ibright® TMU-1500 Carrier Installation Guide

Contents

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Federal Communications Commission Statement

Notice:
Any changes or modifications not expressly approved by the party responsible for

compliance could void your authority to operate the equipment.

DECLARATION OF CONFORMITY WITH FCC RULES FOR ELECTROMAGNETIC COMPATIBILITY

We, Coretex Limited, of Level 2, 135 Broadway, Newmarket, Auckland 1023, New Zealand, declare under our sole responsibility that the product, **TMU-1500**, to which this declaration relates, complies with Part 15 of the FCC Rules.

Operation is subject to the condition that this device does not cause harmful interference.

Caution: Exposure to Radio Frequency Radiation

The radiated output power of the TMU1500 is well below the Federal Communications Commission (FCC) radio frequency exposure limits. Nevertheless, it is important that the TMU-1500 is installed and used in such a manner that the potential for human contact during normal operation is minimized.

When connecting an external antenna to the TMU-1500, the antenna shall be placed in such a manner to minimize the potential for human contact during normal operation. To avoid the possibility of exceeding the FCC Radio frequency exposure limits, human proximity to the antenna must not be less than 20 cm (8 inches) during normal operation.

Federal Communications Commission Notice

This equipment has been tested and found to comply with the limits for a **Class B digital device**, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a typical fleet asset installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, it may cause harmful interference to radio or television communications. There is no guarantee that interference will not occur at any particular installation. If the TMU-1500 does cause harmful interference to radio or television communications, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Re-orient or relocate the radio or television device's receiving antenna.
- Increase the distance between the TMU-1500 and the radio or television device.
- Connect the TMU-1500 to a power supply on a circuit different to the circuit to which the radio or television device is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications

The FCC requires the user to be notified that any changes or modifications to this device that are not expressly approved by Coretex Limited may void the user's authority to operate the equipment.

Industry Canada Statement

Notice:
Any changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.
Aucune modification apportée à l'appareil par l'utilisateur, quelle qu'en soit la nature. Tout changement ou

modification peuvent annuler le droit d'utilisation de l'appareil par l'utilisateur.

DECLARATION OF CONFORMITY WITH IC RULES FOR ELECTROMAGNETIC COMPATIBILITY

This device complies with Industry Canada license-exempt RSS standard(s).
Operation is subject to the following two conditions: (1) This device may not cause interference, and (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.
L'exploitation est autorisée aux deux conditions suivantes:
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Caution: Exposure to Radio Frequency Radiation

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be providing with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

Industry Canada Notice

The radiated output power of the Wireless Device is below the Industry Canada (IC) radio frequency exposure limits. The Wireless Device should be used in such a manner such that the potential for human contact during normal operation is minimized.

This device has also been evaluated and shown compliant with the IC RF Exposure limits under mobile exposure conditions. (antennas are greater than 20cm from a person's body).

Informationsconcernantl'exposition aux fréquences radio (RF)

La puissance de sortie émiseparl'appareil de sans filestinférieure à la limited'exposition aux fréquences radio d'Industry Canada (IC). Utilisezl'appareil de sans fil de façon à minimiser les contacts humainslors du fonctionnement normal.

Cepériphérique a également été évaluéetdémontréconforme aux limitesd'exposition aux RF d'ICdans des conditions d'exposition à des appareils mobiles (antennessontsupérieures à 20 cm à partir du corps d'unepersonne).

Inductry Canada Canices-3(A)/NMB-03(A)

This Class B digital apparatus complies with Canadian ICES-003.
To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.
This device complies with Industry Canada licence-exempt RSS standard(s).
Operation is subject to the following two conditions:
1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 Canada.
Pour réduire le risque d'interférence aux autres utilisateurs, le type d'antenne et son gain doivent être choisies de façon que la puissance isotrope rayonnée équivalente (PIRE) ne dépasse pas ce qui est nécessaire pour une communication réussie.
Cet appareil est conforme à la norme RSS Industrie Canada exempts de licence norme(s). Son fonctionnement est soumis aux deux conditions suivantes:
1. Cet appareil ne peut pas provoquer d'interférences et
2. Cet appareil doit accepter toute interférence, y compris les interférences

qui peuvent causer un mauvais fonctionnement du dispositif.

Modifications

The IC requires the user to be notified that any changes or modifications to this device that are not expressly approved by Coretex Limited may void the user's authority to operate the equipment.

Contact Information

North America

New York:
CoretexLtd
311 West 43rd Street, Suite 304
New York
NY 10036
United States
P: +888 887 0935 option 3

New Zealand

Auckland:
CoretexLtd
Level 2, 135 Broadway, Newmarket
Auckland
1023
New Zealand
P: +64 9 379 7211

Overview

The following document provides details on the steps to complete a successful installation of a Carrier TMU-1500.
The steps below are guidelines for an install. Different reefers and/or customer specific installation requirements may alter the required process.The steps and comments below are based on experience with many unit installs.

Please note that you are responsible for undertaking a professional install. If the vehicle is returned for faulty workmanship you will be responsible for repair and warranty of the workmanship and materials.

For Whom is this Guide?

This guide is for installers of the ibright® Solution hardware.

It covers hardware, part and tool checklists, installation planning, installation best practice, post-install checks including LED status conditions and troubleshooting.

The material in this guide falls into three overall sections.

- We first describe **planning for the installation**.
- Next, we describe the **hardware components** required.
- We then describe the **pre-installation checks** and **installation** in detail.
- Finally, we describe **post installation** procedures.

Coretex's Expectations

A quality installation is vital to ensure that the ibright® Solution performs in the expected manner.

An installation is only considered finished:

- When each unit is successfully connected and providing all the necessary data from the fleet asset to the end application, and
- The installation paperwork has been submitted and accepted by Coretex requires all installers to have read all the information in this ibright® Installation and Operations guide prior to commencing any ibright® installations, and to follow all instructions in detail.

If there is any aspect of the installation that is not covered in this guide, or which you need further clarification on, please do not hesitate to contact us (see "Contact Information" on page 8).

