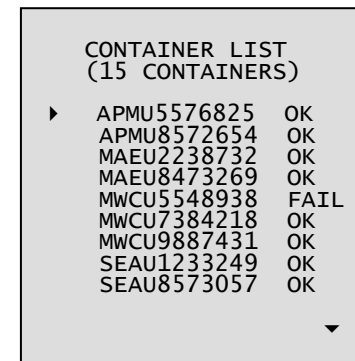
Up to nine containers are shown at a time. If there are more, "▲" and "▼" are shown in the corners. Use the [Up] and [Down] keys to scroll through the list.

When a container logs in, "CONTAINERS FOUND" is shown. After a moment, the container list will be updated with the new container ID. The time required to acquire all containers will vary from a few minutes to a half hour or more dependent on the number. Repeated use will give you an idea of the time required.

The result of the communication test appears to the right of the container ID. "OK" indicates that the container is sending valid data and the communication link is good. "FAIL" indicates a problem with either the controller, the modem, or the power connection. See "Detailed log" on page 12.

To view more information about a specific container, select it using the [Up] and [Down] keys and then press [Enter]. See "Container details" on page 10.

Note: the RefTest does not immediately detect that a container has been removed from the power line or that its controller has been switched off. A container typically remains listed for several minutes after it has been disconnected or turned off. The container list can be cleared using the RefTest Setup menu.



Continued on next page

Testing the Functionality of RMM Modems

RefTest Menu Details, Continued

- Container details** The *Container Details* screen shows the following:
- Setpoint temperature
 - Supply temperature
 - Return temperature
 - Number of controller alarms. Selecting the ALARMS line and pressing [Enter] displays more information in the *Container Alarm Details* screen, described below.
 - Result of the communication test (OK or FAIL). If the result is FAIL, select the line and press [Enter] to see the cause. See "Detailed log" on page 12.

```

DETAIL APMU8572654

SETPOINT  -17.8C
SUPPLY    -18.0C
RETURN    -17.9C

▶ ALARMS      4

TEST OK
  
```

The valid temperature range is -125 to 75° C or -193 to 167° F. The temperature scale is selected in the RefTest Setup menu.

- Container alarm details** The *Container Alarm Details* screen shows the current alarms on a specific container. The list is ordered with the latest alarm at the top.
- Each alarm is listed with a description and the time of occurrence.
- A maximum of three alarms can be displayed. The symbols "▲" and "▼" indicate that you can scroll up or down with the [Up] and [Down] keys.

```

ALARMS APMU8572654

▶ LOW COMP. OIL TEMP

TEMP. OUT OF RANGE

▼
  
```

- Alarm list** The *Alarm List* screen is displayed when you press the [Alarm] key, not through the menu. The screen lists the containers that has not passed the test.
- Containers can be selected and viewed as described under "Container list" on page 9.

```

ALARM LIST
(3 CONTAINERS)

▶ APMU8572654  FAIL
  MWCU9887431  FAIL
  APMU5576825  FAIL
  
```

Continued on next page

Testing the Functionality of RMM Modems

RefTest Menu Details, Continued

Prefix list

The *Prefix List* groups containers by prefix, that is, the first four letters of the container ID. Selecting a prefix and pressing [Enter] opens a list of containers with that prefix. The prefix list is otherwise identical to the list described under “Container list” on page 9.

If there are many containers with the same prefix, RefTest can further divide containers using digits in the ID number. In this case, the list might read APMU1, APMU2, APMU3, and so on. This option is selected in the RefTest Setup menu.

A maximum of nine prefixes can be displayed at a time. When there are more, “▲” and “▼” appear in the corners and you can use the [Up] and [Down] keys to scroll through the list.

PREFIX LIST (15 CONTAINERS)	
▶	APMU 2
	MAEU 2
	MWCU 3
	SEAU 8

Logs menu

The *Logs* menu contains the following options:

Show Logs

- Displays saved test logs. See “Log overview” on next page.

