

FMM640 FMS Eco Driving



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Description

Overall purpose of FMS ECO Driving is to monitor drivers behavior by reading FMS CAN data from the truck and sending a report to the server which allows the fleet manager to see the driving style of specific drivers - good driving styles can be rewarded, and bad driving styles can be corrected. Good driving style means that the driver is using the whole spectrum of trucks capability - engine breaking (retarder), coasting, cruise control etc. and is predicting the road/traffic conditions ahead - using the momentum of the truck when needed, not overusing the brakes etc.

The main benefit for the client is that FMS ECO Driving report allows them to make and monitor driver behavior changes to save fuel costs and maintenance cost of the truck - saving more revenue and making the company more environmentally friendly.

Additionally, clients can also reduce the data traffic of the device and save data cost as well - instead of monitoring live FMS data from the trucks - new functionality accumulates the data inside the device and sends a report by specified triggers/period.

Note: 01.03.01.rev.114 Firmware is needed for FMS Eco Driving functionality.

Notion List

Cruise control - selectable option in the truck - by using cruise control the truck can use optimal fuel consumption to maintain the speed window selected by the driver.

https://wiki.teltonika-gps.com/view/File:Cruise_Control.mp4

ECO Roll - option that if enabled in truck uses neutral gear to roll using truck momentum on slopes

<https://wiki.teltonika-gps.com/view/File:EcoRoll.mp4>

Coasting - similar to ECO Roll, however the Cruise Control is not active and gear is not neutral - simply letting off the accelerator pedal.

https://wiki.teltonika-gps.com/view/File:Driver_Support_Score.mp4

Power take-off (PTO) - is a device that transfers an engine's mechanical power to another piece of equipment.

<https://wiki.teltonika-gps.com/view/File:PTO.mp4>

Retarder - A hydraulic accessory that is connected to a gearbox which slows down the truck by slowing down the gearbox. It is operated by lever in the truck.

<https://wiki.teltonika-gps.com/view/File:Retarder1.mp4> <https://wiki.teltonika-gps.com/view/File:Retarder2.mp4>

FMS eco driving functionality working

Units

Driver behaviour can be monitored via various accumulators - Distance travelled in specific state and/or Fuel used in specific state and/or Time spent in specific state. Additionally count accumulator is also available for specific elements.

Client can select what accumulator is required to him by enabling it in configurator. For example, Braking Accumulator:



In report you can get:

- distance travelled while brake pedal was depressed
- fuel used while brake pedal was depressed
- time in seconds of how long the brake pedal was depressed during the trip
- count - number of times the brake pedal was depressed

Example: report states that Braking accumulator count is 10 while distance travelled while brake pedal was depressed is 2 km - the driver is feathering the brake to slow down the truck instead of using engine braking.

Important: IO elements appear in record if the trigger that generated the event is enabled for the element - for example report is generated by trip end - periodical accumulators will not be included in the record and vice versa. However - more than one trigger can be selected.

Triggers and others

As mentioned, - FMS ECO driving is a report-based functionality - purpose is to get a report on drivers' behaviour after each trip he takes and not to monitor the data while the trip is happening, however a possibility for that also exists. Some Triggers are hardcoded, for example:

- **Startup** - Permanent trigger. Generated on device start-up. Indicates that accumulation has begun.
- **Powerdown** - Permanent trigger. Generated on device reset command. Intended for saving current accumulators to Flash on software reset.
- **DriverID** - Permanent trigger. Generated on active driver ID change detection. Changing driver ID should always send current accumulators so that they would not be assigned to another driver. Two reports are sent on this trigger: one before accumulators are reset (to get a report for the previous driver) and one after (to get a reference starting point for a new driver).

- **EndOfDay** - Permanent trigger. Generated every 24h near midnight. Event is triggered in time interval from 23:56 to 00:00. All accumulators are sent and cleared.

