

INSTALLATION MANUAL

CRG-Fendt Roof Bridge



CRG-Fendt
May 2022

CE UK
CA


AGRA-GPS LTD

Contact information

Agra-GPS Ltd.
Box 2585
Stony Plain, AB
T7Z 1X9
CANADA
+1 (780) 990 4052
www.agra-gps.com

Release Notice: This is the May 2022 release of the CRG-Fendt Installation Manual.

It is assumed that users of the products described herein have either system integration or technical experience, as well as an understanding of the fundamentals of agricultural machinery.

Disclaimer

While every effort has been made to ensure the accuracy of this document, Agra-GPS Ltd assumes no responsibility for omissions and errors. Nor is any liability assumed for damages resulting from the use of information contained herein. Agra-GPS Ltd shall not be responsible or liable for incidental or consequential damages or a loss of anticipated benefits or profits, work stoppage or loss, or impairment of data arising out of the use, or inability to use, this system or any of its components.

DO NOT USE THE CRG-FENDT IF YOU DISAGREE WITH THE DISCLAIMER.

Important Safety Information

Read this manual and the machine operation & safety instructions carefully before installing the CRG. Refer to Appendix A for Product Specifications.

- Follow all safety information presented within this manual.
- If you require assistance with any portion of the installation or service of your equipment, contact Agra-GPS for support.
- Follow all safety labels affixed to the system components. Be sure to keep safety labels in good condition and replace any missing or damaged labels. To obtain replacements for missing or damaged safety labels, contact Agra-GPS.

When operating the machine after installing the CRG, observe the following safety measures:

- Be alert and aware of surroundings.
- Do not operate the CRG system while impaired.
- Always remain in the operator's position in the machine when the CRG system is engaged.
- Determine and maintain a safe working distance away from other individuals. The operator is responsible for disabling the CRG system when a safe working distance has been diminished.
- Ensure the CRG is disabled prior to starting any maintenance work on the machine or parts of the CRG system.
- Follow all safety instructions from the Fendt machine as well as the John Deere system.
- The CRG must only be used in the field, never on public roads.

Electrical Safety

- Always verify that the power leads are connected to the correct polarity as marked. Reversing the power leads could cause severe damage to the equipment.
- Verify that all cables and connectors are not in contact with sharp edges or anything that could cause chafing, as this could result in power shorts and/or other malfunctions.
- Power is supplied to the CRG even when the key is off. Power can be removed in 3 different ways: 1) Remove the connector from the CRG, 2) Remove the fuse supplying circuit power, or 3) Remove a battery lead while the machine is off.

Risk of Fire

- The circuit supplying 12 volt power for this product requires a fuse. The maximum fuse rating is 5 amps, and the minimum is 1 amp.

Introduction

Congratulations on your purchase of the CRG! The CRG (Fendt version) is designed to bridge the communication between a Fendt tractor and a John Deere (JD) display (1800, 2600, 2630, 4240, or 4640). This allows a JD display to create maps in the John Deere format, and also provides autosteer functionality. The operator uses the JD display to create AB-lines or field documentation, or to handle any other GPS system input.

The CRG contains a) an RTK-capable GPS receiver, **AND** b) a full steering controller capable of steering a Fendt tractor with a John Deere display!

All conditions for autosteer such as minimum speed, steering enabled, etc., must be met by the Fendt tractor before the autosteer engage option can be activated.

NOTICE

This manual is not intended to replace the manuals for the Fendt tractor nor the John Deere GPS system. The operator must read and understand the manuals and instructions of these systems, before using the CRG.

Components

The CRG-Fendt kit contains the following items:

1. CRG receiver
2. Harness to connect the John Deere display to the ISO in-cab connector of the Fendt tractor
3. Harness from the CRG to the X4250 roof connector for autosteer integration
4. Harness to integrate the CRG to a John Deere tractor as a receiver-only option



Pre-Install

(Optional): Install CRG SIM Card

If your CRG is equipped with an optional cellular modem, install the SIM card **BEFORE** installing the CRG. Later on, the SIM card cannot be installed or changed without removing the CRG from the tractor.

Refer to the [CRG Modem Guide](#) for further instructions.

Determine Mount Type

The CRG is designed to mount within the Fendt interior roof panel. However, if you wish to mount the CRG outside instead, you will need a standard receiver mount.

NOTE: the CRG mounting bracket for JD mounts is not compatible with the shallow mount type as shown below.



Not supported



This style of external mounting is usable

Step 1: Install the CRG

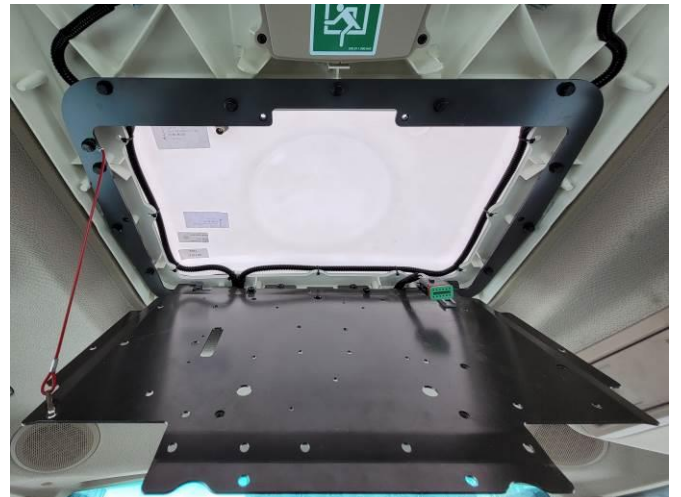
1a) Open the Roof Panel

The CRG is installed in the roof above the main seat.

Removing the plastic cover, exposing the metal panel behind it.