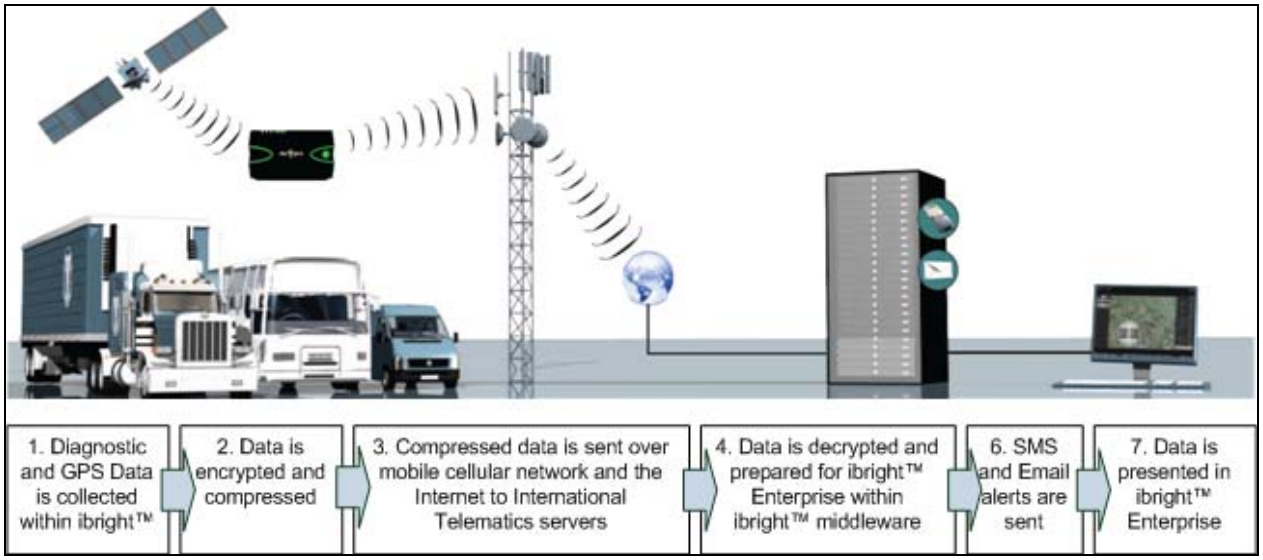
How Does the ibright® Solution Work?

The ibright® Solution has three parts:

- ibright® telematic unit
- Server
- ibright® Enterprise software application

The ibright® unit is an advanced telematic computer incorporating GPS andcellular communications technology.

It collects data from the asset's internal microcontrollers, combines the data with location information from GPS satellites, encrypts the data, and sends it over the Internet to the Coretex servers.



The servers decrypt the information, send SMS and email alerts if required, and prepare the data for viewing in ibright® Enterprise within the ibright® middleware.

The information is then loaded into the ibright® Enterprise software for the customer to view.

Planning and Coordinating Installations

The most important factor in installations of the ibright® Solution is to properly plan and coordinate installations. The planning needs to be based on a proper understating of what equipment and options the customer has purchased, e.g. door sensors, fuel sensors, additional temperature probes, wireless equipment, and so on. It is important to understand the fleet makeup - what types of assets this will be placed in (down to makes and models) as there can be important variances that affect the install.The customer must be told ahead of time that installations are happening and that equipment should be available (Availability can easily be the biggest problem in making installations run smoothly).

The following are additional considerations:

- Location of installations. We recommend that installations be performed in the open, as this allows the TMU-1500 to gain a GPS lock without obstruction. .
- Resources - for example, contact personnel, drivers, technicians.
- Installation environment restrictions (outdoors, indoors, asset availability, authorization).
- Coordination of asset installations so that identical assets are installed together.
- Placement of the ibright® Solution hardware and components.
- Best connections for ground/GND (earth) and constant power.
- Unusual 3rd party hardware specific to the fleet.

Documenting the installation so that it can be followed up at a later date is important, to do this please use the Installation form for Reefer.

General Installation Considerations

The ibright® hardware SHOULD be installed:

1. With vertical and horizontal axis as plumb as possible.
2. So that tampering by unauthorized personnel is avoided.
3. Where accidental damage is least likely to occur.
4. So that cables are concealed from view, secure and cannot be loosened or stepped on.
5. So that components cannot easily be removed.
6. With screws or bolts, using lock-nuts or nuts with shake-proof washers, or rivets.
7. Firmly and securely, away from moving parts.
8. Wiring joints firm and insulated with heat-shrink insulation for crucial connections like POWER.
9. Away from sources of excessive heat.

The ibright® hardware should NOT be installed:

1. On harnesses, hoses, pipes or heater ducts.
2. Where it can create interference on audio head units.
3. Where it may protrude or obstruct in any way.
4. In a way that may constitute a hazard or contravene any applicable Health and Safety Standards.
5. In a way that ibright® components, cords or attachments vibrate or rattle.
6. Where it may chafe cables, pipes or the fleet asset's body during operation.

Asset Warranty Conditions

The first responsibility of the installer is to thoroughly check all fleet asset warranty conditions, and whether any or all of the ibright® hardware installation steps may void any of the asset warranties.

The customer has the discretion to halt the installation if there is a danger of voiding a warranty or the asset is in unsatisfactory condition.

If this is the case, Coretex must be promptly informed.

If the customer decides to proceed with the installation and void any warranties, confirmation must be gained in writing.

Health and Safety Precautions

To safeguard the health and safety of all installers and take proper care of the customer's property, please observe the following when doing an installation.

- Remove all ties and loose or unsecured items of clothing, to avoid these being caught on moving fleet asset parts or hinder movement.
- Remove all accessories or sharp objects like jewellery or belt buckles that may scratch the body of the asset or hinder movement.
- Wear protective eyewear, gloves and protective clothing as appropriate.
- Wearing a high visibility (hi-viz) vest is recommended at all times, and is mandatory for work on open roads or open areas.
- Adequate, independently powered lighting is recommended for night installations.

Drilling and Cutting Precautions

1. Always read the asset's owners manual for any special instructions before commencing.
2. Before drilling ensure there are no obstructions, pipes or cables on either side of the panel to be drilled.
3. Check that any equipment or wiring or equipment has not been damaged once drilling or cutting is complete.
4. Remove any rough edges and filings dropped from holes drilled.
5. Protect any drilled holes or cut edges using a recognized anti-corrosion treatment.
6. Fit suitable grommets where wiring is to be routed through body panels and ensure grommets through engine bulk-heads are water and gas tight.
7. Ensure the structural integrity of the asset will not be reduced.
8. Ensure the technicians are aware of any manufacturer’s instructions regarding corrosion, particularly on aluminum assets.

Installation Documentation

Documenting the installation using the Installation form for reefer will not only capture essential reference information, but will also safeguard you in the event of a problem with the installation.

Installation Form for Reefer

An installation form should be included with each unit shipped. Theform is designed to capture all relevant asset and installation information, allowing correct setup and operation of the reefer telematics unit.

Note: Completing the installation form is essential - the unit will not be provisioned and may not operate correctly unless a completed form is received at Coretex.

Camera

A **camera** or some sort of image capture device canusefulto document the installation.

This is to record anything important or unusual before beginning the installation, while doing the installation and after it also. This is not only for reference, but as a safeguard against being held responsible for faults that existed before the installation began.

Basic Hardware Components

This section describes the components that may be used for a typical installation to a Carrier reefer trailer. An overview of the way these components work together is shown in the system diagram (see A1).

