

FMC650 FMS Eco Driving

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Contents

- [1 Description](#)
- [2 Notion List](#)
- [3 FMS eco driving functionality working](#)
 - [3.1 Units](#)
 - [3.2 Triggers and others](#)
- [4 FMS Eco Driving Report Structure](#)
- [5 FMS Eco Driving AVL ID List and description](#)
- [6 Parameter list](#)

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: 03.01.00.rev.306 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) ▲ ▼

Include Tachograph data into regular record	Send data with last good value	Disable	Enable	Disable	Enable
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- **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 "Trop/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 - ON 9 - Non active 1 - Active meters millilitres <string> <string>	1B	Event ID
Ignition	-	239		1B	
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	125030	12017	millilitres	4B	
Braking Time	-	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 Range 10 Distance	-	12109	meters	4B	
Speed Range 1 Fuel used	-	12110	millilitres	4B	
Speed Range 2 Fuel used	-	12111	millilitres	4B	
Speed Range 3 Fuel used	-	12112	millilitres	4B	
Speed Range 4 Fuel used	-	12113	millilitres	4B	
Speed Range 5 Fuel used	-	12114	millilitres	4B	
Speed Range 6 Fuel used	125500	12115	millilitres	4B	
Speed Range 7 Fuel used	-	12116	millilitres	4B	
Speed Range 8 Fuel used	-	12117	millilitres	4B	
Speed Range 9 Fuel used	-	12118	millilitres	4B	
Speed Range 10 Fuel used	-	12119	millilitres	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 Range 10 Distance	-	12109	meters	4B	
RPM Range 1 Fuel used	-	12110	millilitres	4B	
RPM Range 2 Fuel used	-	12111	millilitres	4B	
RPM Range 3 Fuel used	-	12112	millilitres	4B	
RPM Range 4 Fuel used	-	12113	millilitres	4B	
RPM Range 5 Fuel used	-	12114	millilitres	4B	
RPM Range 6 Fuel used	125510	12115	millilitres	4B	
RPM Range 7 Fuel used	-	12116	millilitres	4B	
RPM Range 8 Fuel used	-	12117	millilitres	4B	
RPM Range 9 Fuel used	-	12118	millilitres	4B	
RPM Range 10 Fuel used	-	12119	millilitres	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 Range 10 Distance	-	12109	meters	4B	
Torque Range 1 Fuel used	-	12110	millilitres	4B	
Torque Range 2 Fuel used	-	12111	millilitres	4B	
Torque Range 3 Fuel used	-	12112	millilitres	4B	
Torque Range 4 Fuel used	-	12113	millilitres	4B	
Torque Range 5 Fuel used	-	12114	millilitres	4B	
Torque Range 6 Fuel used	125520	12115	millilitres	4B	
Torque Range 7 Fuel used	-	12116	millilitres	4B	
Torque Range 8 Fuel used	-	12117	millilitres	4B	
Torque Range 9 Fuel used	-	12118	millilitres	4B	
Torque Range 10 Fuel used	-	12119	millilitres	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 Range 10 Distance	-	12109	meters	4B	
Braking Range 1 Fuel used	-	12110	millilitres	4B	
Braking Range 2 Fuel used	-	12111	millilitres	4B	
Braking Range 3 Fuel used	-	12112	millilitres	4B	
Braking Range 4 Fuel used	-	12113	millilitres	4B	
Braking Range 5 Fuel used	-	12114	millilitres	4B	
Braking Range 6 Fuel used	125530	12115	millilitres	4B	
Braking Range 7 Fuel used	-	12116	millilitres	4B	
Braking Range 8 Fuel used	-	12117	millilitres	4B	
Braking Range 9 Fuel used	-	12118	millilitres	4B	
Braking Range 10 Fuel used	-	12119	millilitres	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

Count - Number of total parking brakes

Extra Triggers

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

Count - Number of total parking brakes

Extra Triggers

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

Count - Number of total parking brakes

Extra Triggers

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.

Periodic - Generated after every periodic Tacho record generation

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.

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.

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.

Periodic - Generated after every periodic Tacho record generation

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.

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.

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.