UMD Installation Manual
Carrier Reefers One-Way

Version 4.4 One Way Interface   **Jan 2013**

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UMD Installation V3: With Remote Control

Standard System Kit of Parts:

1. Universal Monitoring Device (UMD).
2. 3G/GSM Antenna
3. GPS Antenna
4. RF Temperature Tags – if required by the customer
5. RF Door Tag and Magnet – if required by the customer
6. RF Low Profile Antenna
7. 3m Carrier Interface Cable
8. One 1.5M UMD Power Cable.
9. Mounting Plate for UMD - optional

Maintenance Box Kit:

1. Maintenance Box
2. Maintenance Box Harness
3. Reset Switch

Please note that the V3 UMD and Maintenance Box will be supplied with a specially made installation plate. This plate has been designed to be easily mounted on the reefer frame for both X2500 and Vector reefer units.

Third Party Protocol Upgrade Components:

With the Carrier Fridge interface the following additional components are required.

1. Carrier ePROM for fridge units with Standard Controller
2. Data Card Option for fridge units with an Advanced Controller

Note: Check the controller type of the fridge to which the UMD is being installed as Standard Controllers require an ePROM and Advanced Controllers require a Datacard download to enable 3rd party Protocols.

EPROM Revisions:

1. Standard Controller One way only - Revision 3.32
2. Standard Controller with 2-Way Remote Control capability - Revision 3.38
3. Standard Controller Multi-temp - Revision 4.12

Picture 1: UMD System Kit

Hardware Installation Instructions Key Points:

The following Hardware Installation Instructions must be read in conjunction with the detailed information that follows in the Cooltrax Hardware Installation Manual. The "Hardware" refers specifically to the Cooltrax UMD and Wireless Tags.

<u>NOTE</u>: Failure to comply with these instructions will void the Hardware warranty.

1) The Hardware must be positioned:
    a) in a suitable location where it is not directly exposed to outside weather elements;
    b) where it is not directly exposed to any water or other liquids including water emissions from the internal workings of refrigeration unit;
    c) where it is not directly exposed to excessive heat, dirt or grease;
    d) in a horizontal alignment where the UMD the LTW connectors are at the top
2) All cables must be:
    a) enclosed in split tubing up to 150mm from the connectors at each end of the cable;
    b) kept away from heat sources;
    c) of sufficient length so that there is no tension or kinking applied to the cables.
3) All connectors must be locked into place and tested to ensure they will not come loose.
    a) For the UMD the LTW black connectors with locking sleeve require a quarter-turn
4) Fixing screws are supplied with the UMD. Do not drill out mounting holes for larger screws as this may pierce the internal seal and will void warranty.

5) All installations must be fully validated by Cooltrax Support before the asset leaves the installation location. Cooltrax will not be liable for costs incurred through the asset being recalled for validation at a later time.

6) No Cooltrax Hardware or component is to be replaced without consultation and agreement from a Cooltrax support staff member.

7) Hardware must not be opened outside of the Cooltrax Office.

Considerations When Installing or Servicing a Cooltrax Unit:

⚠️	**Temperature Increases Within the Trailer :** The Reefer unit MUST be turned off when installing or conducting maintenance on A Cooltrax Unit, this will lead to increased temperatures within the trailer and if the trailer is loaded the goods may be damaged. Always give due consideration to the temperature within the trailer, Cooltrax will not be held responsible for any spoiled contents.
⚠️	**Warning Risk of Electrical Shock:** Always remove the battery cable from the negative terminal followed by the cable from the positive terminal prior to commencing an installation or service of Cooltrax hardware. There is danger of exposure to high electrical energy during installation procedures highlighted in this manual and a risk of shock or injury. Only trained Technical staff should install service or maintain Cooltrax hardware.
⚠️	**DANGER: Risk of Personal Injury**. This unit can be remote controlled. The unit may START and STOP at any time by remote command. Prior to performing any maintenance to the unit, place the Maintenance Toggle Switch (located on the Cooltrax Maintenance Box) to the MAINT MODE position to disable the remote starting capability.

Picture 2: UMD Connections.
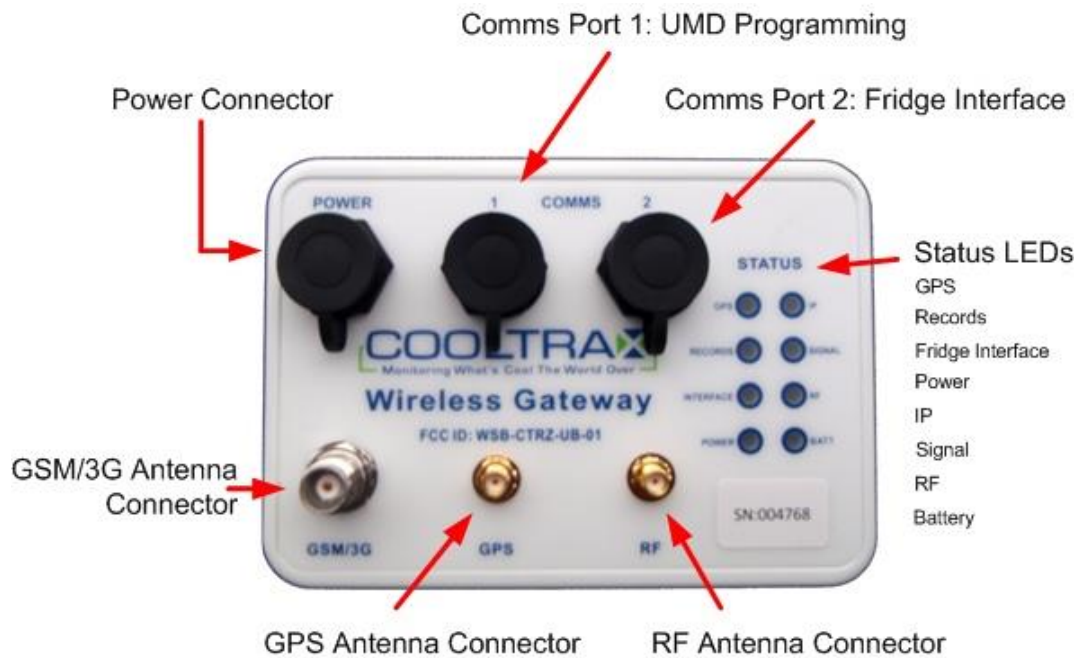
UMD Installation

Initial Setup:

1. Open the front engine bay access doors
2. Open LH compartment access door to the fridge battery
3. Turn OFF the main switch on the side or front of the Carrier Controller cabinet
4. Disconnect Carrier Refrigeration System Battery.

First Step – Install Antenna's:

GSM and GPS Antennas:

1. Locate the GSM and GPS Antennas on top of the carrier system painter steel frame as pictured below. The base of each antenna is magnetic and they can be attached directly to the steel frame. Run a bead of Sigaflex or a similar adhesive product around the base of the antenna to ensure that it won't come free with vibration.
2. Locate the antennas as pictured to ensure maximum separation between the two devices to deliver optimal performance.
3. From the top side insert the antenna cables in split tubing and feed through the hole in the fridge frame
4. Retrieve the cables from the hole lower down the frame just above the battery compartment close to where the UMD Gateway unit will be installed.
5. Cable tie the co-axial cables to the Carrier system's wiring harness or fixed hardware that does not get hot.
6. Loop and secure the excess co-axial cable in the reefer cavity and connect and finger tighten the co-axial connectors to the UMD.

