Introduction

This document describes the web-services supported by the SpiritIT Flow-X flow computer. This document is intended for internal use and third parties who wish to interface with the flow computer through its web-server.

For more information

All publications of SpiritIT Flow-X are available for free download from:

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<thead>
<tr>
<th>Search for:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SpiritIT Flow-X instruction manual</td>
<td>IM/FlowX-EN</td>
</tr>
<tr>
<td>SpiritIT Flow-X configuration manual</td>
<td>CM/FlowX-EN</td>
</tr>
<tr>
<td>SpiritIT Flow-X gas metric application manual</td>
<td>CM/FlowX/GM-EN</td>
</tr>
<tr>
<td>SpiritIT Flow-X liquid metric application manual</td>
<td>CM/FlowX/LM-EN</td>
</tr>
<tr>
<td>SpiritIT Flow-X gas USC application manual</td>
<td>CM/FlowX/GU-EN</td>
</tr>
<tr>
<td>SpiritIT Flow-X liquid USC application manual</td>
<td>CM/FlowX/LU-EN</td>
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1 Cyber-security

HTTP is vulnerable to sniffing

Keep in mind that all HTTP traffic can be sniffed by anyone who has the access to the network. Only use HTTP in protected networks.

Flow-X HTTPS server uses self-signed certificate

The Flow-X web server supports HTTPS but it uses the self-signed certificate. Browsers may require additional settings to accept this certificate.

2 Web server

HTTP response headers

The Flow-X web server offers additional response headers which may be of use to automated systems interacting with the flow computer¹.

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-FlowX-Instance</td>
<td>This header contains identifying information about a flow computer, in that it can be used to detect when a flow computer has last been restarted (i.e. when it has last been (soft) rebooted). The layout of this field is a JSON object, which contains the last-started time of the web server, as well as a randomly generated instance ID which is different for every boot:</td>
</tr>
</tbody>
</table>

```
{
    "start_time" : "2003-01-01T00:00:00Z",
    "id"         : "0123456789ABCDEF0123456789ABCDEF01234567"
}
```

3 Web services

The following web-services are supported by the flow computer. This can be considered the flow computer web namespace:

<table>
<thead>
<tr>
<th>Web-service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ackalarms</td>
<td>Acknowledges specific or all alarms.</td>
</tr>
<tr>
<td>/alarms</td>
<td>Returns the alarms.</td>
</tr>
<tr>
<td>/archive</td>
<td>Returns historical archive data. (see also: /snapshots)</td>
</tr>
<tr>
<td>/archives</td>
<td>Returns historical archive information.</td>
</tr>
<tr>
<td>/dashboard</td>
<td>Returns dashboard information.</td>
</tr>
<tr>
<td>/deviceinfo</td>
<td>Returns device info information.</td>
</tr>
<tr>
<td>/framework</td>
<td>Returns the framework information for the User Interface.</td>
</tr>
<tr>
<td>/languages</td>
<td>Returns the languages and translations.</td>
</tr>
<tr>
<td>/logs</td>
<td>Returns the event-log.</td>
</tr>
<tr>
<td>/navigation</td>
<td>Returns the navigation structure for the User Interface.</td>
</tr>
<tr>
<td>/perfcounters</td>
<td>Returns system performance counter information.</td>
</tr>
<tr>
<td>/print</td>
<td>Prints a report.</td>
</tr>
<tr>
<td>/report</td>
<td>Returns a report.</td>
</tr>
<tr>
<td>/reports</td>
<td>Returns list of reports.</td>
</tr>
<tr>
<td>/security</td>
<td>Handles login/logout.</td>
</tr>
<tr>
<td>/snapshots</td>
<td>Returns historical archive data.</td>
</tr>
<tr>
<td>/tags</td>
<td>Returns the tags.</td>
</tr>
<tr>
<td>/units</td>
<td>Returns the units &amp; enumerations.</td>
</tr>
<tr>
<td>/writetags</td>
<td>Writes one or more tag values.</td>
</tr>
</tbody>
</table>

Table 3-1: Web-services overview

**AckAlarms**

This web-service allows for acknowledging all or specific alarms.

