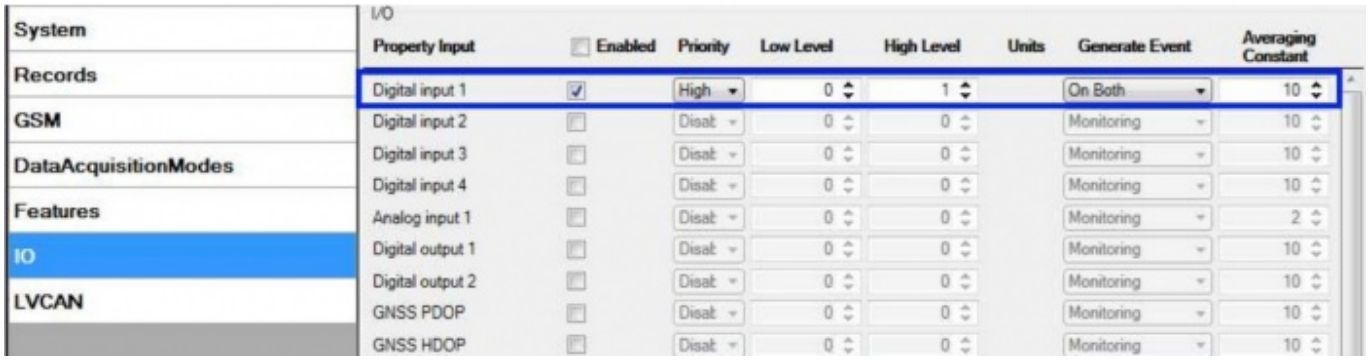
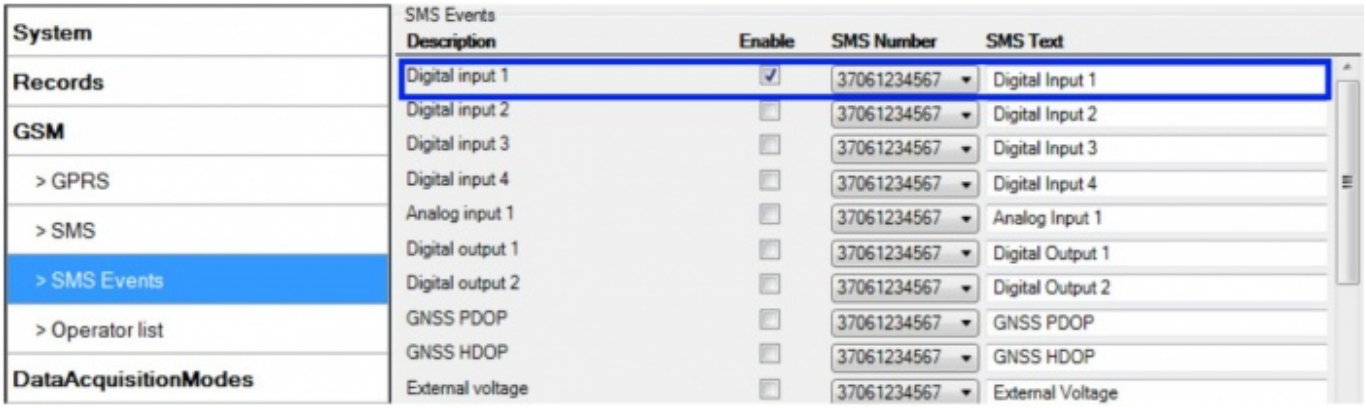
FMA110 I/O settings

FMA110 sends SMS event message when a configured I/O property enters and/or exits its configured High/Low boundaries or Hysteresis event generation is chosen (Monitoring does not generate event, so SMS event could not be configured).



Every IO element SMS event can be configured to send individual message to different numbers.



When no I/O element is enabled, AVL packet comes with GNSS information only. After enabling I/O element(s) AVL packet along with GNSS information contains current value(s) of enabled I/O element.

