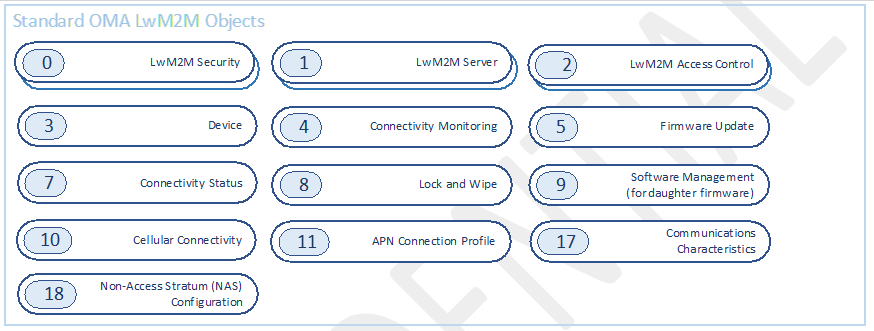
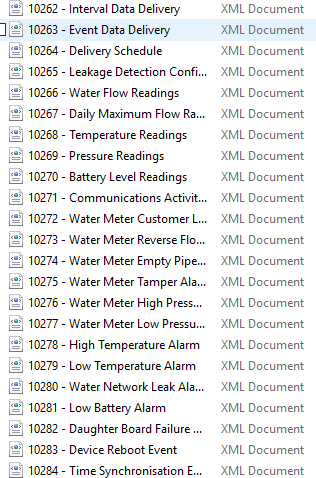
# Introduction

The aim of this document is to provide an overview of interval / event data format.

LWM2M client running on this water meter consists of both existing OMA objects and vendor defined objects to meet specific data collection requirements.

This document is based off South East Water’s “Digital Utility LwM2M Technical Specification”.





**Figure 1 LWM2M object model**

# Data definition

## Interval Data Delivery Object Instance 0 – Interval Data Delivery

Following is the default configuration of /10262/0. A definition is provided in the later section of this document for each of the interval reading objects.

|  |  |  |
| --- | --- | --- |
| **Resource**  **ID** | **Resource Name** | **Default Value** |
| 0 | Name | Default Interval Data Delivery |
| 1 | Interval Data Links | By default, this should link to the following objects:-   1. /10266/0 Flow Data Readings (daily) 2. /10266/1 Flow Data Readings (30 minutes) 3. /10267/0 Daily Maximum Flow Rate Readings 4. /10268/0 Water Temperature Readings \* 5. /10269/0 Water Pressure Readings \* 6. /10270/0 Battery Level Readings 7. /10271/0 Meter Communication Activity Time Readings   \* If supported |
| 3 | Schedule | By default, this should link to the following schedule  /10264/0 |

When a device registers with the LwM2M Server, an Observe operation on the **Latest Payload** resource must be initiated from the Server. This Observe operation is necessary to configure the daily notification of interval data to the server.

## Event Data Delivery Object Instance 0 – Event Data Delivery

Following is the default configuration of **/10263/0**. A definition is provided in the later section of this document for each of the alarm objects.

|  |  |  |
| --- | --- | --- |
| **Resource ID** | **Resource Name** | **Default Value** |
| 0 | Name | Default Event Data Delivery |
| 1 | Event Data Links | 1. 10272/0 Water Meter Customer Leakage Alarm 2. 10273/0 Water Meter Reverse Flow Alarm 3. 10273/1 Water Meter Reverse Flow Alarm (real time) 4. 10274/0 Water Meter Empty Pipe Alarm 5. 10275/0 Water Meter Tamper Alarm 6. 10276/0 Water Meter High Pressure Alarm 7. 10277/0 Water Meter Low Pressure Alarm 8. 10278/0 High Temperature Alarm 9. 10279/0 Low Temperature Alarm 10. 10280/0 Water Network Leak Alarm 11. 10281/0 Low Battery Alarm 12. 10282/0 Daughter Board Failure Alarm 13. 10283/0 Device Reboot Event 14. 10284/0 Time Synchronization Event   By default, the links should also include any vendor  specific events that are supported by the meter. |
| 3 | Schedule | By default, this should link to the following schedule:  /10264/0 |

When a device registers with the LwM2M Server, an Observe operation on the **Latest Eventlog** resource must be initiated from the Server. This Observe operation is necessary to configure the daily notification of Event Data to the server.