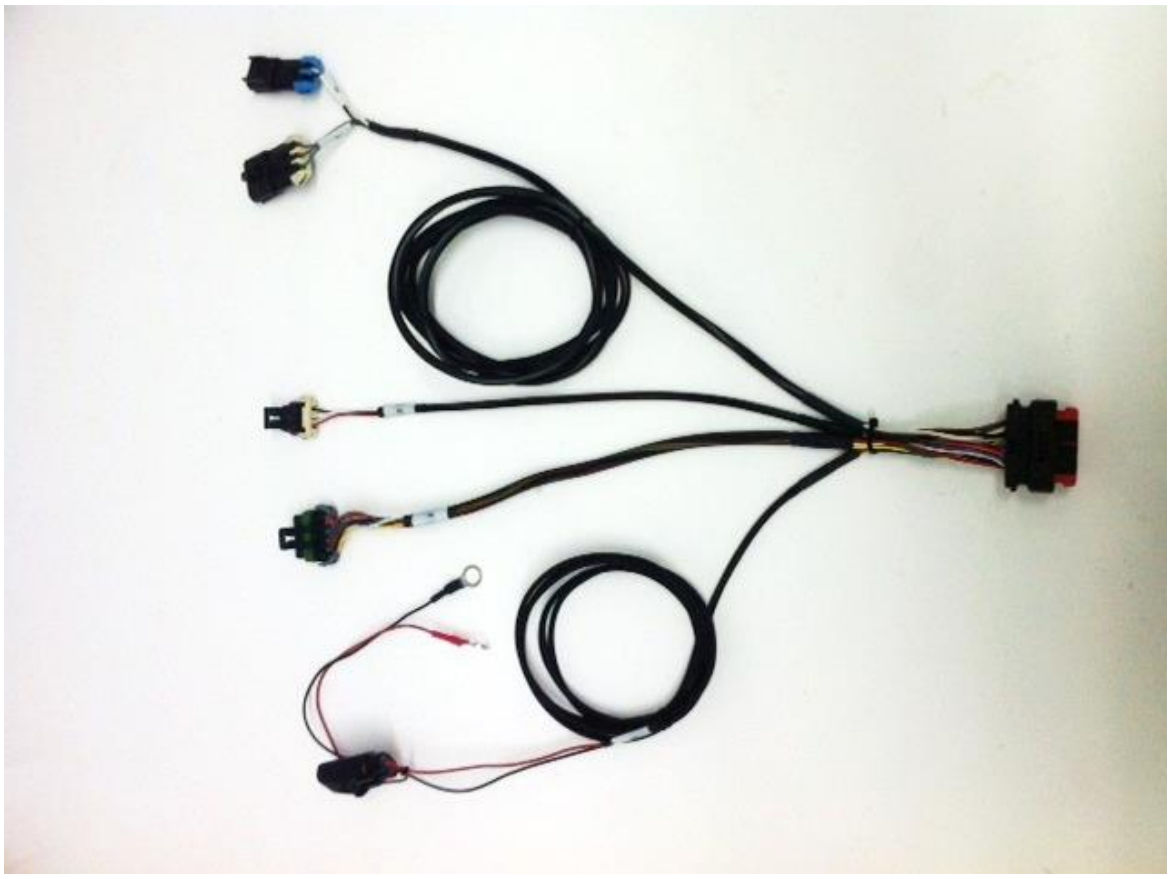
I-bright TMU-1500

The I-bright TMU-1500 for Carrier reefer trailers comes pre-assembled to a bracketready for installation

Carrier Standard Harness

To support standard installations a 8' long installation harness is required. The harness is divided into multiple legs that group various aspects of system functionality together. These are:

- Power related (unit main power)
- Analog and Digital Input Output (ADIO) related.
- Reefer data
- Reefer J1 power control
- Reefer on off switch connection



Switch Relocation Kit

The TMU-1500 can be remotely controlled by the I-bright TMU-1500, but may also be locally controlled by the operator using an external momentary ON / OFF switch. This switch is typically mounted in place of the main start / run switch which is left turned on and relocated (or covered) out of sight - essentially becoming a master off switch for the system.

Optional Hardware Components

This section describes the components that are optionally used for installation to a Carrier reefer trailer. An overview of the way these components work together is shown in the system diagram (see A1).

Door Switch

Where customers want to monitor door open and close continuously a magnetic door sensor can be used. This consists of a Reed switch sensor plus a magnet. The magnet is mounted on the door in parallel to the magnetic reed switch and so that the two are within one inch of each other when the door is closed.

Door sensor and magnet

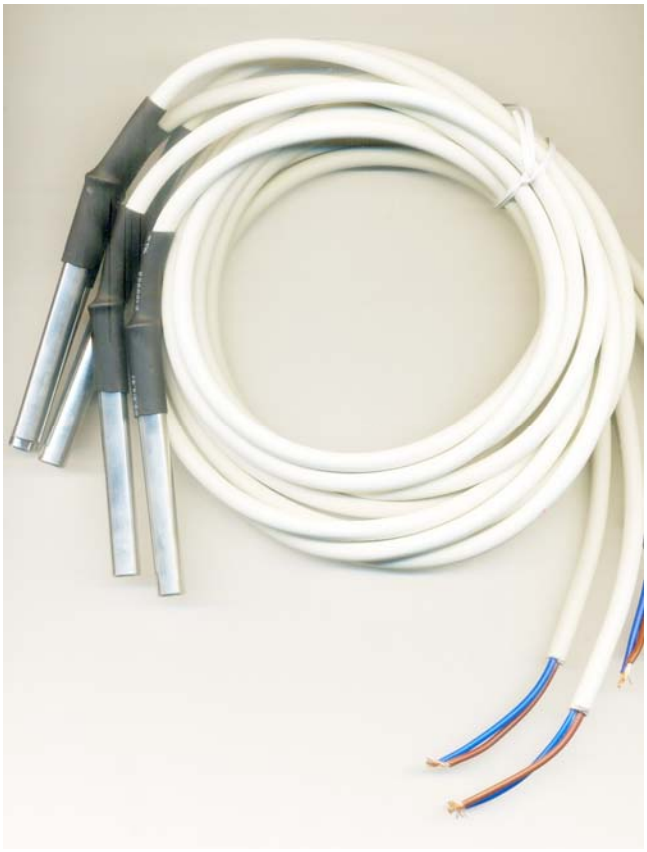
Fuel Sensor

Where continuous fuel level monitoring is required a fuel sensor and associated harnesses can be used. These are connected directly to the I-bright and can be used to measure fuel level, fuel refills and fuel loss.

Ultrasonic Fuel Sensor

Tethered Probes

Some customers like to have continuous temperature monitoring that is independent from the reefer. In this case tethered (wired connection)temperature probes can be used.