Permanent I/O elements (are always sent to server if enabled)		
No.	**Property Name**	**Description**
01	Digital Input Status 1	Logic: 0 / 1
02	Digital Input Status 2	Logic: 0 / 1
03	Digital Input Status 3	Logic: 0 / 1
04	Analog Input 1	Voltage: mV, 0 – 30 V
05	Digital Output 1	Logic: 0 / 1

06	Digital Output 2	Logic: 0 / 1
07	GNSS PDOP	Probability * 10; 0-500
08	GNSS HDOP	Probability * 10; 0-500
09	External Voltage	Voltage: mV, 0 – 30 V
10	GNSS Status	States: 0 – off state (when GPS module is off) 1 – Reserved 2 – GPS ready (antenna is working, but with no GPS fix) 3 – GPS working (antenna is working and has GPS fix) 4 – GPS sleep (when device is in GPS sleep mode) 5 – Overcurrent (The only condition to get value 5, then antenna is damaged and short circuit)
11	Movement Sensor	0 – not moving, 1 – moving.
12	Trip distance	Distance between two records: m
13	GSM Operator	Currently used GSM Operator code
14	Speed (Km/h)	Value in km/h, 0 – xxx km/h
15	iButton ID	iButton ID number
16	Mode	0 – home on stop, 1 – home on move, 2 – roaming on stop, 3 – roaming on move, 4 – unknown on stop, 5 – unknown on move
17	GSM Signal	GSM signal level value in scale 1 – 5
18	Deep Sleep	0 – not deep sleep mode, 1 – deep sleep mode
19	Cell ID	GSM base station ID
20	Area Code	Location Area code (LAC), it depends on GSM operator. It provides unique number which assigned to a set of base GSM stations. Max value: 65536
21	Dallas Temperature 1	10 * Degrees (°C), -55 - +115, if 3000 – Dallas error
22	Ignition	Ignition status indication. Logic: 0 / 1
23	Total distance	Distance which device has been traveled with ignition ON: m
24	Reserved IO 1	Reserved for future use
25	Reserved IO 2	Reserved for future use
26	Dallas Temperature 2	10 * Degrees (°C), -55 - +115, if 3000 – Dallas error
27	Dallas Temperature 3	10 * Degrees (°C), -55 - +115, if 3000 – Dallas error
28	Dallas Temperature 4	10 * Degrees (°C), -55 - +115, if 3000 – Dallas error
29	Dallas temperature ID1	1st connected dallas temperature sensor ID
30	Dallas temperature ID2	2nd connected dallas temperature sensor ID
31	Dallas temperature ID3	3rd connected dallas temperature sensor ID
32	Dallas temperature ID4	4rd connected dallas temperature sensor ID
Eventual I/O elements (generate and send record to server only if appropriate conditions are met)		
33	Geofence zone 01	Event: 0 – target left zone, 1 – target entered zone
34	Geofence zone 02	Event: 0 – target left zone, 1 – target entered zone
35	Geofence zone 03	Event: 0 – target left zone, 1 – target entered zone