To access the connector for steering, you need to remove all the bolts securing the inner panel, allowing it to swing down.

CAUTION! The hinge side of the roof panel is loose, and the panel can easily fall. Ensure the red corner cable remains connected!

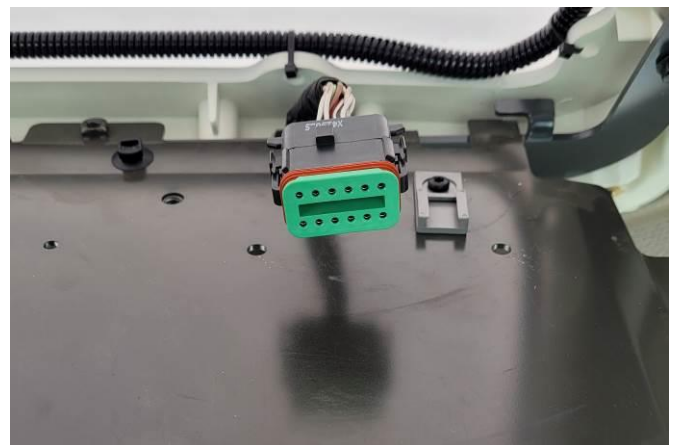


Once the panel is open, the connector(s) should be exposed.

ENSURE YOU HAVE THE CORRECT CABLE HARNESS TO MATCH THE CONNECTOR STYLE AS SHOWN:



Old Style Connectors



New Style Connector

1b) Remove JD Mounting Bracket

Even though the CRG comes with a JD mounting bracket, it is designed to fit into the Fendt sunroof and has the same bolt pattern as the Fendt metal roof plate.

If your CRG came with the JD mount pre-installed at the bottom, you will need to remove it.

Remove the JD mounting bracket from the CRG bottom by removing four bolts, as shown.



The JD bracket is only needed when you use the CRG as a receiver on a John Deere machine and mount. For the Fendt installation it is not required.



1b) Mount the CRG

Prior to mounting the CRG, determine if the unit contains an internal cellular modem. If so, a SIM card must be installed.

Use the same 4 bolt locations to fasten the CRG onto the Fendt sunroof metal base.

For older model Fendt tractors, the CRG is mounted forward (cable connectors toward the back of the tractor).

For newer Fendt tractors, the CRG receiver is mounted sideways facing right (cable connectors to the left).

The roof plate will only allow you to install the CRG in one particular direction due to the bolt pattern on the CRG.

IMPORTANT!

The mount direction is configured within the CRG ISO App in the JD display (refer to page 11). Specifying the correct direction is crucial to proper operation. The CRG is shown mounted in a right-hand direction.



1c) Connect the CRG

Use the harness marked X4250 and connect the 2 DTM plugs (black and grey) to the CRG. Connect the other end to the Fendt X4250 connector.

Optionally, the configurable serial NMEA output from the CRG can be connected to the internal NMEA serial lines of your Fendt tractor. The 9-pin serial connector in your cab will output various NMEA formats based on the configuration in the CRG ISO App (ISObus VT). Refer to the connector image on page 7.



The CRG contains an RTK receiver which, like any RTK receiver, requires RTCM correction data. To achieve this, you may use an Internet-based NTRIP server.

To get RTCM correction data into the CRG, there are 3 options available:

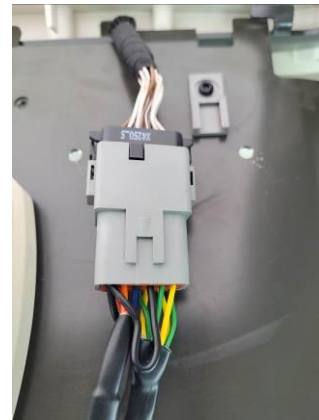
- Internal cellular modem (Refer to page 12 for NTRIP caster setup).
- Bluetooth® using your mobile phone (Refer to page 14 for Agra-GPS app setup).
- External correction source via radio modem

For an external radio, you may use the 4-pin DT deutsch connector (shown unconnected). If the CRG is supplied with an internal cellular modem, this connector must remain unconnected.



ENSURE THE X4250 CONNECTOR IS FULLY SEATED AS SHOWN.

(The side tabs will *click*.)



Close the overhead panel and plastic cover.

ENSURE THE FASTENERS ARE TIGHT.

Any loose movement of the CRG or overhead metal panel will harmfully impact proper operation.



Step 2: Mount the JD Display

The mounts for the JD display are NOT part of the CRG kit, but can easily be manufactured in the average shop or ordered from John Deere.

The JD display adapter cable will be plugged into the 9-pin ISO socket on the back right roof panel. Plug the other end into the JD monitor as shown below.



Should another device in your tractor require NMEA GPS information, this can be provided with the 9-pin D-sub CRG serial output (shown unconnected to the right of the cable). Configure the required signals in the CRG ISO App.

The 4-pin ISObus access plug can be left unconnected as shown.



The JD display may be mounted in many ways. You may use the standard JD mounts or a RAM mount. A display mount is not provided in the CRG kit and must be purchased separately.