Send Logs

- Sends all logs to a PC via the RS232 port. Be sure the device is connected and ready! See “Send logs” on next page.

Delete Logs

- Opens a screen that allows you to erase all logs. See “Erase logs” on next page.

LOGS	
▶	SHOW LOGS
	SEND LOGS
	ERASE LOGS

Continued on next page

Testing the Functionality of RMM Modems

RefTest Menu Details, Continued

Log overview

The *Logs Saved* screen displays logs saved in the RefTest. The newest logs are shown first.

The following data is displayed for each container:

- Container ID.
- Test result (OK / FAIL).
- Date and time of test.

Selecting a container ID and pressing [Enter] opens the *Test Log* screen, see “Detailed log” on page 12.

```
LOGS SAVED 6
▶ QWER1234567 OK
  2005.01.17 09:32
  QWER1234568 FAIL
  2005.01.17 09:35
  QWER1234569 OK
  2005.01.17 09:39
  QWER1234570 OK
  2005.01.17 09:40
```

Detailed log

The *Test Log* screen shows the reason why a test failed. The faults that can occur and suggestions for fixing them are described in “Troubleshooting Guide” on page 17.

New logs can be saved by pressing [Enter]. The save prompt does not appear if the log has already been saved.

The [Up] and [Down] keys select faults if more than one exists.

```
TEST LOG
LOSU8572654

INVALID
CONTAINER ID

PRESS ENTER TO
SAVE LOG
```

Send logs

When *Send Logs* is chosen from the *Logs* menu, RefTest transmits its saved test logs to the connected PC.

Before doing so, the RefTest must be connected to the PC with an RS232 cable (part no. 0601-174), and the PC log receiver program from Johnson Controls must be running.

Please verify that the logs have been successfully transferred to the PC before deleting them from the RefTest.

Erase logs

To delete **all** logs stored in the RefTest, proceed as follows:

- Use [Up] or [Down] to change selection to “Yes”.
- Press and hold [Enter] to erase the logs.

Precaution: When the logs are erased there is no way to recover them.

```
ERASE LOGS

ERASE LOGS: NO
▲

PRESS AND HOLD
ENTER TO ERASE
```

Continued on next page

Testing the Functionality of RMM Modems

RefTest Menu Details, Continued

RefTest setup

The *RefTest Setup* menu provides the following options:

Delete Containers

- This option clears all containers, after which the RefTest performs a fresh logon procedure. See “Delete containers” on page 13.

Set Clock

- This option allows you to set the RefTest’s time and date. See “Change clock” on page 14.

Set Temp. Unit

- This option allows you to select the temperature scale, C or F. See “Set temperature unit” on page 15.

Test Container ID

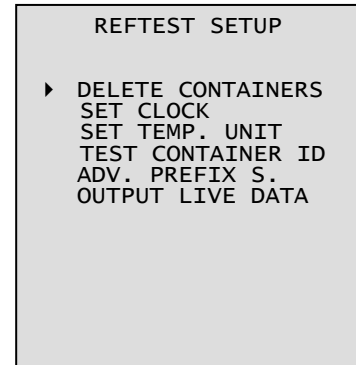
- This option allows you to enable and disable the container ID test. See “Test container ID” on page 15.

Adv. Prefix S(etup)

- This option allows you to enable the option to subdivide the prefix list by numbers. See “Advanced prefix setup” on page 15.

Output Live Data

- This option allows you to enable the output of live test data on the RS232 interface, this option can be used to enable other systems to access live test data.

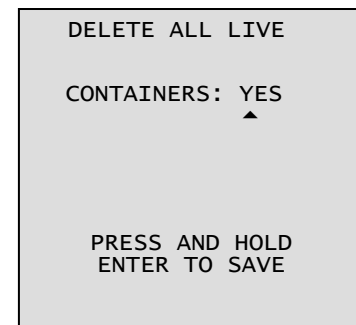


Delete containers

The *Delete All Live screen* allows you to clear all connected containers. This is desirable, for example, when the RefTest has been connected for an extended period while containers have been disconnected and moved.