Picture 4: GSM/GPS Antenna Location

Antennas Located on Top Rail

GPS and GSM Antennas:

RF Antenna:

The RF antenna should be mounted inside the refrigerated trailer (the "box") for optimal results when receiving data from RF temperature or door tags located within the trailer. If the customer configuration is for fridge interface only with <u>NO</u> internal RF Tags then the Antenna is not required.

Internal RF Antenna:

1. Drill a small pilot hole through the firewall and ensure the loom and hardware clearance from the engine bay side is adequate.
2. If OK, enlarge the hole to 20mm and remove any drill swarf from both sides of the firewall
3. Feed the cable into split tubing up to 150mm from the connectors at each end of the cable
4. Feed the mounting plate onto the RF Antenna Cable and tighten into place using the supplied lock-nut.
5. Feed the length of antenna cable into 20mm convoluted tubing for protection

6.   From inside the trailer feed the connector end of the RF Antenna through the prepared hole leaving sufficient cable to reach the preferred mounting location inside the trailer.

7.   Loop and secure the excess co-axial cable in the cavity and connect and finger tighten the co-axial RF connector to the UMD

8.   Cable tie the antenna cable to existing cabling or components that do not get hot near the firewall hole and up the evaporator cavity.

9.   When connecting the RF antenna cable to the UMD ensure there is sufficient length available so that there is no tension or kinking applied to the cable at the connection point.

⚠️   Avoid routing the cables any closer than three inches of pipes, valves (plumbing) or parts of the engine that become hot during reefer operation.

RF Antenna Installation – Physical Location Inside the Trailer:

For optimal results the antenna should be mounted to the roof of the trailer in a horizontal position.   Ensure that the antenna is located out from the back wall as far as possible but where it is still protected from damage by the internal bulkhead of the fridge unit – this provides the best opportunity for the antenna to communicate consistently with any tags located inside the trailer.

Wherever possible the RF Antenna should be located 300mm away from any steel such as fridge supports, internal bulk-heads etc

Use P-Clips to tidy up excess cabling and fasten to the internal wall.

Important – Recommended Antenna

The UMD is designed and certified to work with the recommended antenna 2J model 2J6A41BG. Use with any other antenna could adversely affect the electromagnetic emission characteristics and will violate the terms of certification and require retesting.

Low Profile Perspex Backed RF Antenna.
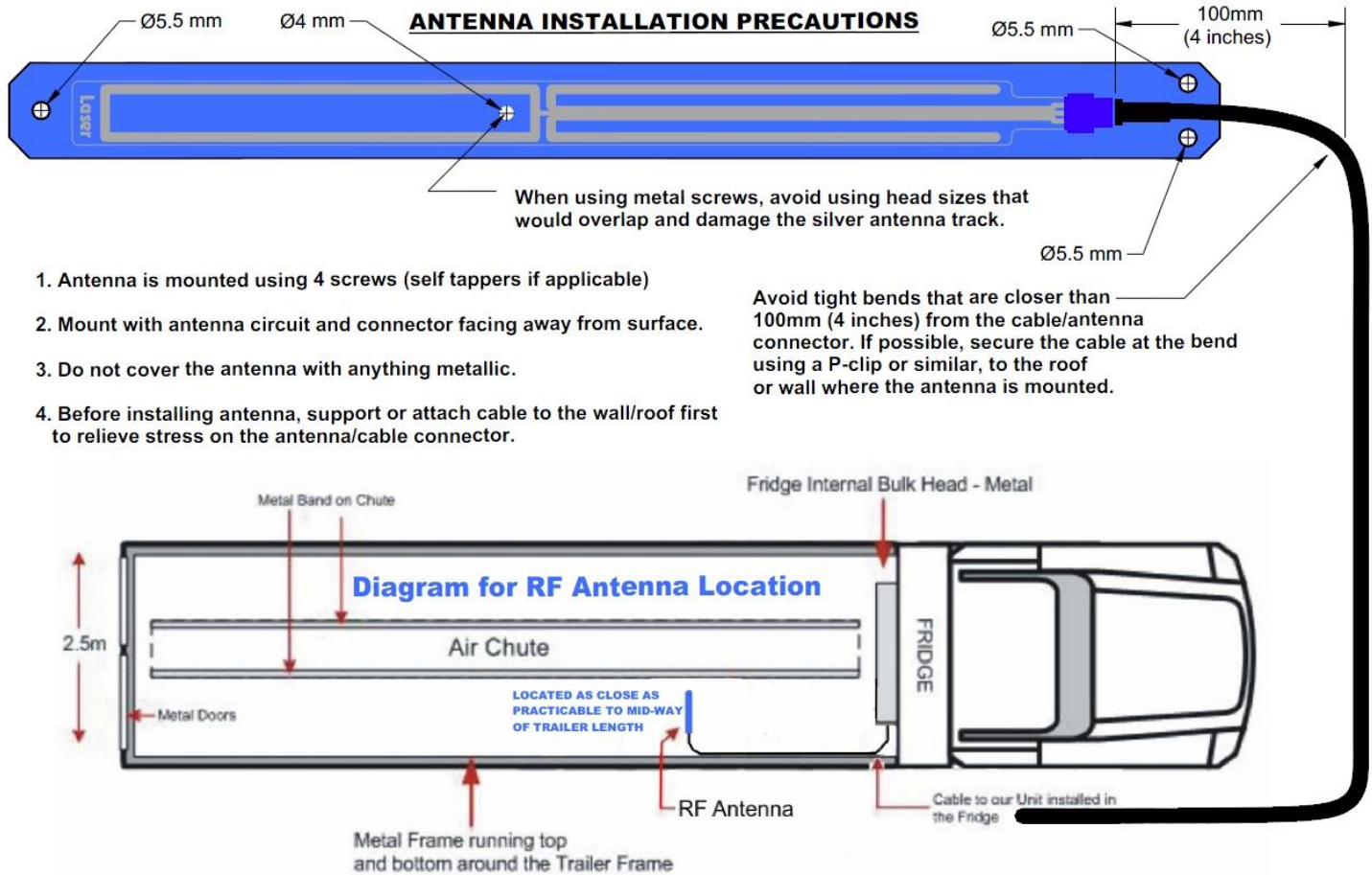
UMD Power Cable:

The Cooltrax Power Cable comes complete with a 3A in-line fuse. The cable is 1.5M long and has a 6-Pin connector at one end and eye-connectors at the other.

Fuse

Recommended replacement fuse is ATC-3 automotive 3A blade fuse from Bussmann, or equivalent.

Picture 7: Cooltrax Power Cable

Cooltrax Power Cable

1. Power Cable Battery Connections
    a. Locate the red wire on the battery cable assembly. This lead, with in-line fuse and eye terminal, should be added to the leads coming from the Carrier system's battery positive (+VE) terminal.
    b. Locate the black wire on the battery cable assembly. This lead, with eye terminal, should be added to the leads coming from the Carrier system's battery negative (-VE) terminal.
2. Thread the power cable UMD connector up from the battery area to the UMD.
3. Use cable ties to ensure that the wires leading to and from the fuse holder are not subjected to strain or tension that could cause the wires to be pulled from the fuse holder.
4. NOTE: Sufficient amounts of slack must be maintained to prevent possible disconnection, or damage to the wires and fuse holder. In addition, care must be taken to mount the fuse holder in a position that will allow it to be easily accessed in the event that future servicing is required.
5. **DO NOT CONNECT TO THE UMD** at this time but leave enough cable in the area of the UMD so that there will be no tension on the cable when it is connected.
6. Coil and tie down any excess Power Cable Length in the UMD area.
7. Cable tie the UMD Power cable from the UMD area down to the battery area onto the existing wiring harness or fixed hardware - keep away from any sources of excessive heat.
8. When connecting the Power cable to the UMD ensure there is sufficient length available so that there is no tension or kinking applied to the cable at the connection point.

