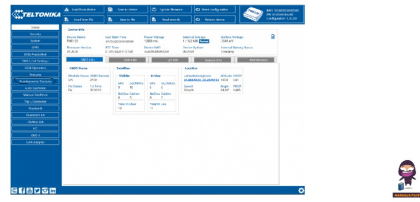**Manuals+** — User Manuals Simplified.

Teltonika FMC13A Accelerometer Features Settings

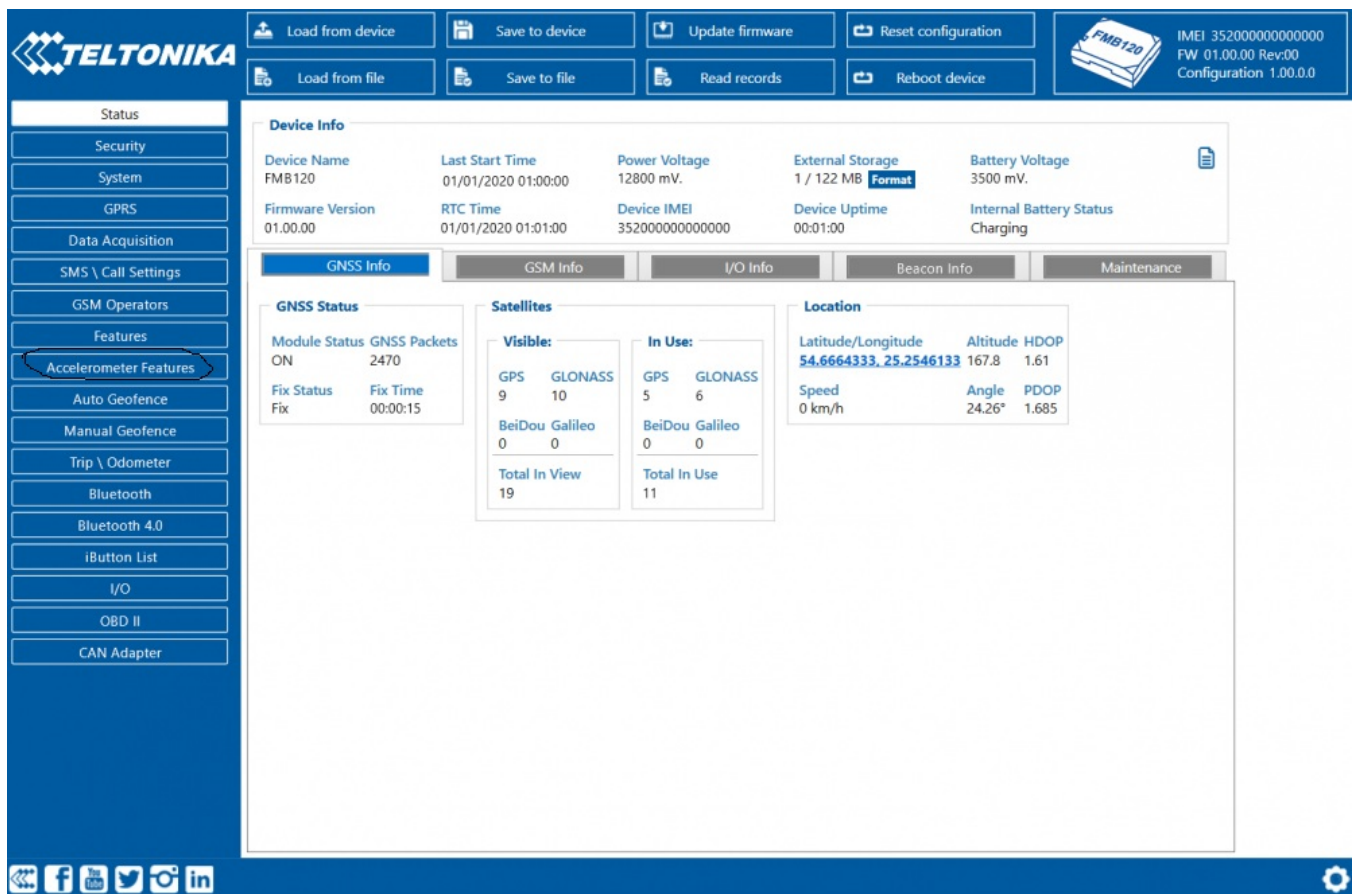# Teltonika FMC13A Accelerometer Features Settings User Guide

