

Water Meter Project. Events, Alarms.

Rev. 1.78

Revision History

Version	Date	Description
Rev. 1.0	25.11.2020	First document revision.
Rev. 1.1	14.12.2020	Added several events
Rev. 1.2	05.02.2021	Added several events
Rev. 1.3	25.03.2021	Added Manufacture specific events
Rev 1.4	15.04.2021	Added Manufacture specific events
Rev 1.5	28.09.2021	Added Communication and Security Event Logs.
Rev 1.6	11.10.2021	Added security related events
Rev 1.7	10.05.2022	Added communication related events
<u>Rev 1.8</u>	<u>24.05.2022</u>	<u>Added manufacture specific related events;</u> <u>Deleted 27 code event from standard event log;</u> <u>Changed alarm object</u>

1. Event and error handling

1.1 Events

There are 5 groups of events. Each group has its own event log, i.e., 5 event logs.

Every event has a unique code to identify the action which has triggered it. Every event is assigned to one event log and it is only stored there. This assignment is fixed and can't be changed dynamically.

Event Codes

Group	Name	Min Entries	Description
1	Standard	120	
2	Firmware	120	
3	Valve	120	
4	Communication	120/380	<u>120 – without LoRaWAN</u>
5	Security	120	
6	Manufacture	120	

Отформатировано: английский (США)

Отформатировано: английский (США)

Standard Event Log		
Number	Group	Event Description
1	1 Manufacture specific	Dry On (the water meter is not filled with water)
2		Dry Off
3		Reverse On (water flows in the opposite direction)
4		Reverse Off
5		Leak On (water flows for more than 24 hours in a row)
6		Leak Off
7		Burst On (water flow is constantly high for more than 30 minutes in a row)
8		Burst Off
9		Tamper (the water meter was opened)
10		Low battery
11		Normal battery
12		Hardware fault
13		Meter not calibrated
14		Coefficient changed
15		Program memory error
16		Measurement system error
17		Non volatile memory error
18		Watchdog
19		Inadmissible change of legally relevant software or device-specific parameters

20	Alarm register is cleared
21	Reserved
22	Clock object parameters changed
23	Billing profile configuration changed
24	Profile with period1 changed
25	Profile with period2 changed
26	Reserved
27	Security setup configuration changed Reserved
28	Clock invalid
29	Hardware fault is over
30-35	Reserved
36	Security setup configuration changed
37	Changing security settings reading client
38	Changing security settings management client
39	Changing security settings firmware client
40	Reserved
41	Changing security policy for reading client
42	Changing security policy for management client
43	Changing security policy for firmware client
44	Reserved
45	Keys reset
46	Master key changed
47	Global unicast encryption key Changed
48	Authentication key changed
49-51	Reserved
52	Tamper is finished (the water meter was closed)
53	Low ambient temperature
54	Restart host MCU
55-100	Reserved
101	Changing errors GP30
102	Detection of decreased consumption GP30
103	Detecting large spike consumption
104	Mismatch between flow and consumption
105	No connection with GP30
106	Connection with GP30 restored
107	LSE stopped
108	LSE restarted
109	Delta measure error
110	Data accumulation error
111-254	Reserved
255	Event log has been cleared

Firmware Event Log

Number	Group	Event Description
1	2	Firmware activated
2		Firmware ready for activation
3		Firmware image block transfer initiated
4		Firmware image block transfer finished
5		Firmware image verification initiated
6		Firmware image verification successful
7		Firmware image verification failed
8		Firmware image activation initiated
9		Firmware image activation failed
10		Firmware image block write error
11		Digital signature valid
12		Digital signature invalid
13-254		Reserved
255	Event log has been cleared	

Valve Control Event Log		
Number	Group	Event Description
1	3	Remote disconnection (command) – клапан закрыт
2		Remote connection (command) – клапан открыт
3		Valve communication error
4		Valve communication OK
5		Opening the valve cover
6		Closing the valve cover
7		Magnet impact - beginning
8		Magnet impact - end
9		The valve is 10 % open
10		The valve is 50 % open
11-254		Reserved
255	Event log has been cleared	

Communication Event Log		
Number	Group	Event Description
1	4	WAN modem fault
2		WAN modem OK
3		Unsuccessful registration on the LoRaWAN server
4		Successful registration on the LoRaWAN server
5		LoRa sending

6		LoRa sent fault
7		LoRa sent ok
8-254		Reserved
255		Event log has been cleared

Security Event Log		
Number	Group	Event Description
1	5	Error changing master key
2		Error changing global unicast encryption key
3		Error changing authentication key
4		Error in transport messages with ciphering or authentication
5		Association with invalid password
6		Error changing security policy
7-254		Reserved
255		Event log has been cleared

<u>Manufacture Specific Event Log</u>		
<u>Number</u>	<u>Group</u>	<u>Event Description</u>
<u>1</u>	6	<u>Reset STM32</u>
<u>2</u>		<u>Restart by stuck thread</u>
<u>3</u>		<u>STM32 hard fault</u>
<u>4</u>		<u>Fram hard fault</u>
<u>5-254</u>		<u>Reserved</u>
<u>255</u>		<u>Event log has been cleared</u>

1.2 Event Logs

The meter features 5-6 different event logs as described below. The event logs have different basic structure.

Standard Event Log [8-0:99.98.0.255]

Contains all events not recorded in a special event log, e.g. firmware update, etc.

Structure: Timestamp – Event Code

Minimum size: 120 entries

Firmware Events Logs (8-0:99.98.4.255)

Contains all events related to firmware change.

Structure: Timestamp – Event Code – Former Firmware Version – New Firmware

Minimum size: 120 entries

Valve Control Log [8-0:99.98.2.255]

Contains all events related to the valve, e.g. open, close.

Structure: Timestamp – Event Code – current valve control status – open reason

Minimum size: 120 entries

Communication Event Log [8-0:99.98.7.255]

Contains all events related to communication.

Structure: Timestamp – Event Code (without LoRaWAN)

Minimum size: 120/380 entries (120 without LoRaWAN)

Security Event Log [8-0:99.98.11.255]

Contains all events related to security.

Structure: Timestamp – Event Code

Minimum size: 120 entries

Manufacture Specific Event Log [8-0:99.98.14.255]

Contains all events related to security.

Structure: Timestamp – Event Code – manufacture parameter

Minimum size: 120 entries

1.3 Alarm Handling

A selection of events can be made which are treated as alarms (alarm filter). If one of these events occurs, the corresponding flag in the alarm register is set.

Alarm Codes

The table below gives an overview of all possible alarms and their assignment.

Non Critical Alarms	Non Critical Alarms	Critical Alarms	Non Critical Alarms
Byte 4	Byte 3	Byte 2	Byte 1
8 4 2 1 8 4 2 1	8 4 2 1 8 4 2 1	8 4 2 1 8 4 2 1	8 4 2 1 8 4 2 1