Note: Continuous power can also be taken from the Starter Motor rather than from the battery.

Note: Enclose the cable in split tubing up to 150mm from the connectors at each end of the cable

⚠️ Avoid routing the cables any closer than three inches of pipes, valves (plumbing) or parts of the engine that become hot during reefer operation.

Installing the UMD

1) The UMD must be positioned:
    a) in a suitable location where it is not directly exposed to outside weather elements;
    b) where it is not directly exposed to any water or other liquids including water emissions from the internal workings of refrigeration unit;
    c) where it is not directly exposed to excessive heat, dirt or grease;
2) The connection sequence for any of the UMD connectors to their associated cables is common :
    a) Ensure that the number of circuits in the cable connector matches the number of circuits of the connector on the UMD.
    b) Align the cable end groove in the cable connector body to the ridge in the connector on the UMD.
    c) Push the cable connector fully into the UMD connector receptacle.
    d) Rotate the cable connector locking ring clockwise while pushing it gently towards the UMD. When the locking ring aligns with the connector bayonet coupling the ring will go forward.

e) Continue to rotate the locking ring a further quarter turn where the ring will come up against the stops.
f) To disconnect the cable, rotate the connector locking ring one quarter turn anti-clockwise and pull the connector directly away from the UMD panel. Pull only on the connector body. Never pull on the cable.
i) in a suitable location where it is not directly exposed to outside weather elements;
ii) where it is not directly exposed to any water or other liquids including water emissions from the internal workings of refrigeration unit;
iii) where it is not directly exposed to excessive heat, dirt or grease;

Note: If the supplied mounting plate is being used then attach the V3 UMD to the mounting plate using self tapper screws or rivets.

- The UMD the LTW connectors are at the top

Note: Enclose all cables in split tubing up to 150mm from the connectors at each end of the cable

⚠️   Avoid routing the Cable Harness any closer than three inches of pipes, valves (plumbing) or parts of the engine that become hot during reefer operation.

The Fridge Interface Cable:

The Fridge Interface cable connects to the 4-Pin Panel COM2 Connector located on the UMD Gateway.

The other end of the cable is a 3-Pin Carrier Plug which connects to the Carrier Serial Port, a 3 Way flat plug located in the cable loom behind the controller box. The cable must be run from the UMD on the LHS of the refrigeration system to the Serial Port Plug's location underneath the controller on the RHS of the refrigeration system. The cable should be well supported and protected from damage from hot components and sharp edges. Ensure there is enough free cable length at each end to provide tension free connections.

1. Connect the interface cable to the Carrier system's Serial Port Plug.
2. Ensure the contacts are fully inserted, and the connector shells are locked.
3. Unplug the dust cap on the UMD COM Port 2 connector
4. Connect the Fridge Interface Cable to the Panel Connector on the UMD
5. Cable Tie and Tidy up. Be careful to keep the cables away from any excessive heat source.
6. Note: When connecting the interface cable ensure there is sufficient length available so that there is no tension or kinking applied to the cable at the connection point.
7. Note: Enclose the cable in split tubing up to 150mm from the connectors at each end of the cable

Picture 10: Interface Cable

Cooltrax supplied Interface Cable

Interface Cable fed into Split tubing

Interface Plug connected to Serial Port on Reefer

Carrier Controller Setup

There are at least two different types Carrier Control systems which can interface with the UMD. This installation procedure does not cover the detail of the installation or setup requirements of the Carrier equipment; however it outlines the general requirements for the known Controller types

Standard Controller:

1. The Standard controller requires the fitting of an EPROM Revision 3.32 and above to be fitted before the interface will be functional – this revision has the DataTrak Communication Option. Revision 3.34 also has this option. For detailed instructions on upgrading and ePROM see Appendix at the end of the manual.
2. For a Standard Controller with 2-Way capability enabled an EPROM with Revision of 3.38 is required.
3. For a Standard Controller on a multi-Temp reefer with 2-Way capability enabled an EPROM with Revision of 4.12 is required

Advanced Controller:

1. The Advance controller requires the 'Third Party Protocol' to be programmed into the controller using a 'Data Configuration Card'. The controller is then enabled using the 'Reefer Manager' PC application. Scroll through the options and set the 'Communications Protocol' to 'OTHER'.
2. Note: Minimum Firmware Revision for the Micro should be: 04.12

Picture 11: Carrier Datacard in Controller PCMCIA Slot

Powering Up the System for the First Time:

After all hardware and wiring is installed, power may be connected to the Cooltrax System for the first time.

⚠️ **IMPORTANT NOTE:**
Verify that all cable and individual wiring connections are properly connected and weather-sealed before reconnecting the cable to the positive terminal first and then to the negative terminal of the reefer battery.

Once the cables to the positive and negative terminals of the refrigerated battery are connected, the UMD will commence its power up sequence.
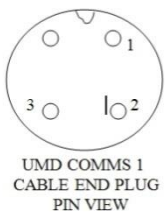
Boot-Up Sequence:

1. Within approximately 30 seconds the UMD 'Power' LED will light up GREEN, followed closely by the battery light.
2. Shortly after the Signal LED will begin to flash, assuming that there is GPRS or 3G service available on the GSM/3G network.
3. The IP LED will at first flash and then remain in a constant ON State once an IP connection has been established
4. The GPS LED will light up a constant RED to indicate that GPS has been acquired – typically in 30 secs or less.
5. If RF Tags have been installed then the RF LED will flash every few seconds as the tags communicate with the RF Reader section of the UMD

Diagnostic Tests:

Testing the Fridge Interface:

After the UMD / Carrier Fridge interface cable is connected to the 3 way flat connector in the Carrier fridge loom, with the fridge OFF, measure the resistance between the chassis (0V) and Pin 3 of the plug that will connect into the UMD COM2 Port. This should be <10 ohms. If this is not correct, check the wiring of the Flat Carrier loom plug back to the Fridge Controller. Turn the fridge ON and measure the voltage between the chassis (0V) (negative of meter) and Pin 2 of the plug that will connect into the UMD COM2 Port. This should be –8 to –10V DC. If this is not correct, check the voltage on Pin 1 of the same plug. If that is –8 to –10V DC then the wiring to pins A & B of the carrier flat loom plug need to be swapped and the measurement re-taken. If there is no voltage present on either pins 2 or 1, check the connections from the Carrier loom flat plug back to the fridge controller.
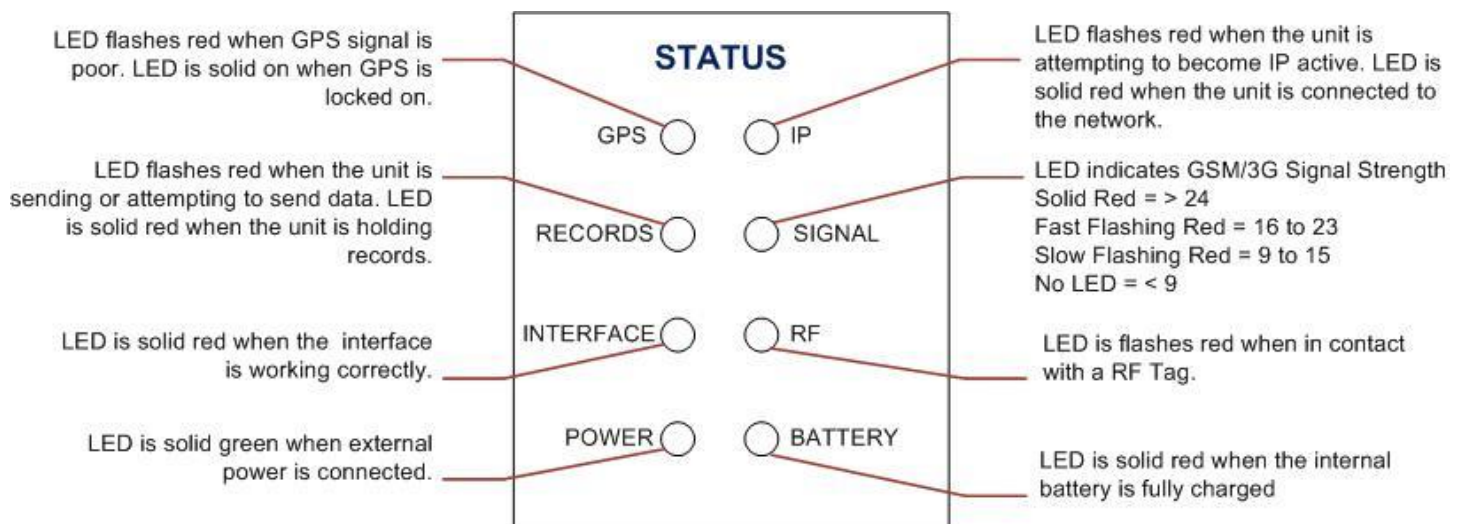
UMD COMMS 1
CABLE END PLUG
PIN VIEW

Picture 12: Cooltrax Interface Plug

If these two measurements are correct, connect the fridge interface cable to the UMD COM2 Port and power ON the UMD (If not already ON).

If the Fridge cable was connected to a UMD that was OFF and then powered ON after the connection was made, the UMD should sense the fridge within a couple of minutes and the fridge light on the UMD should come ON RED.

Picture 12: UMD LED's

	STATUS	
LED flashes red when GPS signal is poor. LED is solid on when GPS is locked on.	GPS ○ ○ IP	LED flashes red when the unit is attempting to become IP active. LED is solid red when the unit is connected to the network.
LED flashes red when the unit is sending or attempting to send data. LED is solid red when the unit is holding records.	RECORDS ○ ○ SIGNAL	LED indicates GSM/3G Signal Strength Solid Red = > 24 Fast Flashing Red = 16 to 23 Slow Flashing Red = 9 to 15 No LED = < 9
LED is solid red when the interface is working correctly.	INTERFACE ○ ○ RF	LED is flashes red when in contact with a RF Tag.
LED is solid green when external power is connected.	POWER ○ ○ BATTERY	LED is solid red when the internal battery is fully charged

System Test:
1. Check the Engine Bay for any tools, fixings or off-cuts, which may have been left behind.

2. Install and re-connect Carrier System Battery
3. Un-plug the UMD 'POWER' connector dust-cap and connect the UMD Power lead.
4. Within approximately 30 seconds the UMD 'Power' LED will light up GREEN, followed closely by the battery light. Within a few minutes, assuming that there is GPRS or 3G service available on the GSM/3G network, after the Signal LED will begin to flash.
5. Turn ON the Carrier Controller using the main 12V ON/OFF switch and be prepared for the refrigeration system to start.

Please Note: **Always connect the power to the UMD last!**

Wireless Tag Installation:

The new RFID UMD communicates with CoolTrax remote temperature and door sensors via wireless; this saves considerable installation time. Depending on the customers desire to have independent temperature reading points in the trailer or a door open and close tag and magnet, CoolTrax provides RF capable tags which communicate with our UMD, these tags should located by the installer according to the customer's requirements.

Picture 13: Wireless Temperature and Door Tags

                    Wireless Temperature Tag   Wireless Door Tag and Magnet

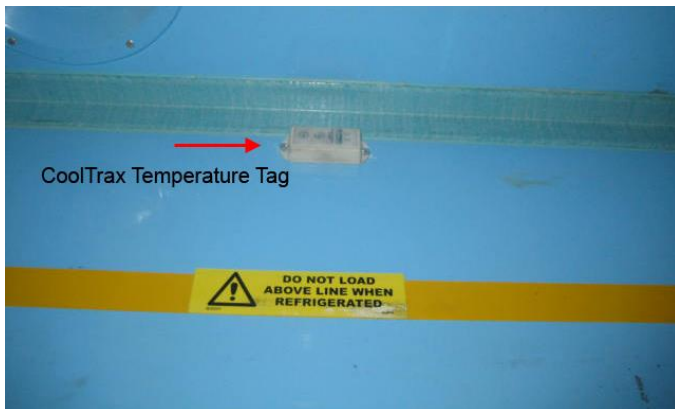### Cooltrax Wireless Temperature Tag:
Each CoolTrax Tag has a flanged base with holes to allow the installer to either screw or pop-rivet the tag to the trailer wall or door. Double-sided tape is another mounting option for flexibility and ease in moving around to different monitoring locations within the trailer.

Check with Cooltrax or the customer for information in respect to where the tags should be located in each trailer.

Important Note: The RFID Tags supplied with a UMD are specific for that particular UMD they must be kept with and installed with the specific UMD. If RF Tags from another UMD Kit are installed they will not be able to report to that UMD.

Temperature and Door Tags need to be located in a position within the trailer where they will not be damaged in the trailers normal daily operations – by fork-lifts when loading pallets etc.

Picture 14: Wireless Temperature Tags Locations

Temperature Tag located <u>above</u> the load line along the trailer wall.

Temperature Tag located next to the Return Air duct

Cooltrax Wireless Door Tag:

The location of the Door Tags and Magnet will vary according to the various body types of the trailer and whether the fitted doors are roller or barn style. The important consideration, again, is to locate the Tag and Magnet in a position where they will not be damaged. This requires a careful assessment by the installer on a case by case basis as there are so many variations from trailer to trailer and even between the different door types.

Cooltrax provides brackets for both types of door installation.

<u>**Installation Options:**</u>

1. On the Inside of the Barn doors with the magnet located on the RH door (looking from inside the trailer out
2. If the Trailer body has a lip along the top at the rear then the tag can be located on the inside of that lip where it is protected and the magnet attached to a bracket on the inside of the door
3. In the case of a roller type door the tag is typically located on the inside LH side wall directly adjacent to the roller door and the magnet and spacer is located on the roller door itself – checking for clearance when the door is "rolled up". See picture below

Picture 15: Wireless Door Tags

Door Tag fitted to a Roller Door Installation

Door Tag and Magnet fitted to Barn or Side Door

Door Tag Installation Considerations:

Tag Alignment with the Magnet:

On the side of the door tag is a label "Magnet This Side", make sure that the door tag is installed with this side of the tag facing the magnet.

Please Note: The magnet should be vertically aligned mid-way with the side of the door tag where possible – this may require packing the magnet up.

Distance between the Door Tag and the Magnet:

Install the door tag with a maximum of 12mm between the tag and the magnet to ensure consistent communication.

Please Note: Make sure that the Door Tag is switched on by holding down the on/off button on the tag and checking that the green On LED flashes to indicate an On State.

Post Installation:

Once the physical installation of the unit is complete and the UMD is powered on contact CoolTrax Support staff so that they can check that the unit is reporting as expected.