For example: RAM-270U + 2 * 1.5" balls (RAM-202U) + 4" double socket arm (RAM-201U)
<http://www.rammount.com/part/RAM-270U>

Shown: JD 2600 in a Fendt 714



Step 3: Setup ISObus Apps

The CRG comes with 2 ISObus VT applications (ISO apps) that will be loaded onto the John Deere monitor. The apps will automatically install themselves into the monitor after the first few minutes of the initial start-up. On subsequent runs the apps will load themselves from monitor memory much more quickly. The CRG apps include:

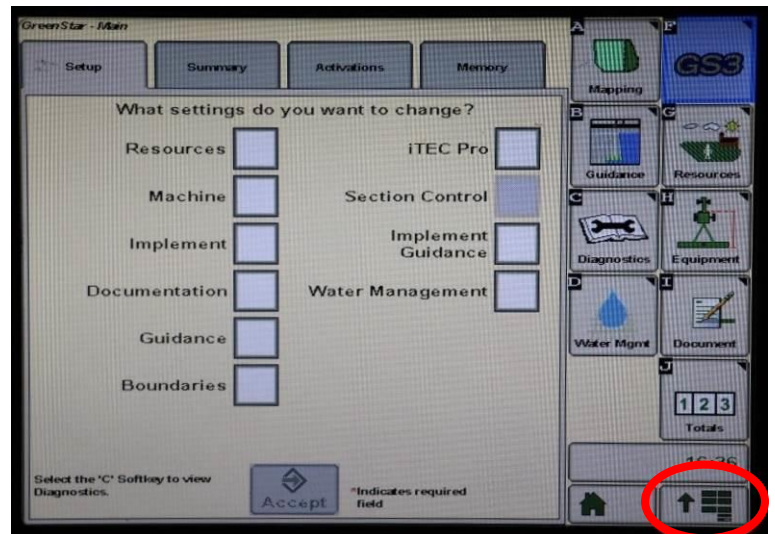
- Bridge/steering configurations
- Option to change work recording mode
- Option to change the machine type
- RTK configuration
- NMEA serial output configurations

Depending on the model of JD monitor, the CRG ISO apps may be found in different locations.

On a John Deere 4640 the application will be loaded in the ISObus VT section on the main page of the display.



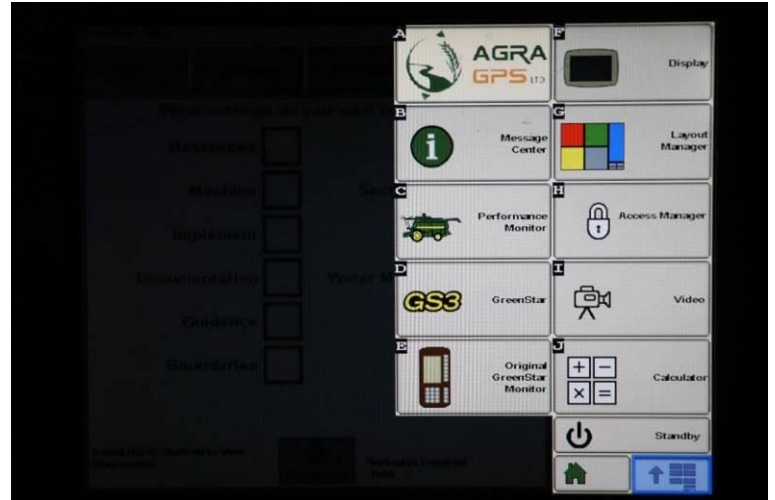
On John Deere 1800, 2600, & 2630 the application will be shown in the side menu of the John Deere display. The side menu (shown below) is opened by clicking the button on the bottom right.



NOTE: John Deere 1800 and 2600 monitors do not show a loading bar for ISO applications, while 2630 and 4640 monitors do.

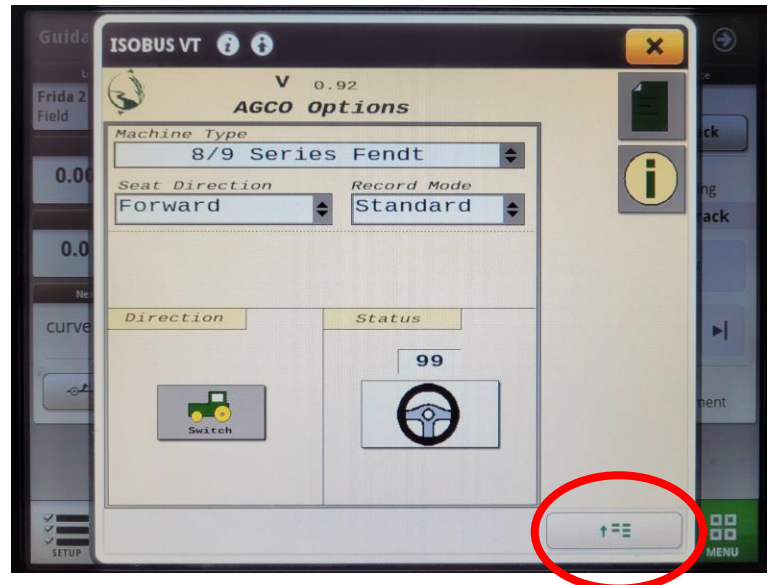
If the ISO application does not load:

- Try clearing the monitor's memory. On 2630 monitors this can be done in the Message Center in the side menu. Go to the Cleanup tab, check controllers, then Begin Cleanup. On 4640 monitors this can be done in the info page of the ISOBus VT. Navigate to the ISOBus VT window and click the info (i) button at the top of the page, then press Clean Up ISOBus VT.
- Do a hard reset of the John Deere monitor (Unplug it, then plug it back in).
- Do a full restart of the machine. Remember, the app may take a few minutes to load.



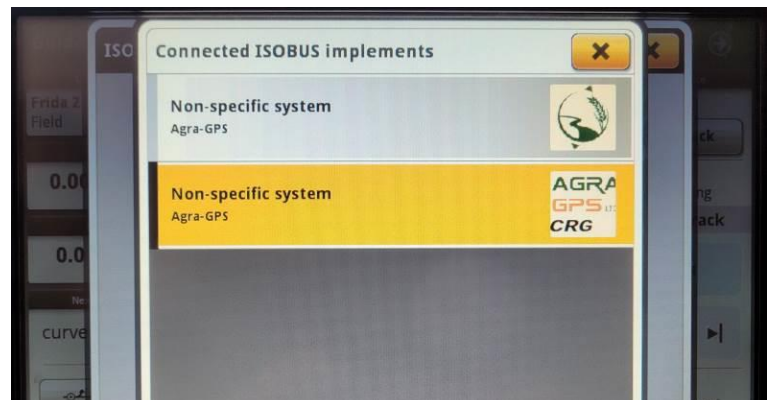
Switching Between ISO Apps

When accessing ISOBus VT, the first page viewed may be the CRG-Bridge app. Before setting up the Bridge parameters, it is necessary to setup the CRG-Receiver app. To do this, pull up the app page using the button circled.



