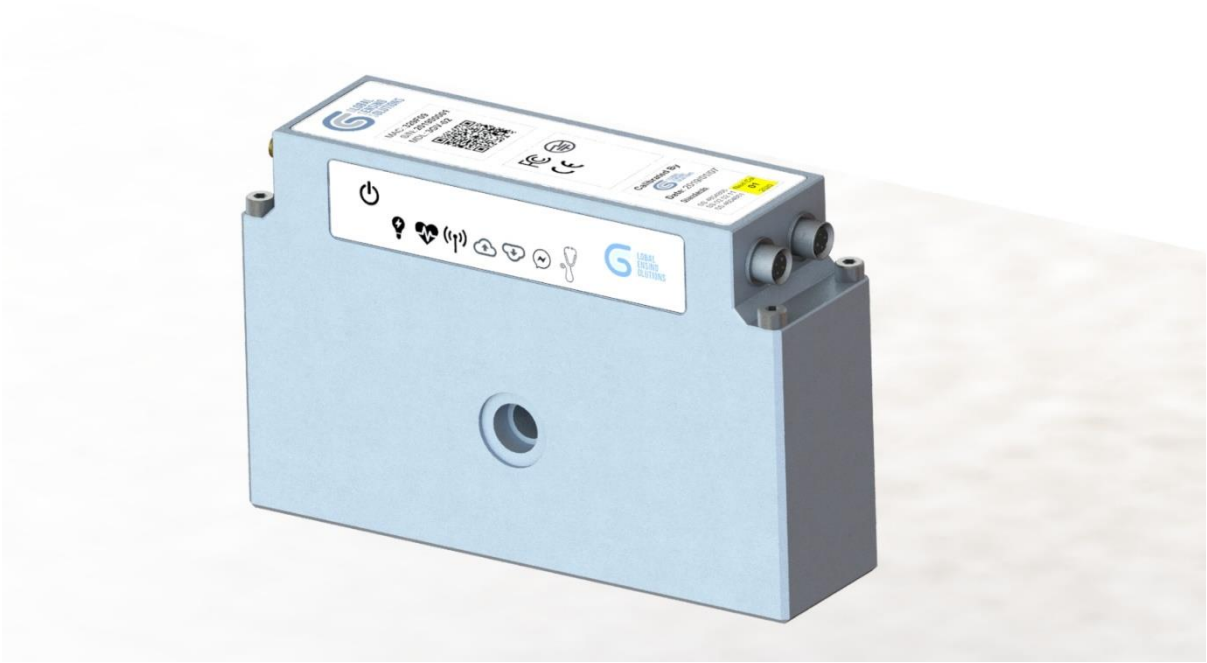
Vibration Monitor

5GV-W01 User Manual



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DOCUMENT INFORMATION

DISCLAIMER

GSS reserves the right to change product specifications without notice. Wherever possible, GSS will issue changes to functionality and specifications in the form of product-specific errata sheets or in new versions of this document. GSS advises customers to check with GSS for the most recent updates on this product.

LIFE SUPPORT POLICY

GSS does not authorize its products for use in safety-critical applications (such as life support) where a failure of the GSS product is likely to cause severe personal injury or death. GSS customers using or selling GSS products in such a manner do so entirely at their own risk and agree to indemnify GSS and its representatives against any damages arising out of the use of GSS products in such safety-critical applications.

FCC APPROVAL

NOTE: 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 residential 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 or more 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

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

FCC RF Exposure Warning Statements:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
This equipment shall be installed and operated with minimum distance 23.1cm between the radiator & body.

USA REPRESENTATIVE INFORMATION

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IC APPROVAL

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.

IC Radio Frequency Exposure Statement:

This equipment complies with IC exposure limits set forth for an uncontrolled environment. This equipment shall be installed and operated with minimum distance 34cm between the radiator & body.

Cet équipement est conforme aux limites d'exposition IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 34 cm entre le radiateur et le corps.

1 Introduction

The GSS 5GV Vibration Monitor is a sophisticated vibration sensor with an integrated Wi-Fi communication module. The 5GV can generate alerts, capture and upload alerts, waveforms and interval files to the user-defined FTP server.

The 5GV has many configuration settings, so GSS provides an Android mobile application that uses Bluetooth to communicate with and reconfigure the 5GV. The GSS 3GV Console, which is a PC-based application, can also be used to view alerts, waveforms and peak interval files.

The 5GV Vibration Monitor has been developed after years of research with input from geotechnical engineers, construction companies, consultants and GIS providers. After setting up the 5GV unit, it is quick and easy to deploy and can be remotely managed and reconfigured as necessary.

The user should carefully read and follow the instructions contained herein to quickly set-up and configure the 5GV Vibration Monitor. The user should also keep this manual for their frequent and future reference.

2 Hardware Overview

2.1 Package Contents

The standard device purchase comes in a protectively packaged gift box and contains the 5GV device itself, a Wi-Fi stub antenna, and a Bluetooth antenna. Magnet keys may also be provided for new customers.

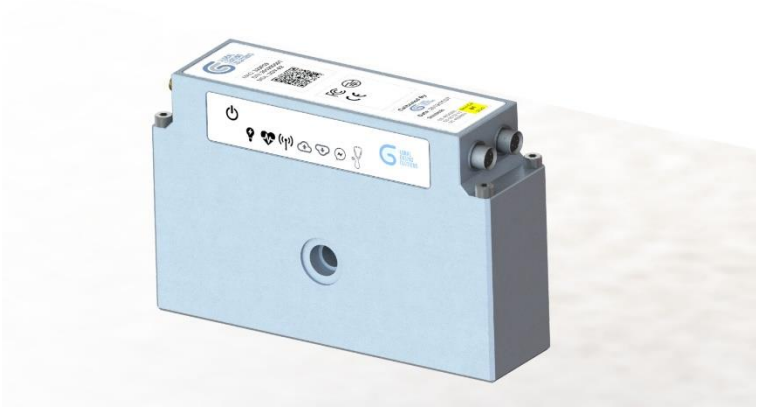

Figure 1 – 5GV Standard Device

If the user prefers, the purchase may also include accessories for the unit. Available accessories are a custom USB to LEMO connector, mounting bracket, flange lock, flange spacers (quantity 4), and standoffs (quantity 4).

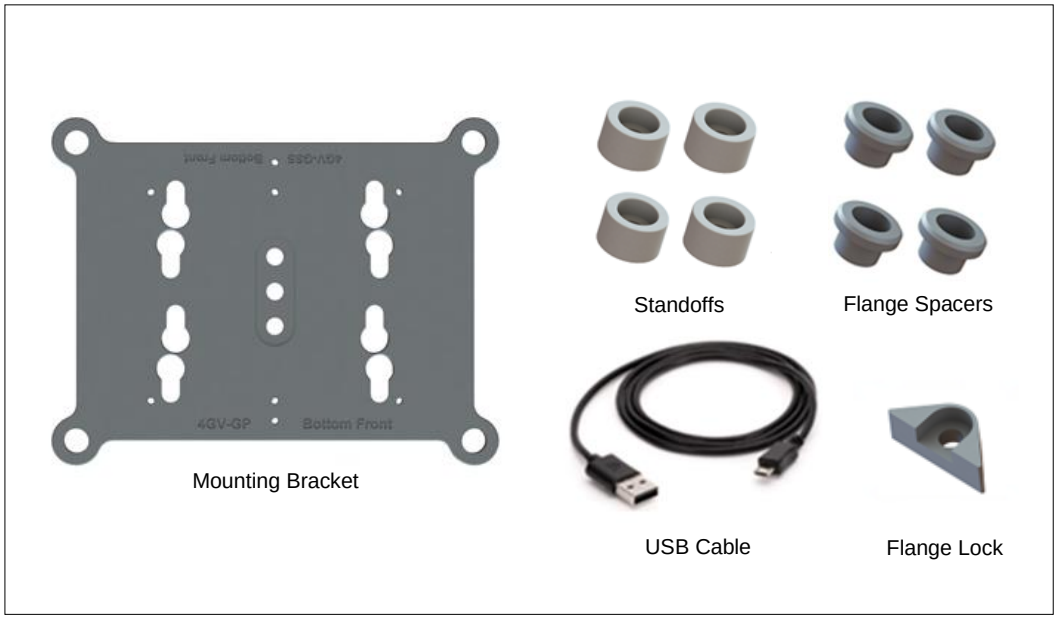

Figure 2 – Optional Accessories

2.2 Key Hardware Features

The 5GV is well-engineered, precision-machined from solid aluminium, anodised for corrosion protection, and sealed against water ingress.

The 5GV features a two-piece housing consisting of a top case and base case.

The top case houses the following components:

- 5GV Main Board with indicator LEDS and has connectors for plug-in modules:
    1. Power Module
    2. Processor Module
    3. Memory Module
    4. Bluetooth Module
    5. Accelerometer Module (underneath)
    6. Wi-Fi Communication Module

Note: Note that only the communication module should be removed by customer. The other modules should only be removed and installed by GSS certified agents.

- SMA antenna connectors
    1. Wi-Fi
    2. Backup (used when one of the other connectors fail)
    3. Bluetooth
- LEMO external connectors
    1. USB / External Power (6-pin)
    2. Microphone (4-pin)
    3. Auxiliary (8-pin) - optional

Figure 3 – 5GV Top Case inside view (communication module not installed)

3 Battery Installation

First loosen the corner M4 hex capture screws in the sequence shown. (This relieves stress on the screws and aluminium threads.) Then in the same sequence, unscrew the screws completely to separate the top and bottom sections of the case.

Figure 4 – Top Case Screw Removal Sequence

Now disconnect the ribbon cable between the top section and the battery-retaining PCB.

Figure 5 – Top Case Removed

GSS does not ship devices with the batteries installed. The user needs to remove the battery-retaining board and install four new batteries according to the following instructions.

Note: If the user does not have the required batteries available, the 5GV can be powered via the USB connector. Use GSS custom USB cable and plug one end into the USB port on a PC and the other end into the 5GV USB LEMO connector. The 5GV top label has text to identify the USB LEMO connector, which is the only 6-pin connector and is keyed. The keyed connector means only the correct cable can be connected.

3.1 Recommended Models

The device takes four primary lithium batteries, preferably spiral-wound to cope with high surge currents. GSS has tested many brands and models of battery, and the following are confirmed to work.

Brand	Modem	Comments
SAFT	LS20H	13Ah rating and fitted with 5A fuse. *Be careful not to short the terminals; a blown fuse renders the SAFT battery useless.*
FANSO	ER34615M	14Ah rating and not fitted with a fuse. (The device has fuses on the battery retainer PCB to compensate.)

3.2 Accessing Battery Compartment

The battery compartment is located under the battery board as shown in the following image.

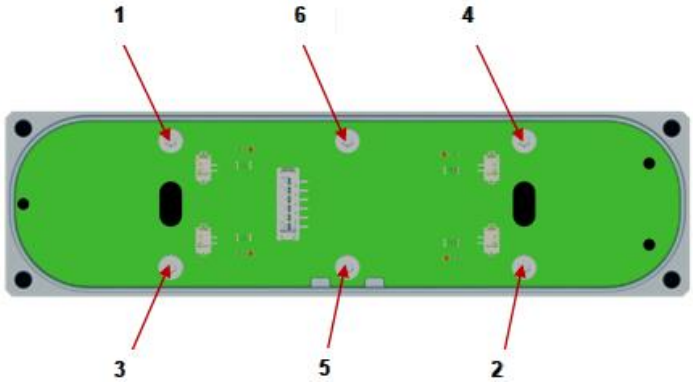

Figure 6 – Screw Removal Sequence

Remove the battery-retaining PCB in the same method as used to open the case. First loosen each screw (in the order shown in the above image), then repeat the sequence, this time removing each screw completely. (This method of unscrewing reduces stress on the battery board.) Once all the screws are removed, gently lift the PCB assembly away from the case.

Note: When batteries are present in the unit, they exert force on the battery board. In these instances, the user should pay special attention to fastening and unfastening screws in the sequence shown in Figure 11 to avoid damaging the battery board.

3.3 Installing the Batteries

Insert four D-Cell primary lithium batteries into the battery slots, with the positive terminal facing up (as shown in the following image). Next, position the battery board over the batteries by aligning the two small cut-outs on the side of the battery board with the matching protrusions in the case.

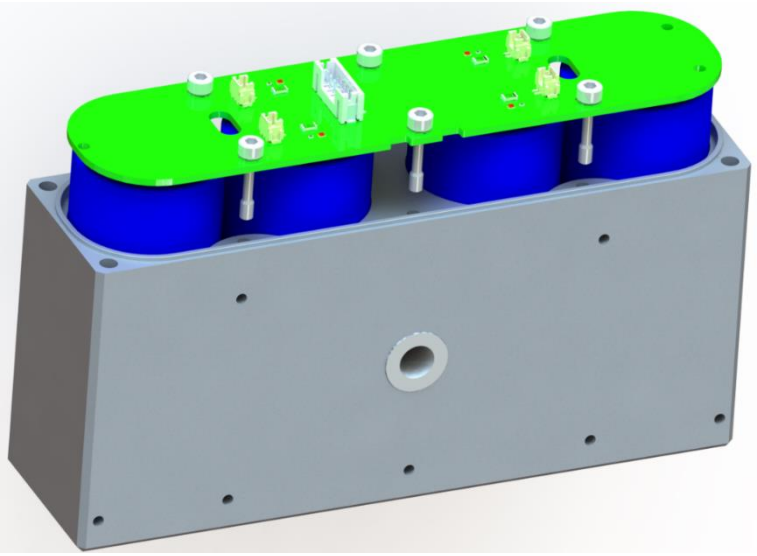

Figure 7 – Installing Batteries

Turn each screw until it catches its thread and then give it one full turn. Repeat the process for all six screws.

3.4 Reassembly

After firmly screwing down the battery board, re-connect the battery cable between the Main PCB and the battery board.

Position the top case so that the connectors do not interfere with the modem when the case is closed and so that the four screws on the case top are aligned with the four screw holes on the base case. Then lower the case into position (the four screws should drop evenly into their respective holes).

Now tighten each of the screws in a zigzag pattern as depicted in Figure 6. The unit is now ready for testing.

4 Antennas

4.1 Wi-Fi Antenna

The 5GV-W01 comes with a 2.4GHz Wi-Fi antenna as standard.

4.2 Bluetooth Antenna

The 5GV standard unit supports Bluetooth. The Bluetooth stub antenna shipped with the device is 2.4GHz, which can be used to support future communication modules including Wireless Mesh.

The GSS Bluetooth mobile application is used to communicate to the device via the Bluetooth antenna, which allows users to be up to 10 meters away.

4.3 Backup Antenna

The 5GV comes with a backup antenna. This antenna may also be used for future capability, but for now it serves as a backup antenna connector to the Wi-Fi and Bluetooth antennas.

5 Powering the 5GV

The following section gives instructions for the power up and power down of the 5GV unit.

5.1 Power On

The unit can be powered on using the following method:

Hold a magnet (magnet keys may be included with first purchase) next to the power symbol on the front of the unit for one second. When the correct pole of a magnet is positioned near the power symbol, the power indicator will glow red. The power indicator starts blinking green and the start-up sequence begins.

Note: If the power indicator does not begin blinking green, the power-on has not been successful. Repeat the process, this time holding the magnet in place a little longer.)

The device begins with a self-diagnostics process where LED lights are flashing at various times. If the device successfully connects to the network and starts the sensors, then the power and heartbeat indicator flash green in unison every 5 seconds. The sensor indicator flashes every 5 seconds, but not in unison with the other indicators.

Figure 8 – Front Label

	Power Symbol	Position magnet here to power on and off the device
	Power	Solid red indicates power on; Solid green indicates powering off
	Heartbeat	Flashing green every 5 seconds when device operational
	Communication	Flashing green every 5 seconds when communications operational
	Upload	Flashing green during uploads
	Download	Flashing green during downloads
	SMS	Flashing green when sending or receiving SMS messages
	Sensor	Flashing green every 5 seconds when sensor operational

The results of the diagnostics are displayed when using a serial terminal. The table below shows the normal results when powered via USB cable.