On contact provide the following Installation Details (via phone or fax the completed Installer Template provided by CoolTrax):

1. The Customer Name
2. The Fleet ID of the Trailer
3. The UMD ID (located on the front of the UMD – typically UCXXXX
4. The Fridge Model
5. The Sensor location with Sensor ID – if fitted
6. The installer name and contact details – mobile phone number to call once the unit has been tested

Please ensure that CoolTrax staff confirms that the unit is reporting data as expected **<u>BEFORE</u>** the trailer leaves the installers premises. Cooltrax will not be liable for costs incurred through the asset being recalled for validation at a later time.

CoolTrax staff will ask you to conduct a number of fridge operations as part of the Installation Check to make sure the unit fridge interface is correctly installed and configured.

- Power the fridge unit on and off to check the Fridge Interface is functioning as expected

- Change Set Point Temperature

- Open and Close the Rear Door to test Door Tag if fitted.

- Send some Remote Commands to ensure the Interface is working correctly

- Switch to Maintenance Mode to ensure that the Maintenance Box is connected correctly

<u>CoolTrax Support Contacts:</u>

Support – (613) 9686 6011

Email: Support@Cooltrax.com

Specifications:

UMD Power	Power Supply	12VDC to 24VDC
	Average Power Consumption	Less than 2W
	Internal Fuse	2A (not field replaceable)
Discrete	Type	Closing contact
	No of Channels	2
WiFi Interface	Band	430 MHz UHF ISM
	Transmit Power	10 dBm Max Burst Transmission
	Receive Sensitivity	-100 dBm typical
	Range	50m typical in clear line of sight
Serial Data Comms	Comm 1	RS-232
	Data Rate	9600 Baud Standard - configurable up to 38.4K Baud by firmware
	Function	Typical use for fridge interface
	Comm 2	RS-232
	Data Rate	9600 Baud Standard - configurable up to 38.4K Baud by firmware
	Function	Typical use for firmware upgrades
GPS		Specifications subject to available / visible satellites
Acquisition Time	Power Up	< 1min typical
	Re-acquisition	< 1 sec typical
Accuracy	Horizontal	< 2.5 meters CEP
Enclosure Dimensions	Length	160mm
	Width	120 mm
	Height	55 mm
	Min height clearance	120 mm

Mounting Centers	(4 by 5.0mm slot holes in base flanges)	Mountable in any attitude
	Length	150 mm
	Width	110 mm
Environmental Specifications	Sealing	IP65
	Operational Temperature	-30°C to +35°C (external)

RF Tag Specifications:

Tag Power	Internal battery	3.6V lithium thionyl chloride
	Average Power Consumption	Less than 70 uW
	Expected Life	< 3 years
Range and Accuracy	Temp measurement accuracy	$\pm0.5^0$C by calculation
	Temp range	-30^0C to $+70^0$C
	Stabilization period	4 hrs typical
Sample Rates and Temperature Data Storage	Sample send rate (temp mode)	20 secs average
	Sample rate (consignment mode)	1 min to 4 hrs in 1 min increments
	Temp data storage capacity (consignment mode)	31,488 samples
	Temp data upload rate	400 samples per sec
	Range	50m typical in clear line of sight
WiFi Interface	Band	430 MHz UHF ISM
	Transmit Power	10 dBm Max Burst Transmission
	Receive Sensitivity	-100 dBm typical
	Range	50 m typical in clear line of sight
Enclosure Dimensions	Length	97 mm
	Width	40 mm
	Height	22 mm

Mounting Centers	(2 by 3.5mm by 13mm slot holes in base flanges)	Mountable in any attitude subject to antenna requirements
Environmental Specifications	Sealing	Wet assembled
	Operational Temperature	-30°C to +70°C (external)

Compliance and Safety

FCC Compliance:

Note: 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.

Modifications not expressly approved by the manufacturer could void the user's authority to operated the equipment under FCC rules.

CAUTION

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.

DISPOSE OF USED BATTERIES ACCORDING TO THE INTRUCTIONS.

Function of Cellular Component

The UMD reports to the server approximately once every 15 minutes on the LTE or 3G mobile carrier networks, transferring close to 100 kB of data per day.

In the US and Canada, model **WG-V3-LTE-NA**, the UMD uses a ublox TOBY-R202, communicating on LTE bands 2, 4, 5 and 12, as well as UMTS bands 850 and 1900.

In the APAC region, including Australia and New Zealand, model **WG-V3-LTE-AP**, the UMD uses ublox TOBY-L280, operating in LTE bands 1, 3, 5, 7, 8, and 28, as well as UMTS hands 850/900 and 1900/2100.

APPENDIX A: Upgrading a Carrier ePROM Chip

1. Start the unit and verify operation
2. Disconnect the negative battery cable
3. Locate the Micro-Processor Logic Board
    a. For Trailer Units – it will be located behind the key-pad & display module or inside the control box
    b. For truck units it will be located inside the control box, on the door.
4. Connect a wrist strap to your wrist and secure the clamp onto good ground such as the bare-metal hinge holding the micro assembly in place or other non-painted metal area.
5. Locate the ePROM, carefully cut and remove the tie-wrap, holding the ePROM in place.
6. Note the orientation of the ePROM before removing it. There is a small notch in one end that will match up with the notch in the outline of the chip on the board. *The new chip must be installed with the notch in exactly the same position*. Using the removal tool (p/n 07-00297-00) remove the chip from the board.
7. Place the new small tie-wrap (inc in the Parts Kit) under the ePROM socket. Open the box and hold it by both ends. Attach the installation tool (p/n 07-00298-00) on the ePROM while holding the tool with your thumb on the silver pad (this allows the entire tool to be grounded through your hand). After positioning the notch on the ePROM in the correct direction, carefully align the pins with the socket. Gently push the ePROM into the socket until seated. Remove the insertion tool and closely inspect the ePROM prongs where they entered the socket. *Make certain that all of the prongs are fully inserted into the socket and that none were bent or pushed out of the way during the insertion process.* Secure the ePROM in place with the tie-wrap and cut off excess length.
8. For REV 3.32 only – place decal onto a visible location inside the control box.
9. Secure the logic board back into place and close the control box door.
10. Start the unit and verify operation.
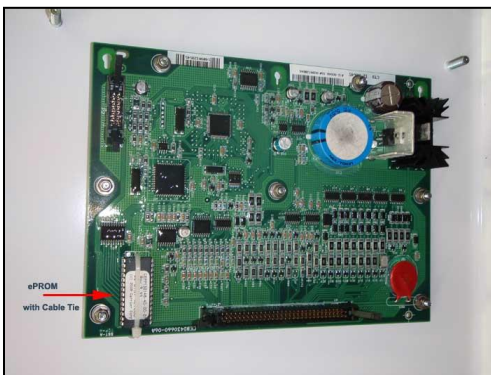
Note: Adjustments to hour meters, Functional Parameters and Configurations are not necessary as these settings are contained within the logic board itself and replacing the ePROM will not effect or change their settings.

APPENDIX B: Conditions for Making a Warranty Claim

Pursuant to the Contract of Sale (Master Agreement) you entered with Cooltrax, Cooltrax provides 12 months warranty on all hardware in accordance with the terms and conditions of the Master Agreement. To make a warranty claim, the customer and their installer must comply with the following:

1. Your Service Agent, who has been previously approved by Cooltrax, must call Cooltrax Support on telephone number +61 3 9686 6011 within Support Hours, which are 09:00 to 17:00 Monday to Friday (AEST) to interactively work through a diagnostic process on a faulty Universal Monitoring Device ("UMD"), Maintenance Box or Tag before a UMD, Maintenance Box or Tag is removed or replaced.