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Teltonika FMC13A Accelerometer Features Settings

Product Information

Specifications

- **Product Name**: FMC13A Accelerometer
- **Functionality:** Accelerometer Features settings
- **Calibration:** Auto-calibration available
- **Features:** Excessive Idling, Unplug Detection, Towing Detection, Crash Detection, Crash Data Visualisation

Product Usage Instructions

Accelerometer Calibration

The calibration algorithm recalculates accelerometer axes to represent the vehicle's axes. X is front, Y is left, Z is down.

Auto-calibration

To start auto-calibration, use the command auto_calibrate:set. Check calibration info with auto_calibrate:get.

Data Required

Upon successful calibration, the device sends a message indicating calibration completion.

Re-Calibration

To recalibrate, send the command auto_calibrate:set.

Excessive Idling

Scenario activates when the vehicle stops for a specific time. Digital output status changes when configured.

Unplug Detection

An event is generated when the device is unplugged or re-plugged from external power.

Scenario settings

- **Disable –** Disables scenario
- **Low Priority** – Additional record with event cause indication
- **High Priority** – Sends event packet immediately to server by GPRS
- **Panic Priority** – Triggers actions as High priority and sends AVL packet via SMS if GPRS fails

Eventual Records

- **Disable –** Scenario status sent in each AVL record
- **Enable –** Scenario status sent only in eventual AVL records

Unplug Detection mode

- **Simple –** Unplug detection based on external voltage only (recommended for cars not dependent on ignition)
- **Advanced –** Unplug detection based on external voltage and accelerometer (for cars with power voltage disconnected on ignition off)

FAQ

- **Q: How to start auto-calibration?**
  - **A:** Use the command auto_calibrate:set to initiate auto-calibration.
- **Q: What happens when the device is unplugged?**
  - **A:** An event is generated to indicate unplugging from external power.

FMC13A Accelerometer Features settings

Accelerometer Calibration

The calibration algorithm is used to recalculate accelerometer axes to represent the vehicle's axes (see Picture below). Vehicles axes are as follows:

1. X is front.
2. Y is left.
3. Z is down.

http://wiki.teltonika-gps.com/view/File:Vehicle_axis.PNG.png

Once the vehicle's axes are calculated, the device is considered calibrated.

Note: moving forward along any axis will generate negative values. This means acceleration will generate -X values, accordingly breaking will generate X values. The same goes for other axes.

Configurable parameters can be found at **System Settings Accelerometer Auto Calibration**

Commands that can be used during calibration:

Command /**Response** /**Description**

- **auto_calibrate**: set /Yes /Request auto calibration task start
- **auto_calibrate**: get/ Yes /Request calibration info (time, ground vector, side vector)
- **auto calibrate**: clear/ Yes/ Request calibration clear from flash and stop calibration task
- **auto_cahbrate**: status/ Yes /Request calibration status and calibration task status

Auto-calibration

Auto calibration task is launched on one of these conditions (assume calibration is enabled in configuration):

1. Every time device turns on, it checks whether it was previously calibrated and has calibration stored in flash. If a device has no calibration in flash, an auto-calibration task is started.
2. Device calibration was previously disabled by configuration and now is enabled.
3. SMS "auto _calibrate:set" is received.
    - **Note:** SMS response is sent after calibration has been acquired.
      This SMS triggers an SMS response to be sent. The response is sent when calibration is acquired. When 1 hour passes without successful calibration, a failed SMS response is sent.
4. The calibrated device's mean axes of set interval differ more than set amount from the desired (0,0,1) calibration is considered inaccurate. Calibration is deleted from flash and the auto-calibration task is started. After the auto-calibration task has been started, it will go on indefinitely until satisfactory calibration is acquired.

Data Required

Auto calibration needs to fill two buffers to calibrate the device:

1. All accelerometer data – buffer which collects all data from accelerometer at 10Hz frequency. To fill this buffer set seconds of data samples are needed. When buffer is full, oldest data is dumped and new data is placed into the buffer.
2. Straight accelerometer data – buffer which collects straight acceleration data from the accelerometer at 10Hz

frequency. To fill this buffer set seconds of data samples (set times Hz samples) are needed. When a buffer is full, oldest data is dumped and new data is placed into the buffer Algorithm rules to acquire these samples.