Clients can also select additional triggers for each element - Trip/Periodic:

- **Periodic** - Configurable trigger. Only accumulators that have "Periodic" setting configured are sent and cleared. Generated after every periodic Tacho record generation (separate period configuration will be available in upcoming release).
- **Tachograph Record Settings** in "Tachograph Data" Tab:

Tachograph Settings

Tachograph periodic record timeout (s)

0

Include Tachograph data into regular record

Send data with last good value

Disable

Enable

Disable

Enable

- **Trip Start** - Configurable trigger. Only accumulators that have "Trip" setting configured are sent and cleared. Generated on trip start.
- **Trip End** - Configurable trigger. Only accumulators that have "Trip" setting configured are sent and cleared. Generated on trip end.



Trip Settings from "Trip/Odometer" Tab

FMS Eco Driving Report Structure

FMS report comes in separate record with specific **AVL ID - 12000**. The value of AVL ID specifies what trigger generated the report.

After each FMS ECO Driving report is generated - the accumulators are renewed - counting starts from zero.

The record structure description could be found [HERE](#)

FMS Eco Driving AVL ID List and description

All enabled elements have their specific AVL IDs - Braking Accumulators shown before are configurable with same Parameter ID, but all have specific AVL IDs. Full list can be found [HERE](#)

IO Name	Config ID	AVL ID	Record Structure	Value / Unit	IO size, Bytes	Notes
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Event Type	125000	12000	0 - Periodic 1 - Trip Start 2 - Trip End 3 - Driver change 4 - Device startup 5 - Device off / reset 6 - End of Day 7 - VIN Change 8 - OFF 1 - ON 0 - Non active 1 - Active meters millilitres <string> <string>	1B	Event 10 ID
Ignition	-	239		1B	Always included
Trip	-	250		1B	Always included
Total Distance	-	192		4B	Always included
Engine Fuel used	-	138		4B	Always included
Active Driver ID	-	12001			Always included
VIN Number	-	12002			Always included
Event Counter	-	12003		2B	Always included
Coasting Distance		12010	meters	4B	
Coasting Fuel used	125010	12011	millilitres	4B	
Coasting Time		12012	seconds	4B	
EcoRoll Distance		12013	meters	4B	
EcoRoll Fuel used	125020	12014	millilitres	4B	
EcoRoll Time		12015	seconds	4B	
Braking Distance		12016	meters	4B	
Braking Fuel used		12017	millilitres	4B	
Braking Time	125030	12018	seconds	4B	
Braking Count		12019	-	2B	
Retarder Distance		12020	meters	4B	
Retarder Fuel used	125040	12021	millilitres	4B	
Retarder Time		12022	seconds	4B	
Cruise Distance		12023	meters	4B	
Cruise Fuel used	125050	12024	millilitres	4B	
Cruise Time		12025	seconds	4B	
Torque Distance		12026	meters	4B	
Torque Fuel used	125060	12027	millilitres	4B	
Torque Time		12028	seconds	4B	
PTO Distance		12029	meters	4B	
PTO Fuel used	125070	12030	millilitres	4B	
PTO Time		12031	seconds	4B	
Fuel While Driving fuel	125080	12032	millilitres	4B	
Fuel While Idle fuel	125090	12033	millilitres	4B	
Engine Load fuel	125100	12034	millilitres	4B	
Total Distance		12035	meters	4B	
Total Fuel used	125110	12036	millilitres	4B	
Total Time		12037	seconds	4B	
Short Stops Count		12050	-	2B	
Long Stops Count	125250	12051	-	2B	
Speed Range 1 Distance		12100	meters	4B	
Speed Range 2 Distance		12101	meters	4B	
Speed Range 3 Distance		12102	meters	4B	
Speed Range 4 Distance		12103	meters	4B	
Speed Range 5 Distance		12104	meters	4B	
Speed Range 6 Distance		12105	meters	4B	
Speed Range 7 Distance		12106	meters	4B	
Speed Range 8 Distance		12107	meters	4B	
Speed Range 9 Distance		12108	meters	4B	
Speed Range10 Distance		12109	meters	4B	
Speed Range 1 Fuel used		12110	milliliters	4B	
Speed Range 2 Fuel used		12111	milliliters	4B	
Speed Range 3 Fuel used		12112	milliliters	4B	
Speed Range 4 Fuel used		12113	milliliters	4B	
Speed Range 5 Fuel used		12114	milliliters	4B	
Speed Range 6 Fuel used	125500	12115	milliliters	4B	
Speed Range 7 Fuel used		12116	milliliters	4B	
Speed Range 8 Fuel used		12117	milliliters	4B	
Speed Range 9 Fuel used		12118	milliliters	4B	
Speed Range10 Fuel used		12119	milliliters	4B	
Speed Range 1 Time		12120	seconds	4B	