## Payload data format

### Interval data objects

* + 1. **10266 Water Flow Readings object**

The water meters support two instances of this object, one for daily water flow register (which is the accumulated lifetime total, also known as the ‘register’, ‘billing’ or ‘face-value’ of the meter) and one for interval flow readings (which will be the periodic volumes that have been consumed by the meter, e.g. hourly or half hourly).

|  |  |  |  |
| --- | --- | --- | --- |
| **Object Name** | **Instances** | **Mandatory** | **ID** |
| Water Flow Readings | Multiple | Optional | 10266 |
| Measures the flow of water in regular intervals. | | | |
| Resource ID | Resource Name | Default Value (Instance 0) | Default Value (Instance 1) |
| 6000 | Interval Period | 86400 [1 day] | 1800 [30 Minutes] |
| 6001 | Interval Start Offset | 0 | 0 |
| 6002 | Interval UTC Offset | UTC+00 | UTC+00 |
| 6007 | Delivery Midnight  Aligned | 1 | 1 |
| 6029  Payload Configuration | Number of Values Per  Interval | 1 | 1 |
| Size of Value 1 | 32 bits | 16 bits |
| Type of Value 1 | Unsigned Integer value (between 0-99999)  Units = KILO-LITRES | Unsigned Integer value (between 0-9999)  Units = LITRES |

Valid interval periods for instance 1 for the meter can be configured as follows:

* + - 1. 300 [5 Minutes]
      2. 1800 [30 Minutes] (Default)
      3. 3600 [60 Minutes]
      4. 7200 [2 Hours]
      5. 14400s [4 Hours]
      6. 28800 [8 Hours]
      7. 43200 [12 Hours]
      8. 86400 [24 Hours]

Example A: Four hourly single value data from Midnight 2nd March (local time, UTC+10) to Midnight 3rd March (local time, UTC+10) described as a CBOR object (RFC7049). Timestamps should represent the end of each interval

[

10266,

1,

[

# Object ID

# Instance ID (Water flow interval data)

1519927200,

14400, [

1011,

543,

12,

57,

# Time of the end of first interval in the payload(this is UTC+00, # which converts to 4am local time on 2nd March (UTC+10))

# Interval period

# Interval 1 value (1519927200 this is UTC+00) # Interval 2 value

# Interval 3 value # Interval 4 value

2222,

1482

# Interval 5 value # Interval 6 value

]

]

]

Example B: Hourly single value data for water flow intervals from Midnight 2nd March (local time, UTC+10) to Midnight 3rd March (local time, UTC+10) described as a CBOR object (RFC7049). Timestamps should represent the end of each interval

[

10266,

1,

[

# Object ID

# Instance ID (Water flow interval data)

1519916400, # Time of the end of first interval in the payload(this is UTC+00, # which converts to 1am local time on 2nd March (UTC+10))

3600, # Interval period in seconds (3600 seconds = 1 hour)

[

]

]

]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1011, | # | Interval | 1 | value |
| 543, | # | Interval | 2 | value |
| 12 | # | Interval | 3 | value |
| 57, | # | Interval | 4 | value |
| 2222, | # | Interval | 5 | value |
| 1482, | # | Interval | 6 | value |
| 235, | # | Interval | 7 | value |
| 789, | # | Interval | 8 | value |
| 651, | # | Interval | 9 | value |
| 1489, | # | Interval | 10 | value |
| 9856, | # | Interval | 11 | value |
| 324, | # | Interval | 12 | value |
| 2654, | # | Interval | 13 | value |
| 1111, | # | Interval | 14 | value |
| 9856, | # | Interval | 15 | value |
| 3256, | # | Interval | 16 | value |
| 321, | # | Interval | 17 | value |
| 856, | # | Interval | 18 | value |
| 79, | # | Interval | 19 | value |
| 456, | # | Interval | 20 | value |
| 987, | # | Interval | 21 | value |
| 234, | # | Interval | 22 | value |
| 632, | # | Interval | 23 | value |
| 215 | # | Interval | 24 | value |

Example C: Four hourly single value data, catch up from 8:00 a.m. 3rd March (UTC+10) to Midnight 5th March (UTC+10) described as a CBOR object (RFC7049). Interval timestamps representing the end of the interval.

[

|  |  |  |
| --- | --- | --- |
| 10266, | # | Object ID |
| 1,  [ | # | Instance ID |
| 1520042400, | # | Time of the first interval in the payload |
| 14400, | # | Interval period |
| [  100, | # | Interval 1 value (1520042400 = 12pm 3rd) |
| 200, | # | Interval 2 value |
| 300, | # | Interval 3 value |
| 400, | # | Interval 4 value |
| 500, | # | Interval 5 value |
| 600, | # | Interval 6 value |

700,

800,

900,

1000

# Interval 7 value # Interval 8 value # Interval 9 value # Interval 10 value

]

]

]

This can also be represented by breaking it up in 2 days, as shown below. However, we would prefer the method above as it has a smaller payload size.