- GPS fix is present.
- Ignition is on.
- GPS speed is more than 5 km/h.
- GPS heading is equal to last GPS heading (+/-1 degree) at GPS sample rate 1Hz.
- GPS speed more then 5 km/h from last sample (accelerating).
- Once both buffers are full, auto-calibration is attempted. If calibrated values pass the calibration quality threshold, calculated calibration is written to flash as current calibration – the device is calibrated.
- **Note**: If GPS fix is lost or ignition is turned off, buffers' data is dumped and must be gathered from 0 again.
- At this point calibration is successfully ended as an indication device sends an SMS/GPRS message with the Device is calibrated, to recalibrate send:auto_calibrate:set.

Note: SMS/GPRS message will be sent only if auto calibration functionality was triggered by SMS/GPRS message. For user convenience in case auto calibration functionality fails then a notification message will be sent. For exact messages, check the algorithm section. Note: SMS/GPRS message will be sent only if auto calibration functionality was triggered by SMS/GPRS message. To get the current calibration status auto_calibrate:get SMS/GPRS command must be sent to the device. If the device is calibrated it will respond with Calibration state: calibrated or otherwise Calibration state: not calibrated. Also this command returns saved Ground and Side vectors.

Re-Calibration

When calibration is present, the device checks for re-calibration every 60s indefinitely. Re-calibration requires fix and ignition to run also re-calibration is turned off when the vehicle is stopped for more than 15s until conditions are satisfied again. When calibrated device's mean axes of set interval(calibrated accelerometer data) differ more than set amount from desired (0,0,1) (perfect vehicle's axes) calibration is considered inaccurate, or the device's position has changed and recalibration is needed. Calibration is cleared from flash and auto calibration task is started.

Note: turning the device around the calibrated Z axis will not trigger re-calibration, after turning the device around Z axis manual re-calibration is advised. After calibration, if the quality value is less than 0.80, calibration update functionality is run. Calibration update constantly tries calibrating device in the background until 0.80 quality is reached. The calibration update functionality does not change calibration if the calculated new calibration quality is less than 0.80.

Excessive Idling

Excessive Idling

Scenario settings

Disable	Low Priority
High Priority	Panic Priority

Eventual Records

Disable	Enable

Time To Stopped(s) 300

Time To Moving(s) 5

Output Control

None	DOUT 1
DOUT 2	

DOUT ON Duration(ms) 200

DOUT OFF Duration(ms) 200

Send SMS To

SMS text Idling Event

When vehicle stops for a specific amount of time the scenario is activated, a record will be generated and digital output status will be changed to 1 when configured. You can configure the time it takes to turn on this scenario (Time to Stopped). Scenario is activated until the vehicle starts moving(movement is detected only by the accelerometer) and keeps moving for an amount of time that is configured. You can configure the time it takes to turn off this scenario (Time to Moving) info

Unplug Detection

An event will be generated when FMC13A is unplugged from external power or plugged back in again.

Scenario settings

Disable – disable scenario.
Low Priority – when low priority event is triggered, the device makes an additional record with an indication of the event cause. High Priority – module makes additional record with High priority flag and sends event packet immediately to the server by GPRS.

Panic Priority – triggers the same actions as High priority, but if GPRS fails, it sends an AVL packet using SMS mode if SMS is enabled in **SMS Data Sending** settings.

Eventual Records

Disable – scenario status value is sent in each AVL record.
Enable – scenario status value is sent only in eventual AVL records.

Unplug Detection mode

Simple – unplug detection according to external voltage only. Is used in cars where power voltage is not dependent on ignition (recommended).
Advanced – unplug detection according to external voltage and accelerometer. Is used in cars where power voltage is disconnected when ignition is switched off.

Towing Detection

http://wiki.teltonika-gps.com/view/File:Fmb120_towings.png

The towing Detection feature helps to inform the driver about unexpected car movement when it was parked. FMC13A generates an event when car is being towed or lifted, for example, in a case of vehicle evacuation. FMC13A activates towing function when following conditions are met:

1. Ignition (configured Ignition Source) is OFF.
2. Activation Timeout is reached.

When the towing function is engaged FMC13A monitors accelerometer data. If the acceleration Threshold or Angle reaches configured values for a configured Duration, and Ignition is still OFF for a period of time that is longer than Event Timeout, then an event is generated. When configured, Make Call To and Send SMS To functions make a call or send an SMS to a predefined phone number. Towing function will be reactivated after FMC13A detects a change of Ignition state from ON to OFF.