Test	Result	Description
LED PIO Expander	[PASS]	LED Function Check
PIO Expander	[PASS]	Communication Module Function Check
PWR PIO Expander	[PASS]	Power Module Function Check
BAT PIO Expander	[Not Done]	Battery Module Function Check
Real Time Clock	[PASS]	Real Time Clock Function Check
Battery Gauge	[PASS]	Battery Fuel Gauge Function Check
ADXL355 Sensor	[PASS]	2,4,8G Accelerometer Function Check
ADXL357 Sensor	[PASS]	10,20,40G Accelerometer Function Check
PSRAM Memory	[PASS]	Memory Module Function Check
MicroSD Storage	[PASS]	MicroSD Storage Function Check
Config Load/Save	[PASS]	Configuration File Read/Write Check
Bluetooth Modem	[PASS]	Bluetooth Modem Function Check
WiFi Modem	[PASS]	Wi-Fi Modem Check
FTP Connection	[PASS]	FTP Connection Check

5.2 Power Off

The device can be powered off using this method:

Place a magnet next to the power symbol on the front of the unit for about five seconds.

When the unit detects a power off request, the power indicator turns green to let the user know that a controlled shutdown sequence is in progress. (If the magnet method is being used for shutdown, the user needs to move the magnet away to observe the green indicator, otherwise the red indicator indicating the presence of a magnet will override the green indicator indicating shutdown sequence.)

5.2.1 Controlled Shutdown

The controlled shutdown sequence performs the following tasks:

1) Stops the exporter from picking up and processing new files
2) Stops the FTP upload task from initiating new uploads
3) Flushes the Peak PPV buffer to disk
4) Flushes the Tilt Beat buffer to disk
5) Flushes the Log buffer to disk
6) Finally, the power indicator turns off and all power to the internal electronics is stopped.

6 Configuring the 5GV

There are four methods for configuring the 5GV unit. They are as follows:

1) GSS Bluetooth mobile application
2) Serial terminal SMS commands through the USB port
3) MQTT commands sent to an MQTT broker
4) FTP download of the configuration file from a designated FTP server

6.1 GSS Bluetooth Mobile Application

Using the GSS Bluetooth mobile application is perhaps the most intuitive method. The user can retrieve the current configuration settings from the device, edit it, and then save them back to the device. The mobile application has a *load defaults* button on several configuration screens allowing users to quickly apply default settings.

For further details on the GSS Bluetooth mobile application, please refer to the GSS Bluetooth Mobile Application User Manual.

6.2 Command Line Method

When the device is plugged into a PC and turned on, Windows assigns a serial port to the device and reports it as “USB Serial Device”. Please refer to example below.

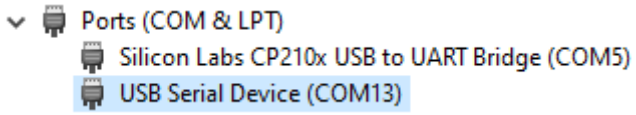

Figure 9 – Windows Device Manager COM Ports

Use a serial terminal and open the USB Serial Device port and confirm the settings as shown below. Once the unit is powered up, the enter SMS commands via the serial terminal to access configuration settings.

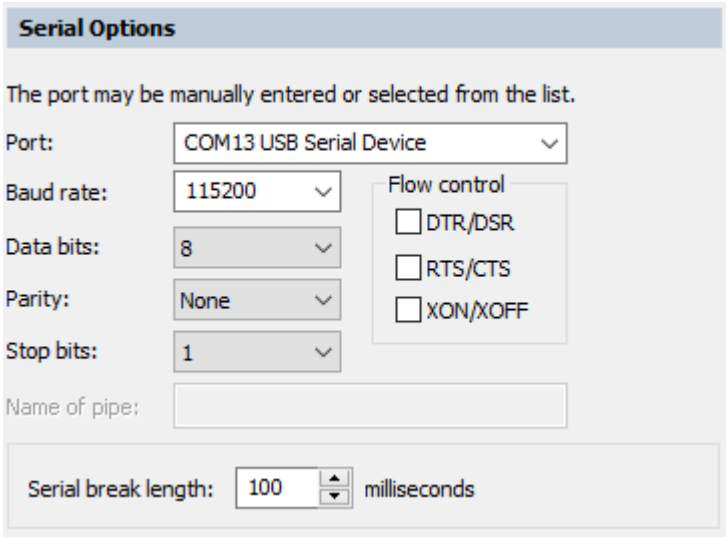

Figure 10 – Serial Terminal Device Settings

6.3 MQTT Commands Method

When the device is operational and has a cellular connection, the user can issue commands to the MQTT broker. These commands are the same as for the command line interface.

6.4 FTP Based Method

Before beginning this method, the user needs to set-up the configuration file. To do so, the user can edit an existing TGV3GCFG.INI file or create a new one and save in a CONFIG folder on the FTP server to which the device is registered. The file must have a .new extension (instead of .ini), otherwise the unit will not find the file when instructed to download the configuration file.

Once the configuration file is complete and uploaded, instruct the device to download the configuration file from the FTP server using the above mentioned command line option or an SMS command.

If desired, the user can configure the device to periodically check for an updated configuration file in the CONFIG folder each time it uploads an Interval file if “true” value is entered for the CHECK_CFG value in the configuration file.

7 Setup Wi-Fi Network

The 5GV-W01 comes standard with a Wi-Fi modem installed. The correct Wi-Fi router or hotspot settings are to be configured for the 5GV to connect to the internet. Please refer to the network administrator for details.

8 Configuration File

For all operation settings, the 5GV unit relies on a master configuration file called *TGV3GCFG.INI,* which is kept in the */CONFIG* folder on the MicroSD card. (There is also a backup file, in case of file corruption, and a DRC file, in case of a bad backup file.) The user can change the parameters in this file code to adjust the settings of the sensor to their preferences.

The configuration file uses the Windows INI format and is stored on the device MicroSD card.

The following sections of this manual cover the various components of the configuration file and how the user can adjust their entries. The sections of the configuration file are as follows:

Section	Description
[MAIN]	General settings
[SCHEDULE]	Task schedules
[FTP]	FTP client settings
[HTTP]	HTTP client settings
[EXPORT]	File Export options
[OTAP]	Firmware update FTP settings
[REM_DIR_FLAT]	FTP server flat directory structure and file naming convention
[REM_DIR_NEST]	FTP server nested directory structure and file naming convention
[SMS]	SMS phone number settings
[SENSORS]	Sensor options (mode and licence)
[xxxxxx_VIBR]	Sensor vibration settings
[xxxxxx_TILT]	Sensor tilt settings (if licenced)
[STATUS]	Status data from the sensor (not sent to the sensor)

Table 1 - Configuration File Sections

With each parameter entry, the user should be sure to enter the correct value or format. Some terms the user should be familiar with before reading the following section of this manual are listed below.

- **Integer** – An integer value is a whole number value.
- **String** – A string value is any ordered sequence of characters. If it is stated that a parameter is a string, the user should be sure to follow the given format for the entry.
- **Boolean** – A Boolean value is a value type that only has two possible values: true or false. For all of the Boolean parameter entries in this manual, the user may set the value to “true” by entering either “T” or “t” or “True” or “1” and set the value to “false” by entering either “F” or “f” or “False” or “0”.

- *Deprecated* – If a value or code is listed as *deprecated*, that indicates that it is being phased out and is therefore not functional. If the user comes across any data entries that are deprecated in this manual, they should understand that any entries or changes made to this entry will not have any effect on the device.
- *Unimplemented* – If a value or code is listed as *unimplemented*, that indicates that this feature is not functional. The user should understand that any entries or changes made to this entry will not have any effect on the device.

8.1 [MAIN] Section

The [MAIN] section of the configuration file contains 26 configuration parameters.

8.1.1 VER_MAJ

This parameter is an **Integer** value indicating the major component of the configuration file version. Users can assign any version they wish to each file, but GSS recommends sequential numbering and backing up old versions.

8.1.2 VER_MIN

This parameter is an **Integer** value indicating the minor component of the configuration file version.

8.1.3 DATE

This parameter is a **String** that is updated by the 3GV Console when users make changes to the configuration file. The format used by GSS is "YYYY/MM/DD", but users can override this with their own date string as required.

8.1.4 SERIAL

This parameter is a **String** that holds the device serial number (GSS uses the MAC address). The MAC address is the last 6-digits of the device MAC.

8.1.5 NUMBER

This parameter is a **String** for storing the mobile phone number of the device. It is not possible for the device to determine its own number, so users must enter this manually.

8.1.6 LOCATION

This parameter is a **String** that gives the device's latitude, longitude and altitude coordinates. The user can set this during commissioning. If the user wishes to utilise this feature, their location coordinates can be found using tools such as Google Maps.

8.1.7 APN

This parameter is a **String** that specifies the access point name for the SIM card provided by the network carrier. For example, a CSL Sim card requires the APN "csl".

8.1.8 APN_USR

This parameter is a **String** that specifies the Login Name for the APN. This is generally not required and left blank ("").

8.1.9 APN_PWD

This parameter is a **String** that specifies the Login Password for the above APN_USR setting. This is generally not required and left blank ("").

8.1.10 WIFI_NETWORK

This parameter is a **String** that specifies the Wi-Fi network for the device to connect.

8.1.11 WIFI_PWD

This parameter is a **String** that specifies the Login Password for the above WIFI_NETWORK.

8.1.12 NTP_URL

This parameter is a **String** that specifies the IP address or URL of the network time-server to contact in case the network carrier does not support the NITZ time command. GSS normally uses the Google Time servers at the address: "216.239.35.12".

8.1.13 NTP_PORT

This parameter is an **Integer** that specifies the TCP *port* on the NTP time-server. The default for most time-servers is "123**"**.

8.1.14 NTP_TZ

This parameter is an **Integer** that specifies the Time Zone to be used. NTP does not recognize time zones, instead it manages all time information based on UTC. The NTP Time Zone is the offset from UTC in 15-minute increments. For instance, Hong Kong is 8 hours ahead of UTC, therefore it is set to 32.

8.1.15 NTP_TIME

This parameter is a **Boolean** setting that controls whether the device prioritizes NTP time.

Setting the value to "true" by entering either "T" or "t" or "True" or "1" the device uses the NTP server and use NTP_TZ to set the current time.

Setting the value to "false" by entering either "F" or "f" or "False" or "0" the device retrieves the time from internal real-time clock

Note: ntp_time relies on the NTP_URL and NTP_PORT to be correct. The default values of NTP_URL=216.239.35.12 and NTP_PORT=123 in MAIN should be used unless you have a preferred NTP Server.

8.1.16 LOG

This parameter is a **String** that specifies the filtering level for logging messages. The value is either 'I' for logging Information, Warning and Error messages; 'W' for logging Warning and Error messages; or 'E' for logging Error messages only.

Note: If this is set to "I" (for Information, Warnings and Error messages), the log buffers will quickly fill and the device will frequently upload log files. GSS recommends that the unit be *set to "I" mode for debugging purposes only, and set to "W" mode for normal operation.*

8.1.17 BAT_WARN

Unimplemented. It is an **Integer** that sets the battery percentage at which the device sends a battery warning to all SMS numbers configured in the SMS settings of the configuration file. Once the unit sends out the battery alert, it sends reminders until the battery level reaches 5%.

The default alert level is 10 (meaning 10%); however, the user can set this to any value between 1 and 99.

8.1.18 SEND_ALERT

This parameter is a **Boolean** setting that controls whether the device uploads vibration alert files or retains them on the memory card. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables alert file uploading. Setting the value to “false” by entering either “F” or “f” or “False” or “0” inhibits alert file uploads.

8.1.19 SEND_PEAK

This parameter is a **Boolean** setting that controls whether the device uploads vibration peak PPV interval files or retains them on the memory card. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables interval file uploading. Setting the value to “false” by entering either “F” or “f” or “False” or “0” inhibits interval file uploads.

8.1.20 SEND_BEAT

This parameter is a **Boolean** setting that controls whether the device uploads Tilt Beat files or retains them on the memory card. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables tilt beat files uploading. Setting the value to “false” by entering either “F” or “f” or “False” or “0” inhibits tilt beat files uploads.

8.1.21 SEND_DATA

This parameter is a **Boolean** setting that controls whether the device uploads Tilt and Vibration data files or retains them on the memory card. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables tilt and vibration data file uploading. Setting the value to “false” by entering either “F” or “f” or “False” or “0” inhibits tilt and vibration data file uploads.

8.1.22 SEND_CFG

This parameter is a **Boolean** setting that controls whether the device uploads configuration files. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables configuration file uploading. Setting the value to “false” by entering either “F” or “f” or “False” or “0” inhibits configuration file uploads.

8.1.23 CHECK_CFG

This parameter is a **Boolean** setting that controls whether the device checks for new configuration files each time the unit uploads an interval file. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables checking for configuration files. Setting the value to “false” by entering either “F” or “f” or “False” or “0” inhibits checking for new configuration files.

8.1.24 SEND_LOG

This parameter is a **Boolean** setting that controls whether the device uploads log files or retains them on the memory card. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables log file uploading. Setting the value to “false” by entering either “F” or “f” or “False” or “0” inhibits log file uploads.

8.1.25 SEND_SMS

This parameter is a **Boolean** setting that controls whether the device sends SMS notifications. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables SMS Up notifications and Vibration, Tilt and Battery alerts. Setting the value to “false” by entering either “F” or “f” or “False” or “0” inhibits the above mentioned SMS notifications.

8.1.26 WIFI_OFF

This parameter is a **Boolean** setting that controls whether the device powers up the Wi-Fi modem. This setting set to True by default. Setting the value to “true” by entering either “T” or “t” or “True” or “1” powers up the Wi-Fi modem. Setting the value to “false” by entering either “F” or “f” or “False” or “0” inhibits the Wi-Fi modem from initializing.

8.1.27 BT_OFF

This parameter is a **Boolean** setting that controls whether the device powers up the Bluetooth module. Setting the value to “true” by entering either “T” or “t” or “True” or “1” powers up the Bluetooth module. Setting the value to “false” by entering either “F” or “f” or “False” or “0” inhibits the Bluetooth module from initializing.

8.1.28 HTTP_ALERT

This parameter is a **Boolean** setting that controls whether the device uploads vibration alert files via FTP or HTTP. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables alert file uploading via HTTP. Setting the value to “false” by entering either “F” or “f” or “False” or “0” enables alert file uploading via FTP.

8.1.29 HTTP_BEAT

This parameter is a **Boolean** setting that controls whether the device uploads Tilt Beat files via FTP or HTTP. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables beat file uploading via HTTP. Setting the value to “false” by entering either “F” or “f” or “False” or “0” enables beat file uploading via FTP.

8.1.30 HTTP_PEAK

This parameter is a **Boolean** setting that controls whether the device uploads vibration peak interval files via FTP or HTTP. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables interval file uploading via HTTP. Setting the value to “false” by entering either “F” or “f” or “False” or “0” enables interval file uploading via FTP.

8.1.31 HTTP_DATA

This parameter is a **Boolean** setting that controls whether the device uploads tilt and vibration data files via FTP or HTTP. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables data file uploading via HTTP. Setting the value to “false” by entering either “F” or “f” or “False” or “0” enables data file uploading via FTP.

8.1.32 HTTP_LOG

This parameter is a **Boolean** setting that controls whether the device uploads log files via FTP or HTTP. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables log file uploading via HTTP. Setting the value to “false” by entering either “F” or “f” or “False” or “0” enables log file uploading via FTP.

8.1.33 HTTP_CFG

This parameter is a **Boolean** setting that controls whether the device uploads configuration files via FTP or HTTP. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables configuration file uploading via HTTP. Setting the value to “false” by entering either “F” or “f” or “False” or “0” enables configuration file uploading via FTP.

8.1.34 HTTP_RECOVER

This parameter is a **Boolean** setting that controls whether the device uploads recovery files stored in the TEMP folder on the MicroSD card are transferred via FTP or HTTP. Setting the value to “true” by entering either “T” or “t” or “True” or “1” enables recovery file uploading via HTTP. Setting the value to “false” by entering either “F” or “f” or “False” or “0” enables recovery file uploading via FTP.

8.2 [SCHEDULE] Section

The schedule section of the configuration file specifies the intervals at which the device will perform various tasks (such as resetting the 3G modem and synchronizing the internal clock or uploading interval and tilt beat files).

The schedule format is “DD:HH:MM:SS” where “DD” represents days, “HH” represents hours, “MM” represents minutes, and “SS” represents seconds.

8.2.1 STATUS

This **String** specifies the interval at which the device requests a status update from the sensor module. The default is “00:00:05:00” (which means the status is checked every 5 minutes).

8.2.2 RESET

This **String** specifies the interval at which the device resets the modem. The device will come back online when the reset takes place. The default is “00:08:00:00” (which means the modem is reset every 8 hours). To reduce power consumption, extend this setting to 12 or more hours.