Refer to page 15 for more information on configuring the Bridge app.

In the image, the top item (light grey) switches back to the CRG-Bridge app, and the bottom item (yellow) switches to the CRG-Receiver app.



Step 4: Configure CRG-Receiver ISO App

The main screen of the CRG-Receiver app is the “CRG Info” page, as shown.

The minimum initial setup requirements include specifying the mount placement & completing the calibration procedure (refer to Mount Settings on page 11).



Refer to the following sections for more information:

SETTINGS

- Page 11 General Settings
- MINIMUM SETUP → Page 11 Mount Settings
- Page 12 NTRIP Settings
- Page 12 Modem Settings



Page 13 **DIAGNOSTICS**

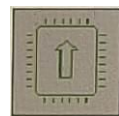


Page 13 **SERIAL PORT**



UPDATES

Refer to the CRG Firmware Update Manual



Use this button to switch between the CRG app and the Bridge app



4a) General Settings

Minutes On After Power Off: Delay for CRG to power down after machine is turned off. This will allow GPS satellite tracking to continue and allows for getting back to work quickly.

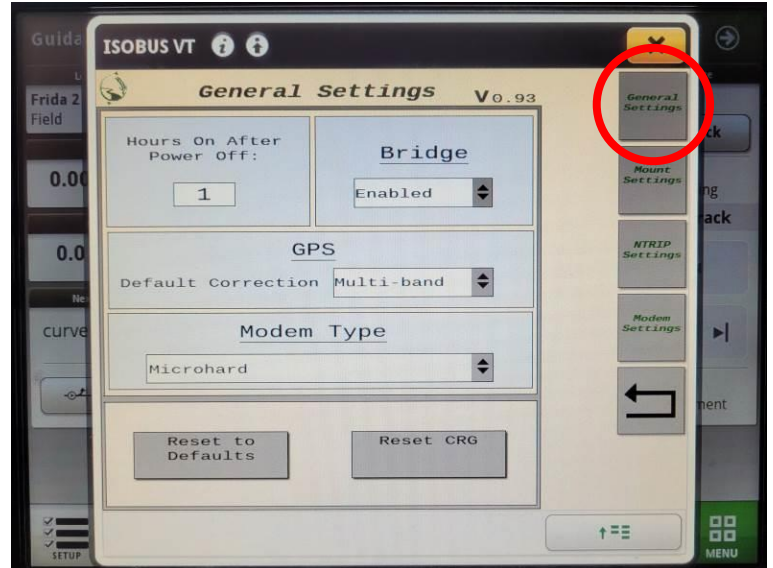
Bridge: Must be enabled to provide auto-steering. Must be disabled if using the CRG as a receiver only.

Default Correction: Multiband allows the CRG to use its preferred default correction algorithms. SBAS restricts the receiver to WAAS or EGNOS only.

Modem Type: If the CRG was purchased with an optional cellular modem, the make of the modem is selected here. The “NTRIP Settings” and “Modem Settings” buttons are invisible if no modem is selected.

Reset to Defaults: All parameters within the CRG Iso App are reset. The default settings take effect after the CRG is rebooted.

Reset CRG: The CRG device is rebooted. **WARNING:** Resetting the CRG while it is engaged will cause loss of machine control.



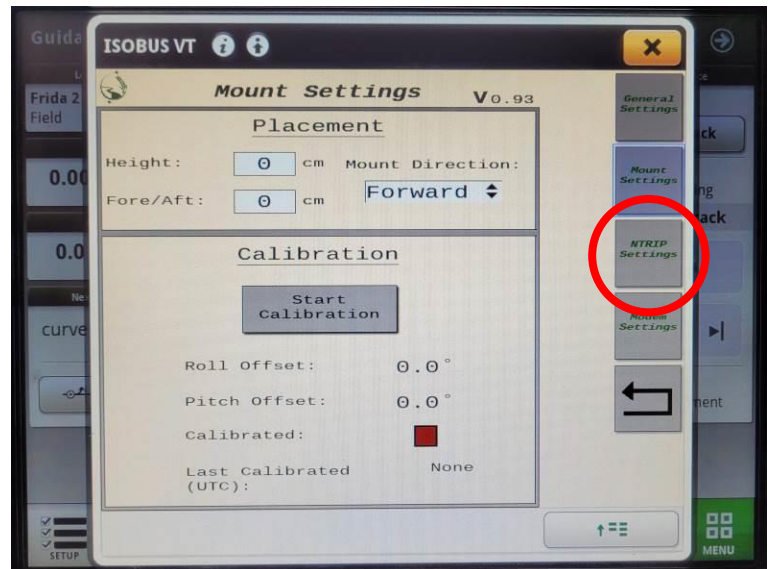
4b) Mount Settings

Height: the height from the ground to the bottom of the CRG.

Fore/Aft: the horizontal distance from the turning point (usually the rear axle) to the CRG.

Mount Direction: the direction of the front of the CRG. For example, when facing forward in the driver’s seat, if the CRG connectors are to the left, the Mount Direction should be specified as Right.

Calibration: the tractor should be parked on a spot that is as level as possible. After initial readings are taken, you will be required to turn the tractor around (180°) and park it on exactly the same spot. Follow the on-screen instructions.