¹ This functionality has been introduced in Flow-Xpress 1.7.4.
Request

Acknowledges alarms can be done by specifying “/ackalarms” in the URL. The following arguments can be specified in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Userkey</td>
<td>Required Userkey. The user must have sufficient privileges (high enough security level) for acknowledging alarms.</td>
</tr>
<tr>
<td>IDFilter</td>
<td>Optional filter of alarm-ID’s to acknowledge. When omitted, all alarms are acknowledged. Multiple ID’s can be separated using a comma-character. A range of ID’s can be specified using the dash-character (e.g. “1,2,3-5,80-100”).</td>
</tr>
</tbody>
</table>

Table 3-2: AckAlarms request arguments

Example #1
Request: /ackalarms?userkey=267AB6
This request acknowledges all alarms.

Example #2
Request: /ackalarms?userkey=267AB6&idfilter=6
This request acknowledges alarm with ID 6.

Example #3
Request: /ackalarms?userkey=267AB6&idfilter=6,7,8
This request acknowledges alarm with ID 6, 7 and 8.

Example #4
Request: /ackalarms?userkey=267AB6&idfilter=100-200
This request acknowledges all alarms in the range 100 to 200.

Alarms

This interface returns current alarm-data from the web-server. It can be used to show an alarm-list on the flow computer display. Additionally it may be used in the future to expose alarm-data to a supervisory computer or an OPC Alarm & Events server.

Request

Reading alarms can be done by specifying “/alarms” in the URL. The following arguments can be specified in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>Optional number containing the maximum number of items to return. Set this to the maximum number of items you can display on the screen. When omitted all items are returned.</td>
</tr>
<tr>
<td>Offset</td>
<td>Optional number containing the offset of items to return. For instance if the display can show only 10 items at a time and the third page is being shown, the offset should be set to 20. When omitted an offset of 0 is used.</td>
</tr>
<tr>
<td>Filter</td>
<td>Optional string containing a filter expression (e.g. “ACKED AND NOT(SUPPRESSED)”). When omitted no filtering is performed and all alarms are returned.</td>
</tr>
<tr>
<td>SortOrder</td>
<td>Optional string containing the sort-order (e.g. “TIMESTAMP DESC, NAME, ACTIVE”). When omitted the alarms are returned according to the internal ordering.</td>
</tr>
<tr>
<td>Fields</td>
<td>Optional integer mask which specifies which fields to return. When omitted, the ID, name, text and state are returned. Instead of an integer mask it is also possible to specify the string “all” which returns all fields.</td>
</tr>
<tr>
<td>0x00000001</td>
<td>ID (unique ID as a number).</td>
</tr>
<tr>
<td>0x00000002</td>
<td>Name (Name of the tag as configured in the application).</td>
</tr>
<tr>
<td>0x00000004</td>
<td>Text (Text in the requested language).</td>
</tr>
<tr>
<td>0x00000008</td>
<td>Multi-lingual text key (e.g. “alarm.pt1”).</td>
</tr>
<tr>
<td>0x00000010</td>
<td>Description (Description in the requested language).</td>
</tr>
<tr>
<td>0x00000020</td>
<td>Multi-lingual description key (e.g. “alarmdesc.pt1”).</td>
</tr>
<tr>
<td>0x00000040</td>
<td>Type (1=Status, 2=LoLo, 3=Lo, 4=Hi, 5=HiHi, 6=ROC, 7=Deviation).</td>
</tr>
<tr>
<td>0x00000080</td>
<td>Priority (Number).</td>
</tr>
<tr>
<td>0x00000100</td>
<td>Timestamp when the state changed.</td>
</tr>
<tr>
<td>0x00000200</td>
<td>Active-timestamp (timestamp when alarm became active).</td>
</tr>
<tr>
<td>0x00000400</td>
<td>Inactive-timestamp (timestamp when alarm became inactive).</td>
</tr>
<tr>
<td>0x00000800</td>
<td>Acked-timestamp (timestamp when alarm was acknowledged).</td>
</tr>
<tr>
<td>0x00001000</td>
<td>Block-count (Number).</td>
</tr>
<tr>
<td>0x00002000</td>
<td>Limit (Alarm limit).</td>
</tr>
<tr>
<td>0x00004000</td>
<td>Deadband (Alarm deadband).</td>
</tr>
<tr>
<td>0x00008000</td>
<td>Delay (Delay in seconds before changing the alarm state).</td>
</tr>
<tr>
<td>0x00010000</td>
<td>Value.</td>
</tr>
<tr>
<td>0x00020000</td>
<td>State bitmask (1=Active, 2=Acked, 4=Suppressed, 8=Blocked, 16=Disabled).</td>
</tr>
<tr>
<td>0x00020000</td>
<td>Alarm group Id</td>
</tr>
<tr>
<td>0x00040000</td>
<td>Id of the tag which is the source of the alarm</td>
</tr>
<tr>
<td>0x00080000</td>
<td>Node on which the alarm lives (panel=0, module1 =1, etc..)</td>
</tr>
</tbody>
</table>
Argument | Description
--- | ---
Language | Optional ID of the requested language (number). When omitted the default language will be used.
CacheID | Optional Cache ID (string) of last received data-set. When omitted a fresh data-set is returned.
Userkey | This is the user key of the user currently logged on. The server is aware of its user level and therefore will only return allowed data.