[

10266,

1,

[

# Object ID # Instance ID

1520042400, # Time of the first interval in the payload 14400, # Interval period

[

100, # Interval 1 value (1520042400 = 12pm 3rd)

200, # Interval 2 value

300, # Interval 3 value

400 # Interval 4 value

]

], [

1520100000,

14400,

# 4th March 4am UTC+10 # Interval period

[

]

]

]

|  |  |
| --- | --- |
| 500, | # Interval 5 value |
| 600, | # Interval 6 value |
| 700, | # Interval 7 value |
| 800, | # Interval 8 value |
| 900, | # Interval 9 value |
| 1000 | # Interval 10 value |

Example D: Four hourly single value data, from Midnight 2nd March (UTC+10) to Midnight 3rd March (UTC+10), where the device was offline from 7:00 a.m. to 6:00 p.m.

[

]

], [

]

]

]

|  |  |  |
| --- | --- | --- |
| 10266, | # | Object ID |
| 1,  [ | # | Instance ID |
| 1519927200, | # | Time of the first interval in block 1 |
| 14400, | # | Interval period |
| [  100 | # | Interval 1 value (1519927200) |

|  |  |  |
| --- | --- | --- |
| 1520071200, | # | Time of the first interval in block 2 |
| 14400, | # | Interval period |
| [ |  |  |
| 500, | # | Interval 5 value (4:00 - 8:00 p.m.) |
|  | # | note the meter will have only recorded |
|  | # | from 6:00 pm in this example so the |
|  | # | value is only a partial interval record. |
| 600 | # | Interval 6 value (8:00 - 12:00 p.m.) |

Example E: The next example shows how the Water Flow reading instance 0 (10266/0) should be handled. Remember that this value represents the midnight aligned snapshot of the meter register/face- value (ie the lifetime accumulated read that is used for billing purposes, and would traditionally

have been read by

manual meter reading personnel). The example shows this snapshot taken on the 15th February 2018 12AM (UTC+10), representing the register read at end of the day on the 14th February:

[

10266,

0,

[

# Object ID

# Instance ID (Water flow register data)

1518616800,

86400,

[

1011,

# Time of the end of day in the payload

# Interval period

# Register reading 1 value (1518616800)

]

]

]

### 10267 Daily Maximum Flow Rate Readings

The water meters support the following Daily Maximum Flow Rate object and configuration.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Object Name** | | **Instances** | **Mandatory** | **ID** |
| Daily Maximum Flow Rate Readings | | Multiple | Optional | 10267 |
| Measures the maximum flow rate and its time stamp for specified period. | | | | |
| Resource ID | Resource Name | Default Value | | |
| 6000 | Interval Period | 86400 [1 day] | | |
| 6001 | Interval Start Offset | 0 | | |
| 6002 | Interval UTC  Offset | UTC+00 | | |
| 6007 | Delivery Midnight  Aligned | 1 | | |
| 6029  Payload Configuration | Number of Values  Per Interval | 2 | | |
| Size of Value 1 | 32 bits | | |
| Type of Value 1 | Timestamp of maximum flow [32-bit unsigned integer]  representing as the number of seconds since Jan 1st, 1970 in the UTC time zone. | | |
| Size of Value 2 | 16 bits | | |
| Type of Value 2 | Unsigned Integer value (between 0-999) representing L/min | | |

Example: Sending daily maximum flow rate values as interval data using multi-value format. This example uses the same format as example 2 however as described in the specifications in this document earlier (for object ID 10267) the first value in the multi-value array would be the actual timestamp at which the maximum flowrate occurred. The timestamp at the beginning of the payload will be for the day during for which the data is contained within.

Example A: Sending a single value of daily maximum flowrate for the 2nd of March. The daily maximum flowrate occurred between 2-3pm on the 2nd of March.

[

10267,

0,

[

# Object ID for daily maximum flow rate # Instance ID

1519999200, # March 3 00:00 (UTC+10) i.e. end of 2nd March 86400, # Interval period

[

[

1519966800, # March 2 15:00 (UTC+10), end of interval # when max flow rate occurred

50 # flow rate between 14:00-15:00 on March 2

]

]

]

]

Example B: Sending multiples values of daily maximum flowrate to catchup from 2nd of March to the end of 3rd of March. The daily maximum flowrate occurred between 2-3pm on the 2nd of March and between 7- 8pm on the 3rd of March.