36	Geofence zone 04	Event: 0 – target left zone, 1 – target entered zone
37	Geofence zone 05	Event: 0 – target left zone, 1 – target entered zone
38	Auto Geofence	Event: 0 – target left zone, 1 – target entered zone
39	Trip	1 – trip start, 0 – trip stop
40	Immobilizer	1 – iButton connected
41	Authorized driving	1 – authorized iButton connected
42	Green driving type	1 – harsh acceleration, 2 – harsh braking, 3 – harsh cornering
43	Green driving value	Depending on green driving type: if harsh acceleration or braking – g*100 (value 123 -> 1.23g), if harsh cornering – degrees (value in radians)
44	Over Speeding	At over speeding start km/h, at over speeding end km/h
45	LVCAN Speed	Value in km/h, 0 – 250 km/h
46	LVCAN Accelerator pedal position	Value range: 0-100 %
47	LVCAN Total fuel used	Value range: 0- 99999999 liters* “Total Fuel Used” is sent to server multiplied by 10. Example: if value was 150.5 liters, “1505” will be sent to server.
48	LVCAN Fuel level (liters)	Value range: 0-100 liters
49	LVCAN Engine RPM	Value range: 0-8200 rpm
50	LVCAN Vehicle distance	Value range: 0-2145000000 meters
51	LVCAN Fuel level (proc.)	Value range: 0-100 %
52	LVCAN Program number	Value range: 0-999
53	LVC ModuleID	Value range: 0-max
54	LVC Engine Work Time	Value range: 0-4294967295
55	LVC Engine Work Time (counted)	Value range: 0-4294967295
56	LVC Total Mileage (counted)	Value range: 0-4294967295
57	LVC Fuel Consumed (counted)	Value range: 0-4294967295
58	LVC Fuel Rate	Value range: 0-4294967295
59	LVC AdBlue Level (percent)	Value range: 0-4294967295
60	LVC AdBlue Level (liters)	Value range: 0-255
61	LVC Engine Load	Value range: 0-65535
62	LVC Engine Temperature	Value range: 0-65535
63	LVC Axle 1 Load	Value range: 0-255
64	LVC Axle 2 Load	Value range: 0-65535
65	LVC Axle 3 Load	Value range: 0-65535
66	LVC Axle 4 Load	Value range: 0-255
67	LVC Axle 5 Load	Value range: 0-65535
68	LVC Control State Flags	Value range: 0-255
69	LVC Agricultural Machinery Flags	Value range: 0-255
70	LVC Harvesting Time	Value range: 0-65535
71	LVC Area of Harvest	Value range: 0-65535
72	LVC Mowing Efficiency	Value range: 0-65535
73	LVC Grain Mown Volume	Value range: 0-65535

74	LVC Grain Moisture	Value range: 0-65535
75	LVC Harvesting Drum RPM	Value range: 0-4294967295
76	LVC Gap Under Harvesting Drum	Value range: 0-max
77	LVC Security State Flags	Value range: 0-4294967295
78	LVC Tacho Total Vehicle Distance	Value range: 0-4294967295
79	LVC Trip Distance	Value range: 0-4294967295
80	LVC Tacho Vehicle Speed	Value range: 0-4294967295
81	LVC Tacho Driver Card Presence	Value range: 0-65535
82	LVC Driver1 States	Value range: 0-65535
83	LVC Driver2 States	Value range: 0-255
84	LVC Driver1 Continuous Driving Time	Value range: 0-max
85	LVC Driver2 Continuous Driving Time	Value range: 0-4294967295
86	LVC Driver1 Cumulative Break Time	Value range: 0-4294967295
87	LVC Driver2 Cumulative Break Time	Value range: 0-65535
88	LVC Driver1 Duration Of Selected Action	Value range: 0-255
89	LVC Driver2 Duration Of Selected Action	Value range: 0-255
90	LVC Driver1 Cumulative Driving Time	Value range: 0-255
91	LVC Driver2 Cumulative Driving Time	Value range: 0-65535
92	LVC Driver1 ID High	Value range: 0-65535
93	LVC Driver1 ID Low	Value range: 0-65535
94	LVC Driver2 ID High	Value range: 0-65535
95	LVC Driver2 ID Low	Value range: 0-65535
96	LVC Battery Temperature	Value range: 0-65535
97	LVC Battery Level (percent)	Value range: 0-65535

Note: There are two types of operations with Permanent I/O elements: simple monitoring and event generating. Monitoring method is used when current I/O information needed with regular GNSS coordinates. Event generating method is used when additional AVL packet is needed when current value of I/O exceeds predefined High and Low levels. I/O settings allow defining I/O event criteria.

Enabled or disabled field – allows enabling I/O element so it is added to the data packet and is sent to the server. By default all I/O element are disabled and FMA110 records only GNSS coordinates.

Priority (AVL packet priority) can be low, high or panic. Regular packets are sent as Low priority records. When low priority event is triggered, FMA110 makes additional record with indication that the reason for that was I/O element change. When High priority is selected, module makes additional record with high priority flag and sends event packet immediately to the server by GPRS. Panic priority triggers same actions as high priority, but if GPRS fails, it sends AVL packet using SMS mode if SMS is enabled in SMS settings.

High and Low levels – define I/O value range. If I/O value enters or exits this range, FMA110 generates event. “Generate event” parameter defines when to generate event – when value enters defined range, exits it or both.