8.2.3 PEAK

This **String** specifies the interval at which the device dumps the buffered Interval records to the disk and queues a file upload to the FTP server. If the SEND_PEAK setting is “false”, the unit does not upload the interval file, but instead saves it to the MicroSD card for later access or uploading. The default setting is **“**00:04:00:00” (which means a 4-hourly interval file dump and upload, if enabled).

8.2.4 BEAT

This **String** specifies the interval at which the device dumps the buffered Tilt Beat records to the disk and queues a file upload to the FTP server. If the SEND_BEAT setting is “false**”**, the device does not upload the beat files, but saves them to the MicroSD card for later access or uploading. The default is “00:08:00:00” (which means a 8-hourly beat file dump and upload, if enabled).

8.2.5 HOUSEKEEP

Unimplemented. This **String** specifies the interval at which the device executes housekeeping tasks. The default value is “00:12:00:00**”** (indicating 12 hourly). This feature will be implemented in the future.

8.2.6 BLUE

This **String** specifies the interval at which the device allows Bluetooth connections. There is a start time parameter and stop time parameter, both in “hh:mm**”** format. The device turns on Bluetooth communication upon the start time, and stops Bluetooth communication upon the stop time. Setting this parameter to “00:00,00:00” deactivates this function, and Bluetooth communication will always be available.

8.2.7 ACTIVE

This **String** specifies the interval at which the device operates. There is a start time parameter and stop time parameter, both in “hh:mm**”** format. The device will wake up and begin operation upon the start time, and start a hibernation process upon the stop time. The hibernation process includes dumping all the peaks, beats and log files if their respective upload flags (send_peak, send_beat, send_log) have been set to “true”.

Setting this parameter to “00:00,00:00” will deactivate this function, and the device will be permanently operational.

8.3 [FTP] Section

This section of the configuration file defines the FTP/FTPS settings for the client's FTP server.

8.3.1 URL

This **String** specifies the IP address or URL of the target FTP server for all file uploads and configuration downloads. This does not include OTAP files.

The default value is "108.167.143.78", which points the device to the GSS FTP server in the USA. The user could use ftp.globalsensingsolutions.com in lieu of the IP address.

8.3.2 PORT

This **Integer** specifies the TCP port the device uses to open in order to establish an FTP connection. The default value is "21" for FTP servers, however, the user should check with the FTP service provider in case they use a different port.

8.3.3 USR

This 40-character **String** specifies the login account name for the FTP server. The default account name is "steve@globalsensingsolutions.com", which the user must change to their own login account when commissioning their device.

Note: GSS frequently cleans out files under the default account name. If customers continue to operate their unit with this account, they are likely to lose their files.

8.3.4 PWD

This 32-character **String** specifies the password for the abovementioned FTP account. The default password is "samantha01" for the above default account. The user must change this to their own login information when commissioning their device.

8.3.5 ACT

This is a **Boolean** that specifies whether the FTP server connection operates in passive or active mode. Set this according to the FTP server's requirements. The default value is zero ("0") which sets the connection to passive mode and which works for most FTP servers. Setting this value to one ("1") enables active FTP mode.

8.3.6 SSL_TYPE

This **Integer** value specifies whether the connection is vanilla FTP or secure FTP (FTPS).

The value can be one of the following:

- **0** = FTP client (vanilla with no only account / password security)
- **1** = FTPS client (FTP over implicit TLS/SSL)
- **2** = FTPS client (FTP over explicit TLS/SSL)

Set the value according to the FTP server requirements.

Note: In the case of FTPS, the FTP Port may change from 21 to 990.

8.3.7 SSL_CIPHER

This **Integer** specifies the SSL Cipher Suite to use when establishing an FTPS connection. The possible integers and their respective settings are as follows:

- **53** TLS_RSA_WITH_AES_256_CBC_SHA
- **47** TLS_RSA_WITH_AES_128_CBC_SHA
- **5** TLS_RSA_WITH_RC4_128_SHA
- **4** TLS_RSA_WITH_RC4_128_MD5
- **10** TLS_RSA_WITH_3DES_EDE_CBC_SHA
- **61** TLS_RSA_WITH_AES_256_CBC_SHA256
- **49169** TLS_ECDHE_RSA_WITH_RC4_128_SHA
- **49170** TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA
- **49171** TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA
- **49172** TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA
- **49191** TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256
- **49192** TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384
- **49199** TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
- **65535** Support all cipher suites above

GSS recommends using the default value 65535 to allow the device to support all cipher-suites.

8.3.8 SSL_LEVEL

This **Integer** value specifies the SSL authentication mode. The accepted values range from zero (“0”) to two (“2”), and their respective settings are as follows:

- **0** = No authentication
- **1** = Manage server authentication
- **2** = Manage server and client authentication if requested by the remote server

The default value is 0, which avoids having to store a certificate on the modem or attempt to validate the server certificate.

8.3.9 SSL_VERSION

This **Integer** value specifies what SSL version the device supports. The accepted values range from zero (“0”) to four (“4”), and their respective settings are as follows:

- **0** = SSL3.0
- **1** = TLS1.0
- **2** = TLS1.1
- **3** = TLS1.2
- **4** = ALL

The default value is 4, which sets the device to support all the above SLL standards.

8.4 [HTTP] Section

This section of the configuration file defines the HTTP/HTTPS settings for the client's HTTP server.

8.4.1 HOSTNAME

This **String** specifies the IP address or URL of the target HTTP server for all file uploads and configuration downloads. This does not include OTAP files.

The default value is "globalsensingsolutions.com".

8.4.2 PROTOCOL

This **String** specifies the HTTP protocol that is used. It can be HTTP or HTTPS. The default value is "HTTP"

8.4.3 PATH

This **String** specifies {…}

8.4.4 FIELD

This **String** specifies {…}

8.4.5 USR

This 40-character **String** specifies the login account name for the HTTP server. The default account name is "steve", which the user must change to their own login account when commissioning their device.

Note: GSS frequently cleans out files under the default account name. If customers continue to operate their unit with this account, they are likely to lose their files.

8.4.6 PWD

This 32-character **String** specifies the password for the abovementioned FTP account. The default password is "gss2021" for the above default account. The user must change this to their own login information when commissioning their device.

8.4.7 SSL_CIPHER

This **Integer** specifies the SSL Cipher Suite to use when establishing an FTPS connection. The possible integers and their respective settings are as follows:

- **53** TLS_RSA_WITH_AES_256_CBC_SHA
- **47** TLS_RSA_WITH_AES_128_CBC_SHA
- **5** TLS_RSA_WITH_RC4_128_SHA
- **4** TLS_RSA_WITH_RC4_128_MD5
- **10** TLS_RSA_WITH_3DES_EDE_CBC_SHA
- **61** TLS_RSA_WITH_AES_256_CBC_SHA256
- **49169** TLS_ECDHE_RSA_WITH_RC4_128_SHA
- **49170** TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA
- **49171** TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA
- **49172** TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA
- **49191** TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256
- **49192** TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384
- **49199** TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
- **65535** Support all cipher suites above

GSS recommends using the default value 65535 to allow the device to support all cipher-suites.

8.4.8 SSL_LEVEL

This **Integer** value specifies the SSL authentication mode. The accepted values range from zero (“0”) to two (“2”), and their respective settings are as follows:

- **0** = No authentication
- **1** = Manage server authentication
- **2** = Manage server and client authentication if requested by the remote server

The default value is 0, which avoids having to store a certificate on the modem or attempt to validate the server certificate.

8.4.9 SSL_VERSION

This **Integer** value specifies what SSL version the device supports. The accepted values range from zero (“0”) to four (“4”), and their respective settings are as follows:

- **0** = SSL3.0
- **1** = TLS1.0
- **2** = TLS1.1
- **3** = TLS1.2
- **4** = ALL

The default value is 4, which sets the device to support all the above SLL standards.

8.5 [EXPORT] Section

This section of the configuration file defines export options and the directory format for the remote FTP server.

8.5.1 REM_DIR_FLAT

This parameter is a **Boolean** that specifies whether the directory structure on the target FTP server is flat or nested. Typically, GSS uses a flat directory structure to simplify importing the files into a client GIS. The default value is “true” and the file naming convention follows that defined in this manual.

8.5.2 EVENT_FMT

This parameter is an **Integer** that specifies the output format for Vibration Event (alert) files stored on the MicroSD and subsequently uploaded to the FTP server (if the SEND_DATA option is set to “true”). The integer can be set to either zero (“0”) or one (“1”), and their respective settings are as follows:

- **0** = CSV
- **1** = JSON

8.5.3 WAVE_FMT

This parameter is an **Integer** that specifies the export format for Vibration Waveform files. The possible values and their respective settings are as follows:

- **0** = CSV
- **1** = JSON
- **2** = BIN

Note: GSS recommends using BIN format, as this is a compressed binary format that is much smaller than a CSV or JSON formatted file which, therefore, takes less time to transfer and less space on the memory card. If the waveform file is over 50K, then it will automatically be converted to BIN format. GSS can provide a decryption program to convert BIN files to the desired format (CSV or JSON).

8.5.4 PEAK_FMT

This parameter is an **Integer** that specifies the export format for Vibration Interval files. The possible values and their respective settings are as follows:

- **0** = CSV
- **1** = JSON

Note: While JSON is the format required by some GIS providers, GSS uses CSV format because it is easier to process in an Excel spreadsheet.

8.5.5 ALERT_FMT

This **Integer** specifies the export format for Tilt alert files. The possible values and their respective settings are as follows:

- **0** = CSV
- **1** = JSON

Note: While JSON is the format required by some GIS providers, GSS uses CSV format because it is easier to process in an Excel spreadsheet. The user should consider their own restraints and requirements when setting this value.

8.5.6 DATA_FMT

This **Integer** specifies the export format for Tilt data files. The possible values and their respective settings are as follows:

- **0** = CSV
- **1** = JSON

Note: GSS uses CSV format, as it is easier to process in an Excel spreadsheet.

8.5.7 BEAT_FMT

This **Integer** specifies the export format for tilt beat files. The possible values and their respective settings are as follows:

- **0** = CSV
- **1** = JSON

Note: GSS uses CSV format, as it is easier to process in an Excel spreadsheet.

8.5.8 PPA_UNITS

This parameter is an **Integer** that specifies the units in which the device reports acceleration values. The possible values and their respective settings are as follows:

- **0** = g (1g = 9.80665m/s^2)
- **1** = m/s^2

Note: GSS uses g, while some GIS providers use m/s^2.

8.5.9 PPV_UNITS

This parameter is an **Integer** that specifies the units in which the device reports peak particle values. The possible values and their respective settings are as follows:

- **2** = mm/s
- **3** = in/s

Note: GSS and most GIS providers use mm/s.

8.5.10 PPD_UNITS

This parameter is an **Integer** that specifies the units in which the device reports displacement values. The possible values and their respective settings are as follows:

- **6** = mm
- **7** = inches
- **8** = mil (1mil = 1/1000th inch)

Note: GSS and most GIS providers use mm

8.6 [OTAP] Section

This section of the configuration file defines the FTP/FTPS settings for the GSS OTAP FTP server.

8.6.1 URL

This parameter is a **String** that specifies the IP address or URL of the target FTP server for all OTAP files.

The default value is "108.167.143.78", which points the device to the GSS FTP server in the USA. The user could also use ftp.globalsensingsolutions.com in lieu of the IP address.

8.6.2 PORT

This parameter is an **Integer** that specifies the TCP port that the device uses to open in order to establish an FTP connection. The default value is "21" for FTP servers, however, the user should check with their FTP service provider in case they use a different port.

8.6.3 USR

This parameter is a 40-character **String** that specifies the login account name for the FTP server. The default is "5gvfw@globalsensingsolutions.com", which is the OTAP user account on GSS FTP server.

8.6.4 PWD

This parameter is a 32-character **String** that specifies the password for the abovementioned FTP account. The default is "gss5gv2022" for the above default account

8.6.5 SSL_TYPE

This parameter is an **Integer** value that specifies whether the connection is vanilla FTP or secure FTP (FTPS).

The value can be set to zero ("0"), one ("1"), or two ("2"), and their respective settings are as follows:

- **0** = FTP client (vanilla with no only account / password security)
- **1** = FTPS client (FTP over implicit TLS/SSL)
- **2** = FTPS client (FTP over explicit TLS/SSL)

This user should set the value according to the FTP server requirements.

Note: In the case of FTPS, the FTP Port may change from 21 to 990.

8.6.6 SSL_CIPHER

This parameter is an **Integer** that specifies the SSL Cipher Suite to use when establishing an FTPS connection. The possible values and their respective settings are as follows:

- **53** TLS_RSA_WITH_AES_256_CBC_SHA
- **47** TLS_RSA_WITH_AES_128_CBC_SHA
- **5** TLS_RSA_WITH_RC4_128_SHA
- **4** TLS_RSA_WITH_RC4_128_MD5
- **10** TLS_RSA_WITH_3DES_EDE_CBC_SHA
- **61** TLS_RSA_WITH_AES_256_CBC_SHA256
- **49169** TLS_ECDHE_RSA_WITH_RC4_128_SHA
- **49170** TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA
- **49171** TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA

- **49172** TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA
- **49191** TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256
- **49192** TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384
- **49199** TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
- **65535** Support all cipher suites above

GSS recommends using the default value 65535 to allow the device to support all cipher suites.

8.6.7 SSL_LEVEL

This **Integer** value specifies the SSL authentication mode. The range of possible values is from zero (“0”) to two (“2”), and their respective settings are as follows:

- **0** = No authentication
- **1** = Manage server authentication
- **2** = Manage server and client authentication if requested by the remote server

The default value is zero (“0”), which avoids having to store a certificate on the modem or attempt to validate the server certificate.

8.6.8 SSL_VERSION

This parameter is an **Integer** value that specifies what SSL version the device supports. The possible values range from zero (“0”) to four (“4”), and their respective settings are as follows:

- **0** = SSL3.0
- **1** = TLS1.0
- **2** = TLS1.1
- **3** = TLS1.2
- **4** = ALL

The default value is four (“4”) which means the device supports all the above SLL standards.

8.7 Directory and File Naming Sections

Before making substitutions in the REM_DIR_FLAT / REM_DIR_NEST sections of the configuration file, it is important for the user to have a good understanding of the substitution parameters.

If the user wanted to specify a flat file naming convention for Vibration Alert Files, they would construct a format string that looked like this:

```
VIBR_ALT={ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.event
```

Note: The Vibration Alert File output format (CSV or JSON) is specified in the EVENT_FMT setting located in the EXPORT section of the Configuration File. In this example, EVENT_FMT = 1 (JSON)

Using the following values:

- ROOT = **"/"**
- PRE = **"5GV_"**
- MAC = **329f0e**
- Alert ID = **23**
- Alert time = **2019/03/04 09:27**

The following substitutions take place:

- **{ROOT}** is replaced with "**/**"
- **{MAC}** is replaced with "329f0e"
- **{SEQ3}** is replaced with "023"
- **{YYYY}** with is replaced by "2022"
- **{MM}** is replaced with "03"
- **{DD}** is replaced with "04"
- **{hh}** is replaced with "09"
- **{mm}** is replaced with "27"

The final file path would therefore be:

```
/5GV_329f0e_023_202203040927_1.event.json
```

8.7.1 Keywords

Keywords allow the user to enter a generalized value in order to call specific values in the file names.

8.6.1.1 Sequence Numbers

These reserved keywords allow the user to format the sequence number associated with the file type (e.g. Alert, Peak, etc.) into the number of digits specified. The number following "SEQ" sets the number of digits in the sequence, as shown below.

- **{SEQ2}** sets a 2-digit sequence
- **{SEQ3}** sets a 3-digit sequence
- **{SEQ4}** sets a 4-digit sequence
- **{SEQ5}** sets a 5-digit sequence

Note: If the user specifies a smaller sequence format than there are numbers, then only the leading digits to the number specified will be used. For example, if SEQ2 is set for the number 1234, only 12 get used.

8.6.1.2 Other Substitution Keywords

Some other substitution keywords are as follows:

- **{MAC}** Device MAC address as 6 Hex Characters
- **{YYYY}** Year as a 4-digit value
- **{YY}** Year as a 2-digit value (0-99)
- **{MM}** Month as a 2-digit value
- **{DD}** Day of Month as a 2-digit value
- **{hh}** Hour as a 2-digit value
- **{mm}** Minute as a 2-digit value

These reserved keywords allow the user to use various timestamp fields and the MAC address when constructing file names.

8.8 [REM_DIR_FLAT] Section

This section of the configuration file defines the path and file naming conventions for all system files uploaded to the client's FTP server. The flat directory structure supports GIS systems that work from a single directory with a separate folder to store configuration files.