[

10267,

0,

[

# Object ID for daily maximum flow rate # Instance ID

1519999200, # March 3 00:00 (UTC+10) i.e. end of 2nd March

86400, # Interval period [

[

1519966800, # March 2 15:00 (UTC+10), end of interval # when max flow rate occurred

50 # flow rate between 14:00-15:00 on March 2

],

[ #Interval of 86400 means array for the next day

#(March 3) starts here

1520071200, # March 2 20:00 (UTC+10), end of interval # when max flow rate occurred

37 # flow rate between 19:00-20:00 on March 2

]

]

]

]

### 10268 Water Temperature Readings

The water meters support the following Water Temperature Readings object and configuration.

|  |  |  |  |
| --- | --- | --- | --- |
| **Object Name** | **Instances** | **Mandatory** | **ID** |
| Temperature Readings | Multiple | Optional | 10268 |
| Periodic temperature measurements. | | | |
| Resource ID | Resource Name | Default Value | |
| 6000 | Interval Period | 14400 [4 Hours] | |
| 6001 | Interval Start Offset | 0 | |
| 6002 | Interval UTC Offset | UTC+00 | |
| 6007 | Delivery Midnight Aligned | 1 | |
| 6029  Payload Configuration | Number of Values Per Interval | 1 | |
| Size of Value 1 | 8 bits | |
| Type of Value 1 | unsigned Integer value (between 0-60) Deg-C | |

Example A: [ 10268, 0, [ 1520071200, 14400, [ 27, 28, 27, 29, 26, 27 ] ] ]

### 10269 Pressure Readings

The water meters support the following Water Pressure Readings object and configuration.

|  |  |  |  |
| --- | --- | --- | --- |
| **Object Name** | **Instances** | **Mandatory** | **ID** |
| Pressure Readings | Multiple | Optional | 10269 |
| Periodic pressure measurements | | | |
| Resource ID | Resource Name | Default Value | |
| 6000 | Interval Period | 14400 [4 Hours] | |
| 6001 | Interval Start Offset | 0 | |

|  |  |  |
| --- | --- | --- |
| 6002 | Interval UTC Offset | UTC+00 |
| 6007 | Delivery Midnight Aligned | 1 |
| 6029  Payload Configuration | Number of Values Per Interval | 1 |
| Size of Value 1 | 8 bits |
| Type of Value 1 | Unsigned Integer value (between 0-150) mH2O |

Example A: [ 10269, 0, [ 1520071200, 14400, [ 140, 139, 131, 126, 97, 127 ] ] ]

### 10270 Battery Readings object

The water meters support the following Battery Level Readings object and configuration.

|  |  |  |  |
| --- | --- | --- | --- |
| **Object Name** | **Instances** | **Mandatory** | **ID** |
| Battery Level Readings | Multiple | Optional | 10270 |
| Periodic battery level measurements | | | |
| Resource ID | Resource Name | Default Value | |
| 6000 | Interval Period | 86400 [1 Day] | |
| 6001 | Interval Start Offset | 0 | |
| 6002 | Interval UTC Offset | UTC+00 | |
| 6007 | Delivery Midnight Aligned | 1 | |
| 6029  Payload Configuration | Number of Values Per  Interval | 2 | |
| Size of Value 1 | 8 bits | |
| Type of Value 1 | unsigned Integer value (between 0-33) dV (Battery  Voltage) | |
| Size of Value 2 | 8 bits | |
| Type of Value 2 | unsigned Integer value (between 0-100) % (Battery  Percentage) | |

Example A: Daily multi value (2 – used for battery readings or communication activity time for example) data from Midnight 2nd March (UTC+10) to Midnight 6th March (UTC+10) described as a CBOR object (RFC7049). Midnight aligned, with interval timestamps representing the end of the interval.

[

10270,

0,

[

# Object ID for battery meter readings # Instance ID

1519999200, # Time of the end of first interval in the

# payload

86400, # Interval period [

[

27, # Interval 1 value 1 - voltage

83 # Interval 1 value 2 - percentage

], [

26, # Interval 2 value 1

75 # Interval 2 value 2

], [

25, # Interval 3 value 1

70 # Interval 3 value 2

], [

25, # Interval 4 value 1

70 # Interval 4 value 2

]

]

]

]

### 10271 Communication Activity Time Readings

The water meters support the following Communications Activity Time Readings object and configuration.