Crash Detection

http://wiki.teltonika-gps.com/view/File:Crash_Detection.PNG

[Click here to enter Crash Tracer data parsing page](#)

If Crash Detection is enabled, it monitors acceleration on each axis which helps to detect an accident. Threshold and Duration values are set depending on the impact magnitude that is required to be detected. FMC13A can detect events ranging between a slight tapping on the device and a severe accident.
If Crash Trace is disabled only one eventual crash record will be generated when Duration (ms) and Threshold (mg) values are exceeded.
If Crash Trace is enabled, FMC13A will collect crash trace data with the frequency defined by the Trace ODR (Hz) parameter. Acceleration, GNSS and IO data monitoring duration during the crash event is defined by these parameters:

- Accel duration (s). Acceleration data duration can be set for up to 15 seconds before the crash event and 15 seconds after;
- GNSS duration (s). GNSS data duration can be set for up to 30 seconds before the crash event and 30 seconds after.
- 10 duration (s). 10 data duration can be set for up to 30 seconds before the crash event and 30 seconds after.

There are three configurable Crash Trace modes:

Trace Full

- **Data tracked**: all GNSS and acceleration data

Trace Full with IO's

- **Data tracked:** all GNSS and acceleration data with IO's, configured in I/O settings as "Crash" parameter (see picture below)

http://wiki.teltonika-gps.com/view/File:Crash_event_input.png

Trace Changes

Data tracked: GNSS and acceleration data, when acceleration values are changed by more then 50mG

- **Data tracked:** GNSS and acceleration data, when acceleration values are changed by more
- **NOTE:** with Crash Trace mode enabled, it is recommended to use Codec 8 Extended Data Protocol.
- This helps to optimize crash trace data sending from device to server. Each record will have accurate timestamps in milliseconds.

NOTE: with Crash Trace mode enabled, it is recommended to use Codec 8 Extended Data Protocol.
This helps to optimize crash trace data sending from device to server.

http://wiki.teltonika-gps.com/view/File:Codec_8_Extended_setting.png

Each record will have accurate timestamps in milliseconds.

http://wiki.teltonika-gps.com/view/File:Fmb120_crash_trace.png

Crash Data Visualisation

With the Teltonika CrashDataVisualizer tool you can analyze crash trace data visually: determine the impact to vehicle direction, view the crash trace on the map, also see the change of mG and speed values during the crash time period. CrashDataVisualizer is dedicated to work with the TAVL application, it means that only crash trace log files exported from TAVL is compatible. To have the ability to export crash trace log files, the device must be configured to send data by Codec8E.

To start using CrashDataVisualizer

Download and install TAVL (version 4.15.0.1 or later) + CrashDataVisualizer applications from here:

Link: https://drive.teltonika.lt/d/05369c90d9744afb14f/

Password: TJEk24YApbRhWrQQ

To get crash data

Login to TAVL application (please contact your Sales manager for TAVL login information).

http://wiki.teltonika-gps.com/view/File:Crash_data_steps.png

In TAVL application:

1. Go to Events
2. Set the date of event
3. Select the object you want to analyze
4. Press the "Crashes" button

A crash event list window will show up. Press the Download icon and save the crash event file (JSON).

http://wiki.teltonika-gps.com/view/File:JSON_download.png

Viewing crash data in the application

Open the CrashData Visualizer application. Drag and Drop or Browse crash data file (JSON).

http://wiki.teltonika-gps.com/view/File:Crash_Data_Visualizer_start_screen.png

Use the Visualizer.

http://wiki.teltonika-gps.com/view/File:Crash_Data_Visualizer_main.png

Documents / Resources

	Teltonika FMC13A Accelerometer Features Settings [pdf] User Guide FMC13A Accelerometer Features Settings, FMC13A, Accelerometer Features Settings, Features Settings, Settings, Accelerometer

References

- 🌐 **Teltonika Drive**
- **User Manual**