Pre Installation

This section covers pre-installation procedures.

Data Track

Warning: Data Track option must be installed and enabled for the unit to report temperature data.

See appendix A&B for guidance about installing Datatrak and reefer setup. The data track protocol must be set to OTHER, not QUALCOMM in the service menu.

Firmware Version

The reefer unit may need to have its firmware upgraded, this will be either through an EEPROM chip or PCMCIA shot (depending on the reefer type).

Summit – EEPROM chip.

Advance – PCMCIA card

Apex – PCMCIA card

Standard Installation

This section covers installation procedures for basic system components.

Things to Remember when Installing

DO NOT cut or bend brackets on the iBright, this makes the unit a non-standard part.

Warning: Always connect data and control cables before connecting POWER.

Warning: Ensure that power is OFF while soldering or connecting wires.

COMPLETE the Installation Form for Reefer.

Take care when removing and re-fitting panels and trims. Some panels may have 'click' connections, others screws or bolts. Please use the appropriate tool to avoid any shredded threads etc. Keep all panels, screws, bolts etc in a safe place whist working on the installation to avoid damage or loss of parts.

ibright® Unit Location and Position

Note: The location and positioning of the ibright® unit is crucial for its operation. Do not proceed with the installation unless you fully understand the mounting requirements.

Different reefer units have different void spaces available for mounting the unit. The harnesses are made long enough that they should accommodate any of the available positions and still reach the power and communications ports of the reefer. Carefully consider the below mounting positions to determine the best position that minimizes the installation effort and maximizes serviceability of the unit.

Position 1)

Above the battery. This LHS position is available in many Advance and Summit based units, though not on Vectors. The unit can be firmly fixed using three self-drilling screws, two on the bottom.

LHS above the battery

Cables tied to avoid tension on connectors

Position 2)

Above the display within the reefer frame. This RHS location is open on many units, some wiring and a drain hose hose must be temporarily unclipped to accommodate the unit (It can be re tied in position after the unit is installed). The unit can be easily secured using two self-drilling screws on the top and one on the bottom. It is highly advisable to use a 1 3/8" hose clamp to fasten the hose to the iBright bracket – preventing the two from rubbing.

RHS above the display

To prevent abrasion use 1 3/8" hose clamp bolted to the iBright bracket

Tie up cables to prevent tension on connector and to avoid the alternator

Existing radiator hose clamp needs to be moved one hole to the left

Position 3)

Behind the battery is available for some units like Vectors. The location can accommodate the IBright but the battery may need to be moved in order to install the unit – BEWARE that this will add a lot of time to the installation so this location is far less preferable than the first two positions.

LHS Behind the battery

Secure the unit and bracket level to and square with the reefer usingfour self drilling machine screws. Holes are pre drilled into the bracket to make this process easy. The TMU-1500connectors should facing down, this way we avoid water intrusion into the housing, and the 3 axis accelerometer that the ibright® unit incorporates functions as intended.

Antenna Location and Position

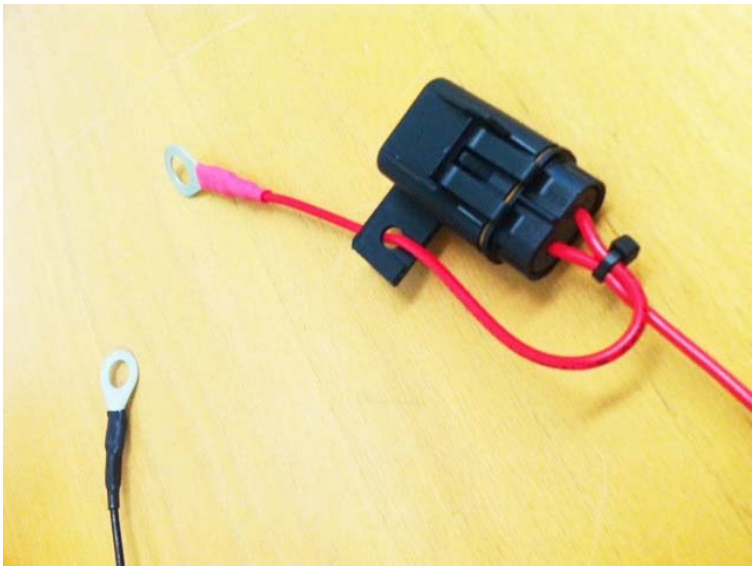
Note: The location and positioning of the antennas are crucial for its operation. Do not proceed with the installation unless you fully understand the antenna positioning requirements.

The iBright uses a combination antenna consisting of a GPS antenna and a cellular antenna. The combo antenna should be mounted away from the ibright unit. It is strongly recommended to mount it at a location with clear view of the sky and in the horizontal orientation for maximum GPS reliability. It should be kept as much as possible away from metal obstructions either to the side or above it. Be careful to keep the antenna and cable away from the exhaust system so that it doesn't get too hot, and protect it with split loom.

An 8' length 3/8" split loom should be included with the installation kit and this should be used to protect the antenna cables as much as possible to prevent them being snagged on sharp edges or from being pinched. Be careful not to over tighten zip ties as this could crush the antenna cables, preventing good reception of either GPS or cellular signals. Keep the antenna cable run away from the exhaust system to avoid heat damage to either the cables or the antennas themselves.

Power and Ground Wiring

The power and ground connections to the ibrightTMU-1500are important. The unit requires a constant (not switched) power supply and a good quality ground. The standard harness provides a braided power leg splitting to a **RED** wire terminated with a 3/8 inch ring (fused to protect the ibright unit from any power surges) and a **BLACK** wire that is similarly ring terminated.

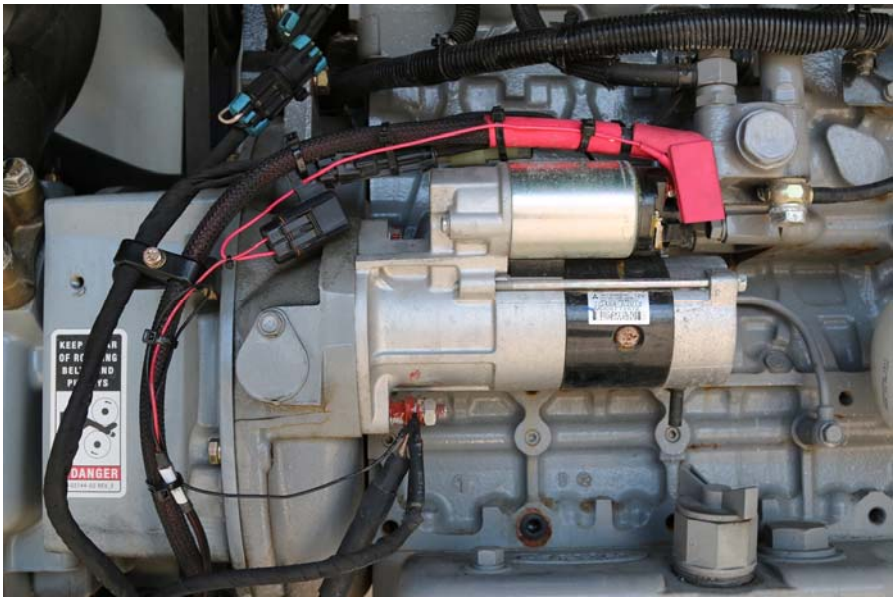


A good, secure ground point is essential, this can best be achieved by utilizing an existing ground stud. At such a connection point which should be nearby the starter there will be a braided metal ground strap leading back to a dedicated chassis ground point. After connection, using a multimeter, test for continuity between the ground point and the main ground connection on the battery. The resistance should be less than 0.1ohms, and this point should remain at ground as the engine cranks.