2. A UMD should not be removed from your asset without approval of Cooltrax Support after an unsuccessful attempt to repair the UMD locally or by remote diagnostics.

3. If a UMD is removed from your asset and sent back to Cooltrax without the prior approval of Cooltrax Support then your warranty claim will not be recognized and all costs of and associated with repairs will be charged to you.

4. If you or your approved Service Agent wishes to have a hardware issue investigated outside of normal Cooltrax Support hours then they should refer to the Troubleshooting Section of the latest Cooltrax Installation Manual. If the issue is not able to be resolved then you or your agent will need to contact Cooltrax Support within normal Support Hours for further investigation and/or approval to remove the UMD for Warranty evaluation.

5. If any Warranty Claim arising from water damage to the UMD or its connectors is to be recognized, you must first provide Cooltrax Support with a photo of the installed location of the UMD on your asset prior to removal.

6. Once approval for removal is given, you must return the faulty hardware to Cooltrax for evaluation of your Warranty claim and a decision as to whether the unit can be repaired or should be replaced.

7. All costs incurred for the assessment and/or removal and delivery of the faulty device to Cooltrax are your responsibility.

8. The Cooltrax warranty applies where the hardware failure arises from a fault in any of the electronic or mechanical components within the hardware under normal operating conditions.

9. Cooltrax will not recognize any Warranty claim where the hardware failure does not arise from any fault on the hardware electronic or mechanical components, including, without limitation, where:
   a) the installation of the hardware has not been carried out in accordance with the Hardware Installation Instructions and the Cooltrax Installation Manual
   b) a non-approved person has installed, worked on or removed the device
   c) the UMD shows evidence of an external event that has damaged the unit
   d) UMD has been opened
   e) UMD has been removed without the prior approval of Cooltrax Support
   f) Cooltrax has not received one or more photos of the install location and the UMD prior to removal in the event of a claim arising from water damage.

APPENDIX C: Installation Flow Chart

Installation Flow Chart for new or Retro Fit Installation:

This is the installation process for a Cooltrax System to a Carrier Reefer. At the end of the process you will have installed and fully validated the Cooltrax System.

Under no circumstances should the asset be released to the fleet without being validated by the Cooltrax Support Staff.

Cooltrax will not be liable for costs incurred through the asset being recalled for validation at a later time.

Note: To fully validate a Cooltrax install the asset should have line of sight to the sky to ensure that the system can gain a GPS fix on sufficient satellites.

Access is provided to the Asset by the Customer, Carrier or Body Builder

Disconnect Power to Battery

Identify the optimal location to install the UMD

Locate GSM and GPS Antennas and run cables

Install RF Antenna in trailer (if required)

Attach UMD and Maint Box to plate and locate in Reefer

Run and secure Harness and interface cables

Install Power Cable but don't connect to UMD yet

Install RF Temp and Door Tags as required

Check all connections to the UMD then power up

Call Cooltrax Support and run through Validation Process

Tidy Up and Secure all Cables

APPENDIX D: Trouble-Shooting Tips and Tricks

Fault: No GPS Reported:

Diagnostics:

Is the GPS LED on the UMD Solid Red? If not then the GPS Engine inside the UMD is unable to get sufficient or any GPS signal

Actions:

Move the asset to a position where the GPS antenna has clear view of the sky

Check the connector on the UMD, the GPS Antenna has a small gold connector (SMA) which connects to the panel connector on the UMD labeled GPS. Make certain it is finger tight.

Note that the RF Panel Connector is the same connector type but labeled RF

Try a second GPS antenna if you have one, if not contact Cooltrax Support to arrange for a spare antenna.

Fault: The UMD is not reporting to the web applications – essentially the unit is offline.

Diagnostics:

How are the IP and the Signal Red LED's behaving?

For consistent communications with the web application the GSM or 3G modem within the UMD must first register with the Telco Provider and then become IP active - ready to communicate with the website. When there is data to be sent, the modem connects to the website allowing a bi-directional transfer to occur between the modem and the website via the cellular network

The Red Signal LED will flash slow, fast or solid depending upon the signal strength and the IP LED will slow at first and then flash fast.

Note: Signal LED Flash Legend

- 🔴 `Slow Flashing Red – Signal Strength of 9 to 15
- 🔴 Fast Flashing Red – Signal Strength of 16 to 23
- 🔴 Solid Red - > than 23

Actions:

Move the asset to a position where the GPS antenna has clear view of the sky

Check the connector on the UMD, the GSM/3G Antenna has a larger silver connector (TNC) which connects to the panel connector on the UMD labeled GSM/3G. Make certain it is finger tight.

Try a second GSM/3G antenna if available, if not contact Cooltrax Support to arrange for a spare antenna.

If none of these actions resolve the issue the UMD will need to be removed and sent back to Cooltrax as:

1. The SIM Card may be inactive or faulty
2. The 3G or GSM Modem within the UMD may be faulty
3. The software configuration of the unit may be corrupt

Fault: The Reefer Unit is on but we are not receiving Reefer Data

Diagnostics:

Cooltrax receives Reefer data via an interface connection between our UMD and the Reefer Serial Port.

When communications is in place between the UMD and the reefer the Interface LED on the UMD will be solid red, if this LED is not lit then there is no interface available and corrective actions are required.

Actions:

Check the Interface cable is locked securely into place on the UMD COM2 panel connector – COM2 is the top left connector.

Try a second Interface Cable if one is available, if not contact Cooltrax Support to arrange for a spare cable.

If the Reefer is fitted with a Carrier Standard Controller then it requires an EPROM upgrade to enable the 3rd party Communications DATATRAK option. See instructions in Appendix A for fitting the correct Revision EPROM – it must be 3.32 and above. Without this upgrade the Interface will not work.

If the Reefer is fitted with a Carrier Advanced Controller then the Reefer must have its Data Port opened by a Carrier supplied DATATRAK PCMCIA Card. See instructions in Appendix A for enabling the 3rd Party Protocol Data Port on an Advanced Reefer unit. Without this upgrade the Interface will not work.

On the Advanced Controller only you may need to select "Other" as the protocol type in the Data Menu option on the controller.

Testing the Fridge Interface:

After the UMD / Carrier Fridge interface cable is connected to the 3 way flat connector in the Carrier fridge loom, with the fridge OFF, measure the resistance between the chassis (0V) and Pin 3 of the plug that will connect into the UMD Comm2 Port. This should be <10 ohms. If this is not correct, check the wiring of the Flat Carrier loom plug back to the Fridge Controller. Turn the fridge ON and measure the voltage between the chassis (0V) (negative of meter) and Pin 2 of the plug that will connect into the UMD Comm2 Port. This should be –8 to –10V DC. If this is not correct, check the voltage on Pin 1 of the same plug. If that is –8 to –10V DC then the wiring to pins A & B of the carrier flat loom plug need to be swapped and the measurement re-taken. If there is no voltage present on either pins 2 or 1, check the connections from the Carrier loom flat plug back to the fridge controller.

CoolTrax Interface Plug

UMD COMMS 1
CABLE END PLUG
PIN VIEW
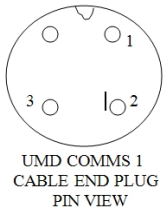
If these two measurements are correct, connect the fridge interface cable to the UMD COMM 2 Port and power ON the UMD (If not already ON).

If the Fridge cable was connected to a UMD that was OFF and then powered ON after the connection was made, the UMD should sense the fridge within a couple of minutes and the fridge light on the UMD should come ON RED.