After clearing, the containers log back on. The logon procedure is faster than a normal logon from power up.

Press [Up] or [Down] to change the selection to “YES”. Press and hold [Enter] to execute the command, or press [Esc] to return to the previous menu.



Testing the Functionality of RMM Modems

Change clock

This screen allows you to set the RefTest date and time.

When setting values, note the following:

- The “▲” cursor indicates the current digit.
- Pressing [Enter] briefly moves the cursor to the right. At the end of the line the cursor rolls around to the beginning.
- Pressing [Up] or [Down] increases or decreases the value.
- Press and hold [Enter] to save the setting, or press [Esc] to cancel changes and return to the previous menu.

CHANGE DATE/CLOCK

YYMMDD HHMM
070321 1321
▲

PRESS AND HOLD
ENTER TO SAVE

Continued on next page

Testing the Functionality of RMM Modems

RefTest Menu Details, Continued

Set temperature unit

This screen allows you to select the temperature unit displayed.

- Press [Up] or [Down] to change the selection to “C” (Celsius) or “F” (Fahrenheit).
- Press and hold [Enter] to store your choice.

```

CHANGE TEMP. UNIT

NEW UNIT: C
          ▲

PRESS AND HOLD
ENTER TO SAVE
    
```

Test container ID

This screen allows you to enable or disable the container ID test. When set to “YES”, which is the recommended setting, RefTest checks the container ID for a valid prefix and check digit.

Press [Up] or [Down] to change the setting to “YES” or “NO”. Press and hold [Enter] to save the setting, or press [Esc] to return to the previous menu.

```

TEST CONTAINER FOR

VALID ID: NO
          ▲

PRESS AND HOLD
ENTER TO SAVE
    
```

Advanced prefix setup

The *Advanced Prefix* screen allows you to enable the option to group containers by the first numbers in the prefix list.

When enabled, the prefix list might read APMU1, APMU2, APMU3, and so on. Under APMU1 would be all container IDs starting with “APMU1”. This is useful if there are many containers with the same prefix.

Press [Up] or [Down] to change the setting to “YES” or “NO”. Press and hold [Enter] to save the setting, or press [Esc] to return to the previous menu.

```

ADVANCED PREFIX
ALSO SORT ON

NUMBERS: YES
          ▲

PRESS AND HOLD
ENTER TO SAVE
    
```

Testing the Functionality of RMM Modems

Output Live Data This screen allows you to enable or disable the output of live test data. When set to “YES”, the live data is updated on the RS232 interface every approximate 10 seconds. The serial output can be used by other systems that use the live test data from the RefTest.

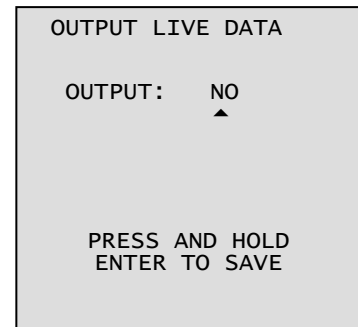
The RS232 is set to a baud rate of 115200, 8N1 and no Handshake.

The output is ; separated and has a outline like this:

```
RefTest Status:5 Units; Time:10:09:22; Date:13/10-2009
```

```
Line;ID;Type;Setpoint;Supply Air;Return Air;Test Result
000;MWSU9093300;STARCOOL;1.0 C;3.9 C;1.8 C;OK
001;RMMU0000010;ISO;E0;E0;E0;FAIL,CONNECTION TO CONTROLLER/MODEM MISSING
002;RMMU0000500;ISO;E0;E0;E0;FAIL,CONNECTION TO CONTROLLER/MODEM MISSING
003;TSTU0055170;CARRIER;-38.2 C;-15.1 C;-30.2 C;OK
004;TSTU0055210;CARRIER;-29.6 C;-5.4 C;-16.6 C;OK
```

Press [Up] or [Down] to change the setting to “YES” or “NO”. Press and hold [Enter] to save the setting, or press [Esc] to return to the previous menu.