|  |  |  |  |
| --- | --- | --- | --- |
| **Object Name** | **Instances** | **Mandatory** | **ID** |
| Communications Activity Time Readings | Multiple | Optional | 10271 |
| Measures the total duration that the meter was activating its radio for packet transmission or receipt for the  period | | | |
| Resource ID | Resource Name | Default Value | |
| 6000 | Interval Period | 86400 [1 Day] | |
| 6001 | Interval Start Offset | 0 | |
| 6002 | Interval UTC Offset | UTC+00 | |
| 6007 | Delivery Midnight Aligned | 1 | |
| 6029  Payload Configuration | Number of Values Per  Interval | 2 | |
| Size of Value 1 | 32 bits | |
| Type of Value 1 | unsigned Integer value (between 0-86400)  Transmit Time in Seconds | |
| Size of Value 2 | 32 bits | |
| Type of Value 2 | unsigned Integer value  (between 0-86400) Receive Time in Seconds | |

Example A: [10271, 0, [1580738400, 86400, [0, 133]]]

Example B: [10271, 0, [1580738400, 86400, [[0, 133], [0, 52]]]]

### Event data objects

* + 1. **10272 Water Meter Customer Leakage Alarm**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Object Name** | | **Instances** | | **Mandatory** | **ID** |
| Water Meter Customer Leakage Alarm | | Multiple | | Optional | 10272 |
| A binary flag indicating continual usage (e.g. greater than 5 L/h for 24 hours – and the flow never returning to  zero at any time). | | | | | |
| Resource ID | Resource Name | | Default Value | | |
| 6024 | Event Code | | 100 | | |
| 6011 | Event Type | | 1 - Alarm Current State | | |
| 6012 | Alarm Realtime | | 0 – Non Realtime | | |
| 6014 | Alarm Set Threshold | | 5.0 (represented as L/hr over 24 hours) | | |
| 6015 | Alarm Set Operator | | 1 – Greater Than | | |
| 6016 | Alarm Clear Threshold | | 0.0 (represented as L/hr measured over any period) | | |
| 6017 | Alarm Clear Operator | | 2 – Less Than or equal to | | |
| 6018 | Alarm Maximum Event Count | | 2 | | |
| 6019 | Alarm Maximum Event Period | | 86400 (1 Day) | | |
| 6023 | Alarm Auto Clear | | 0 | | |
| 6025  Payload Configuration | Alarm Value | | Current value for the alarm (1 or 0) | | |

Example A: [100, 1, [1580738400, 1]]

Example B: [100, 1, [[1580738400, 1], [1580824800, 0]]]

Example C: [100, 1, [[1580738400, 1], [1580824800, 0], [1580911200, 1]]]

### 10273 Water Meter Reverse Flow Alarm

The water meters support two instances of this object, one real-time and other non-real time

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Object Name** | | **Instances** | **Mandatory** | | **ID** |
| Water Meter Reverse Flow Alarm | | Multiple | Optional | | 10273 |
| An alarm indicating reverse flow through the pipe. Also supports delivery of the approximate volume of water flowing in  the reverse direction in the preceding period. | | | | | |
| Resource ID | Resource Name | Default Value (Instance 0) | | Default Value  (Instance 1) | |
| 6024 | Event Code | 101 | | 102 | |
| 6011 | Event Type | 2 – Alarm State Change Log | | 1 – Alarm Current  State | |
| 6012 | Alarm Realtime | 0 – Non Realtime | | 1 – Realtime | |
| 6018 | Alarm Maximum Event Count | 1 | | 1 | |
| 6019 | Alarm Maximum Event Period | 86400 (1 Day) | | 86400 (1 Day) | |
| 6023 | Alarm Auto Clear | 1 | | 1 | |
| 6025  Payload Configuration | Number of Values Per Event | 1 | | 1 | |
| Size of Value 1 | 32 bits | | NA | |
| Type of Value 1 | unsigned Integer value representing reverse flow  litres. | | Current value for the alarm (1 or 0) | |

Example A: [101, 2, [1580738400, 123]] for 10273/0 representing reverse flow 123 litres

Example B: [102, 1, [1580738400, 1]] for 10273/1 representing alarm is set

### 10274 Water Meter Empty Pipe Alarm

The water meters support the following default configuration. This is an alarm that should be raised if the meter detects that there is no liquid in the pipe. No Set or Clear threshold configuration is required as the alarm should clear as soon as the pipe fills.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Object Name** | | **Instances** | **Mandatory** | **ID** |
| Water Meter Empty Pipe Alarm | | Multiple | Optional | 10274 |
| An alarm when meter detects there is no liquid in the pipe | | | | |
| Resource ID | Resource Name | Default Value (Instance 0) | | |
| 6024 | Event Code | 103 | | |
| 6011 | Event Type | 2 – Alarm State Change Log | | |
| 6012 | Alarm Realtime | 1 – Realtime | | |
| 6018 | Alarm Maximum Event Count | 2 (Only trigger twice per day – set and clear) | | |
| 6019 | Alarm Maximum Event Period | 86400 (1 Day) | | |
| 6023 | Alarm Auto Clear | 0 | | |
| 6025  Payload Configuration | Alarm Value | Current value for the alarm (1 or 0) | | |