Table 3-3: Alarms request arguments

The following keywords can be used in the filter- and sort-order arguments:

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIVE</td>
<td>Boolean</td>
<td>True when alarm is currently active.</td>
</tr>
<tr>
<td>ACKED</td>
<td>Boolean</td>
<td>True when alarm has been acknowledged.</td>
</tr>
<tr>
<td>BLOCKED</td>
<td>Boolean</td>
<td>True when alarm has toggled between active/inactive state too much</td>
</tr>
<tr>
<td>SUPPRESSED</td>
<td>Boolean</td>
<td>True when alarm is being suppressed.</td>
</tr>
<tr>
<td>DISABLED</td>
<td>Boolean</td>
<td>True when alarm has been completely disabled.</td>
</tr>
<tr>
<td>DELAYED</td>
<td>Boolean</td>
<td>True when alarm is in delayed state.</td>
</tr>
<tr>
<td>ID</td>
<td>Integer</td>
<td>Unique ID of the alarm.</td>
</tr>
<tr>
<td>NAME</td>
<td>String</td>
<td>Name of the alarm (e.g. “PT6”).</td>
</tr>
<tr>
<td>TEXT</td>
<td>String</td>
<td>Alias in requested language (e.g. “Druk Opnemer 6”).</td>
</tr>
<tr>
<td>DESC</td>
<td>String</td>
<td>Description in requested language.</td>
</tr>
<tr>
<td>TYPE</td>
<td>Integer</td>
<td>Type (1=Status, 2=LoLo, 3=Lo, 4=Hi, 5=HiHi).</td>
</tr>
<tr>
<td>PRIORITY</td>
<td>Integer</td>
<td>Priority.</td>
</tr>
<tr>
<td>TIMESTAMP</td>
<td>DateTime</td>
<td>Timestamp at which the alarm state changed (Format: dd-mm-yyyy hh:mm:ss)</td>
</tr>
<tr>
<td>ACTIVETIME</td>
<td>DateTime</td>
<td>Timestamp at which alarm became active (Format: dd-mm-yyyy hh:mm:ss).</td>
</tr>
<tr>
<td>INACTIVETIME</td>
<td>DateTime</td>
<td>Timestamp at which alarm became in-active (Format: dd-mm-yyyy hh:mm:ss).</td>
</tr>
<tr>
<td>ACKEDTIME</td>
<td>DateTime</td>
<td>Timestamp at which alarm was acknowledged (Format: dd-mm-yyyy hh:mm:ss).</td>
</tr>
<tr>
<td>BLOCKCOUNT</td>
<td>Integer</td>
<td>Number of times the alarm has been blocked.</td>
</tr>
<tr>
<td>LIMIT</td>
<td>Float</td>
<td>Limit.</td>
</tr>
<tr>
<td>DEADBAND</td>
<td>Float</td>
<td>Deadband.</td>
</tr>
<tr>
<td>DELAY</td>
<td>Integer</td>
<td>Delay in seconds before the alarm state changes.</td>
</tr>
<tr>
<td>VALUE</td>
<td>Float</td>
<td>Current value.</td>
</tr>
<tr>
<td>STATE</td>
<td>Integer</td>
<td>State bitmask (1=Active, 2=Acked, 4=Suppressed, 8=Blocked, 16=Disabled).</td>
</tr>
<tr>
<td>TAGID</td>
<td>Integer</td>
<td>Id of the tag which is the source of the alarm.</td>
</tr>
<tr>
<td>NODE</td>
<td>Integer</td>
<td>Node on which the alarm lives (panel=0, module1 =1, etc..).</td>
</tr>
</tbody>
</table>