8.8.1 ROOT

The **String** "/" is the ROOT keyword for directory substitution

8.8.2 PRE

The **String** "5GV_" is the PRE keyword for file name prefix substitution

8.8.3 NEW_CFG

The **String** "{ROOT}CONFIG/{PRE}{MAC}.new" is for new configuration files.

8.8.4 CUR_CFG

The **String** "{ROOT}CONFIG/{PRE}{MAC}.config" is for uploaded configuration file path and name.

8.8.5 BAD_CFG

The **String** "{ROOT}CONFIG/{PRE}{MAC}.new.bad" is for rejected configuration file path and name.

8.8.6 VIBR_ALT

The **String** "{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.event" is the Vibration Event file path and name.

8.8.7 VIBR_DATA

The **String** "{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.waveform" is the Vibration Waveform file path and name.

8.8.8 VIBR_PEAK

The **String** "{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.interval" is the Vibration Peak file path and name.

8.8.9 TILT_ALT

The **String** "{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.talert" is the Tilt Alert file path and name.

8.8.10 TILT_DATA

The **String** "{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.tdata" is the Tilt Data file path and name.

8.8.11 TILT_BEAT

The **String** "{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.beat" is the Tilt Beat file.

8.8.12 LOG_FMT

The **String** "{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.log.txt" is the LOG file.

8.9 [REM_DIR_NEST] Section

This section of the configuration file defines the path and file naming conventions for all system files uploaded to the client's FTP server. The nested directory structure supports GIS systems that work from a nested directory with a separate folder to store configuration files.

8.9.1 ROOT

The **String** "/" is the ROOT keyword for directory substitution

8.9.2 PRE

The **String** "5GV_" is the PRE keyword for file name prefix substitution

8.9.3 NEW_CFG

The **String** "{ROOT}CONFIG/{PRE}{MAC}.new" is for new configuration files.

8.9.4 CUR_CFG

The **String** "{ROOT}CONFIG/{PRE}{MAC}.config" is for uploaded configuration file path and name.

8.9.5 BAD_CFG

The **String** "{ROOT}CONFIG/{PRE}{MAC}.new.bad" is for rejected configuration file path and name.

8.9.6 VIBR_ALT

The **String** "{ROOT}{MAC}/FILES/VIBR/ALT_{SEQ4}" is the Vibration Event file path and name.

8.9.7 VIBR_DATA

The **String** "{ROOT}{MAC}/FILES/VIBR/VACC{SEQ4}" is the Vibration Event file path and name.

8.9.8 VIBR_PEAK

The **String** "{ROOT}{MAC}/FILES/PEAKS/{YY}{MM}{DD}{SEQ2}" is the Vibration Peak file path and name.

8.9.9 TILT_ALT

The **String** "{ROOT}{MAC}/FILES/TILT/ALT_{SEQ4}" is the Tilt Alert file path and name.

8.9.10 TILT_DATA

The **String** "{ROOT}{MAC}/FILES/TILT/DAT_{SEQ4}" is the Tilt Data file path and name.

8.9.11 TILT_BEAT

The **String** "{ROOT}{MAC}/FILES/BEATS/{YY}{MM}{DD}{SEQ2}" is the Tilt Beat file path and name.

8.9.12 LOG_FMT

The **String** "{ROOT}{MAC}/LOG/{YY}{MM}{DD}{SEQ2}.txt"is the LOG file path and name.

8.10 [SMS] Section

This section of the configuration file defines the mobile phone numbers to which the device sends notifications in the event of an Alert. The device sends SMS messages to indicate Vibration Alerts, Tilt Alerts, and upon device start-up. The [SMS] section allows entry of up to five mobile phone numbers, if enabled.

Each entry in the [SMS] section follows the format # = “number, Flag”, where their respective settings are as follows:

- # is a number from one (“1”) to five (“5”) and indicates which entry it is (up to 5) of the mobile phone numbers the device sends alerts.
- Number is entered as the full SMS number, including country code if needed (e.g. +44 for the UK, +61 for Australia, +852 for Hong Kong, etc.).
- Flag is a single letter, “T” or “F”, where “T” indicates that the entry is active. “F” indicates that the entry is not active.

8.10.1 Mobile Phone Entry #1

This parameter is a **String** containing the complete mobile number and whether or not this number is currently enabled. For example, if the first mobile phone entry is "+85290960771,T”, then the device sends alerts to this phone number as the mobile number is entered and entry is marked as enabled.

8.10.2 Mobile Phone Entry #2

This parameter is a **String** containing the complete cell number and whether or not this number is currently enabled. This entry is not used in the sample file below, and therefore the entry reads only. “, F”. The user should enter the number they wish to use (in the format given above) and then enable alerts to this number by setting the last value to “T”.

8.10.3 Mobile Phone Entry #3

This parameter is a **String** containing the complete cell number and whether or not this number is currently enabled. This entry is not used in the sample file below, and therefore the entry reads only. “, F”. The user should enter the number they wish to use (in the format given above) and then enable alerts to this number by setting the last value to “T”.

8.10.4 Mobile Phone Entry #4

This parameter is a **String** containing the complete cell number and whether or not this number is currently enabled. This entry is not used in the sample file below, and therefore the entry reads only. “, F”. The user should enter the number they wish to use (in the format given above) and then enable alerts to this number by setting the last value to “T”.

8.10.5 Mobile Phone Entry #5

This parameter is a **String** containing the complete cell number and whether or not this number is currently enabled. This entry is not used in the sample file below, and therefore the entry reads only. “, F”. The user should enter the number they wish to use (in the format given above) and then enable alerts to this number by setting the last value to “T”.

8.11 [SENSORS] Section

This section of the configuration file defines the sensor modes available within the device. The device supports only one mode at a time.

The format of this configuration entry is MAC = “MODE, KEY”. The respective settings are as follows:

- MAC = the device MAC address (**5b2990** for this example)
- MODE = can be either “VIBR” or “TILT” (if appropriately licenced)
- KEY = Licence key (not required for Vibration mode)

If the sensor licensing is only valid for vibration, the licence key will be all zeroes, as shown in the following example.

```
000000 = "VIBR,00000000000000000000000000000000"
```

The following example shows a licence key that enables vibration and tilt operation:

```
5b2990 = "VIBR,58022F1EFF4FDE680FA83914DE0AB185"
```


8.12 [000000_VIBR]

This section of the configuration file defines the vibration configuration settings for the sensor. *Note that some of the parameters in this section are disabled.*

8.12.1 FLG_RAW

This parameter is a **String** that can be set to “true” (by entering either “T”, “t”, or “true”) or false (by entering either “F”, “f”, or “false”) for the capture and upload of raw acceleration data. The default setting is “T”.

8.12.2 FLG_ACC_X

Unimplemented. This parameter is a **String** that can be set to “true” (“T”, “t”, or “true”) or false (“F”, “f”, or “false”) to enable or disable detecting alerts using acceleration threshold on the X-axis. The default setting is “F”.

8.12.3 FLG_ACC_Y

Unimplemented. This parameter is a **String** that can be set to “true” (“T”, “t”, or “true”) or false (“F”, “f”, or “false”) to enable or disable detecting alerts using acceleration threshold on the Y-axis. The default setting is “F”.

8.12.4 FLG_ACC_Z

Unimplemented. This parameter is a **String** that can be set to “true” (“T”, “t”, or “true”) or false (“F”, “f”, or “false”) to enable or disable detecting alerts using acceleration threshold on the Z-axis. The default setting is “F”.

8.12.5 FLG_ALT_X

This parameter is a **String** that can be set to “true” (“T”, “t”, or “true”) or false (“F”, “f”, or “false”) to enable or disable detecting alerts on the X-axis. The default setting is “T”.

8.12.6 FLG_ALT_Y

This parameter is a **String** that can be set to “true” (“T”, “t”, or “true”) or false (“F”, “f”, or “false”) to enable or disable detecting alerts on the Y-axis. The default setting is “T”.

8.12.7 FLG_ALT_Z

This parameter is a **String** that can be set to “true” (“T”, “t”, or “true”) or false (“F”, “f”, or “false”) to enable or disable detecting alerts on the Z-axis. The default setting is “T”.

8.12.8 FLG_ORIENT

This parameter is a **String** that can be set to “true” (“T”, “t”, or “true”) or false (“F”, “f”, or “false”) to enable or disable correct XYZ->LTV mapping based on the installed orientation. The default setting is “F”.

8.12.9 SAMP_FREQ

This parameter is an **Integer** that can be set to “1000”, “2000”, or “4000” to set the sample rate in Hertz. The default setting is “1000”.

8.12.10 PEAK_SPAN

This parameter is an **Integer** that can be set to any value number from “30” to “86400” to set the peak PPV/ACC reporting interval in seconds. The default setting is “300”.

Note: Peak interval readings start and align to the top of the hour at the :00 second mark. If PEAK_SPAN is set to 300 (5 minutes), then peak readings will start at a 5 minute interval on the clock (i.e. xx:00:00, xx:05:00, xx:10:00, etc).

8.12.11 TRIG_LEVEL

Deprecated. This **Integer** can be set to any value number from “64” to “2048” to set the trigger level in mg. The default setting is “80”.

8.12.12 PPV_MAX_X

This parameter is a **Float** that can be set to any value from “0.01” to “254” to set the X-axis (L) alert threshold in *mm/s*. The default setting is “5.0”.

8.12.13 PPV_MAX_Y

This parameter is a **Float** that can be set to any value from “0.01” to “254” to set the Y-axis (T) alert threshold in *mm/s*. The default setting is “5.0”.

8.12.14 PPV_MAX_Z

This parameter is a **Float** that can be set to any value from “0.01” to “254” to set the Z-axis (V) alert threshold in *mm/s*. The default setting is “5.0”.

8.12.15 ACC_MAX_X

Unimplemented. This parameter is a **Float** that can be set to any value from “{x}” to “{x}” to set the X-axis (L) alert acceleration threshold in *g*. The default setting is “{x}”.

8.12.16 ACC_MAX_Y

Unimplemented. This parameter is a **Float** that can be set to any value from “{x}” to “{x}” to set the Y-axis (T) alert acceleration threshold in *g*. The default setting is “5.0”.

8.12.17 ACC_MAX_Z

Unimplemented. This parameter is a **Float** that can be set to any value from “{x}” to “{x}” to set the Z-axis (V) alert acceleration threshold in *g*. The default setting is “5.0”.

8.12.18 PRE_SEC

This parameter is an **Integer** that sets the pre-trigger recording time. It can be set from zero (“0”) to whichever is the lesser value of the following: “30” *or* the result of MAX_SEC - MIN_SEC. The default setting is “1”.

8.12.19 MIN_SEC

This parameter is an **Integer** that controls the post-trigger recording time (with auto-extend if more alerts are detected) and can be set in the range from “1” to the lesser value of the following: the result of MAX_SEC - PRE_SEC *or* “2”.

8.12.20 MAX_SEC

This parameter is an **Integer** that sets the maximum recording time in seconds (at one kHz). It can be set to any value in the range from “1” to “120”. The default setting is “10”.

8.12.21 REA_SEC

This parameter is an **Integer** that sets the minimum time between alerts in seconds. It can be set to any value in the range of “0” to “30”. The default setting is “2”.

8.12.22 FILTER

This parameter is an **Integer** that sets the filter number and can be set to any value in the range of “0” to “16”. (A “0” setting indicates no filter.) The default setting is “15”.

8.12.23 ACC_SCALE

This parameter is an **Integer** that can be set to either “2”, “4”, “8”, “10”, “20”, or “40” to set the accelerometer range in *g.* The default setting is “8”.

8.13 [000000_TILT]

This section of the configuration file defines the tilt configuration settings for the sensor. (It is ignored if a licence key is not present).

8.13.1 BEAT_RATE

This parameter is an **Integer** in the range from “0” to “86400” that sets the beat message rate in seconds. The default setting is “30”.

8.13.2 PRE_REC

This parameter is an **Integer** in the range from “0” to “120” that sets the seconds of recording prior to trigger. The default setting is “5”.

8.13.3 PST_REC

This parameter is an **Integer** in the range from “0” to “120” that sets the seconds of recording post-trigger. The default setting is “5”.

8.13.4 FLG_ALT_P

This parameter is a **String** that can be set to “true” (by entering either “T” or “t” or “True”) or “false” (by entering either “F” or “f” or “False”) to check for pitch alerts. The default setting is “T”.

8.13.5 FLG_ALT_R

This parameter is a **String** that can be set to “true” (by entering either “T” or “t” or “True”) or “false” (by entering either “F” or “f” or “False”) to check for roll alerts. The default setting is “T”.

8.13.6 FLG_REA_P

This parameter is a **String** that can be set to “true” (by entering either “T” or “t” or “True”) or “false” (by entering either “F” or “f” or “False”) to enable rearm stable checking on pitch axis. The default setting is “T”.

8.13.7 FLG_REA_R

This parameter is a **String** that can be set to “true” (by entering either “T” or “t” or “True”) or “false” (by entering either “F” or “f” or “False”) to enable rearm stable checking on roll axis. The default setting is “T”.

8.13.8 FLG_TRIG

This parameter is a **String** that can be set to “true” (by entering either “T” or “t” or “True”) or “false” (by entering either “F” or “f” or “False”) to enable impact detection trigger. The default setting is “T”.

8.13.9 FLG_REBASE

This parameter is a **String** that can be set to “true” (by entering either “T” or “t” or “True”) or “false” (by entering either “F” or “f” or “False”) to re-establish a pitch and roll baseline after an alert. The default setting is “T”.

8.13.10 FLG_ORIENT

Unimplemented. This parameter is a **String** that can be set to “true” (by entering either “T” or “t” or “True”) or “false” (by entering either “F” or “f” or “False”) to automatically reorient the sensor. The default setting is “F”.

8.13.11 ALT_P

This parameter is a **Float** that can be set in the range from “0.5” to “70” and sets the pitch change that triggers an alert (if FLG_ALT_P is set to “true”). The default value is “5.0”.

8.13.12 ALT_R

This parameter is a **Float** that can be set in the range from “0.5” to “70” and sets the roll change that triggers an alert (if FLG_ALT_R is set to “true”). The default value is “5.0”.

8.13.13 TRIM_P

This parameter is a **Float** that can be set in the range from “-45” to “+45” and sets the trim pitch reading (useful after remounting the device). The default setting is “0.0”.

8.13.14 TRIM_R

This parameter is a **Float** that can be set in the range from “-45” to “+45” and sets the trim roll reading (useful after remounting the device). The default setting is “0.0”.

8.13.15 REA_P

This parameter is a **Float** that can be set in the range from “0.5” to “70” and sets the pitch rearm value. If FLG_REA_P set to False, then this value is ignored. The default value is “5.0”.

8.13.16 REA_R

This parameter is a **Float** that can be set in the range from “0.5” to “70” and sets the roll rearm value. If FLG_REA_R set to False, then this value is ignored. The default value is “5.0”.

8.13.17 REA_SEC

This parameter is an **Integer** in the range from “30” to “3600” and sets the rearm delay time in seconds to prevent false re-triggering. The default setting is “30”.

8.13.18 TRIG_LEVEL

This **Integer** is a value in the range from “80” to “2048” and sets the impact detection trigger in *milli-g*. The default setting is “250”.

8.14 [STATUS] Section

This section of the configuration file contains the most recent device status information and is populated by the device each time it uploads its current configuration data to the FTP server. (Uploads occur each time an interval file is uploaded.) *It is important to note that this section simply displays data from the sensor, and is not for sending information to the sensor.*

8.14.1 MAC

This line gives the device's MAC address. Addresses can range from "000000" to "ffffff". In the sample file below, the address is "123456".

8.14.2 HARDWARE_VERSION

This line gives the hardware version of the device. It is populated in the format "f.f", and can range from "0.0" to "9.9". In the sample file below it is "2.2", or 2B.

8.14.3 MAIN_FIRMWARE

This line gives the main firmware version of the device. It is populated in the format "f.f.f" and can range from "0.0.0" to "99.99.99". In the sample file below, it is "5.0.0".

8.14.4 TEMPERATURE

This line gives the temperature in degrees Celsius. Values can range from "-40.00" to "85.00". In the example below, it is "26.62".

8.14.5 Power

This line gives the power source, which could be "Battery" if running on internal batteries, or "External" if powered via external power via the USB/Power connector.

8.14.6 CAPMAH

This line gives the total new battery capacity in mAh. Values range from "0.00" to "99999.99". This value is 0.00 when running on external power.

8.14.7 USEDMAH

This line gives the total used battery capacity in mAh. Values range from "0.00" to "99999.99".

