FMA202 I/O settings

[Main Page](#) > [EOL Products](#) > [FMA202](#) > [FMA202 Configuration](#) > **FMA202 I/O settings**

FMA202 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	Battery Voltage	Voltage: mV
23	Battery Charging Current	Current: mA
24	Ignition	Ignition status indication. Logic: 0 / 1
25	Total distance	Distance which device has been traveled with ignition ON: m
26	Reserved IO 1	Reserved for future use
27	Reserved IO 2	Reserved for future use
28	Dallas Temperature 2	10 * Degrees (°C), -55 - +115, if 3000 – Dallas error
29	Dallas Temperature 3	10 * Degrees (°C), -55 - +115, if 3000 – Dallas error
30	Dallas Temperature 4	10 * Degrees (°C), -55 - +115, if 3000 – Dallas error
31	Dallas temperature ID1	1st connected dallas temperature sensor ID
32	Dallas temperature ID2	2nd connected dallas temperature sensor ID
33	Dallas temperature ID3	3rd connected dallas temperature sensor ID
34	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)		
35	Geofence zone 01	Event: 0 – target left zone, 1 – target entered zone
36	Geofence zone 02	Event: 0 – target left zone, 1 – target entered zone
37	Geofence zone 03	Event: 0 – target left zone, 1 – target entered zone
38	Geofence zone 04	Event: 0 – target left zone, 1 – target entered zone

39	Geofence zone 05	Event: 0 – target left zone, 1 – target entered zone
39	Geofence zone 05	Event: 0 – target left zone, 1 – target entered zone
40	Auto Geofence	Event: 0 – target left zone, 1 – target entered zone
41	Trip	1 – trip start, 0 – trip stop
42	Immobilizer	1 – iButton connected
43	Authorized driving	1 – authorized iButton connected
44	Green driving type	1 – harsh acceleration, 2 – harsh braking, 3 – harsh cornering
45	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)
46	Over Speeding	At over speeding start km/h, at over speeding end km/h

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 FMA202 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, FMA202 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, FMA202 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
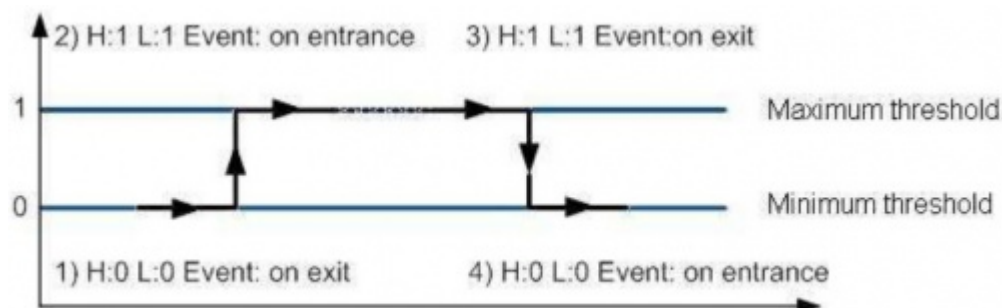
Averaging.

Monitoring

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

I/O Property Input	Enabled	Priority	Low Level	High Level	Units	Generate Event	Averaging Constant
Digital input 1	☑	Low	0	1		Monitoring	10
Digital input 2	☐	Disab	0	0		Monitoring	10
Digital input 3	☐	Disab	0	0		Monitoring	10
Digital input 4	☐	Disab	0	0		Monitoring	10
Analog input 1	☐	Disab	0	0		Monitoring	2
Digital output 1	☐	Disab	0	0		Monitoring	10
Digital output 2	☐	Disab	0	0		Monitoring	10
GNSS PDOP	☐	Disab	0	0		Monitoring	10
GNSS HDOP	☐	Disab	0	0		Monitoring	10

(Left sidebar: System, Records, GSM, DataAcquisitionModes, Features, IO, LVCAN)

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)


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2) H:1 L:1 Event: on entrance    3) H:1 L:1 Event:on exit

1 ──────────────────────────────── Maximum threshold

0 ──────────────────────────────── Minimum threshold

1) H:0 L:0 Event: on exit    4) H:0 L:0 Event: on entrance
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Hysteresis

Enabled	Priority	Low Level	High Level	Generate Event	Averaging Constant
☑	Low	0	0	Hysteresis	10

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):