Table 3-4: Alarms filter- and sort-order keywords

Response

The response from the server is an XML-stream of the following layout:

```xml
<alarms totalcount="23" cacheid="1">
  <alarm id="1" tagid="2" node="1" name="PT6" text="Druk opnemer 6" desc="Some description" type="3" priority="10"
    timestamp="01-01-2007 00:00:00" activetime="01-01-2007 00:00:00"
    inactivetime="01-01-2007 00:00:00" ackedtime="01-01-2007 00:00:00"
    blockcount="0" limit="102.5" deadband="1.6"
    delay="10" value="201.89" state="9"/>
  ...
</alarms>
```

Figure 3-1: Alarms XML response

Only those fields are returned that were specified in the request.

Caching

The cacheid can be used to request new alarm data only when needed. When the cacheid is omitted, a fresh result is returned. The device keeps track of all changes to the alarms. When an alarm changes, the cacheid on the device is updated. When a request is made and the cacheid on the device is the same, then the following response is returned:
When the client receives the same cacheid as it sent to the device, it should use its last full result instead.

Archive

The archive web-service can be used to retrieve historical data. Historical data is stored in so-called archives and for each archive snapshots are created, either periodically or on batch-ends.

- To retrieve information about the contents of snapshots, see the /archives web service.
- When using the SQLite Database Storage System, snapshot data may also be retrieved through the /snapshots web service. This web service offers a JSON interface which is more suitable for processing by automated systems.