Warning: Connect the POWER wire AFTER all other connections have been made, and take great care not to short the power connector leading back to the battery against any other reefer parts.

The TMU-1500 takes its constant power connection from the starter. At the starter there is a high amperage power harness leading directly back to the battery. Test the power source with a multimeter to ensure that there is a consistent voltage of between 10 to 28 volts. The unit power connection is protected by a 5 amp fuse

assembly, close to the main power ring. It is suggested that it be treated with dielectric grease prior to the unit being put in service.



Power and ground locations near the starter

The power and ground rigs should be securely fastened, and should be sprayed with a protectant to prevent corrosion.

Protect the connections from corrosion

Reefer Power & Data

A dedicated harness leg provides connections for reefer data and power control. These connections should be relatively familiar to anyone that has previously installed telematics equipment to a Carrier reefer trailer. Power to the reefer micro is controlled through the J1 jumper and the Datatrak reefer data connection has a 3 plug cover seal that needs to be removed before making this connection.

The J1 connector on the iBright harness is typically labelled P2

The Datatrak connector on the iBright harness is typically labelled P3.

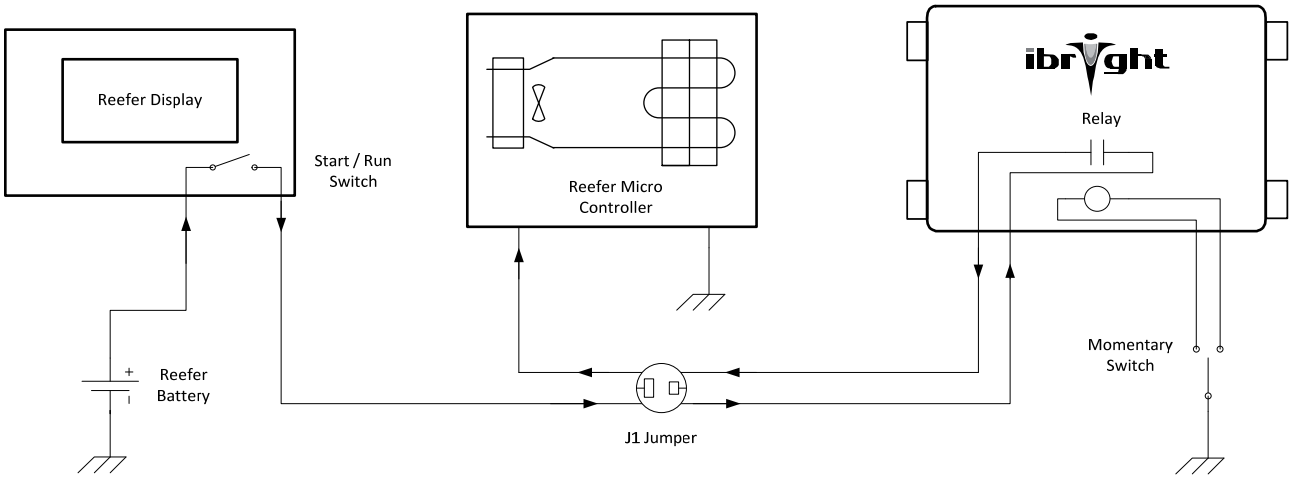
Warning: Datatrak must be installed in the reefer unit in order for the iBright to see reefer data, and the third

party protocol must be set to OTHER (not QUALCOMM).

J1 shown to the left and Datatrak to the right.

Reefer Power Control

A key benefit of the iBright system is the ability to turn the reefer on and off remotely. Usually along with remote control customers also like to retain manual control capability at the unit. The basic power switch topology of a typical reefer / iBright system is shown below:



iBright power control topology

The iBright relay is shown in series, and after the reefer start / run switch. The unit will only run if the start / run switch is on and the iBright relay is closed. The relay is a latching relay which actually has two coils, one to turn the relay on, and one to turn the relay off. Once on, the relay will remain on (magnetically held) even if power is removed from the ibright. The iBright will only modify the relay contact position when asked to do so remotely,

or using the iBright momentary switch. In this way the reefer can be operated both remotely and locally so long as the start / run switch remains on.

Implementation of the different power control schemes is a matter of what reefer or iBright switches are available to users, and how (or if) these switches are connected electrically. The ibright supports the following power control scenarios:

1) No power control ability – leave the J1 jumper in place, no J1 connection to iBright.
2) Remote control and manual control at the unit – j1 connected to iBright, start / run switch on, relay controlled by telematics and momentary switch.
3) Only remote control – j1 connected to iBright, start/run switch left on or bypassed, relay controlled by telematics, no momentary switch added.

The Standard harness provides a 3 pin momentary switch connection to effect manual control of the iBright relay. Black is ground, red is the OFF input, and white is the ON input. Temporarily shorting the black to either red or white will exercise the relay – this is effectively what happens inside the momentary switch when it is moved to the on or off positions.

Momentary switch connector on the iBright harness

A remote switch relocation kit is provided to allow installation of a manual control option by mounting the iBright momentary switch appropriately. The kit includes a sealed momentary switch, switch plate, and safety cover. The switch extension harness plugs into the connector above and is twelve feet long in order to accommodate a range of iBright and switch locations.

iBrightSwitch relocation kit ITC-CTTR-RSW

Main Switch Relocation - Advance

In this scenario which is recommended for Advance and Summit reefers the iBright momentary switch will be mounted in the display panel where the reefer start / run switch would normally be mounted. This placement makes for very clean operation of the unit as the driver or operations person uses the iBright switch to start and stop the unit with no further training.

iBright momentary switch on Advance micro placed where the start / run switch is normally located.

Reefer start/run switch (master switch) on Advance micro relocated to the back of the controller.