About RefTest

The *About RefTest* screen shows the RefTest software version and provides an email address for support. Please state the software version when contacting Johnson Controls for technical support.



Testing the Functionality of RMM Modems

Troubleshooting Guide

Overview

- Hazard warning**
- Do not try to make any of these verifications with the power on. There are **400 – 440 VAC** connected to the containers.
 - If you want to verify the LEDs of the modem please do that from a distance! Do not under any circumstances touch any of the cables when the power is on.
 - Johnson Controls will not be held responsible if the safety precautions are ignored!
-

Troubleshooting The possible results of container testing are shown below.

Test result	Symptoms and possible reason(s)	Your next step
TEST OK	The container ID is valid and the temperature data is within range.	No action required
TEST OK but Container ID is unexpected	A container logged in and passed the communication test but the ID in RefTest does not match an actual container.	See “Invalid Container ID” on page 18
TEST FAIL: Invalid container ID	The Container ID prefix has an invalid prefix (LANG, RAND, LOSU, or RMMU), or the check digit indicates the number is wrong.	See “Invalid Container ID” on page 18
TEST FAIL: Connection to Controller/Modem missing	The RMM modem is communicating but all temperature values read E0 (= unknown).	See “Connection to Controller/Modem Missing” on page 20
TEST FAIL: Temperature out of range	The RMM modem is communicating but temperature values are outside the valid range.	See “Temperature Out of Range” on page 21
TEST FAIL: Poor communication	A high percentage of the messages on the PCT are failing.	See “Poor Communication” on page 22
A container is missing from the RefTest container list	No communication	See Defective Modem or Controller” on page 23
	The container ID is programmed incorrectly in the reefer controller.	See “Invalid Container ID” on page 18

Testing the Functionality of RMM Modems

Invalid Container ID

Symptoms

The temperature readings seem to be okay, however:

- The Container ID prefix is LANG, RAND, LOSU, or RMMU; or
- The check digit indicates the number in the container ID is wrong, or
- Even though the result is OK, the container ID in RefTest does not match an actual container.

Note: You could have the same Container ID symptoms and no temperature readings. In this case the error message is “Connection to Controller/Modem Missing”, see page 20.

Explanation

In most cases the cause of an invalid container ID is that:

- No container ID has been entered, or
- An incorrect container ID has been entered.

In the first case you will see the factory default ID, most often with the prefix LOSU.

Basic solution

Basically, you need to do this:

Step	Action
1	Locate the container with wrong or missing container ID.
2	Correct the container ID.
3	Test again to verify.

Finding the match

When RefTest reports an invalid container ID, you will normally also have a container that does **not** appear on the RefTest *Container List*. If you have just one such pair, the missing container is the one with the invalid ID.

However, you will probably have multiple containers that do not log in simply because they have no RMM installed. Whatever the reason, finding the match can be quite difficult. Please use the tips below.

The “radical” solution

If allowable, you could either disconnect all containers except one that is missing from the *Container List*, or connect the single container and RefTest to a portable genset. Then clear the container list using the RefTest Setup menu and allow the container to log in. If it logs in with an invalid or unexpected ID, you have your match. Correct the ID and test again.

Continued on next page

Testing the Functionality of RMM Modems

Invalid Container ID, Continued

Solution: Comparing values

If you have multiple containers on the RefTest *Container List* with invalid container IDs you can match them to real containers without disconnecting as follows:

Step	Action
1	Write down the container ID, the setpoint and the temperature readings for each of the containers in question.
2	Visit each container that did not log in. Using the controller display, check the setpoint and temperatures. Do they match any of those on your list? If so, you have a match. Correct the ID and allow the container to log in.
3	If you are not sure of the match, one technique you can use – if allowable – is to change the setpoint of the suspected container to a unique, recognisable value. Now check the setpoint value for the containers with invalid IDs in the RefTest. Where the new setpoint value appears, you have your match.
4	Remember to change the setpoint back to the proper temperature.