Speed Range 2 Time		12121	seconds	4B	
Speed Range 3 Time		12122	seconds	4B	
Speed Range 4 Time		12123	seconds	4B	
Speed Range 5 Time		12124	seconds	4B	
Speed Range 6 Time		12125	seconds	4B	
Speed Range 7 Time		12126	seconds	4B	
Speed Range 8 Time		12127	seconds	4B	
Speed Range 9 Time		12128	seconds	4B	
Speed Range 10 Time		12129	seconds	4B	
RPM Range 1 Distance		12100	meters	4B	
RPM Range 2 Distance		12101	meters	4B	
RPM Range 3 Distance		12102	meters	4B	
RPM Range 4 Distance		12103	meters	4B	
RPM Range 5 Distance		12104	meters	4B	
RPM Range 6 Distance		12105	meters	4B	
RPM Range 7 Distance		12106	meters	4B	
RPM Range 8 Distance		12107	meters	4B	
RPM Range 9 Distance		12108	meters	4B	
RPM Range10 Distance		12109	meters	4B	
RPM Range 1 Fuel used		12110	milliliters	4B	
RPM Range 2 Fuel used		12111	milliliters	4B	
RPM Range 3 Fuel used		12112	milliliters	4B	
RPM Range 4 Fuel used		12113	milliliters	4B	
RPM Range 5 Fuel used	125510	12114	milliliters	4B	
RPM Range 6 Fuel used		12115	milliliters	4B	
RPM Range 7 Fuel used		12116	milliliters	4B	
RPM Range 8 Fuel used		12117	milliliters	4B	
RPM Range 9 Fuel used		12118	milliliters	4B	
RPM Range10 Fuel used		12119	milliliters	4B	
RPM Range 1 Time		12120	seconds	4B	
RPM Range 2 Time		12121	seconds	4B	
RPM Range 3 Time		12122	seconds	4B	
RPM Range 4 Time		12123	seconds	4B	
RPM Range 5 Time		12124	seconds	4B	
RPM Range 6 Time		12125	seconds	4B	
RPM Range 7 Time		12126	seconds	4B	
RPM Range 8 Time		12127	seconds	4B	
RPM Range 9 Time		12128	seconds	4B	
RPM Range 10 Time		12129	seconds	4B	
Torque Range 1 Distance		125530	meters	4B	
Torque Range 2 Distance		12101	meters	4B	
Torque Range 3 Distance		12102	meters	4B	
Torque Range 4 Distance		12103	meters	4B	
Torque Range 5 Distance		12104	meters	4B	
Torque Range 6 Distance		12105	meters	4B	
Torque Range 7 Distance		12106	meters	4B	
Torque Range 8 Distance		12107	meters	4B	
Torque Range 9 Distance		12108	meters	4B	
Torque Range10 Distance		12109	meters	4B	
Torque Range 1 Fuel used		12110	milliliters	4B	
Torque Range 2 Fuel used		12111	milliliters	4B	
Torque Range 3 Fuel used		12112	milliliters	4B	
Torque Range 4 Fuel used		12113	milliliters	4B	
Torque Range 5 Fuel used		12114	milliliters	4B	
Torque Range 6 Fuel used	125520	12115	milliliters	4B	
Torque Range 7 Fuel used		12116	milliliters	4B	
Torque Range 8 Fuel used		12117	milliliters	4B	
Torque Range 9 Fuel used		12118	milliliters	4B	
Torque Range10 Fuel used		12119	milliliters	4B	
Torque Range 1 Time		12120	seconds	4B	
Torque Range 2 Time		12121	seconds	4B	
Torque Range 3 Time		12122	seconds	4B	
Torque Range 4 Time		12123	seconds	4B	
Torque Range 5 Time		12124	seconds	4B	
Torque Range 6 Time		12125	seconds	4B	
Torque Range 7 Time		12126	seconds	4B	
Torque Range 8 Time		12127	seconds	4B	
Torque Range 9 Time		12128	seconds	4B	
Torque Range 10 Time		12129	seconds	4B	
Braking Range 1 Distance		125530	meters	4B	
Braking Range 2 Distance		12101	meters	4B	
Braking Range 3 Distance		12102	meters	4B	
Braking Range 4 Distance		12103	meters	4B	
Braking Range 5 Distance		12104	meters	4B	
Braking Range 6 Distance		12105	meters	4B	
Braking Range 7 Distance		12106	meters	4B	
Braking Range 8 Distance		12107	meters	4B	
Braking Range 9 Distance		12108	meters	4B	
Braking Range10 Distance		12109	meters	4B	
Braking Range 1 Fuel used		12110	milliliters	4B	
Braking Range 2 Fuel used		12111	milliliters	4B	
Braking Range 3 Fuel used		12112	milliliters	4B	
Braking Range 4 Fuel used		12113	milliliters	4B	
Braking Range 5 Fuel used	125530	12114	milliliters	4B	
Braking Range 6 Fuel used		12115	milliliters	4B	
Braking Range 7 Fuel used		12116	milliliters	4B	
Braking Range 8 Fuel used		12117	milliliters	4B	
Braking Range 9 Fuel used		12118	milliliters	4B	
Braking Range10 Fuel used		12119	milliliters	4B	
Braking Range 1 Time		12120	seconds	4B	
Braking Range 2 Time		12121	seconds	4B	
Braking Range 3 Time		12122	seconds	4B	
Braking Range 4 Time		12123	seconds	4B	
Braking Range 5 Time		12124	seconds	4B	
Braking Range 6 Time		12125	seconds	4B	
Braking Range 7 Time		12126	seconds	4B	
Braking Range 8 Time		12127	seconds	4B	
Braking Range 9 Time		12128	seconds	4B	
Braking Range 10 Time		12129	seconds	4B	