The control cable for the iBright momentary switch runs through a cable gland at the bottom of the control box, and feeds up back to the original switch location. The cable run can follow the cable run of the original start/run switch cable to reach the iBright momentary switch on the front of the display.

The iBright can telemetrically control the reefer unit via the iBright relay and the existing start / run switch is moved to the back of the control box, becoming the master power switch. There is enough cable leading to the run/stop switch already present in the control box to support the switch relocation but it must be unclipped and moved along with the switch.

The ON/OFF switch plate and red safety cover are mounted with the master switch in such a way that the switch remains ON when the cover is in its locked down position. Where possible always use the safety cover in association with the master switch. Note that the switch plate included if used with the Carrier switch orients to the OFF position for the Carrier switch being on – so it needs to be rotated so that the switch plate tab is 180 degrees out from the switch alignment notch (The switch plate is also used with the iBright momentary switch in some situations and aligns correctly in that case).

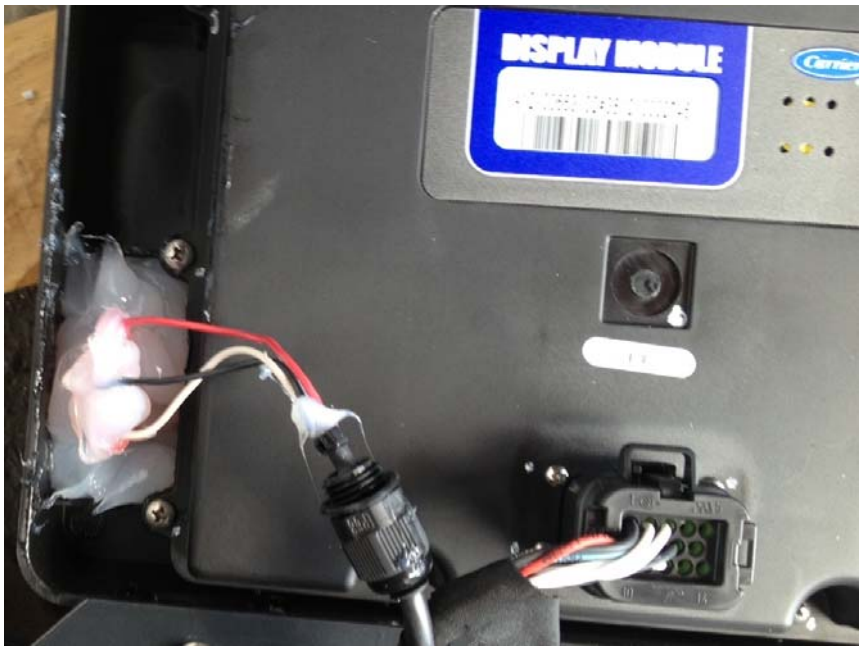
Warning: The master switch is identified by a decal that should be placed nearby it. This shows the positions that the switch should be in while being serviced and while operating normally.

Adjacent Switch Mounting - APX

The iBright momentary switch can be mounted adjacent to the start/run switch. This is the recommended positioning for APX units where drilling into the back of the sealed display to gain access is problematic in terms of display warranty. In this positioning scenario we avoid drilling the sealed area, and instead drill an unsealed area to the right of the display to accommodate the ibright switch.

iBright switch and switch plate are to the right of the display.

This means that the back of the iBright switch must be thoroughly sealed using RTV silicone in order to prevent corrosion. Though the switch itself is fully sealed, the terminals and push on connectors on the switch relocation harmess are not fully sealed.



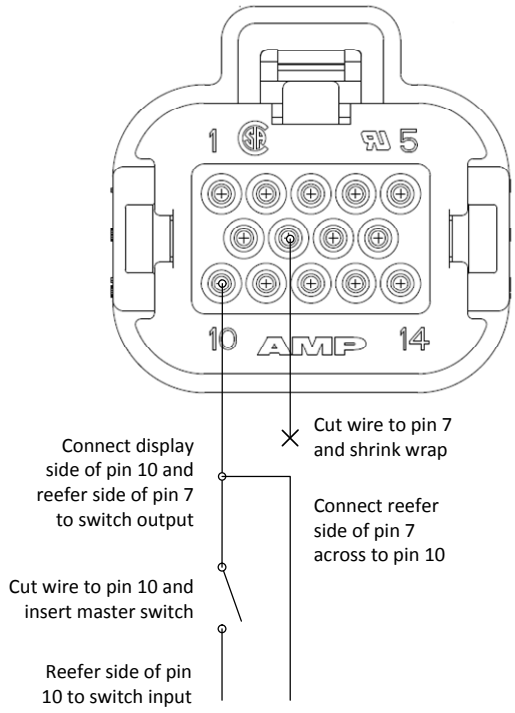
Ibright switch is completely sealed at the back of the display.

In order that the iBright can control power manually and remotely using the momentary switch we must ensure that the start/run switch remains on. This can be achieved by covering the main switch – the red cover cannot be used, but a 3rd party cover is available. The start / run switch in this case is the master switch.

Start/run switch turned on and covered.

Alternatively, it is possible to bypass the switch externally by manipulating the display connector wiring. In this case a 'master' switch can be installed externally behind the display panel (but not by drilling the display enclosure). The wiring details for this setup are shown below.

Display connector – unwrap some of the protective tape to get at the wiring.



Display connector – unwrap some of the protective tape to get at the wiring.

Warning Decals

A decal label showing the safety cover is provided to be positioned near master switch if possible this reinforces that this switch needs to be left on for correct remote power operation of the unit to be effective. In addition

another decal should be placed on the front of the refrigeration unit near to where the door would be opened while servicing the unit. This decal warns that the unit is remotely controllable and may start at any time.

Warning near master switch

Warning on door near display.

Decal near master switch at the back of an Advance control box.

Decal on the bottom right road side door.

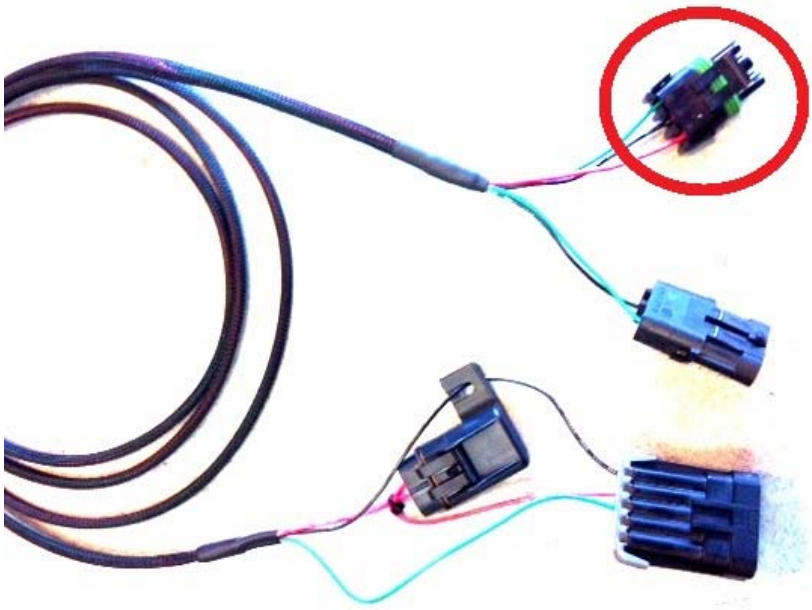
Installation Options

This section covers installation procedures for optional system components.