Example A: [103, 2, [[1580738400, 1], [1580824800, 0]]]

Example B: [103, 2, [[1580738400, 1], [1580824800, 1]]]

### 10275 Water Meter Tamper Alarm

The water meters support the following default configuration. This is an alarm that should be raised if the meter detects interference from strong magnetic field or other electrical sources. No Set or

Clear

threshold configuration is required as the alarm should clear daily and re-raise the next day if the tamper occurs again.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Object Name** | | **Instances** | **Mandatory** | **ID** |
| Water Meter Tamper Alarm | | Multiple | Optional | 10275 |
| Detects interference from strong magnetic field or other electrical sources. If this is not relevant for ultrasonic meters then the tamper alarm may be used to indicate someone attempting to open the physical enclosure or other options the  manufacturer may present. | | | | |
| Resource ID | Resource Name | Default Value (Instance 0) | | |
| 6024 | Event Code | 104 | | |
| 6011 | Event Type | 2 – Alarm State Change Log | | |
| 6012 | Alarm Realtime | 1 – Realtime | | |
| 6018 | Alarm Maximum Event Count | 1 (Only trigger once per day) | | |
| 6019 | Alarm Maximum Event Period | 86400 (1 Day) | | |
| 6023 | Alarm Auto Clear | 1 | | |
| 6025  Payload Configuration | Alarm Value | Current value for the alarm (1 or 0) | | |

Example A: [104, 2, [1580738400, 1]]

### 10276 Water Meter High Pressure Alarm

The water meters that are provisioned with pressure sensors support the following default configuration. this is an alarm that should be raised if the meter detects pressure above a pre-configured threshold. When the pressure drops below the clear threshold, the alarm should be cleared. Because pressure varies over the network, the alarm thresholds (both set and clear) are defined as threshold (in mH2O) above a rolling 7-day average.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Object Name** | | **Instances** | **Mandatory** | **ID** |
| Water Meter High Pressure Alarm | | Multiple | Optional | 10276 |
| Where supported by the meter this is an alarm that should be raised if the meter detects pressure above a pre-  configured threshold. | | | | |
| Resource ID | Resource Name | Default Value (Instance 0) | | |
| 6024 | Event Code | 105 | | |
| 6011 | Event Type | 2 – Alarm State Change Log | | |
| 6012 | Alarm Realtime | 0 – Non Realtime | | |
| 6014 | Alarm Set Threshold | 10 (mH2O above rolling 7-day average) | | |
| 6015 | Alarm Set Operator | 1 – Greater Than | | |
| 6016 | Alarm Clear Threshold | 5 (mH2O above rolling 7-day average) | | |
| 6017 | Alarm Clear Operator | 2 – Less Than or Equal to | | |
| 6018 | Alarm Maximum Event Count | 2 (Only trigger twice per day – set and clear) | | |
| 6019 | Alarm Maximum Event Period | 86400 (1 Day) | | |
| 6023 | Alarm Auto Clear | 0 | | |
| 6025  Payload Configuration | Number of Values Per Event | 2 | | |
| Size of Value 1 | 8 bits | | |
| Type of Value 1 | Current value for the alarm (1 or 0) | | |
| Size of Value 2 | 8 bits | | |
| Type of Value 2 | Float value representing pressure reading (0-150  mH2O). | | |

Example A: [105, 2, [1575561603, 1, 20]]

Example B: [105, 2, [[1575561603, 1, 20], [1575565203, 0, 5], [15755341603, 1, 20], [153565203,

0, 5]]]