Parameter list

To configure via SMS/GPRS commands FMS ECO driving functionality you can find all parameters IDs [HERE](#)

Coasting Accumulators



Coasting Accumulators - feature that calculates elements when driver lets off accelerator pedal. The Report can include:

Units	Extra Triggers	Ranges
Distance - distance travelled while accelerator pedal was left off	Periodic - Generated after every periodic Tacho record generation	Fuel rate (L/h) - Fuel rate threshold for coasting pattern to be detected
Fuel - fuel used while accelerator pedal was left off	Trip - Generated on Trip start or Trip end.	Torque (%) - Engine Torque threshold for coasting pattern to be detected
Time - time in seconds of how long the accelerator pedal was left off.		Speed (km/h) - Speed threshold for coasting pattern to be detected

EcoRoll Accumulators



EcoRoll Accumulators - feature that calculates elements when vehicle use gravity to roll in neutral. The Report can include:

Units	Extra Triggers
Distance - distance travelled while vehicle was rolling in neutral	Periodic - Generated after every periodic Tacho record generation
Fuel - fuel used while vehicle was rolling in neutral	Trip - Generated on Trip start or Trip end.
Time - time in seconds of how long the vehicle was rolling in neutral.	

Cruise Control State	Ranges
Disable - When disabled coasting pattern is detected when fuel rate or Engine torque is below certain range.	Fuel rate (L/h) - Fuel rate threshold for EcoRoll pattern to be detected
Enable - When enabled coasting pattern is detected when vehicle is on neutral gear.	Torque (%) - Engine Torque threshold for EcoRoll pattern to be detected
	Speed (km/h) - Speed threshold for EcoRoll pattern to be detected

Braking Accumulators



Braking Accumulators - feature that calculates elements when brake pedal was depressed.
The Report can include:

Units

Distance - distance travelled while vehicle's brake pedal was depressed
Fuel - fuel used while brake pedal was depressed.
Time - time in seconds of how long the brake pedal was depressed during the trip.
Count - number of times the brake pedal was depressed.