8.14.8 REMPCT

This **Integer** is in the range from "0" to "100" and gives the battery capacity remaining. This value is 0 when running on external power.

8.14.9 IDLEMA

This **Integer** is in the range from "0" to "100" and gives the used capacity when the modem is not operational, which has a much higher reading. This value is 0 when running on external power.

8.14.10 MODEM

This 16-character **String** gives the communication module modem make.

8.14.11 MODEL

This 16-character **String** gives the communication module modem model.

8.14.12 REV

This 64-character **String** gives the communication module modem firmware version.

8.14.13 WIFI NETWORK

This 32-character **String** gives the connected Wi-Fi network.

8.14.14 RSSI

This **Integer** is a value in the range from “0” to “99” and indicates the received signal strength.

8.14.15 MODE

This **String** gives the current sensor mode (VIBR or TILT).

8.14.16 STATE

This 16-character monitor **String** gives the current sensor component state.

9 Sample Configuration File

Below is a sample configuration file from a 5GV with a MAC address 123456.

```
; Device Configuration Snapshot

[MAIN]
VER_MAJ=1
VER_MIN=1
DATE="01/09/22"
SERIAL="123456"
NUMBER=""
LOCATION="22.287,114.1483,6"
WIFI_NETWORK=”GSS 5G”
WIFI_PWD=”GSS12345"
NTP_PORT=123
NTP_TZ=32
LOG="W"
BAT_WARN=25
SEND_ALERT=True
SEND_PEAK=True
SEND_BEAT=True
SEND_DATA=True
SEND_CFG=False
CHECK_CFG=True
SEND_LOG=True
SEND_SMS=True
WIFI_OFF=False
BT_OFF=False
HTTP_ALERT=False
HTTP_BEAT=False
HTTP_PEAK=False
HTTP_DATA=False
HTTP_LOG=False
HTTP_CFG=False
HTTP_RECOVER=False
NTP_TIME=False

[SCHEDULE]
STATUS="00:00:05:00"
RESET="00:08:00:00"
PEAK="00:02:00:00"
BEAT="00:08:00:00"
HOUSEKEEP="00:12:00:00"
BLUE=00:00,00:00
ACTIVE=00:00,00:00

[FTP]
URL="ftp.globalsensingsolutions "
PORT=21
USR="steve@globalsensingsolutions.com"
PWD="samantha01"
SSL_TYPE=0
SSL_CIPHER=65535
SSL_LEVEL=0
SSL_VERSION=4
ACT=False

[HTTP]
HOST="globalsensingsolutions.com"
PROTOCOL="http"
PATH="/gss/upload"
FIELD="upload_file"
USR="steve"
```


```
PWD="gss2021"
SSL_CIPHER=65535
SSL_LEVEL=0
SSL_VERSION=4

[SMS]
1="+85290960771,T"
2=",F"
3=",F"
4=",F"
5=",F"

[REM_DIR_FLAT]
ROOT="/"
PRE="5GV_"
NEW_CFG="{ROOT}CONFIG/{PRE}{MAC}.new"
CUR_CFG="{ROOT}CONFIG/{PRE}{MAC}.config"
BAD_CFG="{ROOT}CONFIG/{PRE}{MAC}.new.bad"
VIBR_ALT="{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.event"
VIBR_DATA="{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.waveform"
VIBR_PEAK="{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.interval"
TILT_ALT="{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.talert"
TILT_DATA="{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.tdata"
TILT_BEAT="{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.tbeat"
LOG_FMT="{ROOT}{PRE}{MAC}_{SEQ3}_{YYYY}{MM}{DD}{hh}{mm}_1.log.txt"

[REM_DIR_NEST]
ROOT="/"
PRE="5GV_"
NEW_CFG="{ROOT}CONFIG/{PRE}{MAC}.new"
CUR_CFG="{ROOT}CONFIG/{PRE}{MAC}.config"
BAD_CFG="{ROOT}CONFIG/{PRE}{MAC}.new.bad"
VIBR_ALT="{ROOT}{MAC}/FILES/VIBR/ALT_{SEQ4}"
VIBR_DATA="{ROOT}{MAC}/FILES/VIBR/VACC{SEQ4}"
VIBR_PEAK="{ROOT}{MAC}/FILES/PEAKS/{YY}{MM}{DD}{SEQ2}"
TILT_ALT="{ROOT}{MAC}/FILES/TILT/ALT_{SEQ4}"
TILT_DATA="{ROOT}{MAC}/FILES/TILT/DAT_{SEQ4}"
TILT_BEAT="{ROOT}{MAC}/FILES/BEATS/{YY}{MM}{DD}{SEQ2}"
LOG_FMT="{ROOT}{MAC}/LOG/{YY}{MM}{DD}{SEQ2}.txt"

[OTAP]
URL="108.167.143.78"
PORT=21
USR="5gvfw@globalsensingsolutions.com"
PWD="gss5gv2022"
SSL_TYPE=0
SSL_CIPHER=65535
SSL_LEVEL=0
SSL_VERSION=4

[EXPORT]
REM_DIR_FLAT=True
EVENT_FMT=0
WAVE_FMT=2
PEAK_FMT=0
ALERT_FMT=0
DATA_FMT=0
BEAT_FMT=0
PPA_UNITS=0
PPV_UNITS=2
PPD_UNITS=6

[SENSORS]
123456 = "VIBR,3bcee1ec980f7333086722d7d22e9082"
```


```
[123456_VIBR]
FLG_RAW=True
FLG_ACC_X=False
FLG_ACC_Y=False
FLG_ACC_Z=False
FLG_ALT_X=False
FLG_ALT_Y=False
FLG_ALT_Z=True
FLG_ORIENT=False
SAMP_FREQ=1000
PEAK_SPAN=30
TRIG_LEVEL=80
PPV_MAX_X=5.000000
PPV_MAX_Y=5.000000
PPV_MAX_Z=5.000000
ACC_MAX_X=0.000000
ACC_MAX_Y=0.000000
ACC_MAX_Z=0.000000
PRE_SEC=1
MIN_SEC=2
MAX_SEC=10
REA_SEC=2
FILTER=8
ACC_SCALE=8

[123456_TILT]
BEAT_RATE=14400
PRE_REC=5
PST_REC=5
FLG_ALT_P=False
FLG_ALT_R=False
FLG_REA_P=False
FLG_REA_R=False
FLG_REA_INC=False
FLG_TRIG=False
FLG_REBASE=True
FLG_ORIENT=False
ALT_P=5.000000
ALT_R=5.000000
TRIM_P=0.000000
TRIM_R=0.000000
REA_P=5.000000
REA_R=5.000000
REA_SEC=30

[STATUS]
MAC=123456
HARDWARE_VERSION=1.1
MAIN_FIRMWARE=5.0.0
TEMPERATURE=26.62
POWER=External
CAPMAH=0.00
USEDMAH=0.00
REMPCT=0
IDLEMA=0
MODEM=Renesas
MODEL=DA16200
REV=DA16200MOD-AA
Oper=GSS 5G
RSSI=16
WIFI_NETWORK=GSS 5G
MODE=VIBR
STATE=Monitor
```

10 Bluetooth Support

A Bluetooth communication module comes standard in the device and is supported by the GSS Bluetooth Mobile application. The GSS Bluetooth Application has the ability to:

- Work on all GSS Bluetooth Enabled Devices (i.e. 5GV, 4GV, GVWD)
- Retrieve and update the device configuration settings
- Perform Admin Functions (i.e. Snapshots, Status, Storage, Power and Reset Functions)
- Perform File Management Functions (i.e. View, Upload, Delete)
- View Data Buffers (i.e. Peak Interval, Tilt Beats, VW Beats)
- Standalone Operation including manual samples

The pictures below are screenshots from the GSS Bluetooth Mobile application. Refer to the GSS Bluetooth Application user manual for more details.

Figure 11 - Select Bluetooth Device

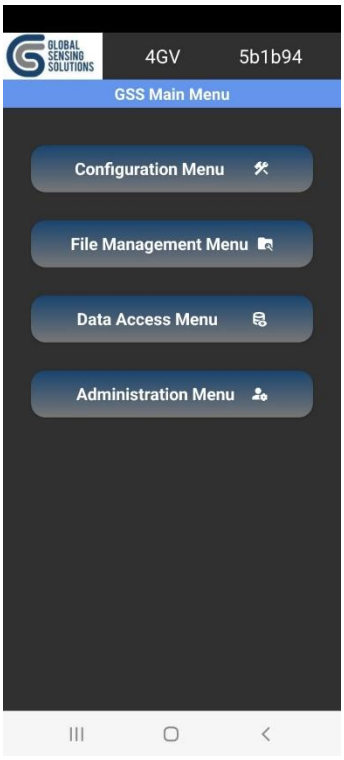

Figure 12- Main Menu

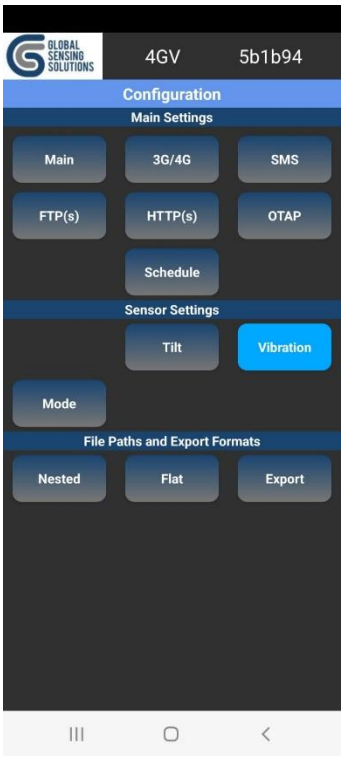

Figure 13 - Configuration Settings

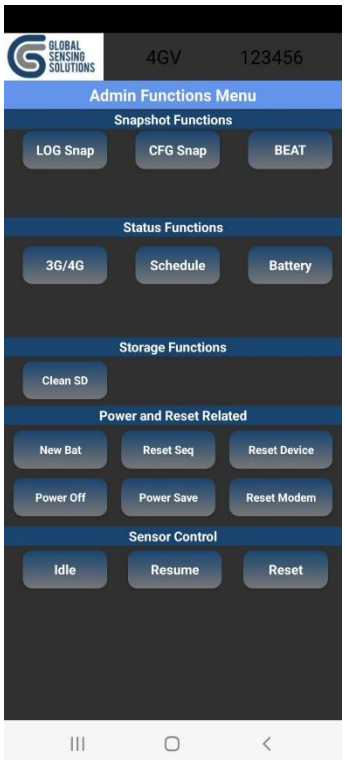

Figure 14 - Admin Functions

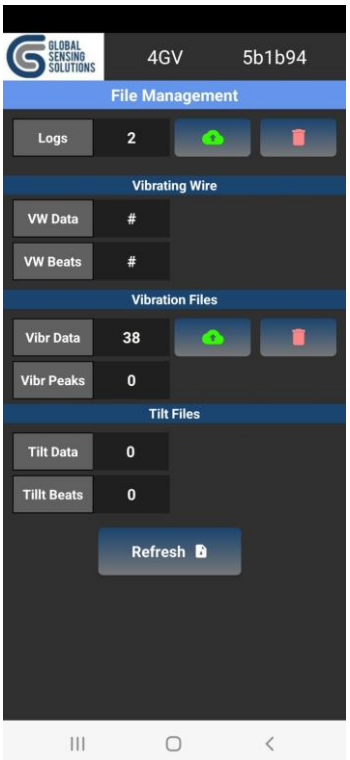

Figure 15 - File Management

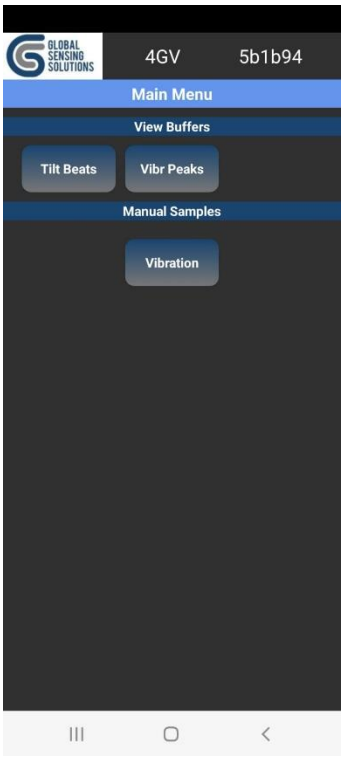

Figure 16 - View Buffers & Perform Manual Samples

11 MicroSD Card

The device uses an industrial-grade MicroSD card to provide high reliability. The file system can be viewed by using a MicroSD card reader and a PC. There is no special software required to view the file system.

12 Console and SMS Commands

The device accepts text-based commands via the USB serial port and SMS commands via MQTT when connected to a Wi-Fi network. *The commands used are the same for all methods.*

This section documents the basic command structures for console and SMS-based commands, along with command and response examples.

In some cases, the response to a console-based command (over USB serial) will differ from that sent over SMS due to the 160-character limit on the size of an individual SMS message.

Note: The firmware was modified to handle double-byte characters used in Asia. For instance, 00530074006100740020003300 67 is the double-byte for “stat 3g”. When the firmware receives this number it will convert it and process the stat 3G command.

12.1 Configuration Commands

Configuration commands (CFG) are used to view or change the current setting. To view the current setting, issue the command without a value. To change the current setting, issue the command followed by the desired new value. After issuing the command to change a value, the user must then send the command “CFG APPLY” to save the settings.

To change the settings via SMS message, the user should send a text message to the device in the following format:

CFG {section} {field} {value}

Where {section} is the section of the configuration file (i.e. MAIN, FTP, SCHED), {field} is an accepted field name (as shown in the following tables) and {value} is the desired value to be set.

Note: The commands can be upper or lowercase as shown below in the examples.

For example, the field URL in section FTP accepts a domain name or IP address and would be set with either of the following text messages to the device:

CFG FTP URL ftp.globalsensingsolutions.com

cfg ftp url 108.167.143.78

The device will respond with an acknowledgment of the following form:

5GV ftp url set to {value}

If the device was issued the URL command text given in the above examples, its response would be as follows:

5GV FTP URL set to ftp.globalsensingsolutions.com

3GV ftp url set to 108.167.143.78

The following table contains more examples of how to view and change configuration settings.

Command	Outcome
CFG MAIN APN	Returns the current APN value
CFG VIBR PEAK_SPAN	Returns Vibration value peak_span, which is the interval of Peak PPV readings

Changing configuration settings is the same as viewing them, except that the user must also provide a *value*. The following examples show how to change configuration settings.

Command	Outcome
CFG MAIN APN CSL	Changes the APN value to CSL
CFG VIBR PEAK_SPAN 900	Changes the Vibration mode peak_span to 900 seconds (15 minutes)

Note: If the user forgets to send the "CFG APPLY" command after making SMS configuration changes, these new settings would be lost in the event of a device reboot.

The details for each configuration setting are shown in the sub-sections that follow.

12.1.1 CFG Main

This table below gives the commands for viewing and updating the Main configuration settings.

Base Command	Field	Value	Comments
CFG MAIN	VER_MAJ	A numeric value in the range of 0 to 255	No validation; user-defined field
CFG MAIN	VER_MIN	A numeric value in the range of 0 to 255	No validation; user-defined field
CFG MAIN	DATE	A 12-character string	No validation; user-defined field
CFG MAIN	SERIAL	A 20-character string	No validation; user-defined field; Normally filled in with device MAC Address
CFG MAIN	NUMBER	A {x}-character string	No validation; user-defined field
CFG MAIN	LOCATION	A {x}-character string	No validation; user-defined field
CFG MAIN	LOG	I = Information W = Warning E = Errors	
CFG MAIN	WIFI_NETWORK	A 32-character string that is used when establishing an internet connection	Used when Wi-Fi Communication Module installed
CFG MAIN	WIFI_PWD	A 20-character string that is used when establishing an internet connection	Used when Wi-Fi Communication Module installed
CFG MAIN	NTP_URL	A string of up to 64 characters that contains an IP address or domain name	Recommend to use Google Time Server
CFG MAIN	NTP_PORT	A numeric value in the range of 0 to 65535	Normally NTP port is set to 123
CFG MAIN	NTP_TZ	A numeric value in the range of -96 to +96	1 every 15 minutes off from UTC
CFG MAIN	NTP_TIME	True or False	Default “False”
CFG MAIN	BAT_WARN	Future Development	Default “25”
CFG MAIN	SEND_ALERT	True or False	Default “True”
CFG MAIN	SEND_BEAT	True or False	Default “True”
CFG MAIN	SEND_PEAK	True or False	Default “True”
CFG MAIN	SEND_DATA	True or False	Default “True”
CFG MAIN	SEND_CFG	True or False	Default “False”
CFG MAIN	CHECK_CFG	True or False	Default “True”
CFG MAIN	SEND_LOG	True or False	Default “True”

Base Command	Field	Value	Comments
CFG MAIN	SEND_SMS	True or False	Default “True”
CFG MAIN	WIFI_OFF	True or False	Default “False”
CFG MAIN	BT_OFF	True or False	Default “False”
CFG MAIN	HTTP_ALERT	True or False	Default “False”
CFG MAIN	HTTP_BEAT	True or False	Default “False”
CFG MAIN	HTTP_PEAK	True or False	Default “False”
CFG MAIN	HTTP_DATA	True or False	Default “False”
CFG MAIN	HTTP_CFG	True or False	Default “False”
CFG MAIN	HTTP_LOG	True or False	Default “False”
CFG MAIN	HTTP_RECOVER	True or False	Default “False”

Table 2 - MAIN Configuration Settings

12.1.2 CFG Schedule

The following table gives the commands for viewing and updating the Schedule configuration settings.