### 10277 Water Meter Low Pressure Alarm

The water meters that are provisioned with pressure sensors support the following default configuration. This is an alarm that should be raised if the meter detects pressure below a pre-configured threshold. When the pressure raises above the clear threshold, the alarm should be cleared. Because pressure varies over the network, the alarm thresholds (both set and clear) are defined as threshold (in mH2O) below a rolling 7-day average.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Object Name** | | **Instances** | **Mandatory** | **ID** |
| Water Meter Low Pressure Alarm | | Multiple | Optional | 10277 |
| Where supported by the meter this is an alarm that should be raised if the meter detects pressure below a pre-  configured threshold. | | | | |
| Resource ID | Resource Name | Default Value (Instance 0) | | |
| 6024 | Event Code | 106 | | |
| 6011 | Event Type | 2 – Alarm State Change Log | | |
| 6012 | Alarm Realtime | 0 – Non Realtime | | |
| 6013 | Alarm State |  | | |
| 6014 | Alarm Set Threshold | -5 (mH2O above rolling 7-day average) | | |
| 6015 | Alarm Set Operator | 2 – Less Than | | |
| 6016 | Alarm Clear Threshold |  | | |
| 6017 | Alarm Clear Operator | 1 – Greater Than or Equal to | | |
| 6018 | Alarm Maximum Event Count | 2 (Only trigger twice per day – set and clear) | | |
| 6019 | Alarm Maximum Event Period | 86400 (1 Day) | | |
| 6023 | Alarm Auto Clear | 0 | | |
| 6025  Payload Configuration | Number of Values Per Event | 2 | | |
| Size of Value 1 | 8 bits | | |
| Type of Value 1 | Current value for the alarm (1 or 0) | | |
| Size of Value 2 | 8 bits | | |
| Type of Value 2 | Float value representing pressure reading (0-150  mH2O). | | |

Example A: [106, 2, [1575561603, 1, -6]]

Example B: [106, 2, [[1575561603, 1, -6], [1575565203, 0, 10]]]

### 10278 High Temperature Alarm

The water meters support the following default configuration. This is an alarm that should be raised if the meter detects temperature above a pre-configured threshold. When the temperature drops below the clear threshold, the alarm should be cleared.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Object Name** | | **Instances** | **Mandatory** | **ID** |
| High Temperature Alarm | | Multiple | Optional | 10278 |
| Where supported by the meter this is an alarm that should be raised if the meter detects temperature above a pre-  configured threshold. When the temperature drops below the clear threshold, the alarm should be cleared. | | | | |
| Resource ID | Resource Name | Default Value (Instance 0) | | |
| 6024 | Event Code | 107 | | |
| 6011 | Event Type | 2 – Alarm State Change Log | | |
| 6012 | Alarm Realtime | 0 – Non Realtime | | |
| 6013 | Alarm State |  | | |
| 6014 | Alarm Set Threshold | 50 (Celsius) | | |

|  |  |  |
| --- | --- | --- |
| 6015 | Alarm Set Operator | 1 – Greater Than |
| 6016 | Alarm Clear Threshold | 45 (Celsuis) |
| 6017 | Alarm Clear Operator | 2 – Less Than or Equal to |
| 6018 | Alarm Maximum Event Count | 2 (Only trigger twice per day – set and clear) |
| 6019 | Alarm Maximum Event Period | 86400 (1 Day) |
| 6023 | Alarm Auto Clear | 0 |
| 6025  Payload Configuration | Number of Values Per Event | 2 |
| Size of Value 1 | 8 bits |
| Type of Value 1 | Current value for the alarm (1 or 0) |
| Size of Value 2 | 8 bits |
| Type of Value 2 | Integer value representing temperature reading. |

Example A: [107, 2, [1575561603, 1, 51]]

Example B: [107, 2, [[1575561603, 1, 51], [1575565203, 0, 45]]]

### 10279 Low Temperature Alarm

The water meters support the following default configuration. This is an alarm that should be raised if the meter detects temperature below a pre-configured threshold. When the temperature rises above the clear threshold, the alarm should be cleared.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Object Name** | | **Instances** | **Mandatory** | **ID** |
| Low Temperature Alarm | | Multiple | Optional | 10279 |
| Where supported by the meter this is an alarm that should be raised if the meter detects temperature below a pre-  configured threshold. When the temperature rises above the clear threshold, the alarm should be cleared | | | | |
| Resource ID | Resource Name | Default Value (Instance 0) | | |
| 6024 | Event Code | 108 | | |
| 6011 | Event Type | 2 – Alarm State Change Log | | |
| 6012 | Alarm Realtime | 0 – Non Realtime | | |
| 6013 | Alarm State |  | | |
| 6014 | Alarm Set threshold | 1 (Celsius) | | |
| 6015 | Alarm Set Operator | 2 – Less Than | | |
| 6016 | Alarm Clear threshold | 3 (Celsius) | | |
| 6017 | Alarm Clear Operator | 1 – Greater Than or Equal to | | |
| 6018 | Alarm Maximum Event Count | 2 (Only trigger twice per day – set and clear) | | |
| 6019 | Alarm Maximum Event Period | 86400 (1 Day) | | |
| 6023 | Alarm Auto Clear | 0 | | |
| 6025  Payload Configuration | Number of Values Per Event | 2 | | |
| Size of Value 1 | 8 bits | | |
| Type of Value 1 | Current value for the alarm (1 or 0) | | |
| Size of Value 2 | 8 bits | | |
| Type of Value 2 | Integer value representing temperature reading. | | |