4c) NTRIP and Modem Settings

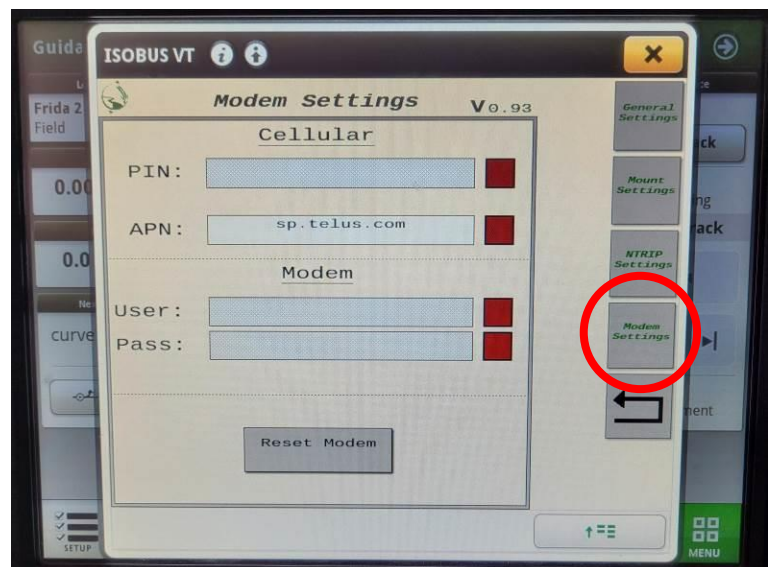
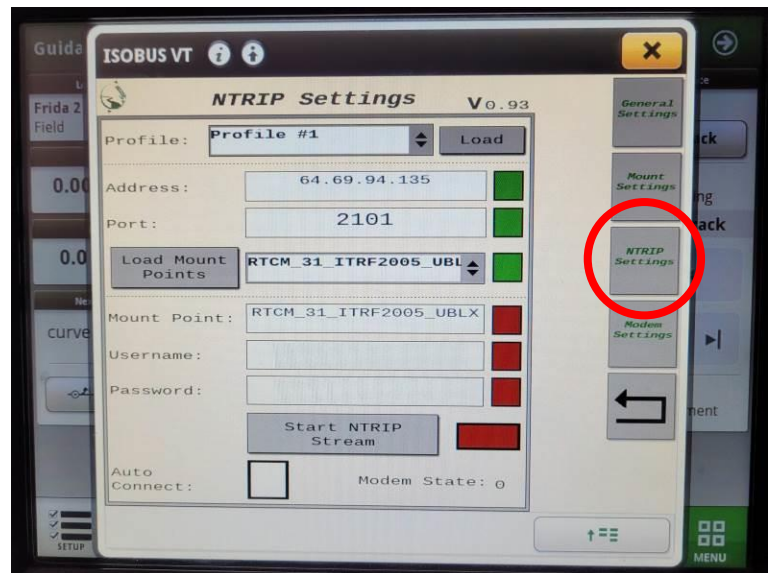
There are 3 options for connecting to an NTRIP caster of your choice:

- You may have purchased the CRG with an internal cellular modem. This modem requires a SIM/data card to be installed.
- If you don't have a cellular modem, you may use our Agra-GPS app on your phone to connect to the CRG via Bluetooth® and get the RTCM correction data from an NTRIP caster. In this case, the IP address and other details of the NTRIP caster are specified within the phone app.
- You may connect an external radio modem. Consult with Agra-GPS for options.

If your CRG is equipped with an optional cellular modem, setup within ISOBus VT is required. The NTRIP settings page allows you to connect to RTCM correction data via cellular connection.

The CRG also works without correction data; however, accuracy is not nearly as good as with an RTCM correction source.

Refer to the [CRG Modem Guide](#) for further instructions.



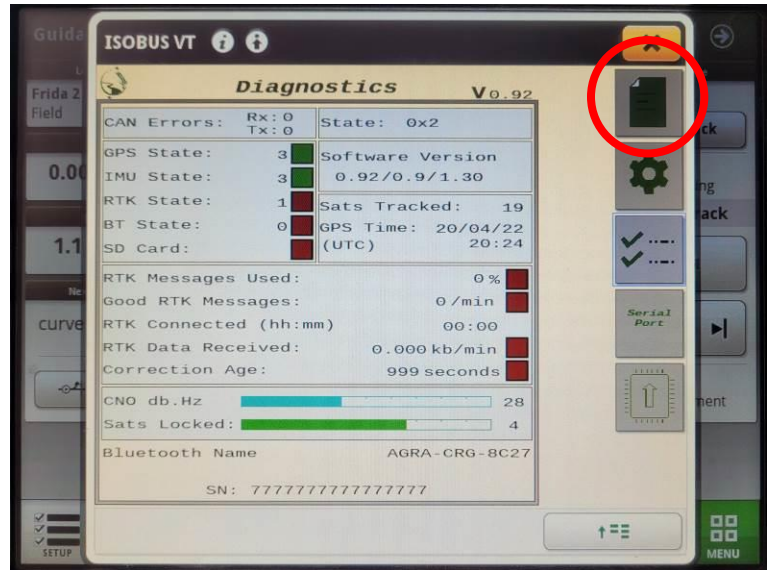
4d) Diagnostics

The diagnostics page is useful for determining proper operation of the CRG.

For connecting with Bluetooth, please note the name displayed near the bottom. This name should appear on your phone on the Bluetooth connections page.

Each CRG will have a unique Bluetooth name (the last 4 characters will differ).

Refer to page 17 for notes on normal indications and/or troubleshooting.