Solution if prefix is LOSU

If the prefix of an invalid container ID is LOSU, you can determine the actual container by inspecting the RMM modems. The digits after LOSU reflect the modem ID number printed on the RMM modem. For example, if the RMM modem ID is 0155 – 2920, then the container ID on RefTest appears as LOSU155292x (x being the check digit).

So, you can check the suspected containers one by one:

Step	Action
1	Note the LOSU numbers from the RefTest <i>Container List</i> .
2	Turn off the power to the container (for your own safety).
3	Open the lid to the controller and modem casing.
4	Read the modem ID number. Does it correspond to the LOSU number?
5	If yes, rename the container
6	If no, close the lid, turn power back on and check the next container.

Testing the Functionality of RMM Modems

Connection to Controller/Modem Missing

Symptoms All temperature values read E0 (= unknown). The Container ID is possibly correct or unexpected.

Explanation The communication cable between the RMM modem and the controller does not work.

If it never worked, or if it is an older modem, the RMM modem will use its factory selected container ID, which is the prefix LOSU succeeded by 6 digits from the ID printed on the modem, and the check digit.

If it once worked, a newer RMM modem will remember the container ID that it once obtained from the controller. In this case the container ID will probably be correct.

Solution Proceed as follows. (It might be useful to refer to “RMM Modem LED Details” on page 24.)

Step	Action
1	Turn off the power to the container (also for your safety).
2	Open the lid to the controller and modem casing.
3	Verify that the communication cable connectors are in place.
4	Verify that the communication cable is not cut or broken.
5	Verify that the communication cable is wired correctly.
6	Correct any problems you find, close the lid, turn the power to container back on, and begin the test again!

Further action If the steps above do not solve the problem, there are three possible faults:

- The modem is defective.
- The controller is defective.
- In rare cases, the controller software is not compatible with the RMM.

You will need to:

Step	Action
7	Replace the modem and make a new test. If it still does not work, we recommend that you change back to the original modem.
8	Replace the controller and make a new test.

Testing the Functionality of RMM Modems

Temperature Out of Range

Symptoms	The Container ID seems correct, but the temperature values are outside the expected measuring range – typically more than 100°C.
Explanation	This malfunction can occur when the RMM modem has been communicating with the controller and the communication has stopped for some reason.
Solution	The solution is the same as described in “Connection to Controller/Modem Missing” on page 20.

Testing the Functionality of RMM Modems

Poor Communication

Symptoms A high percentage of the messages on the PCT are failing.

Explanation Bad electrical wiring or a defective modem with bad output circuit can cause poor communication. But several tests should be made before making any conclusion.

Solution We recommend that you proceed as follows:

Step	Action
1	Turn off the power to the container (also for your safety).
2	Open the lid to the controller and modem casing.
3	Verify that the Phoenix connector is connected and correct wired.
4	Verify that the Phoenix connector is not burned or melted.
5	Verify that the 440V connector is not broken or dirty.
6	Correct any problems you find, close the lid, turn the power to container back on, and begin the test again!

Further action If the steps above do not solve the problem, there are three possible faults:

- The modem is defective.
- The controller is defective.
- In rare cases, the controller software is not compatible with the RMM.

You will need to:

Step	Action
7	Replace the modem and make a new test. If it still does not work, we recommend that you change back to the original modem.
8	Replace the controller and make a new test.

Testing the Functionality of RMM Modems

Defective Modem or Controller

Symptoms A container does not log in to RefTest.

Explanation If a container fails to log in to RefTest, the problem is due to a defective modem or, more likely, a poor connection in the power line.

Solution Check the modem, etc. systematically. When you have found an error and corrected it, close the lid and turn the power to container back on and re-test.

Step	Action
1	With power on the container, verify that it works well – values in display?
2	Turn off the power to the container (also for your safety).
3	Open the lid to the controller and modem casing.
4	Verify that the fuse in the RMM modem is OK.
5	Verify that the power cable is connected and correctly wired.
6	Verify that the communication cable is plugged in, not defective, and wired correctly.
7	Verify that the Phoenix connector is connected and correctly wired.