Request

Reading historical archives can be done by specifying “/archive” in the URL. The following arguments can be specified in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archive</td>
<td>Name of the archive for which the snapshots should be returned (e.g. “mod1_Hourly_Run”).</td>
</tr>
<tr>
<td>Name</td>
<td>Same as ‘Archive’. This argument was introduced in revision 1.4 for consistency reasons.</td>
</tr>
<tr>
<td>Start</td>
<td>Optional start-date/time for which snapshots should be returned. When the DateTimeFormat argument is specified, the specified date/time should be in that same format.</td>
</tr>
<tr>
<td>End</td>
<td>Optional start-date/time for which snapshots should be returned. When the DateTimeFormat argument is specified, the specified date/time should be in that same format.</td>
</tr>
<tr>
<td>Count</td>
<td>Optional argument (number) that specifies the maximum number of archives to return. It is preferred that this value is set to a reasonable value (e.g. max 32). When the device contains lots and lots of snapshots, the snapshots should be obtained through a series of requests, rather than a single big request. The maximum number of snapshots that can be requested is 100.</td>
</tr>
<tr>
<td>Skip</td>
<td>Optional argument (number) which specifies the number of snapshots to skip, given the search-direction. This argument can be used in conjunction with the Count-argument to for instance, read all the snapshots using multiple requests.</td>
</tr>
<tr>
<td>Ascending</td>
<td>Optional argument (0/1) that specifies the search-direction. When omitted, the result is returned in Descending order. Descending means, most recent first.</td>
</tr>
<tr>
<td>CacheID</td>
<td>Optional argument which can be used to request only the newly created snapshots since the last request.</td>
</tr>
<tr>
<td>Fields</td>
<td>Optional integer mask which specifies which fields to return for XML-output. When omitted only RecordCount and CacheID are returned. This field is ignored when the type is CSV or TXT.</td>
</tr>
<tr>
<td></td>
<td>0x00000001 Skip (Number of snapshots that were specified in the request, see Skip-argument)</td>
</tr>
<tr>
<td></td>
<td>0x00000002 MaxCount (Maximum number of snapshots that were specified in the request, see Count-argument).</td>
</tr>
<tr>
<td></td>
<td>0x00000004 Nr (Number of snapshots that have been created for the archive).</td>
</tr>
<tr>
<td></td>
<td>0x00000008 Count (Number of snapshots that have been returned by this request).</td>
</tr>
<tr>
<td></td>
<td>0x00000010 Ascending (Sort-order that was specified in the request, see Ascending-argument).</td>
</tr>
<tr>
<td></td>
<td>0x00000020 CacheID (Unique number that changes whenever a snapshot is added for the archive).</td>
</tr>
<tr>
<td></td>
<td>0x00000040 Changed (Returns ‘0’ or ‘1’ depending on whether a new archive snapshot was added, since the specified CacheID).</td>
</tr>
<tr>
<td>Resultmode</td>
<td>Optional string which specifies in what form snapshots are returned. When omitted the “listidsonly” mode below is chosen by default, unless “start” or “end” option are provided then the “full” option is chosen.</td>
</tr>
<tr>
<td></td>
<td>full Returns the full data for a snapshot. This is the same as the old behavior, before this option was introduced.</td>
</tr>
<tr>
<td></td>
<td>unconverted Returns the full data for a snapshot, but does not convert tag names to human readable strings.</td>
</tr>
<tr>
<td></td>
<td>listidsonly Returns only an ID for each snapshot.</td>
</tr>
<tr>
<td></td>
<td>countonly Returns only the number of snapshots.</td>
</tr>
<tr>
<td>Type</td>
<td>Optional type which specifies in which format the result is returned (e.g. XML, CSV, etc.). When omitted the result-data is returned as XML.</td>
</tr>
<tr>
<td></td>
<td>xml Returns the result as xml.</td>
</tr>
<tr>
<td></td>
<td>xmlstream Same as “xml”, except that when requested from a browser, “xmlstream” causes the result to be opened inside the browser rather than showing the “Save As” dialog.</td>
</tr>
<tr>
<td></td>
<td>csv Returns the result as a comma-separated-value file.</td>
</tr>
<tr>
<td></td>
<td>csvstream Same as “csv”, except that when requested from a browser, “csvstream” causes the result to be opened inside the browser rather than showing the “Save As” dialog.</td>
</tr>
<tr>
<td></td>
<td>txt Returns the result as plain text.</td>
</tr>
<tr>
<td></td>
<td>txtstream Same as “txt”, except that when requested from a browser, “txtstream” causes the result to be opened inside the browser rather than showing the “Save As” dialog.</td>
</tr>
<tr>
<td></td>
<td>json Returns the result as a JSON encoded object.</td>
</tr>
<tr>
<td></td>
<td>jsonstream Same as “json”, except that when requested from a browser, “jsonstream” causes the result to be opened inside the browser rather than showing the “Save As” dialog.</td>
</tr>
<tr>
<td>Language</td>
<td>Optional ID of the requested language (number). When omitted the default language will be used.</td>
</tr>
<tr>
<td>DateTimeFormat</td>
<td>Optional date/time format used for formatting date/time fields in the output. When omitted the default format of “YYYY/MM/DD hh:mm:ss” is used.</td>
</tr>
<tr>
<td>ShortTexts</td>
<td>Optional argument (0/1) that specifies whether tag-names should be returned as fully qualified names (e.g. “Meter Temperature 1”) or with their short-names (e.g. “Meter Temperature”).</td>
</tr>
</tbody>
</table>

Table 3-5: Archive request arguments
Example #1
Request: /archive?archive=mod1_Hourly_Run&count=18&type=csv
This request returns the 18 most recent archived snapshots for archive “mod1_hourly_run” in CSV-format.