Note: the recommended firmware revision for the HDMI on Carrier Advanced Controller fridges is Revision 04.12. This works on European Vector and American versions of the fridge and allows for remote two-way control of each. Sometimes if the firmware is a lower revision the fridge interface can fail and an upgrade is recommended.

Fault: The Reefer Will Not Turn On with the Local Switch

After fitting the Cooltrax System the Reefer will not turn on normally using the local On/Off Switch

Actions:

If the Reefer has a standard controller and you have upgraded the EPROM check that the EPROM is seated correctly

Check wiring looms and make sure you haven't accidently unplugged a cable while looking for the Serial Port Plug which is often tucked behind the controller on older model Reefers.

Check Battery Voltage on the Reefer Battery if it is below 12.3DCV you will need to charge the battery as it will not start the reefer at this level.

Fault: The UMD will not Power On or is running on Internal Battery

If there is no Power to the UMD the Green Power LED at the bottom LH corner of the LED array will be off.

Note: If the UMD has been previously powered up for a reasonable time it will run on internal battery for 3 hours or so (if battery is fully charged). In this case the Red Battery LED will be illuminated on the bottom RH side of the LED array.

Actions:

Check Battery Voltage on the Reefer Battery if it is below 12.3DCV you will need to either turn on the reefer or charge the battery as the UMD will not power on at this charge level. The UMD will switch to sleep mode at 12.3V which indicated by the Green Power LED being the only one illuminated.

Once the battery is charged up to 12.8V then the UMD will switch back into full active mode.

Check that the red wire on the UMD Power Cable is connected to the +Ve on the battery and the black to the –Ve terminal.

Check the fuse in the inline fuse holder located on the +Ve cable

Make sure the end two-pin cable connector is tightened securely to the panel connector on the UMD labeled Power – the top left connector on the UMD.

Try a second power cable if it is available, if not contact Cooltrax Support to arrange for a spare cable.

Fault: RF Door Tag is not Reporting

The RF Door Tags are typically mounted on the side and/or rear doors of the trailer and communicate back to the UMD in the Reefer unit via the Low Profile RF Antenna located on the internal roof of the trailer.

Actions:

Check that the gold SMA RF Connector is connected to and tightened firmly on the RF panel connector on the front of the UMD

Make sure that the Tag is turned On – hold down the On/Off Button if the Tag is currently on then the On LED will flash Green rapidly if it is off then the Red Off LED will flash. To change from Off to ON continue to hold down the On/Off Button and the Tag state will change after a few seconds.

The distance between the Tag and the Magnet can be no more than 12mm – check that the distance where it is installed is OK. To test you could remove the magnet and hold it against the tag then move it away from the Tag, the Red LED should flash after about 20 seconds, and then, when you bring the magnet back up to the tag it will flash green after 20 seconds.

Make sure that the side of the tag with the label Magnet attached is facing the magnet when installed.

Make sure the Antenna is mounted with the flat blue antenna case oriented across the trailer width not length-wise as this reduces RF capability.

Make sure that neither the Tag nor the antenna is flat against or located behind any metal obstructions.

Try another Tag or Antenna if you have one, if not contact Cooltrax Support to arrange for a spare.

Fault: RF Temperature Tag is not Reporting

Check that the gold SMA RF Connector is connected to and tightened firmly on the RF panel connector on the front of the UMD

Make sure that the Tag is turned On – hold down the On/Off Button if the Tag is currently on then the On LED will flash Green rapidly if it is off then the Red Off LED will flash. To change from Off to ON continue to hold down the On/Off Button and the Tag state will change after a few seconds.

Make sure the Antenna is mounted with the flat blue antenna case oriented across the trailer width not length-wise as this reduces RF capability

Make sure that neither the Tag nor the antenna is flat against or located behind any metal obstructions.

Try another Tag or Antenna if you have one, if not contact Cooltrax Support to arrange for a spare.

APPENDIX E: Reversing the Wiring Between Serial and Data Ports

On the European Vector model reefers and occasionally on other models we need to swap the wiring between the round data port and the flat serial port. This is required as Cooltrax utilizes Carrier's 3rd Party protocol for

communicating with the micro and on some reefers (always the European Vectors) only provide this information via the round data port and not the flat serial plug.

Please refer to pin and wiring changes below:

The wires of interest are **CURRENTLY** connected as follows:

CARRIER CONFIG PORT	**ADVANCE CONTROLLER**
ROUND PLUG	CONNECTOR 3MP PIN
A	15
B	27
C	3

STARTRAK COMMS PORT	**ADVANCE CONTROLLER**
FLAT PLUG	CONNECTOR 3MP PIN
A	29
B	17
C	5

THESE CONNECTIONS NEED TO BE SWAPPED AROUND AS FOLLOWS.

CARRIER CONFIG PORT	ADVANCE CONTROLLER
ROUND PLUG	CONNECTOR 3MP PIN
A	29
B	17
C	5
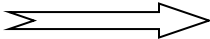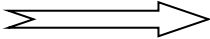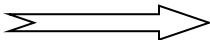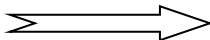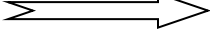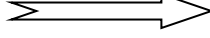
STARTRAK COMMS PORT	ADVANCE CONTROLLER
FLAT PLUG	CONNECTOR 3MP PIN
A	27
B	15
C	3

Summary of Changes:

Plug Pins		Original		New
C	⟹	3MP03	⟹	3MP05
B	⟹	3MP15	⟹	3MP17
A	⟹	3MP27	⟹	3MP29

APPENDIX F: SUPRA 850/950 INSTALLATION

Installing the Cooltrax System to a SUPRA 850 or 950 on a Rigid type asset is slightly different to installing it on Trailer type Reefers.

Note: The SUPRA will require an EPROM Upgrade - see detailed instruction in Appendix A above

EPROM Revisions:

1. Standard Controller One way only - Revision 3.32
2. Standard Controller with 2-Way Remote Control capability - Revision 3.38
3. Standard Controller Multi-temp - Revision 4.12

UMD Location:

The Cooltrax Gateway will locate easily within the control box of the Supra with plenty of room for cabling and antenna connections. The Gateway is screwed to the base of the control box just in front of the motherboard and relays.
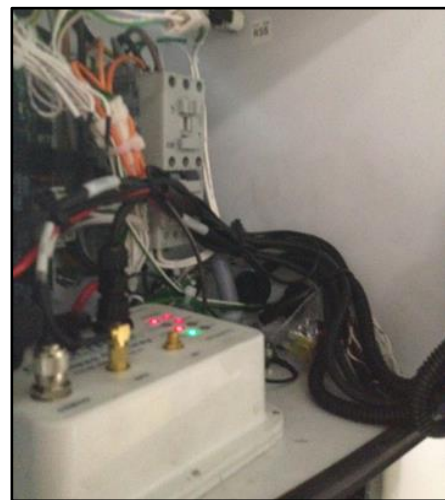
Antenna Location

The GPS and 3G Antennas are attached to the top rail of the reefer frame, their magnetic bases will hold them in place, just run a bead of Sigaflex around the base to make sure they don't vibrate free.