Base Command	Field	Value	Comments
CFG SCHED	STATUS	“DD:HH:MM:SS”	Default “00:00:05:00”
CFG SCHED	RESET	“DD:HH:MM:SS”	Default “00:08:00:00”
CFG SCHED	PEAK	“DD:HH:MM:SS”	Default “00:04:00:00”
CFG SCHED	BEAT	“DD:HH:MM:SS”	Default “00:04:00:00”
CFG SCHED	HOUSEKEEP	“DD:HH:MM:SS”	Default “00:12:00:00”
CFG SCHED	BLUE	“HH:MM,HH:MM”	Default “00:00,00:00”. Used to configure operational time Bluetooth communication is available. Use “00:00,00:00” to disable this setting.
CFG SCHED	ACTIVE	“HH:MM,HH:MM”	Default “00:00,00:00”. If the device is receiving power via the USB port, this setting is ignored. Use “00:00,00:00” to disable this setting.

Table 3 - SCHEDULE Configuration Settings

Note: The Scheduler uploads PEAK and BEAT files at the top of an hour and starting from midnight. For instance, if the upload schedule is set to 00:04:00:00 (every 4 hours), then it will upload at 4AM, 8AM, 12PM, 4PM, 8PM and 12AM.

12.1.3 CFG FTP

The table below gives the commands for viewing and updating the FTP configuration settings.

Base Command	Field	Value	Comments
CFG FTP	URL	A string of up to 64 characters that contains an IP address or domain name	URL to the specified IP address or domain name
CFG FTP	PORT	A numeric value in the range of 0 to 65535	Port number for the FTP server
CFG FTP	USR	A string of up to 39 characters	Login name for the FTP connection
CFG FTP	PWD	A string of up to 15 characters	Sets the login password for the FTP connection
CFG FTP	SSL_TYPE		Default “0”
CFG FTP	SSL_CIPHER		Default “65535”
CFG FTP	SSL_LEVEL		Default “0”
CFG FTP	SSL_VERSION		Default “4”
CFG FTP	ACT	True of False	Default “False”

Table 4 - FTP Configuration Settings

12.1.4 CFG Export

The table below gives the commands for viewing and updating the Export configuration settings.

Base Command	Field	Value	Comments
CFG EXPORT	REM_DIR_FLAT	True or False	FTP directory structure. True = Flat and False = Nested. Default “True” as preference of GIS service providers
CFG EXPORT	EVENT_FMT	0 = CSV 1 = JSON	Vibration Alerts. Customers without GIS prefer CSV to view using Excel. Default “0”
CFG EXPORT	WAVE_FMT	0 = CSV 1 = JSON 2 = BIN	Vibration Waveforms. Binary is recommended for faster download and to preserve battery. Default “2”
CFG EXPORT	PEAK_FMT	0 = CSV 1 = JSON	Vibration Peak PPV or Interval Files. Customers without GIS prefer CSV to view using Excel. Default “0”
CFG EXPORT	ALERT_FMT	0 = CSV 1 = JSON	Tilt Alert. Customers without GIS prefer CSV to view using Excel. Default “0”
CFG EXPORT	DATA_FMT	0 = CSV 1 = JSON	Tilt Alert Data. Customers without GIS prefer CSV to view using Excel. Default “0”
CFG EXPORT	BEAT_FMT	0 = CSV 1 = JSON	Tilt Heartbeats. Customers without GIS prefer CSV to view using Excel. Default “0”
CFG EXPORT	PPA_UNITS	0 = g (1g = 9.80665m/s^2) 1 = m/s^2	Acceleration. Default “0”
CFG EXPORT	PPV_UNITS	2 = mm/s 3 = in/s	Peak Particle Values. Default “2”
CFG EXPORT	PPD_UNITS	6 = mm 7 = inches 8 = mil (1mil = 1/1000th inch)	Displacement. Default “6”

Table 5 - EXPORT Configuration Settings

12.1.5 CFG OTAP

The following table gives the commands for viewing and updating the OTAP FTP configuration settings.

Base Command	Field	Value	Comments
CFG OTAP	URL	A string of up to 64 characters containing an IP address or domain name	URL to the specified IP address or domain name
CFG OTAP	PORT	A numeric value in the range from 0 to 65535	Port number for the FTP server
CFG OTAP	USR	A string of up to 39 characters	Login name for the FTP connection
CFG OTAP	PWD	A string of up to 15 characters	Sets the login password for the FTP connection
CFG OTAP	SSL_TYPE	An integer value	Default “0”
CFG OTAP	SSL_CIPHER	An integer value	Default “65535”
CFG OTAP	SSL_LEVEL	An integer value	Default “0”
CFG OTAP	SSL_VERSION	An integer value	Default “4”

Table 6 - OTAP Configuration Settings

12.1.6 CFG REM_DIR_FLAT

These fields are viewable by opening the .config files uploaded to the FTP server. These fields should be updated by editing the configuration file directly or via the GSS Bluetooth Mobile application. Using SMS commands to update these fields is not recommended.

12.1.7 CFG REM_DIR_NEST

These fields are viewable by opening the .config files uploaded to the FTP server. These fields should be updated by editing the configuration file directly or via the GSS Bluetooth Mobile application. Using SMS commands to update these fields is not recommended.

12.1.8 CFG SMS

The table below gives the commands for viewing and updating the SMS configuration settings.

Base Command	Field	Value	Comments
CFG SMS	1 to 5	20 character phone number string including "+" and country code	SMS entry (1-5) assigned a phone number. Add ",T" or ",F" at the end to enable or disable the entry. Example: **CFG SMS 1 +85212341234,T**. Returns an SMS acknowledgement if successful

Table 7 - SMS Configuration Settings

The unit sends SMS messages to one or more configured cell phones for alert events.

Each SMS entry contains the full cell phone number and an indicator specifying whether the entry is active. The format of the SMS command is as shown below:

CFG SMS n Phone#,Flag

For example:

CFG SMS 1 +85212341234,T

The device will respond with an acknowledgement of the following form:

3GV sms n set to Phone#,FLAG

For example:

3GV sms 1 set to +85212341234,T

Where:

1) **n** is the entry from 1 to 5
2) **Phone#** is the phone number with country code prefix e.g. *+85212341234*
3) **Flag** is either "T" or "F", where T indicates the number is active and F indicates the number is inactive

To remove an entry, send the text message: "CFG SMS n 0,F", where n is the cell number entry to remove.

12.1.9 CFG VIBR

The table below gives the commands for viewing and updating the Vibration configuration settings.

Base Command	Field	Value	Comments
CFG VIBR	FLG_RAW	True or False	If “true”, instructs the sensor to upload Raw Data after capturing an alert, else it is set to “false”
CFG VIBR	FLG_ALT_X	True or False	Default: “True”
CFG VIBR	FLG_ALT_Y	True or False	Default: “True”
CFG VIBR	FLG_ALT_Z	True or False	Default: “True”
CFG VIBR	FLG_ACC_X	True or False	Unimplemented
CFG VIBR	FLG_ACC_Y	True or False	Unimplemented
CFG VIBR	FLG_ACC_Z	True or False	Unimplemented
CFG VIBR	FLG_ORIENT	True of False	If True, then auto-orient the Z axis to gravity.Default: “True”
CFG VIBR	SAMP_FREQ	1000, 2000, 4000	Sample frequency rate in samples per second. Default 1000
CFG VIBR	PEAK_SPAN	A numeric value in the range of 30 to 3600	Duration that max peak PPV will be uploaded. Default: “300”
CFG VIBR	TRIG_LEVEL	N/A	Deprecated
CFG VIBR	PPV_MAX_X	A decimal value in the range of 0.01 to 254	Alert Threshold on X Axis. Default: “5.00”
CFG VIBR	PPV_MAX_Y	A decimal value in the range of 0.01 to 254	Alert Threshold on Y Axis. Default: “5.00”
CFG VIBR	PPV_MAX_Z	A decimal value in the range of 0.01 to 254	Alert Threshold on Z Axis. Default: “5.00”
CFG VIBR	ACC_MAX_X	A decimal value	Unimplemented
CFG VIBR	ACC_MAX_Y	A decimal value	Unimplemented
CFG VIBR	ACC_MAX_Z	A decimal value	Unimplemented
CFG VIBR	MAX_SEC	Minimum is pre_sec + min_sec	Maximum Alert Sample Seconds. Default: “32”
CFG VIBR	REA_SEC	A numeric value from 0 to 300	Number of secs the sensor must wait before rearming after an alert event. Default: “2”
CFG VIBR	FILTER	A numeric value from 1 to 16	Filter Selection. Default: “15” (Geophone)
CFG VIBR	ACC_SCALE	2,4,8,10,20,40	Sensor Sensitivity in *g*. Default: “8”

Table 8 - VIBRATION Configuration Settings

To change the Vibration sensor configuration parameters, send an SMS text message to the device in the format below:

CFG VIBR {field} {value}

For examples:

CFG VIBR FLG_RAW T

CFG VIBR PEAK_SPAN 300

The first example sets the sensor raw data flag to “true”. The second example sets the sensor peak PPV interval to be 300 seconds (5 minutes).

The unit would respond with an acknowledgment message of the following form:

Sensor vibr {field} set to {value}

The device would send the following confirmation response messages to the example messages given above:

Sensor vibr flg_raw set to t

Sensor vibr peak_span set to 300

Note: If the user forgets to send the CFG APPLY command after making SMS configuration changes, these settings would be lost in the event of a device reboot.

12.1.10 CFG TILT

The table that follows gives the commands for viewing and updating the Tilt configuration settings.

Base Command	Field	Value	Result
CFG TILT	BEAT_RATE	A numeric value from 10 to 65535	Heartbeat-reporting interval in seconds and returns an SMS with the result. Default: “300”
CFG TILT	PRE_REC	A numeric value from 1 to 100	Number of records to capture prior to an alert. Default: “5”
CFG TILT	PST_REC	A numeric value from 1 to 100	Number of records to capture after an alert. Default: “5”
CFG TILT	FLG_ALT_P	True or False	Alert on Pitch. Default: “True”
CFG TILT	FLG_ALT_R	True or False	Alert on Roll. Default: “True”
CFG TILT	FLG_REA_P	True or False	Rearm on Pitch. Default: “False”
CFG TILT	FLG_REA_R	True or False	Rearm on Roll. Default: “False”
CFG TILT	FLG_REA_INC	True of False	Deprecated
CFG TILT	FLG_TRIG	N/A	Deprecated
CFG TILT	FLG_REBASE	True or False	Establishes new Pitch and Roll baseline after alert if value set to True. Default: “True”
CFG TILT	FLG_ORIENT	True or False	Re-orient tilt when device powered on
CFG TILT	ALT_P	A decimal value in the range from 0.0 to 89.9	Pitch Alert threshold in degrees. Default: “5.00”
CFG TILT	ALT_R	A decimal value in the range from 0.0 to 89.9	Roll Alert threshold in degrees. Default: “5.00”
CFG TILT	TRIM_P	A decimal value in the range from -45.000 to +45.000	Trim Pitch reading (useful after remounting device). Default: “0.000”
CFG TILT	TRIM_R	A decimal value in the range from -45.000 to +45.000	Trim Roll reading (useful after remounting device). Default: “0.000”
CFG TILT	REA_P	A decimal value in the range from 0.0 to 89.9	Sets the Pitch Alert rearm stable window in degrees.
CFG TILT	REA_R	A decimal value in the range from 0.0 to 89.9	Sets the Roll Alert rearm stable window in degrees.
CFG TILT	REA_SEC	A numeric value in the range from 30 to 300	Sets the number of seconds the Rearm checked readings must be stable before rearming. Default: “30”
CFG TILT	TRIG_LEVEL	N/A	Deprecated

Table 9 - TILT Configuration Settings

12.2 Custom Configuration Files

This firmware has been enhanced to allow our customers to create custom configuration files. The commands to save and switch to this custom configuration file are:

cfg save {name}	Creates a new configuration file using the current configuration settings
cfg switch {name}	Switches the device to use the specified configuration file

12.2.1 Create New Configuration File

Create a new configuration file using the **cfg save {name}** command, where {name} is a user-defined 8-character alphanumeric field that must start with an alphabetic value. The example below shows a user-defined name of "testing". The file is created on the microSD card and stored in the /CONFIG directory. The user can create many configuration files to meet their needs. For instance, one for blasting and another for piling.

> **cfg save testing**

[SMS] Save Config to ./CONFIG/TESTING.INI

[CFG] Config -> ./CONFIG/TESTING.INI

[CFG] Config -> ./CONFIG/TGV3GCFG.BIN

CFG Stored OK

Note: In the future, these new configuration files can be uploaded to the FTP server and downloaded to other devices using a Transfer function in the 3GV Console.

12.2.2 Switch Configuration File

The **cfg switch gss** command changes the configuration file to use GSS default settings. These settings are known to work and point to GSS FTP and HTTP server.

The **cfg switch {name}** command is used to switch the device to use the specified custom configuration file. The example below shows a switch to the "testing" configuration file.

> **cfg switch testing**

[CFG] Backup current config

[CFG] Trying to load ./CONFIG/TESTING.INI

[CFG] Config -> ./CONFIG/TGV3GCFG.SNP

[CFG] Config -> ./CONFIG/TGV3GCFG.BIN

CFG Switch to testing OK

Note: If the user uses the **cfg switch {name}** command and there is a change to the sensor settings, then it must be followed by the reset sensor command. Otherwise, the settings will only become effective upon the next device reset.

Note: The **cfg switch {name}** command does not change the device from vibration to tilt or vice versa.

12.3 Status Commands

12.3.1 STAT 3G

The device provides an SMS status report in response to a 3G stat request, which provides useful information about the unit.

The format of the SMS command is as follows:

Stat 3G

The device returns a formatted text message representing the status. Below is an example of a “Stat 3G” response message, and the entries’ respective indications.

Note: Issuing the “Stat 3G” command from the command line provides some additional information because it isn’t restricted to SMS maximum character length.

```
MAC:    5b293e
HW:     1.1
FW:     5.0.6
Temp:   25.2
Pwr:    External
Volts:  0.0
Modem:  Renesas
Model:  DA16200
Rev:    DA16200MOD-AA
Oper:   GSS 5G
RSSI:   16
Bat:    0%
Net:    WIFI
```

MAC:5b293e	The Short MAC address of the device, which is unique for each device and used as the “Root” folder for all files on the FTP server
HW:	Indicates the Hardware version of the device
FW:5.0.6	Indicates the Version, Release and Build of the firmware currently running in device (in this case, 5.0.6.)
Temp: 25.2	Indicates the internal temperature of the device in degrees Celsius
Volts: 0.0	Indicates the amount of volts from the batteries. This should be around 3.6 when running on batteries.
Modem: Renesas	Indicates the manufacturer of the Wi-Fi modem
Model: DA16200	Indicates the model of the Wi-Fi modem
Rev: DA16200M..	Indicates the modem firmware version
Oper: GSS 5G	Indicates the name of the connected Wi-Fi network

RSSI: 16	Indicates network signal strength.
Bat: 0%	Indicates the power level of the internal batteries. If external power, then this value is 0%, as there is no way for the device to know the remaining power of the external source
Net: WIFI	Indicates which network connection is active. In this case, it is connected to a Wi-Fi network

12.3.2 STAT GET

The unit provides a function to query the status of the sensor using SMS command.