Fuel Sensor Option

The Ibright accepts input from almost any fuel sensor that drives an input voltage somewhere in the range of 0-5v, but as standard ITC offers an ultrasonic fuel sensor. The unit can be configured to linearly (or even non-linearly) interpolate between any two voltage levels as being empty or full.

The fuel sensor input is provided by the appropriate breakout harness having the standard Carrier weatherpack tower 3 pin fuel connection for fuel input.In cases where a "Y" connection is specified the breakout harness will also have a connection for the reefer, in this case the connections are clearly labelled.



Example door and fuel breakout harness

Fuel "Y" connection

The fuel extension harnessplugs into the weatherpakfuel connector at the ibright end and is run through conduit or under the trailer to the fuel tank. The extension harness should be long enough to follow the route of either the fuel lines or the trailer electrical wiring by pulling it from the front to the back using a wire fish tool. Great care must be taken in running the fuel sensor extension harness, as we wish to avoid jagged edges that could damage the cabling, and we wish to protect existing wiring and fuel lines. The extension harness should preferably run through existing conduit or wire support struts, or should be tied up so that it doesn't dangle below the trailer to be snagged on branches or the like.

Warning: Connect the extension harness to the breakout harness AFTER all other connections have been made. Take great care to do this so as not to short power from the battery against any other reefer parts as the harness is being run.

To install the fuel sensor it will be necessary to drop or rotate the fuel tank, and this should be done carefully as diesel could be spilt creating a dangerous hazard. Where possible it is a good idea to drain the tank, this will make it easier to manoeuver. The tank needs to be rotated slightly (probably by 30 degrees or so) in order to provide enough access to allow the sensor to be fitted. The fuel supply and return lines should of course be

disconnected before doing this and the tank should be supported using jacks or heavy ratchet tie downs **before** loosening the mounting straps. The bolts holding the straps in place could be very rusted, and the straps themselves rusted or coated in hardened grime, making rotating the tank difficult. Using grease between the straps and the tank, as well as lifting it off the straps will make rotating it before and after the fuel sensor installation much easier.

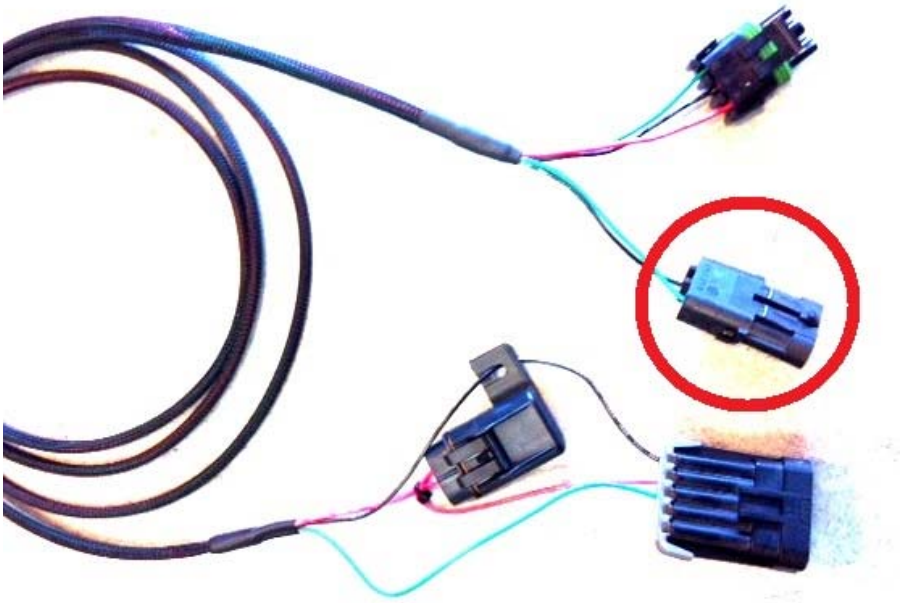
The best way to lift the tank of the mounting brackets is using a jack

As the environment is particularly harsh on the connectors and equipment underneath the trailer proper care should be taken to seal up the connections. Before the splices are crimped and heat shrunk, the adhesive lined sleeve should be slid over all three wire connections so that later it can surround and cover all the splices together. The following connections are available and should be made near the fuel sensor.

- Harness red (Fuel sensor power) connect to fuel sensor red
- Harness white (Fuel level variable voltage input) connect to fuel sensor yellow.
- Harness black (Reference and power ground) connect to fuel sensor black.

Door Switch

By default the unit is configured to use a normally closed door switch – this form of switch is closed when the door is closed and open when the door is open.The Carrier standard harness supports up to two door switch connections and these can be exposed using the right option breakout harness. The breakout harness provides standard Carrier 2 pin door switch connections. In cases where a "Y" connection is specified the harness may have



Door switch connection on the breakout harness.

Door switch mounting on the inside of a swing door.

The door switch magnet should be mounted in PARALLEL with the door switch sensor and such that the sensor and the magnet are within 1 inch of each other when the door is in a 'closed' state. The switch operation can easily be verified prior to connection to the I-bright by confirming that door switch open = circuit open and door switch closed = circuit closed with a meter.The connections between the door sensor and door sensor extension harness should be made by crimping and heat shrinking the supplied butt splices.