Extra Triggers

Periodic - Generated after every periodic Tacho record generation
Trip - Generated on Trip start or Trip end.

Retarder Accumulators



Retarder Accumulators - feature that calculates elements when retarder in a vehicle is operated.
The Report can include:

Units

Distance - distance travelled while vehicle's retarder was operated
Fuel - fuel used while vehicle's retarder was operated
Time - time in seconds of how long the retarder was operated.

Extra Triggers

Periodic - Generated after every periodic Tacho record generation
Trip - Generated on Trip start or Trip end.

Cruise Control Accumulators



Cruise Control Accumulators - feature that calculates elements when vehicle is on cruise control.
The Report can include:

Units

Distance - distance travelled while vehicle was on cruise control.
Fuel - fuel used while vehicle was on cruise control
Time - time in seconds of how long the vehicle was on cruise control.

Extra Triggers

Periodic - Generated after every periodic Tacho record generation
Trip - Generated on Trip start or Trip end.

Torque Accumulators



Torque Accumulators - feature that calculates elements on engine's workload.

The Report can include:

Units	Extra Triggers	Ranges
Distance - distance travelled while vehicle's torque is detected	Periodic - Generated after every periodic Tacho record generation	Accelerator pedal position (%) - Pedal position percent for Torque pattern to be detected.
Fuel - fuel used while vehicle's torque is detected.	Trip - Generated on Trip start or Trip end.	
Time - time in seconds of how long the vehicle's torque is detected.		

PTO Accumulators



PTO Accumulators - feature that calculates elements on PTO event.

The Report can include:

Units	Extra Triggers
Distance - distance travelled on PTO event.	Periodic - Generated after every periodic Tacho record generation
Fuel - fuel used while on PTO event.	Trip - Generated on Trip start or Trip end.
Time - time in seconds of how long the PTO event lasted.	

Fuel While Driving Accumulators



Fuel While Driving Accumulators - feature that calculates fuel while driving.

The Report can include:

Units	Extra Triggers
Fuel - fuel used while driving.	Periodic - Generated after every periodic Tacho record generation
	Trip - Generated on Trip start or Trip end.

Fuel While Idle Accumulators



Fuel While Idle Accumulators - feature that calculates fuel while vehicle is idle.

The Report can include:

Units	Extra Triggers
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Fuel - fuel used while vehicle is idle. **Periodic** - Generated after every periodic Tacho record generation
Trip - Generated on Trip start or Trip end.

Fuel Consumption Under Load Accumulators



Fuel Consumption Under Load Accumulators - feature that calculates fuel consumption under load
The Report can include:

Units	Extra Triggers	Ranges
Fuel - fuel used while vehicle is under load.	Periodic - Generated after every periodic Tacho record generation Trip - Generated on Trip start or Trip end.	Engine Load (%) - Engine load threshold for Engine load to be detected.

Total Accumulators



Total Accumulators - feature that calculates elements total values.
The Report can include:

Units	Extra Triggers
Distance - Total calculated distance during the trip Fuel - Total fuel used during the trip Time - Total calculated time during the trip	Periodic - Generated after every periodic Tacho record generation Trip - Generated on Trip start or Trip end.

Number of Stops Accumulators



Number of stops Accumulators - feature that calculates Number of stops during the trip
The Report can include:

Units	Extra Triggers	Ranges
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Count - Number of stops during the trip.	Periodic - Generated after every periodic Tacho record generation	Brake time (s) - Braking time threshold for number of stops to be detected.
	Trip - Generated on Trip start or Trip end.	

Number of Parking Brake Accumulators



Number of Parking Brake Accumulators - feature that calculates total number of parking brakes. The Report can include:

Units	Extra Triggers
Count - Number of total parking brakes	Periodic - Generated after every periodic Tacho record generation
	Trip - Generated on Trip start or Trip end.