The format of the SMS command is as follows:

Stat get

The device returns a formatted text message representing the sensor's status. Below is an example of a "stat get" response message, and the entries' respective indications.

```
Temp:   28.1
Mode:   VIBR
State:  Monitor
Opts:   ADXL355 ADXL357
```

Temp: 24.8	Indicates the internal temperature of the sensor in degrees Celsius
Mode: VIBR	Indicates the sensor's current operating mode; sensors can operate in Vibration (VIBR) or Tilt (TILT) modes
State: Monitor	Indicates the sensor's current state (sensors go through various states during start-up and in operation, including Initialising, Orienting, Monitoring, Alert, and Rearming)
Opts: ADXL…	Indicates the installed sensor options; i.e. ADXL355 (2, 4, and 8g) and ADXL357 (10g, 20g, 40g) accelerometers

12.3.3 STAT SCHED

The device provides a function to query the scheduler for timing of the next scheduled activity, including uploads and internal status checks.

The format of the SMS command is shown as follows:

Stat sched

The device returns a formatted text message representing the sensor's status. Below is an example of a "stat sched" response message, and the entries' respective indications.

```
Peak: 00:00:14:09
Beat: 00:02:14:09
Vibr: 00:00:00:09
Tilt: 00:02:14:09
Cell: 00:02:14:09
Batt: 00:00:00:09
Powr: 00:00:00:09
Actv: 00:00:00:09
```


Peak: Indicates the amount of time until the next vibration peak PPV (interval) file upload in DD:HH:MM:SS format; the duration is based on the peak schedule

Beat: Indicates the amount of time until the next tilt heartbeat file upload in DD:HH:MM:SS format; the duration is based on the beat schedule.

Vibr: Indicates the amount of time until the next vibration peak PPV (interval) reading to be written to the MicroSD card in DD:HH:MM:SS format; the duration is based on the Vibration peak_span setting.

Tilt: Indicates the amount of time until the next tilt heartbeat reading to be written to the MicroSD card in DD:HH:MM:SS format; the duration is based on the Tilt beat_rate setting.

Cell: Indicates the amount of time until the next modem reset will be performed in DD:HH:MM:SS format; the duration is based on the reset schedule.

Batt: Indicates the amount of time until the next battery check will be performed in DD:HH:MM:SS format; the duration is internally set at every 5 minutes

Powr: Indicates the amount of time until the next power check will be performed in DD:HH:MM:SS format; the duration is internally set at every 1 minute

Actv: Indicates the amount of time until the active schedule check will be performed in DD:HH:MM:SS format; the duration is internally set at every 1 minute

12.4 Base Command

The baseline command provides a means by which to set the reference value for a tilt to the current reading. (This is necessary when installing the device, so that changes from the starting value are detectable.)

The format of the SMS command is as follows:

Base

The device sends the following SMS response to indicate that the sensor acknowledges the command:

```
Baselining sensor
```


12.5 Battery Commands

The device contains a battery fuel gauge. The commands in this section explain how to inform the device that new batteries have been installed and obtain the latest battery usage information.

Note: When the device is connected to USB, it will automatically use the USB for power. The device will therefore disable the battery fuel gauge when connected to USB (as no battery power will be used). The commands in this section require the battery fuel gauge to be operational. Therefore, these commands should only be used when the device is not connected to USB.

12.5.1 NEW BAT

The “newbat” command is used when replacing the batteries in the device. This command informs the battery fuel gauge of the total capacity that has been installed. The battery fuel gauge will keep track of usage (which is used to report the remaining battery life in mAh and percentage).

The format of the SMS command is as follows:

Newbat {mAh}

{mAh} is the new total battery capacity in mAh. For instance, when 4 x 14Ah batteries are added, the command would be:

Newbat 56000

The device sends the following SMS response:

New Battery Accepted.
Send STAT BAT for details

12.5.2 STAT BAT

The device provides a function to query the battery status using an SMS command.

The format of the SMS command is as follows:

Stat Bat

The device returns a formatted text message representing the sensor’s battery status. Below is an example of a “stat bat” response message, and the entries’ respective indications.

```
Last Upd : 2022-09-02T15:14:16.010+08:00
Cap  mAh : 2200
Used mAh : 12
Rem  mAh : 2188
Meas mA  : 0
Idle mA  : 0
Meas Volt:  0.01
Rem  Pct : 99
```

Last Upd: Indicates the total battery capacity in milliamp hours (mAh); set using “newbat” command

Cap mAh: Indicates the total battery capacity in milliamp hours (mAh); set using “newbat” command

Used mAh: Indicates accumulated battery consumption in milliamp hours (mAh)

Rem mAh:	Indicates remaining battery capacity in milliamp hours (mAh)
Meas mA:	Indicates present battery consumption in milliamps. This value will be 0 if externally powered.
Idle mA:	Indicates present battery consumption in milliamps when the modem is not active and drawing more power. This value will be 0 if externally powered.
Meas Volt:	Indicates battery voltage (between 3.5 and 3.7v is normal for lithium cells).
Rem Pct:	Indicates remaining battery capacity as a percentage

12.6 Mode commands

The device supports vibration and tilt modes. Vibration mode is standard, and tilt mode requires a licence key. The commands to change modes are provided in this section.

12.6.1 Vibration Mode

To change the sensor to Vibration Mode, the format of the SMS command is as follows:

Cfg mode vibr

The device immediately changes to vibration mode and sends the response as follows:

Mode now [VIBR]

12.6.2 Tilt Mode

To change the sensor into Tilt Mode, the format of the SMS command is as follows:

Cfg mode tilt

The device immediately changes to vibration mode and sends the response as follows:

Mode now [TILT]

If the device doesn't have a valid tilt licence key, the sensor will not change into tilt mode and sends the following SMS response:

Mode [TILT] unlicensed

12.6.3 Licence Key

A licence key is required to enable certain sensor functionality.

Please contact GSS for pricing if Tilt Mode is required and you don't have a licence key.

The format of the SMS command is as follows:

Cfg licence {32-character licence key provided by GSS}

12.7 Snapshot Commands

Snapshot commands will prompt the device to take a “snapshot” of the current settings. It allows the user to obtain readings from the device immediately, rather than waiting for the next scheduled event.

12.7.1 CFG SNAP

The configuration snapshot command instructs the device to take a snapshot of the dynamic configuration settings. The device creates an INI file from the settings in static memory on the MicroSD card under the SNAPSHOT folder.

Send the following SMS command to the device:

Cfg snap

The device responds that the command was received with the message below:

CFG Snap in Prog

When the snapshot is complete and the file uploaded to the FTP server, the user receives an SMS response similar to the example below. If the configuration file is uploaded to the GSS FTP server, then it will contain a hyperlink to the file.

Config File
CONFIG/
5GV_5b1fe3.config
Upload OK

In this example, the MAC address of the device is 5b1fe3.

12.7.2 PEAK SNAP

The device dumps the peak PPV (interval) data to the disk based on its schedule. However, the user may want to see the most recent peak PPV readings. In this case, the peak snapshot command instructs the device to upload all peak PPV readings stored in its memory and MicroSD card.

The format of the SMS command is as follows:

Peak snap

When the device receives the command, it sends the following SMS message indicating that the command execution is in progress:

Peak dump in progress

If send_peak setting is set to True, then once the peak snapshot upload is complete, the device sends the following SMS message (if the configuration file is uploaded to GSS FTP server, then the message will contain a hyperlink to the file):

Interval Upload OK

12.7.3 BEAT SNAP

The device dumps tilt heartbeat data to the disk based on its schedule. However, the user may want to see the most recent tilt heartbeat readings. In this case, the beat snapshot command instructs the device to upload all tilt heartbeat readings stored in its memory and MicroSD card.

The format of the SMS command is as follows:

Beat snap

When the device receives the command, it sends the following SMS message indicating that the command execution is in progress:

Tilt Beat dump in progress

Once the peak snapshot upload is complete, the device sends the following SMS message (if the configuration file is uploaded to GSS FTP server, then the message will contain a hyperlink to the file after):

Beat Upl OK

12.7.4 LOG SNAP

The user can take a snapshot of the current log file at any time (to save waiting for the buffers to fill and flush to disk).

The log snapshot uploads the snapshot file to the FTP server and then sends an SMS message with the name of the log file and a URL to the file (if using GSS FTP server).

The format of the SMS command is as follows:

Log snap

When the device receives the command, it then sends the following SMS message that the command execution is in progress:

Log file dump in progress

Once the LOG snapshot upload is complete, the device sends the following SMS message (if the configuration file is uploaded to GSS FTP server, then the message will contain a hyperlink to the file):

File Upload OK

Note: For troubleshooting, it is important to set logging to “I” (informational). However, the user should remember to change it back once the log has been captured, because excessive logging and associated uploads will drain the batteries.

12.8 Files Commands

At times, it is useful to check how many files are waiting to upload to the FTP server. This command returns a count of the files in various folders.

Files vibr	Returns the number of vibration alert and waveform files
Files peak	Returns the number of vibration peak PPV files
Files tilt	Returns the number of tilt alert and data files
Files beat	Returns the number of tilt heartbeat files
Files log	Returns the number of log files

12.8.1 VIBR files

The SMS command format for retrieving a vibration alert and waveform file count is:

Files vibr

The device sends the following SMS response:

{nnn} files available for upload

Where {nnn} indicates the number of pending files.

12.8.2 PEAK files

The SMS command format for retrieving the peak PPV or interval file count is:

Files peak

The device sends the following SMS response:

{nnn} files for upload

Where {nnn} indicates the number of pending files.

12.8.3 TILT files

The SMS command format for retrieving the tilt alert and data file count is:

Files tilt

The device sends the following SMS response:

{nnn} files available for upload

Where {nnn} indicates the number of pending files.

12.8.4 BEAT files

The SMS command format for retrieving the tilt heartbeat file count is:

Files beat

The device sends the following SMS response:

{nnn} files for upload

Where {nnn} indicates the number of pending files.

12.8.5 LOG files

The SMS command format for retrieving the log file count is:

Files log

The device sends the following SMS response:

{nnn} files for upload

Where {nnn} indicates the number of pending files.

12.9 Send Commands

The send command provides a means of uploading files that were configured to remain on the device's internal MicroSD card or of restarting failed file upload attempts. All files remain on the MicroSD card until successfully uploaded or cleaned, whereupon the device removes them.

The send commands and their respective outcomes are as follows:

Send vibr	Queues pending vibration alert and waveform files for upload
Send peak	Queues pending peak PPV files for upload
Send log	Queues pending log files for upload
Send tilt	Queues pending tilt alert and data files for upload
Send beat	Queues pending tilt heartbeat files for upload

12.9.1 Sending VIBR files

The SMS command format for queueing pending vibration files is as follows:

Send vibr

The device sends the following SMS response:

{nnn} files added to FTP queue

Where {nnn} indicates the number of files added to the queue.

12.9.2 Sending PEAK files

The SMS command format for queueing pending peak PPV or interval files is as follows:

Send peak

The device sends the following SMS response:

{nnn} files added to FTP queue

Where {nnn} indicates the number of files added to the queue.

12.9.3 Sending LOG files

The SMS command format for queueing pending LOG files is as follows:

Send log

The device sends the following SMS response:

{nnn} files added to FTP queue

Where {nnn} indicates the number of files added to the queue.

12.9.4 Sending TILT files

The SMS command format for queueing pending tilt alert and data files is as follows:

Send tilt

The device sends the following SMS response:

{nnn} files added to FTP queue

Where {nnn} indicates the number of files added to the queue.

12.9.5 Sending BEAT files

The SMS command format for queueing pending tilt heartbeat files is as follows:

Send beat

The device sends the following SMS response:

{nnn} files added to FTP queue

Where {nnn} indicates the number of files added to the queue.

12.10 Clean Commands

This section covers the following clean commands:

Clean vibr	Removes all pending VIBR alert and Waveform files
Clean peak	Removes all pending Peak PPV files
Clean log	Removes all pending LOG files
Clean tilt	Removes all pending TILT alert files
Clean beat	Removes all pending TILT heartbeat files

12.10.1 Clean VIBR

This command is useful if the user wants to remove all pending vibration alerts and waveform files so the device will not upload them to the FTP server.

The format of the SMS command is as follows:

Clean vibr

The device sends the following SMS response:

Clean Successful

12.10.2 Clean PEAKS

This command is useful if the user wants to remove *all* pending interval files so the device will not upload them to the FTP server.

The format of the SMS command is as follows:

Clean peak

The device sends the following SMS response:

Clean Successful

12.10.3 Clean LOG

The device log files can get quite large and uploading them consumes battery power. In the event there are pending log files of no interest, the user can remove them using this command.

The format of the SMS command is as follows:

Clean log

The device sends the following SMS response:

Clean Successful

12.10.4 Clean TILT

This command is useful if the user wants to remove all pending tilt alert files so they will not be uploaded to the FTP server.

The format of the SMS command is as follows:

Clean tilt

The device sends the following SMS response:

Clean Successful

12.10.5 Clean BEATS

This command is useful if the user wants to remove *all* pending heartbeat files so the device will not upload them to the FTP server.

The format of the SMS command is as follows:

Clean beat

The device sends the following SMS response:

Clean Successful

12.10.6 Clean MicroSD

This command is useful if the device will be deployed on a new site and all previous data needs to be removed. The Clean MicroSD command will copy the configuration file into memory and proceed to format the MicroSD card, create the default internal directory structure, and copy the configuration files back to the CONFIG directory.

The format of the SMS command is as follows:

Clean microsd {MAC Address}

The device sends the following SMS response:

5GV will now reset and format its disk

Once successfully complete, the device restarts and sends the normal “Up” message, which is as follows:

5GV MAC: {MAC Address} – Ver 5.0.0 - Up

12.11 Reset Commands

Reset commands allow the user to reset the device or baseline readings if necessary.

12.11.1 RESET {MAC}

The reset {Mac} command is used when the user wants the device to completely reset and start from a known state.

The format of the SMS command is as follows:

Reset {MAC Address}

Where {MAC address} is the device address. An example reset SMS would be “Reset 123456”.

When the reset is complete, the device will send a message similar to the example below, which is for a sensor with MAC address 123456 on firmware 5.0.0.

5GV MAC: 123456 - Ver 5.0.0 - Up

12.11.2 RESET SEQ

The device alerts and waveform sequence numbers can be reset to start from 0.

The format of the SMS command is as follows:

Reset seq

The device sends the following SMS response:

Resetting Sequence Numbers

12.12 Samp Commands

The device has the ability to take the following manual samples at any time:

- For ambient vibration monitoring (samples up to 2 minutes at 1000 samples per second)
- To obtain current readings from remote devices in the field
- To use as a standalone device to take readings at multiple locations
- For quick readings with or without waveforms

12.12.1 Sample Command Parameters

The sample command is used to request sample readings from the device. The parameters for the command are shown in the table below along with their respective description, valid values, and default.

Parameter	Description	Valid Values	Default
Second	The number of seconds to sample	@ 1000 samp/sec: a numeric value 1 to 120 @ 2000 samp/sec: a numeric value 1 to 60 @ 4000 samp/sec: a numeric value 1 to 30	
Samps/Sec	The number of samples per second	1000, 2000, 4000	1000
Range	The sensor range in g	2, 4, 8, 10, 20, 40	2
Filter	The filter to apply	1 - ISEE_SEISMOGRAPH 2 - DIN_4150_3 3 - DIN_4150_2_KB 4 - BS_7385 5 - AS_2187_2_2006 6 - ONORM_S_9012 7 - ISO_8569_ACC 8 - IN1226 9 - NS_8176_COMFORT 10 - NS_8141_CONSTRUCTION 11 - NS_8141_1 12 - SS_4604866_PILING 13 - SS_025211_SHAFT 14 - SS_4604861_COMFORT 15 – GEOPHONE 16 - ICPE_CIRCULAR_86	1 (ISEE)

Table 10 - Manual Sample Parameters

12.12.2 Sample Command Examples

Below are a few samples of the sample command.

It is recommended to use the 2G range when performing ambient vibration monitoring or expecting small vibration. If larger vibrations are expected, then use 8G to avoid over ranging the sensor.

When Raw is set to “yes” (“1”), the sensor will generate raw data. The configuration settings for “Upload Waveform files” will determine if the raw data will be retained on the device MicroSD card (unchecked) or uploaded to the FTP Server (checked).