Post Installation

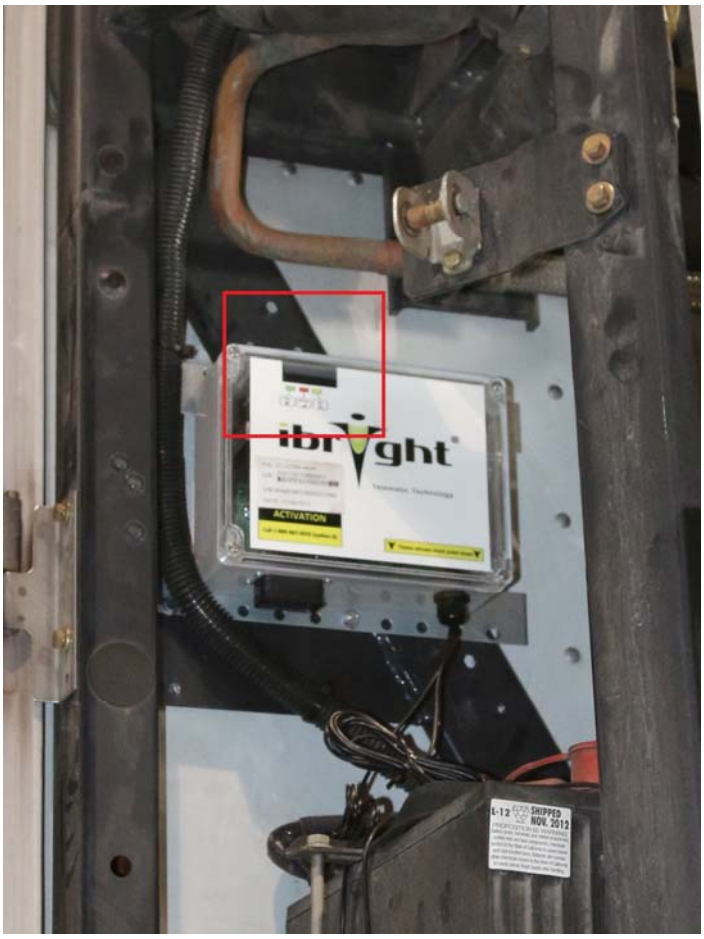
Warning: In order to correctly determine that everything is working these steps must be followed - failure to do so may require that the asset be serviced, and the unit will not be under warranty.

After completing the installation, a simple post-installation procedure must be completed. Connect power and ensure:

- Reefer turns on and off using the momentary switch – this ensures that the iBright relay is functioning correctly.
- Check Diagnostic LEDs to ensure that the iBright powers up correctly and that GPS and cellular, and the reefer communications are working correctly.
- If possible use the iBright tester to ensure that the iBright and accessories are working correctly.
- Report the unit installation into Coretex as described below – various serial numbers and asset information will be needed to ensure that the unit is setup correctly.

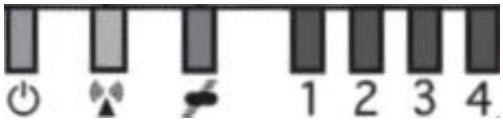
Diagnostic LEDs

The ibright® X-Series unit has a number of LEDs visible through a small window at the top left if the cover panel. Shortly after connecting power to the I-bright turn the reefer on and observe the LEDs which indicate connectivity and power status conditions.



Diagnostic LED window on ibright box.

Make sure you receive a solid lock on GPS and cellular lights after a few mins. Unit will then turn off the LEDs and will only flash power light once every 1-2 second. The table below explains the function of the various LEDs in more detail.



The chart below is a guide to the various conditions.

LED:	LED Color	Steady	Single blink	Double fast blink every second	Single blink every 3 seconds	Off
Power	GREEN	Power On	Engine on, Bluetooth connected	Incorrect or missing config file	Standby mode	Off
Cellular Connection	RED	Cellular Locked	Acquiring cellular, lock, or engine is off (no cellular)	-	Modem Active but in Sleep Mode	Off
GPS Connection	ORANGE	Locked to satellite	Acquiring GPS lock, or engine is off (no GPS)	-	-	Off

Note: If all the lights are on together and do not change, this is a malfunction and you will need to reset the unit. Disconnect the power cable for 2 minutes, and then reconnect - the ibright® unit will reboot.

LCD Tester

The LCD tester allow an installer to verify that a newly installed unit on the ground is working correctly without having to wait for connectivity or to confirm with anyone over the phone. The display gives immediate feedback of the state of the unit without needing any network connection at all.

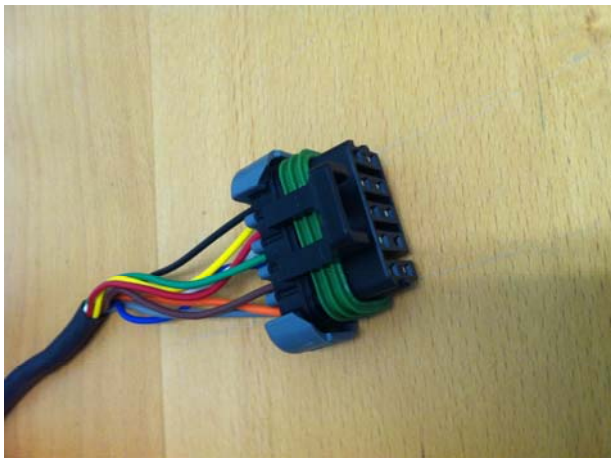
The tester consists of:

- 1 x ITC-LCD-Tester
- 1 x LCD test harness

Test harness

Test harness goes between the iBright and the sensor array.

Before using the tester let it run for about 10 mins if possible, this gives the iBright a chance to see all carrier data channels. Pug the test harness in to the 10 pin Analog Digital Input Output (ADIO) connector on the iBright standard harness. The sensor array (fuel, door, temp probes) connects to the other side of the test harness. A third connection plugs into the display and provides it power and communications.



ADIO connector on iBright standard harness

Sensor array breakout harness for fuel, door and temperature probe.

Once connected, the LCD display should begin to cycle through:

Cellular provider
    APN
    global-eseye

SIM number for the cellular SIM (not always available from the SIM).
    IMSI
    <>

iBright serial number

```
TMU Serial #
010113390800878
```

Firmware revision number

```
Firmware
1.8.7227
```

iBright tethered probe temperatures for each compartment

```
Tethered Probes
?
```

GPS fix type, S=satellites in use

```
GPS
3D S=11
```

Cellular connection true/false, R= cellular registration(should be), S= modem signal strength (should be).

```
GSM
true R=5 S=1
```

Reefer data true/false, T= return temp

```
Reefer
false T=? ?
```

Door sensor as seen by iBright, R= door sensor as seen by reefer protocol

```
Door
CLOSED R=?
```

Fuel level as seen by iBright, R= fuel level as reported by the reefer

```
Fuel
84% V=3.4 R=?%
```

iBright supply voltage, R= voltage reported through the reefer protocol

```
Voltage
12.4 R=12.4
```

Network Verification

Warning: To verify that the ibright is functioning correctly contact Coretexsupport immediately following the install and while the reefer is on.

The contact details are as follows:

888 887 0935 option 8 – these are also provided on the iBright unit itself.

Be prepared to recite the company name where the asset is being installed (or preferably the 5 letter company account code), the asset number, and the TMU serial number. The SIM IMSI (subscriber identity) may also be required in order to activate the cellular connection.

iBright serial number label is in the bottom left corner of the iBright enclosure.

Closing up

Any cables that would otherwise be hanging should be tidily bundled and cable tied to keep them secure.Carefully close any compartments that were opened and secure them so that the asset is left in its original state.