4e) Serial Port

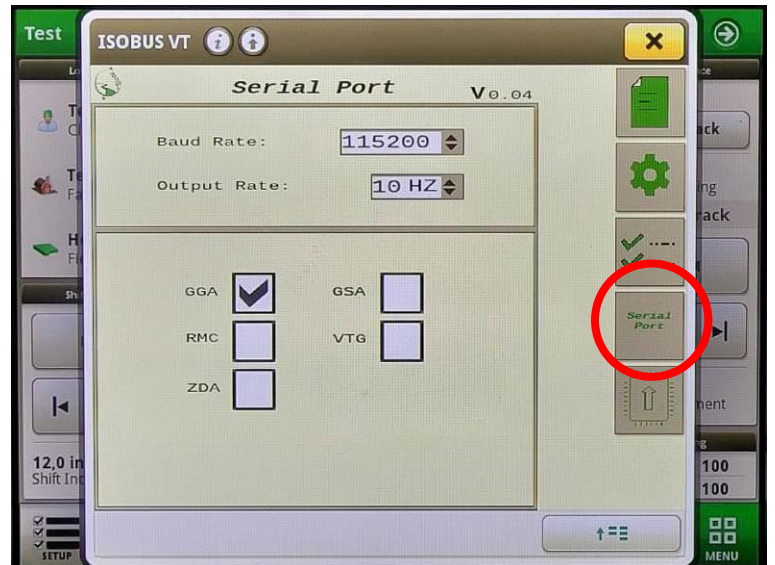
The CRG can send NMEA data to the 9-pin D-sub port on the ceiling panel (image on page 7).

Serial format:

- 8 data bits, no parity, 1 stop bit
- Baud Rate as specified on screen

Output Rate: 10 HZ means “10 sentences per second”

Various NMEA sentence formats may be selected for transmission.



4f) Bluetooth App

The Agra-GPS app provides RTCM correction streaming via Bluetooth, through your mobile phone. Be aware that you will require a reliable cellular network signal at your work site.

NOTE: Streaming data through your phone may incur extra data charges from your mobile phone network provider, depending on your data limits. However, the data rate is fairly low: for example, a typical 15kb/min streaming rate means that it will take almost 1200 hours to consume 1 GB of data.

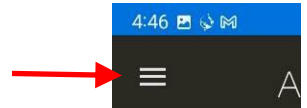
1) Ensure the Bluetooth service on your mobile phone is enabled. Also, ensure it is not being used by another app on your phone (for example, it may try to automatically connect with the audio in your tractor cab or perhaps with a set of headphones).

2) Android: Go to the Google Play Store

iPhone: Go to the App Store

- Search for the Agra-GPS app, and install it.

3) Start the app, and using the upper left menu, go to the Settings page.



4) Under Settings → NTRIP, specify the parameters, for example:

- Host caster.emlid.com:2101
- Mount Point MP99999
- Login u12345
- NMEA Source Receiver

- The Host can also be specified with an IP address, e.g. 159.89.221.86:2101
- 2101 refers to the “Port Number”, and must be separated from the address with a colon
- A list of Mount Points may also be obtained by typing the Host name (along with port number) into a web browser like Google Chrome or Safari
- The Login user name must be obtained from your NTRIP service provider
- The NMEA Source may also be specified manually in terms of Lat/Long/Altitude position. This must be the precise location of the stationary base station receiver.

5) Under Settings → Receiver, select the CRG device such as “AGRA-CRG-xxxx”, where xxxx is a unique identifier for your CRG. The CRG must be powered on in order to be found by your mobile phone. If you have multiple CRGs on different machines, you will need to reset this parameter each time you move to a different machine.

6) User Profile: this is a way to store different NTRIP settings. If you move to work in a different field, you may need to change to a different mount point or even a different caster. By saving a different profile for different locations, it makes changing the setup easier.

7) Return to the Home screen and press Connect. RTCM data from the caster should start streaming to the CRG, and under ideal conditions an RTK fix can be achieved in under 10 seconds. Your phone screen can be turned off and streaming will continue. For long work days, it is recommended to keep your phone plugged into a charger so there is no interruption due to phone battery drain.

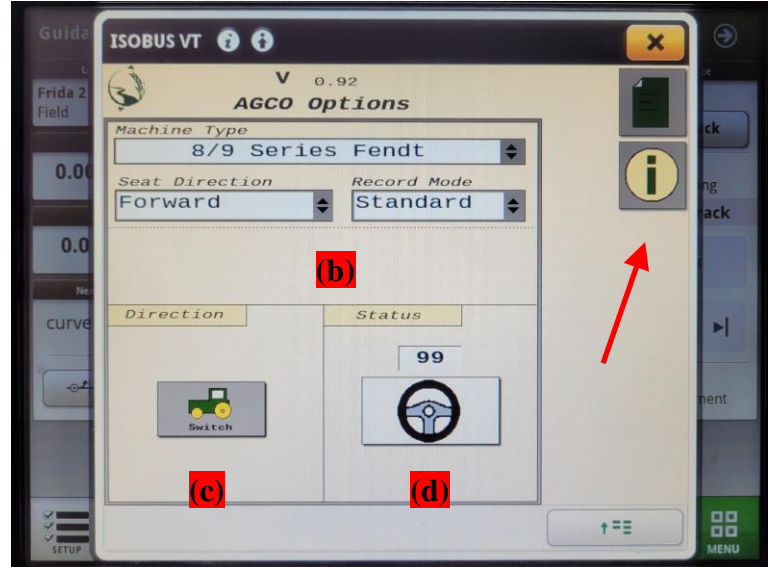
Step 5: Configure CRG-Bridge ISO App




Before adjusting auto-steer performance, the proper settings must be entered into the CRG-Bridge ISO app.

The Bridge options home page is shown.