Example #2
Request: /archive?name=mod1_Hourly_Run&count=18&skip=36
This request returns snapshots 37..55 for archive “mod1_hourly_run” in the default XML-format.

Example #3
Request: /archive?archive=mod1_Daily_Run&count=1&end=12/03/2011&datetimeformat=dd/mm/yyyy
This request returns the most recent ‘Daily-Run’ snapshot which was created before “12/03/2011”.

Example #4
Request: /archive?archive=mod1_Daily_Run&start=1/02/2011&end=1/03/2011&datetimeformat=dd/mm/yyyy
This request returns all ‘Daily-Run’ snapshot which was created in the month February.

Response
The response from the server is a stream of the following layout (example).

XML

```
<archive name="mod1_Hourly_Run" nr="2887" cacheid="1010">
  <snapshot timestamp="26/04/2012 01:59:55">
    <item name="Forward hourly gross volume prev" value="0.0" unit="m3" />
    <item name="Forward hourly mass prev" value="0.0" unit="kg" />
    <item name="Forward hourly base volume prev" value="0.0" unit="sm3" />
    <item name="Forward hourly energy prev" value="0.0" unit="GJ" />
    ...
  </snapshot>
  ...
</archive>
```

Figure 3-3: Archive XML response

TXT (Plain text)

```
Archive: mod1_Hourly_Run
Snapshot: 26/04/2012 01:59:55
Forward hourly gross volume prev: 0.0 m3
Forward hourly mass prev: 0.0 kg
...

Snapshot: 26/04/2012 00:59:53
Forward hourly gross volume prev: 0.0 m3
Forward hourly mass prev: 0.0 kg
...
```

Figure 3-4: Archive TXT response

CSV (Comma separated value)

```
Archive,mod1_Hourly_Run
Snapshot,26/04/2012 01:59:55
Forward hourly gross volume prev,0.0,m3
Forward hourly mass prev,0.0,kg
...

Snapshot,26/04/2012 00:59:53
Forward hourly gross volume prev,0.0,m3
Forward hourly mass prev,0.0,kg
...
```

Figure 3-5: Archive CSV response
Only those fields are returned that were specified in the request.
Archives

The archives web service offers information regarding the archives that are currently configured on the flow computer.

Request

Reading historical archives can be done by specifying “/archives” in the URL. The archives webservice does not accept any additional arguments.

Response

The response from the server is an XML-stream of the following layout (see Figure 3-6). This lists the archives currently configured on the flow computer. For each archive, the tags that will be recorded in a snapshot are given.

```
<?xml version="1.0" encoding="utf-8" ?>
<archives>
  <archive name="mod1_BatchRun">
    <item name="mod1_LM_Run!BATCH_NR_PRV" />
    <item name="mod1_LM_Run!BATCH_ID_PRV" />
    ...
  </archive>
  ...
</archives>
```

Figure 3-6: List of archives configured on a flow computer

Dashboard

The dashboard web-service is used to obtain basic Web UI information such as alarm indicator status, seal status, and the cacheid of the navigation tree. These components were integrated into a single web-service so that the Web-UI periodically only needs to call the service once.

Request

Obtaining the dashboard info can be done by specifying “/dashboard” in the URL. The following arguments can be specified in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Userkey</td>
<td>Optional Userkey. When specified, the Userkey is checked for validity. When not valid an optional entry is returned in the response indicating that the Userkey is not valid: &lt;security invaliduserkey=&quot;1&quot;/&gt;.</td>
</tr>
<tr>
<td>TimeFormat</td>
<td>Optional time-format. When omitted, the time is returned using the &quot;h:mm&quot; format.</td>
</tr>
</tbody>
</table>

Table 3-6: Dashboard request arguments

Response

The response from the server is an XML-stream of the following layout (example):

```
<dashboard signature="01/03/2010 11:19:55.860">
  <time val="10:24" />
  <device name="FQI-400" />
  <alarmindicator color="green" blink="0"
      activecount="5" unackedcount="2" activeunackedcount="6" />
  <seal locked="0" />
  <navigation cacheid="707" />
</dashboard>
```

Figure 3-7: Dashboard XML response

DeviceInfo

The deviceinfo web-service can be used to obtain basic status information of the flow computer. This web-service is typically used to check whether the flow computer is alive and what application/version it is running.
**Request**

Obtaining the deviceinfo can be done by specifying “/deviceinfo” in the URL. No additional arguments exist for this web-service.