Number of Harsh Acceleration Accumulators



Number of Harsh Acceleration Accumulators - feature that calculates total number harsh acceleration. The Report can include:

Units	Extra Triggers
Count - Number of total parking brakes	Periodic - Generated after every periodic Tacho record generation
	Trip - Generated on Trip start or Trip end.

Number of Harsh Braking Accumulators



Number of Harsh Acceleration Accumulators - feature that calculates total number of harsh braking during trip The Report can include:

Units	Extra Triggers
Count - Number of total parking brakes	Periodic - Generated after every periodic Tacho record generation
	Trip - Generated on Trip start or Trip end.

Number of Harsh Cornering Accumulators



Number of Harsh Cornering Accumulators - feature that calculates total number of harsh cornering during trip

The Report can include:

Units

Extra Triggers

Count - Number of total parking brakes

Periodic - Generated after every periodic Tacho record generation

Trip - Generated on Trip start or Trip end.

Speed Range Accumulators



Speed Range Accumulators - feature that calculates selected unit during certain speed ranges.

The Report can include:

Units

Extra Triggers

Ranges

Distance - Distance traveled when speed was on a set speed range.

Fuel - Fuel used on a trip when speed was on a set speed range

Time - Total calculated time during the trip on a set speed range.

Periodic - Generated after every periodic Tacho record generation

Trip - Generated on Trip start or Trip end.

Speed ranges (km/h) - range boundaries in km/h separated by "," for "Speed Ranges" IO's Each number determines the start of a new range. Values should come in ascending order and should not repeat.

RPM Range Accumulators



RPM Range Accumulators - feature that calculates selected units during certain RPM ranges.

The Report can include:

Units

Extra Triggers

Ranges

Distance - Distance traveled when speed was on a set speed range.

Fuel - Fuel used on a trip when speed was on a set speed range

Time - Total calculated time during the trip on a set speed range.

Periodic - Generated after every periodic Tacho record generation

Trip - Generated on Trip start or Trip end.

RPM ranges (rpm) - range boundaries in (rpm) separated by "," for "RPM Ranges" IO's Each number determines the start of a new range. Values should come in ascending order and should not repeat.

Torque Range Accumulators



Torque Range Accumulators - feature that calculates selected units during certain Torque ranges. The Report can include:

Units	Extra Triggers	Ranges
Distance - Distance traveled when speed was on a set speed range.	Periodic - Generated after every periodic Tacho record generation	Torque ranges (%) - range boundaries in % separated by "," for "Torque Ranges" IO's Each number determines the start of a new range. Values should come in ascending order and should not repeat.
Fuel - Fuel used on a trip when speed was on a set speed range	Trip - Generated on Trip start or Trip end.	
Time - Total calculated time during the trip on a set speed range.		

Braking Range Accumulators



Braking Range Accumulators - feature that calculates selected units during certain Braking ranges. The Report can include:

Units	Extra Triggers	Ranges
Distance - Distance traveled when speed was on a set speed range.	Periodic - Generated after every periodic Tacho record generation	Braking ranges (%) - range boundaries in % separated by "," for "Braking Ranges" IO's Each number determines the start of a new range. Values should come in ascending order and should not repeat.
Fuel - Fuel used on a trip when speed was on a set speed range	Trip - Generated on Trip start or Trip end.	
Time - Total calculated time during the trip on a set speed range.		

Fuel Rate Range Accumulators



Fuel Rate Range Accumulators - feature that calculates selected units during certain fuel rate ranges.

The Report can include:

Units	Extra Triggers	Ranges
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Distance - Distance traveled when speed was on a set speed range.

Fuel - Fuel used on a trip when speed was on a set speed range

Time - Total calculated time during the trip on a set speed range.

Periodic - Generated after every periodic Tacho record generation

Trip - Generated on Trip start or Trip end.

Fuel Rate ranges (L/h) - range boundaries in L/h separated by "," for "Fuel Rate Ranges" IO's Each number determines the start of a new range. Values should come in ascending order and should not repeat.