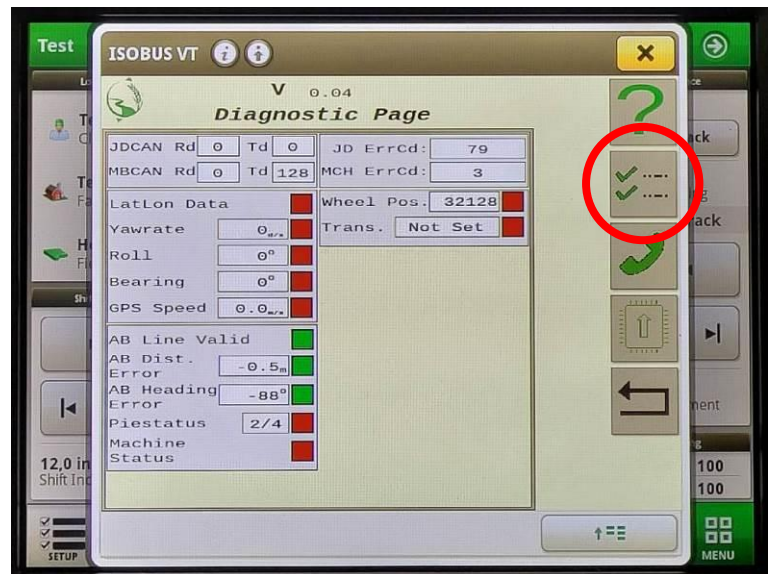
Press the button indicated by arrow to access other information pages.

- Ensure the Machine Type and Seat Direction are appropriate for your machine.
- Record Mode refers to the recording of the work area of the field completed by the implement. Record Mode selects between “Standard” and “On Resume”, where “On Resume” can be triggered by hydraulics (for example, it only records work area when the implement in the ground and not when raised).
- While driving, if the direction of the machine is detected incorrectly, you can force it to change it here.
- You can see how the CRG detects the steering wheel angle from here



Other information pages include Help , Contact , and Firmware Update  (refer to the CRG Firmware Update Manual)

The button for accessing the Diagnostic page is circled.



Auto-Steer Operation

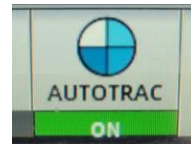
Refer to the Pie indicator on the JD monitor screen. With the CRG's Bridge section enabled (via General Settings), you should see 1 quarter of the Pie (Installed).



Press the AutoSteer-Enable button on the armrest to obtain 2 quarters (Configured).



Press the Pie (on screen) to obtain 3 quarters (Enabled).

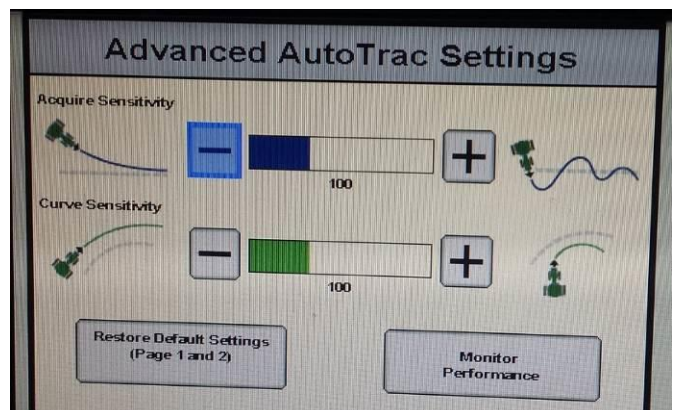
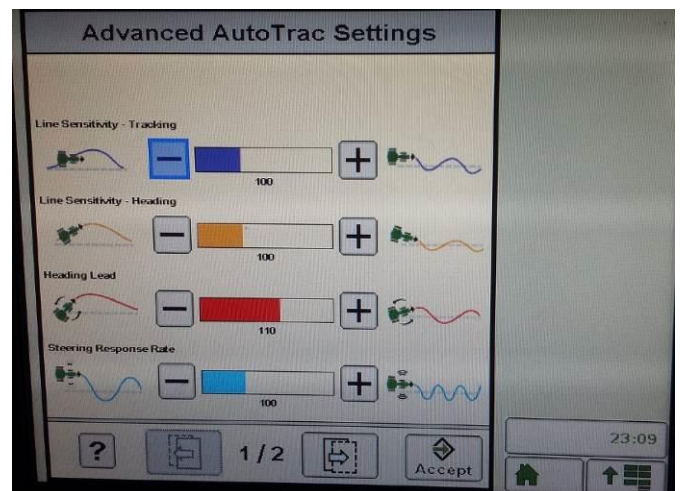


Press the Engage (also known as Resume) button to activate Auto-Steering (4 quarters). You can press the Engage button again to disengage, or simply turn the steering wheel.



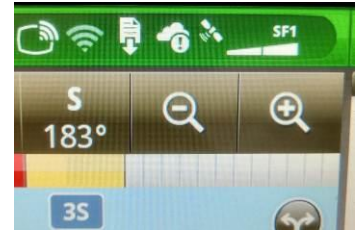
Auto-Steer Optimization

Using the JD display you may adjust your steering performance. Most machines will perform optimally with all JD settings at 100. If a change is required, find an open area where you can travel at target speed and adjust one parameter at a time until you are satisfied with the steering performance.



SF1 & RTK Indicators

In order to communicate with a John Deere monitor, the CRG identifies itself as having an SF1 signal at all times, even when no satellite signals are available. This doesn't mean you are receiving an SF1 signal, and also doesn't mean you have an SF1 license.



When receiving a correction stream and in RTK Fix mode, the JD monitor will show that RTK is enabled.