Further action If the container still does not log in, proceed as follows.

Step	Action
8	Leave the power on and open the lid.
9	Verify that the Power LED (page 24) at the modem is On. If the LED is off, and you verified above that all connections are OK, the RMM modem is most likely defective. Replace it and test anew.
10	With Power LED On, check the User LED (page 24). <ul style="list-style-type: none"> If it is Off, toggle power off and on. The LED should now flash. If it stays Off, the RMM modem is defective. Replace and re-test. If it flashes and keeps flashing for 10 – 20 minutes, there is possibly a fault with the power cable. Check the Phoenix connector again, with the power off. If still no solution, replace the modem, and start the test again. If it lights and stay on, it indicates that it communicates with RefTest – or, with some other master modem. Are you sure RefTest is the only master connected? Are you sure the container did not log in to RefTest, maybe with an unexpected container ID? Please refer to “Invalid Container ID” on page 18 and “Connection to Controller/Modem Missing” on page 20.
11	Verify that that Activity LED flashes. If it does not flash, there is probably a bad connection in the power line. Disconnect power and connect a known working modem. Check the Activity LED. <ul style="list-style-type: none"> If the LED does not light when power is applied, the problem is with the power line. Check for signs of arcing or overheating and repair (with no power on the line). If the Activity LED does light, the problem was with the modem. Replace and re-test.

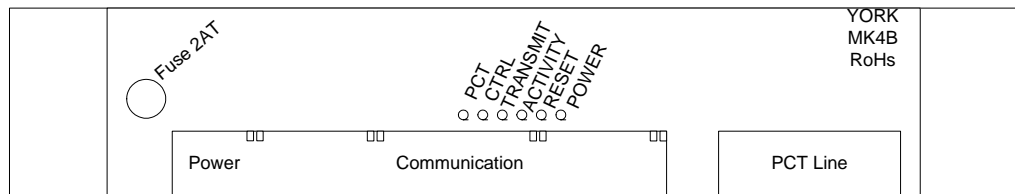
Testing the Functionality of RMM Modems

RMM Modem LED Details

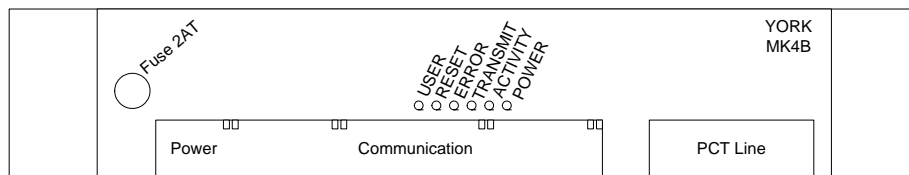
Introduction

You can often obtain useful information simply by watching the Light Emitting Diodes (LEDs) of the RMM modem.

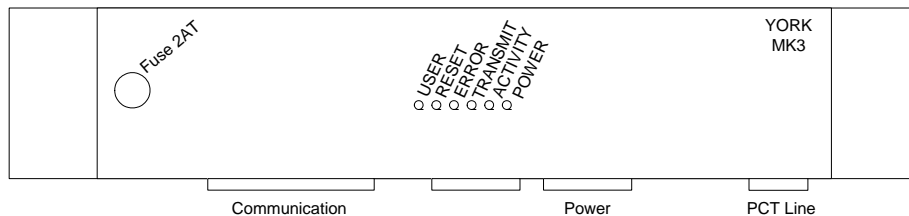
RMM MKIVb RoHS



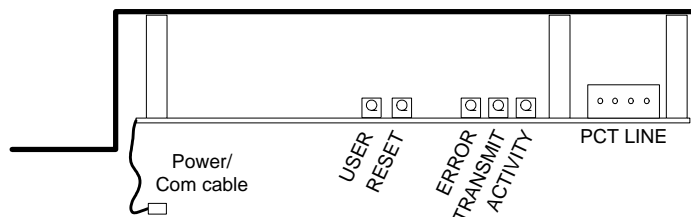
RMM MKIVb



RMM MKIII



MP-3000 RMM



Description of the LEDs

The LEDs should be interpreted as follows:

LED	Color	Status	Description
POWER	Green	ON	24Vac power on. Power cable is correct wired.
POWER	Green	OFF	No power.
ACTIVITY	Green	Flashing	High Data Rate activity is detected at the power line.