Sample Command	Description
samp 5	Generates a 5-second sample at 1000 samples per second using the 2G range, geophone filter, and no raw data
samp 10 1000 2 1 1	Generates a 10-second sample at 1000 samples per second using the 2G range, ISEE filter and generates raw data
samp 5 2000 8 3 0	Generates a 5-second sample at 2000 samples per second using the 8G range, DIN 4150-2 KB filter, and no raw data
samp 30 4000 2 15 1	Generates a 30-second sample at 4000 samples per second using the 2G range, geophone filter and generates raw data

Table 11 - Manual Sample Examples

12.13 Sensor Commands

Sensor commands allow the user to periodically start and stop the functioning of the device.

12.13.1 SENSOR IDLE

If the user moves the sensor while it is operational, it is highly likely that one or more alerts will be triggered. It is a good idea to idle the sensor prior to moving it around.

The format of the SMS command to set the sensor to idle is as follows:

Sensor idle

The device sends the following SMS response:

Sensor idled

Note: When the sensor is idle, it will not generate peak PPV messages

12.13.2 SENSOR RUN

Once the user is ready to resume sampling, inform the sensor to resume operations.

The format of the SMS command is as follows:

Sensor run

The device sends the following SMS response:

Sensor Resumed

12.13.3 SENSOR STOP

If the user wants to conserve power and inhibit the sensor from generating peak PPV messages, they can stop the sensor.

The format of the SMS command is as follows:

Sensor stop

The device sends the following SMS response:

Stopping the sensor

12.13.4 SENSOR START

When the user is ready to start sampling again, they can re-enable the sensor (take it out of idle state). Alternatively to this command, the sensor reset command can be used.

The format of the SMS command for sensor start is as follows:

Sensor start

The device sends the following SMS response:

Starting the sensor

12.14 OTAP Commands

OTAP commands allow the user to apply firmware updates.

12.14.1 OTAP MAIN

When there is a firmware update for the main (gateway) component, the “otap main” command is used to retrieve and apply the new firmware.

The format of the SMS command is as follows:

Otap main {main firmware version}

Where {main firmware version} is the firmware version. For this command, version 5.0.4 would be given as 50004, and likewise for other versions.

Otap main 50004

The device sends the following SMS response, if successful:

Main OTAP OK

The device sends the following SMS response if unsuccessful:

Main OTAP Err

OTAP Error – Try again

Note: An error is normally due to difficulty in the modem downloading the OTAP file from the FTP server before timeout. The GSS FTP server is located in the USA, and high volume internet traffic can cause downloads to be slow and exceed timeout. In the event of an error, the user should retry the OTAP command. If the user continues to receive errors, contact GSS.

When complete, the device sends a message similar to the example below, which is for a sensor with MAC address 123456 upgraded to firmware 5.0.4.

5GV MAC: 123456 - Ver 5.0.4 - Up

13 Console Only Commands

There are some commands that are only available via a terminal console. These commands can be useful for troubleshooting.

13.1 Logging Commands

13.1.1 LOG CON ON

Once a serial COM port is opened, the “log con on” command is used to open a console terminal.

The format of the command is as follows:

log con on

The device sends the following response:

Console ON

13.1.2 LOG {MODE}

The device configuration file has a “LOG” field under “MAIN” section that sets the logging level (I = Information, W = Warning, E = Error). The user can override that setting by using the log command in the terminal console, which doesn’t change the LOG field value in the configuration file.

The format of the command is “log mode” or “log {I | w | e}. An example of changing the log mode to Information mode is as follows:

log i

The device sends the following response:

Log Filter = I

13.1.3 LOG SENSE ON

The 5GV has a single processor that handles both gateway and sensor functions. However, log com on only shows the gateway logging. Use the “log sense on” to view the sensor logging.

The format of the command is as follows:

log sense on

The device sends the following response:

Sensor Log ON

The device immediately starts to show sensor readings. Below is an example when the sensor is in vibration mode

Sensor Log ON
PPV: 0.603 1.060 0.692 HZ:10.417 7.692 13.889
PPV: 0.612 0.915 0.579 HZ: 6.944 7.042 4.673
PPV: 0.192 0.409 0.200 HZ: 8.197 8.197 8.621

13.1.4 LOG SENSE OFF

To turn off sensor logging from “log sense on”, use the “log sense off” command.
The format of the command is as follows:

log sense off

The device sends the following response:

Sensor Log OFF

13.2 Directory Commands

13.2.1 DIR

The device supports the directory command “dir” to view the directories and files contained on the MicroSD card. This command is useful to confirm that the MicroSD card is correctly formatted and contains the required directories used by the device.

The format of the command is as follows:

dir

The device sends the following response:

```
Directory Listing for /mnt/5gv
2022/09/12, 17:01  <DIR>        /CONFIG
2022/09/12, 17:01  <DIR>        /FILES
2022/09/12, 17:01  <DIR>        /FIRMWARE
2022/09/12, 17:01  <DIR>        /MAINT
2022/09/12, 17:01  <DIR>        /LOG
2022/09/12, 17:01  <DIR>        /SNAPSHOT
2022/09/12, 17:01  <DIR>        /TEMP
2022/09/12, 17:01  <DIR>        /RECOVER
```

13.2.2 DIR /S

The “dir /s” is used to view all directories, sub-directories, and files located under each directory. This command is useful to see if there are files contained on the MicroSD card, such as configuration, peaks, beats, and logs.

The CONFIG folder should have 4 files as shown below.

If there are files in the FILES/PEAKS, FILES/BEATS or FILES/VIBR folders and the device has been configured to upload these files, then there could be an issue with the communication. Use “reset modem” and the appropriate “send” command to initiate the upload to view the logs and see if there is an issue with the SIM card, network provider, FTP Server or modem.

If there are a number of files in the LOGS folder and no issues with the device, then consider removing them with the “clean log” command.

When the device is operational, there will be a “.$$$ file in the TEMP folder that holds the most recent sensor readings.

Files in the RECOVER folder are normally files that had an issue during upload. Use “send recover” to upload these files and check the log files for more details.

The format of the command is as follows:

dir /s

The device sends the following response:

```
Directory Listing for /mnt/5gv
2022/09/12, 17:01  <DIR>        /CONFIG
2022/09/15, 18:50  3,347        /CONFIG/TGV3GCFG.INI
2022/09/21, 10:01  4,351        /CONFIG/TGV3GCFG.BIN
2022/09/21, 10:00  16           /CONFIG/TGVSEQ.BIN
2022/09/15, 18:50  3,347        /CONFIG/TGV3GCFG.BAK
```


```
              4 File(s)         11,061 bytes

2022/09/12, 17:01  <DIR>          /FILES
2022/09/12, 17:01  <DIR>          /FILES/PEAKS
2022/09/12, 17:01  <DIR>          /FILES/BEATS
2022/09/12, 17:01  <DIR>          /FILES/VIBR
2022/09/12, 17:01  <DIR>          /FIRMWARE
2022/09/12, 17:01  <DIR>          /MAINT
2022/09/12, 17:01  <DIR>          /LOG
2022/09/19, 18:26  65,280         /LOG/220919.048
2022/09/20, 01:00  65,261         /LOG/220920.049
2022/09/20, 07:46  65,265         /LOG/220920.050
2022/09/20, 09:44  30,049         /LOG/220920.051
2022/09/21, 00:00  65,231         /LOG/220921.052
2022/09/21, 06:46  65,269         /LOG/220921.053
              6 File(s)        359,355 bytes

2022/09/12, 17:01  <DIR>          /SNAPSHOT
2022/09/12, 17:01  <DIR>          /TEMP
2022/09/21, 10:02  889            /TEMP/VPEAK348.$$$
              1 File(s)          889 bytes

2022/09/12, 17:01  <DIR>          /RECOVER
```

14 Mounting

The device design and the accompanying mounting accessories give the user a choice of mounting methodologies to suit the client's requirements. The choices are as follows:

- M8 anchor bolt through the hole in the battery compartment
- Optional standoffs to affix the device to uneven surfaces
- Via mounting plate bolted to the target surface
- Via mounting plate epoxied to the target surface

14.1 Anchor Bolt – No Standoffs

The following image depicts the device bolted to a surface with an M8 anchor bolt.

Figure 17 – Anchor Bolt Installed

To install with the anchor bolt, drill a hole in the target surface; the diameter of the hole should be in accordance with the specification of the M8 bolt. (Generally, this would be an M10 hole to accommodate the sleeve.) The depth of the hole must accommodate the entire sleeve and leave sufficient thread exposed to fit the sensor and a nut onto the bolt. The user should consider the following:

- If too much thread protrudes through the base case, either drill a deeper hole or cut off the excess thread with a hacksaw.
- Make sure there is a metal washer under the nut to prevent the nut coming into direct contact with the device housing.
- The device has protruding nylon shoulder washers for protection; make sure they have not fallen out.

14.2 Using Standoffs

It is unlikely that the mounting surface is perfectly smooth; often metal standoffs are necessary to separate the device from the surface.

The user can affix three or more standoffs to the back of the device base case and use an anchor bolt to secure the device in place.

The following image depicts three standoffs fitted to the rear of the device to adapt to curved or uneven surfaces.

Figure 18 – Device with 3 Standoffs

The standoffs attach to the device base case via M3 x 6mm socket head screws; they provide 6mm of clearance between the device and the mounting surface.

14.3 Using a Mounting Plate

The mounting plate provides a quick and easy way to mount the device and alleviates the need to re-align the device axis during re-attachment.

The following image depicts the front and back of the mounting plate.

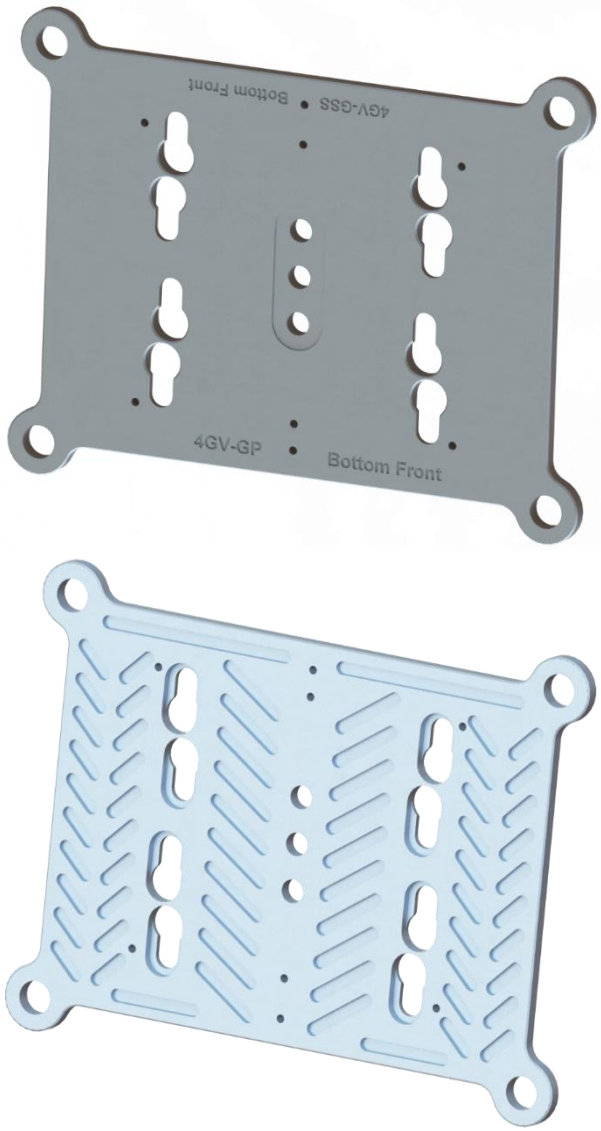

Figure 19 – Mounting Plate Front and Rear Views

The mounting plate holds the device in place using four flange spacers that drop into the holes on the plate and slide into place. An optional flange lock provides a means of locking the device in place to make removal more difficult.

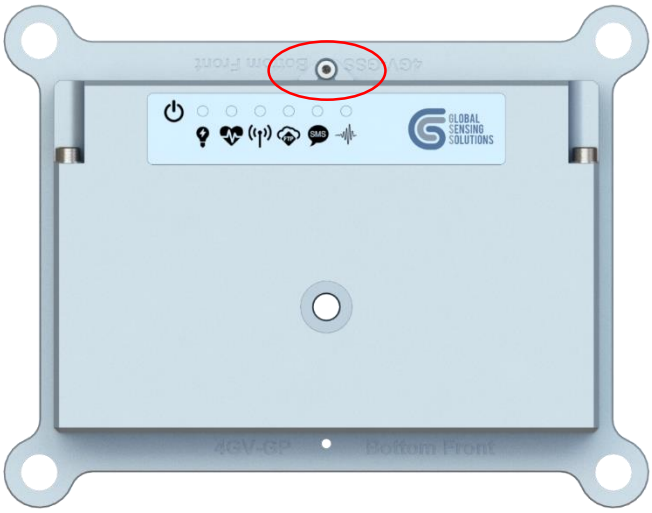

Figure 20 – Device Locked to Mounting Plate

The mounting plate design allows for direct attachment to the target surface using either of the following:

1) The four corner mounting holes
2) Epoxy smeared on the back

The device attaches to the mounting plate using either of the following:

1) Flange spacers that fit into holes and slots cut into the mounting plate
2) An M8 bolt screwed into the hole in the mounting flange.

14.4 Using Bolts

The mounting plate can be attached to a thin surface using four M8 bolts and nuts. It can also attach it to a solid surface using M8 anchor bolts.

The following image depicts the mounting plate fitted with four M8 bolts and washers.

Figure 21 – Mounting Plate with Bolts

14.4.1 Adding Standoffs

Standoffs may be necessary to help level the mounting plate on uneven surfaces. As with the device base case, the mounting plate allows for multiple standoff positions on the rear of the plate. The following image depicts three standoffs fitted to the rear of the mounting plate to adapt to curved or uneven surfaces.

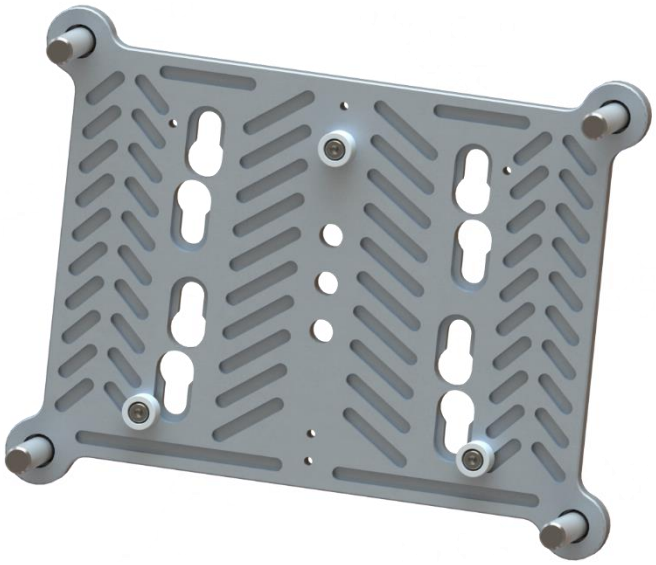

Figure 22 – Mounting Plate with Standoffs

The standoffs attach to the rear of the mounting plate via M3 x 6mm socket head screws; they provide 6mm of clearance between the mounting plate and the surface.

14.5 Single Bolt and Mounting Plate

One final mounting option for the device and mounting plate is to use an M8 threaded rod screwed into the mounting plate with a nut and washer on top to lock the device onto the plate.

The user can fit flange spacers or the flange lock to stop the device from turning on the mounting plate (this may not be necessary).

The following “cut-away” image depicts the threaded bolt approach:

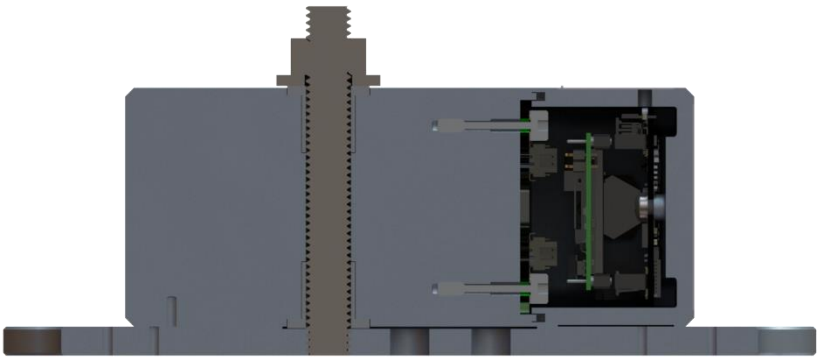

Figure 23 – Device Fixed with Threaded Rod to Mounting Plate

The above image shows a mid-line cut of the device on the mounting plate. In view is an M8 threaded rod screwed into the mounting plate, along with a nut and washer that lock the device in place.