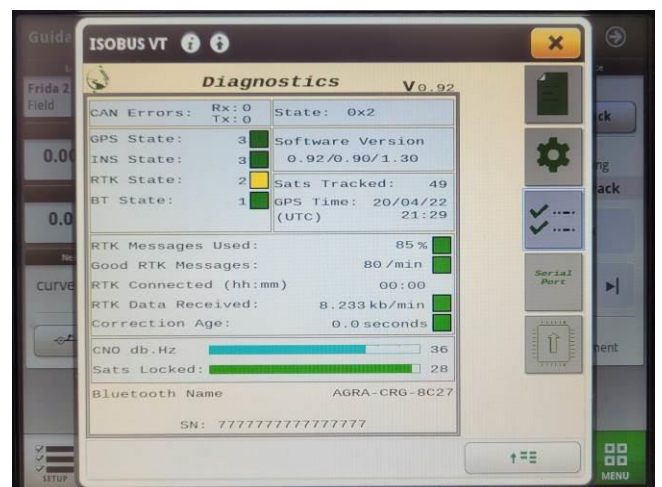
When in RTK Float mode, the JD monitor will show RTK-X.



When the CRG switches from RTK Float to RTK Fix mode, auto-steering will disengage. This is normal and expected behaviour, and prevents a sudden unexpected path change. Press the Engage (or Resume) button to re-engage.

Troubleshooting

- Normal values for RTK Data Received should be between 10 to 20 kb/min, depending on the mount point configuration. If RTK message indicators are yellow, this means data has stopped flowing within the past minute. Once 1 minute has elapsed without a valid RTCM correction stream, indicators will show red.
- RTK State will show yellow in Float mode.
- If an inappropriate mount point is chosen (for example, from a receiver that is too far away), the RTK State may not be able to obtain a Fix, but will stay in Float mode. The accuracy in float mode is not reliable, and in some cases, non-RTK positioning might even be better than float.
- If "Good RTK Messages" shows purple, this is because an information message was received from the caster, which is usually an error message. This can happen if the caster believes you are outside of the service area for the selected mount point.
- CNO refers to "Carrier to Noise" ratio, which is a measure of satellite signal strength. Anything over 35 is normally acceptable for an RTK fix.



Status Light

The back side of the CRG (the connector side) contains a coloured status LED. The following indications are defined:

- Solid RED: A problem with the ISO/Implement bus (connecting to the JD monitor)
- Flashing RED: A problem with the Machine bus (connecting to other tractor devices)
- Solid BLUE: A problem with the GPS
- Flashing BLUE: No GPS signal
- Solid YELLOW: A problem with the INS
- Solid GREEN: All systems normal

NTRIP Caster Setup

The NTRIP caster is a remote internet server that provides an RTCM correction stream, which allows an RTK fix to be achieved. The caster will usually offer many “mount points”, each of which essentially represents a GPS receiver with its location known precisely. The receiver (base station) must usually be located within 35km (22 miles) of your work site in order for RTK to work adequately.

To connect to a caster, you will need to find a local service provider who will give you an IP address, port number, mount point identifier, and mount point login name and password. There may be privately owned casters with base stations in your area that will charge a subscription fee, or there may even be publicly available casters, sponsored by industry groups or government.

Alternatively, you can choose to setup your own base station by purchasing a product like Emlid Reach RS2 or similar (www.emlid.com). As part of the product offering, you can create a mount point for your base station at caster.emlid.com. It is also possible to register your base station with a different caster service such as rtk2go.com.

Setting up your own caster is possible, but this is more technically challenging. Software such as that found at www.use-snip.com can be used freely, or with a paid license for unlocking extra features.

Appendix A: Product Specifications

Operating Voltage Range:	10 to 16 VDC, 12V nominal
Power Consumption:	less than 3W
Operating Temperature:	-20°C to +40°C ambient
Weatherproof:	NEMA 3X, IP65
Supported:	Bluetooth® BLE, RTCM-3, NTRIP 2.0

NOTE: Circuit protection fuse is required: 1A minimum, 5A maximum

COMPLIANCE

This product is in compliance with the following standards:

EMC

- FCC 47 CFR Part 15B: Radio Frequency Devices – Unintentional Radiators
- ICES-003 Issue 7 (2020-10): Information Technology Equipment (including Digital Apparatus)
- EN ISO 14982 (2009): Agricultural and Forestry Machinery – Electromagnetic Compatibility
- ETSI EN 301 489-17 V3.2.4 (2020-09): Electromagnetic Compatibility (EMC) Standard for Radio Equipment and Services (Part 17: Specific conditions for Broadband Data Transmission Systems)
- ETSI EN 301 489-1 V2.2.3 (2019-11): Electromagnetic Compatibility (EMC) Standard for Radio Equipment and Services (Part 1: Common technical requirements)

SAFETY

- EN 62368-1 (2014): Audio/video, information and communication technology equipment (Part 1: Safety requirements)
- IEC 60950-22 (2016): Information technology equipment – Safety (Part 22: Equipment to be installed outdoors)
- IEC 60529-1 (2001): Degrees of protection provided by enclosures. (IP code)

Electromagnetic Compatibility Statements

RF Exposure

The integrated Bluetooth® device operates at an output power level which is within the ISED SAR test exemption limits at any user distance. Maximum output (Class 2 Bluetooth® LE): +10 dBm (+1.5 dBm typical). Frequency range: 2.402 GHz to 2.480 GHz. Maximum gain (integral chip antenna): 1.63 dBi.

USA: FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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 in the specified installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

****DO NOT MODIFY**** Changes or modifications not expressly approved by Agra-GPS Ltd could void the user's authority to operate the equipment.

Canada: ISED

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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 ;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

EU & UK

Hereby, Agra-GPS Ltd, declares that the Bluetooth® module has been installed in accordance with the installation instructions, and in equivalent assessment conditions as tested for compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU, and the essential requirements and other relevant provisions of UK Radio Equipment Regulations 2017.