Note: You may need to cut a hole out of the grill section at the top of the fridge to ensure that the GPS antenna has clear view of the sky so that it can communicate with the minimum number of GPS Satellites.
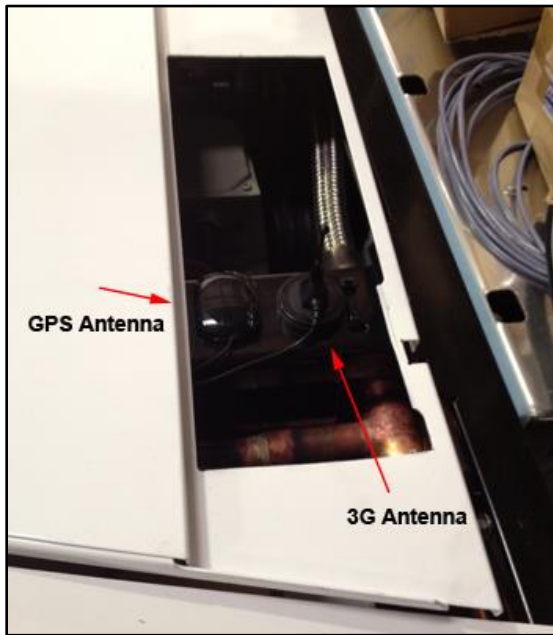
Feed the antenna cables down through the reefer, keeping them away from heat sources and feed them into the controller box via the spare rubber grommets in the side of the box. Cable tie the antenna cables to existing structures or hoses and coil and tie off any excess neatly.
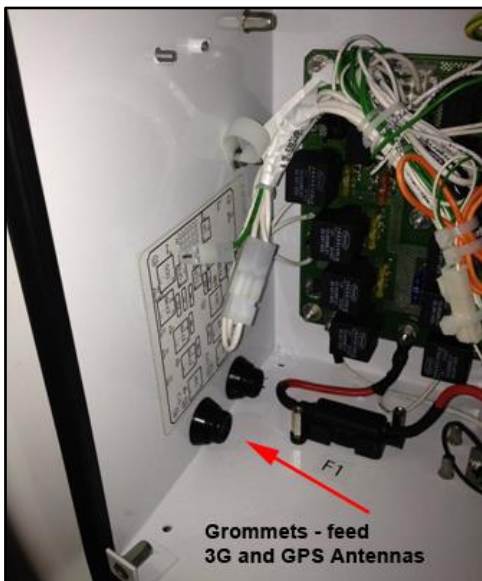
Fridge Interface Cable:

Connect the 3-Pin Delphi Plug on the Fridge Interface cable to the matching Serial Port on the Controller which is located just below the control box. Plug the other end into the COM2 Port on the UMD, tighten down and twist to lock in.
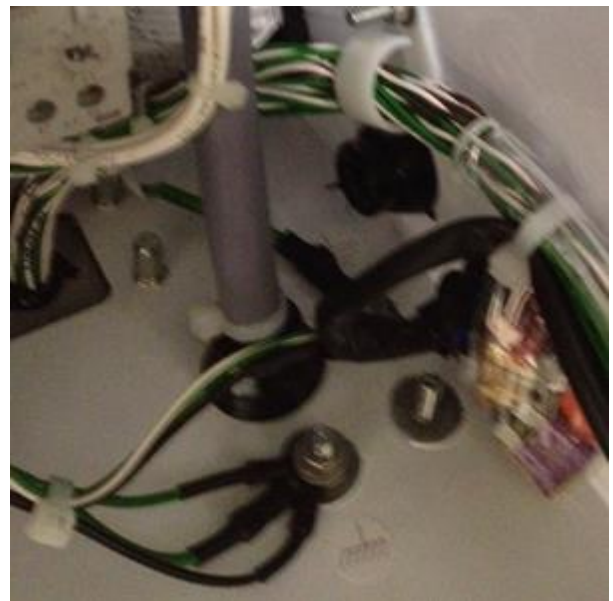

Power Cable Connection:

Once all cables and antenna connectors are in place install the power cable last of all. The Gateway should be connected to continuous power so that the unit continues to track the asset when the fridge unit is powered off. With the Supra Series it is convenient to take power from the positive supply side of the fuse F1 and ground run to fridge chassis.
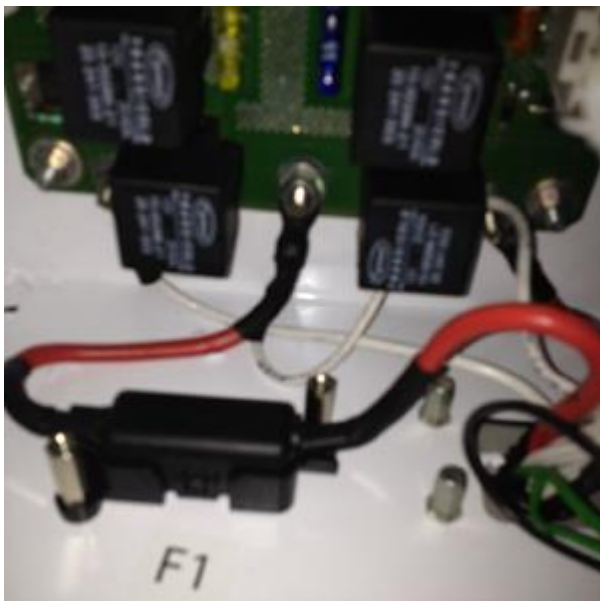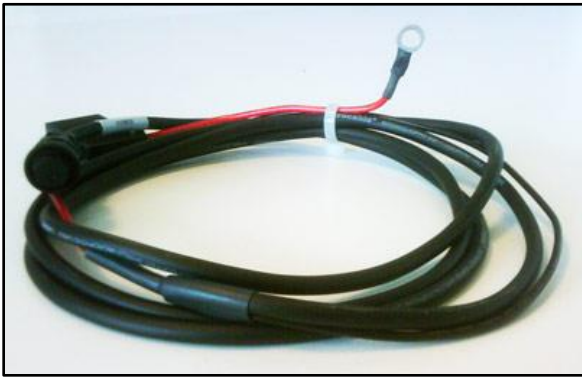

Fuse Holder F1 for Power Connection   Connection to Earth on Control Box

Connect the 2-Pin Power cable connector to the Cooltrax Gateway unit, twist down and lock-in place.

Do a final tidy of cables to complete the installation and call Cooltrax Support to validate that the Gateway is reporting location and fridge information as expected. Refer to the Post Installation section above.

APPENDIX G: INSTALLATION ADVICE

	TO	FROM
Name	Cooltrax Solution Support Team	
Phone number	+61 3 9686 6011	
Facsimile	+61 3 9686 9022	
Email address	support@cooltrax.com	

ASSET DETAILS

Company name					
Fleet number/VIN					
Reefer make	Carrier	Reefer model		Zones	
Controller type	❑ Summit (Standard) ❑ Advance ❑ APX	Firmware revision			
J1 connector	❑ Not present ❑ 2-way connector ❑ 10-way connector				

COOLTRAX HARDWARE

❑ Wireless Gateway (UMD)   Serial number:

❑ Remote Control Maintenance Box   Serial number:

WIRELESS TAGS:	Serial Number	Type	Name or Location
❑ Wireless Tag 1		❑ Door ❑ Temperature ❑ Fuel	
❑ Wireless Tag 2		❑ Door ❑ Temperature ❑ Fuel	
❑ Wireless Tag 3		❑ Door ❑ Temperature ❑ Fuel	
❑ Wireless Tag 4		❑ Door ❑ Temperature ❑ Fuel	
❑ Wireless Tag 5		❑ Door ❑ Temperature ❑ Fuel	
❑ Wireless Tag 6		❑ Door ❑ Temperature ❑ Fuel	

COMMENTS

TECHNICIAN DETAILS	
Your name	
Company name	
Signature	x