Troubleshooting Guide

Revision 2.22 · Updated:091228

Project : RefTest Documentation

File: f:\tp\products\reefer monitoring\reftest\external\pm\manual\version 2.0\manual 2.2\testing the functionality of rmm modems_v222.doc

Global Container Efficiency

Author: MA · Owner: RSV

Testing the Functionality of RMM Modems

ACTIVITY	Green	ON	High Data Rate activity is detected at the power line.
ACTIVITY	Green	OFF	No power cable communication is detected.
TRANSMITTING	Yellow	Flashing	Communication in progress with a Master on the PCT network.
TRANSMITTING	Yellow	OFF	No communication in progress.
ERROR	RED	ON	Internal malfunction has occurred.
ERROR	RED	OFF	Normal operation.
RESET	Red	OFF	Normal operation.
RESET	Red	ON	The RMM is reset. Turns off after a while.
USER	Green	ON	The container is logged on to a master, with normal parameters.
USER	Green	Flashing	Ready to log on.
USER	Green	OFF	Between 15 and 60 minutes has passed since last device poll. As 60 minutes is reached, the unit resets and gets ready to log on.

Description of the LEDs (RoHs version)

The LEDs should be interpreted as follows:

LED	Color	Status	Description
POWER	Green	ON	24Vac power on. Power cable is correct wired.
POWER	Green	OFF	No power.
CTRL	Green	OFF	Controller not connected / Not communicating
CTRL	Green	Flashing	Controller connected but no or invalid container ID
CTRL	Green	ON	Controller connected and having a valid container ID
ACTIVITY	Yellow	Flashing	High Data Rate activity is detected at the power line.
ACTIVITY	Yellow	ON	High Data Rate activity is detected at the power line.
ACTIVITY	Yellow	OFF	No power cable communication is detected.
TRANSMITTING	Yellow	Flashing	Communication in progress with a Master on the PCT network.
TRANSMITTING	Yellow	OFF	No communication in progress.
RESET	Red	OFF	Normal operation.
RESET	Red	ON	The RMM is reset. Turns off after a while.
PCT	Green	ON	The container is logged on to a master, with normal parameters.
PCT	Green	Flashing	Ready to log on.
PCT	Green	OFF	Between 15 and 60 minutes has passed since last device poll. As 60 minutes is reached, the unit resets and gets ready to log on.

Special Precautions

Protection

Please take care of proper protection of the connectors if a modem is not installed at manufacturing time.

The connectors must be protected against environmental impact such as dirt, dust, and water to ensure future failsafe operation.

Testing the Functionality of RMM Modems

Document Revision Record

Rev.	Date	Author	Brief description of change	Pages affected
1.2	040428	HPL	Part of doc package, new layout and logo	All
1.2	050103	RSV	Reefer list updated	6
1.3	050110	BLA	Updated	Most
1.4	050117	BLA	Updated	ALL
1.5	050131	BLA	Updated	ALL
1.6	050302	BLA	Updated	ALL
1.7	050310	BLA	Updated	ALL
1.8	050418	HPL	Fine adjusted	All
1.9	060615	HPL	One more modem example added	4,5 (6,7 removed)
2.0	070202	MA	Update for firmware 1.20	All
2.1	090130	RSV	Minor updates	8,10
2.2	091022	MIL	Output live data added	13,16
2.21	091106	MIL	Alarm details and alarm list	10
2.22	091228	RSV	Minor updates	ALL