Averaging constant – it is an I/O event delay parameter. In some applications there is no need to generate events on every I/O range enter/exit immediately. Sometimes it is necessary to wait some time interval before event generating. Averaging constant allows setting I/O event delay (averaging). If I/O value is entering or leaving predefined range, it must have same value for Averaging constant time. 1 Averaging constant value equals about 30 miliseconds. In Deep Sleep mode there is no Averaging.

Note: Note: I/O element’s “Movement sensor” Averaging constant is interpreted as Start Move Timeout in seconds (from 1 to 59). Start Move Timeout – is a time interval required for movement sensor to be in the moving state, to consider vehicle as moving.

Monitoring

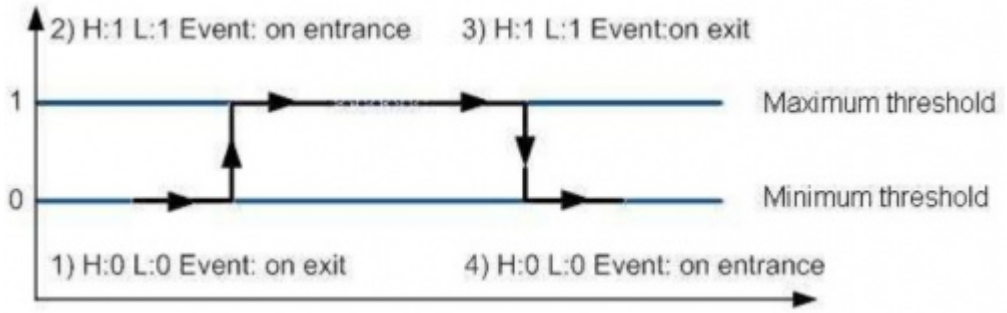
I/O monitoring starts after enabling I/O element and setting up I/O parameters as it is shown below:

Event generating

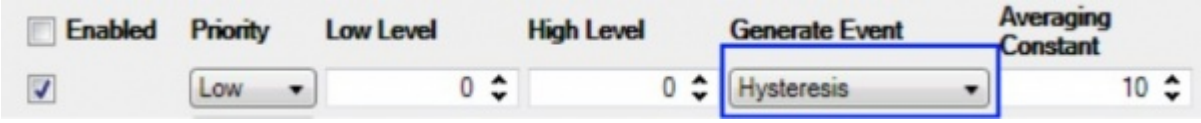
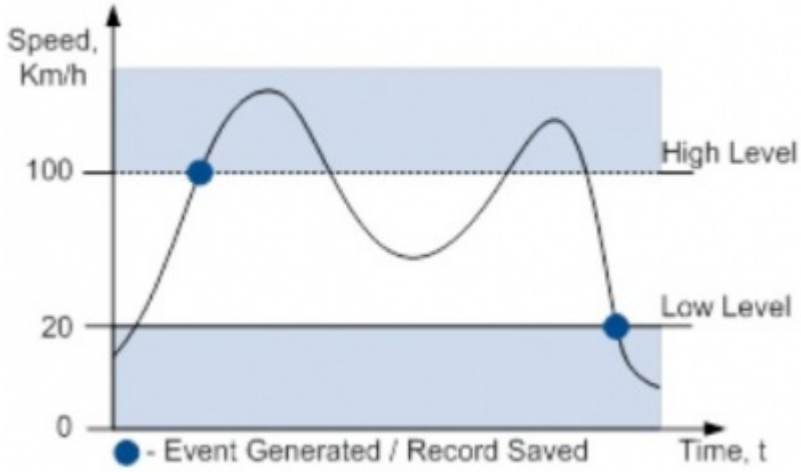
Events happen when the value of enabled I/O intersects thresholds (enter, exit or on both) predefined by High and Low level thresholds. Table below defines all available values of I/O settings.

Setting	Value
Priority	low, high
High level	maximum threshold
Low level	minimum threshold

Generate event	on interval enter, on interval exit, on both enter and exit
Average constant	1 – 2^{32} (4 Bytes)



Hysteresis



I/O elements can generate events according to hysteresis algorithm. If I/O event operand "Hysteresis" is selected, events will be generated as it is shown in the illustration below (I/O speed is taken as I/O value example):