Example A: [108, 2, [1575561603, 1, 0]]

Example B: [108, 2, [[1575561603, 1, 0], [1575565203, 0, 4]]]

### 10281 Low Battery Alarm

The water meters support the following default configuration. This alarm is raised when the battery voltage drops below a defined level.

|  |  |  |  |
| --- | --- | --- | --- |
| **Object Name** | **Instances** | **Mandatory** | **ID** |
| Low Battery Alarm | Multiple | Optional | 10281 |

|  |  |  |
| --- | --- | --- |
| This Alarm is raised when the battery voltage drops below a defined level | | |
| Resource ID | Resource Name | Default Value (Instance 0) |
| 6024 | Event Code | 111 |
| 6011 | Event Type | 2 – Alarm State Change Log |
| 6012 | Alarm Realtime | 0 – Non Realtime |
| 6014 | Alarm Set Threshold | <TBC> |
| 6015 | Alarm Set Operator | 2 – Less than |
| 6016 | Alarm Clear Threshold | <not configured> |
| 6017 | Alarm Clear Operator | <not configured> |
| 6018 | Alarm Maximum Event  Count | 1 (Only trigger once per day) |
| 6019 | Alarm Maximum Event  Period | 86400 (1 Day) |
| 6023 | Alarm Auto Clear | 1 |
| 6025  Payload Configuration | Number of Values Per  Event | 2 |
| Size of Value 1 | 8 bits |
| Type of Value 1 | Current value for the alarm (1 or 0) |
| Size of Value 2 | 8 bits |
| Type of Value 2 | Integer Value representing the current battery voltage in Deci-  volts |

Example A: [111, 2, [1580846701, 1, 36]]

### 10283 Device Reboot Event

The water meters support the following default configuration. This event represents the current counter of the number of times that this device has rebooted. This is a useful indicator of a systemic problem with the device. This event should only be raised when a reboot has occurred but should contain the current reboot total count for the device.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Object Name** | | **Instances** | **Mandatory** | **ID** |
| Device Reboot Event | | Multiple | Optional | 10283 |
| This event records the fact that the device has rebooted | | | | |
| Resource ID | Resource Name | Default Value (Instance 0) | | |
| 6024 | Event Code | 113 | | |
| 6011 | Event Type | 3 – Event Log | | |
| 6012 | Alarm Realtime | 0 – Non Realtime | | |
| 6018 | Alarm Maximum Event Count | 1 | | |
| 6019 | Alarm Maximum Event Period | 86400 (1 Day) | | |
| 6023 | Alarm Auto Clear | 0 | | |
| 6025  Payload Configuration | Number of Values Per Event | 1 | | |
| Size of Value 1 | 16 bits | | |
| Type of Value 1 | Integer value representing total reboot counter for the device. | | |

Example A: [113, 2, [1580846701, 9]]

Example B: [113, 2, [[1580846701, 9], [1580918701, 10]]]

### 10284 Time Synchronisation Event

The water meters support the following default configuration. This alarm represents the fact that a device required a significant time clock correction (in this case > 5 minutes). This alarm should only be raised when the adjustment has occurred but should contain the correction time in seconds for the

device.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Object Name** | | **Instances** | **Mandatory** | **ID** |
| Time Synchronisation Alarm | | Multiple | Optional | 10284 |
| This alarm records the fact that a significant (e.g. >5mins) time adjustment was required on the device | | | | |
| Resource ID | Resource Name | Default Value (Instance 0) | | |
| 6024 | Event Code | 114 | | |
| 6011 | Event Type | 2 – Alarm State Change | | |
| 6012 | Alarm Realtime | 0 – Non Realtime | | |
| 6014 | Alarm Set Threshold | 1 – Greater Than | | |
| 6015 | Alarm Set Operator | 300 (time adjustment in seconds) | | |
| 6016 | Alarm Clear Threshold |  | | |
| 6017 | Alarm Clear Operator |  | | |
| 6018 | Alarm Maximum Event  Count | 2 | | |
| 6019 | Alarm Maximum Event  Period | 86400 (1 Day) | | |
| 6023 | Alarm Auto Clear | 1 | | |
| 6025  Payload Configuration | Number of Values Per Event | 1 | | |
| Size of Value 1 | 32 bits | | |
| Type of Value 1 | Integer value representing total time correction on the device  in seconds. | | |

Example A: [114, 2, [1580684216, 2783]]

Example B: [114, 2, [1580684216, 2783], [1580685306, 3171], [1580847718, 386]]]