**Response**

The response from the server is an XML-stream of the following layout (example):

```xml
<deviceinfo signature="17/09/2015 11:12:06.872">
  <version val="1.9.0.6254" brand="Spirit"/>
  <type val="FlowX-P2"/>
  <brand val="Spirit"/>
  <platform val="spirit1"/>
  <application_name val="Gas_Metric.xls"/>
  <application_version val="1.2.3.0"/>
  <application_datetime val="17/09/2015 10:57:16"/>
  <application_type val="FlowX-P1"/>
  <application_signature val="-264023790"/>
  <device_name val="FQI400"/>
  <locked val="0"/>
  <enclosure val="3"/>
  <paramsignature val="197883635"/>
  <spreadsheetsignature val="-421235412"/>
  <memusage val="56685100"/>
  <memavail val="39018496"/>
  <diskusage val="9.49"/>
  <cpu totaltime="26.72" kernaltime="0.00" usertime="26.72" curprocid="2933426862"/>
  <datetime val="30/09/2015 16:02:24"/>
  <uptime days="13" hours="4" minutes="51" seconds="55"/>
  <modules current="0">
    <module id="0" status="0" ident="FWVer=1.9.0.6254&BusSetup=3&AppType=FlowX-P2&AppVer=1.2.3.0&AppName=Gas_Metric.xls&AppSignature=-264023790&FWChecksum=0&FirstIP=10.0.101.240" platform="spirit1"/>
    <module id="1" status="0" ident="FWVer=1.9.0.6254&BusSetup=3&AppType=FlowX-P2&AppVer=1.2.3.0&AppName=Gas_Metric.xls&AppSignature=-264023790&FWChecksum=0&FirstIP=10.0.101.240" platform="spirit1"/>
  </modules>
</deviceinfo>
```

Figure 3-8: DeviceInfo XML response

**Framework**

The framework returns an XML structure which contains information for displaying the Web-UI. Includes is, supported languages, common language texts, alarm-states.

**Request**

The framework can be obtained by specifying the “/framework in the URL. The framework web-service is actually not a real web-service but merely a reference to files on the flow computer. For each languages that is configured a framework xml-file exists. To obtain such a file append ‘/<languageid>.xml’ to the URL. For instance, to obtain the framework data for language 1 use: “/framework/1.xml”.

**Response**

The response from the server is an XML-stream of the following layout:

```xml
<framework
  labeluser="User"
  labelpassword="Password"
  labellogout="Logout"
```
labellogin="Login"
labelcurrent="Current"
labelnew="New"
labelrestartreq="The device needs to be restarted in order for the change to take effect"
datetimeformat="dd/mm/yy hh:mm:ss"
clocktimeformat="hh:mm"
autologofftimeout="3600"
homelocation="/"
alarmlocation="/207/"
alarmacklevel="1000"
seallockevel="1000"
alarmledvisible="1"
reportprintlevel="500"
reportsavelevel="500"
loginrequired="0"
direction="ltr"
title="Flow-X/P (Panel) – Gas Metric.xls"
displaydevicename="1"
displayfulldatetimeonweb="0" >
<languages count="3" >
    <language id="1" image="images/flags/english.png" name="English" />
    <language id="2" image="images/flags/dutch.png" name="Nederlands" />
    <language id="3" image="images/flags/chinese.png" name="ㄎㄉㄑ" />
    ...
</languages>
<alarmstates count="3" >
    <state mask="16" value="16" forecolor="#000000" backcolor="#808080" blink="0" />
    <state mask="9" value="8" forecolor="#FFFFFF" backcolor="#00C000" blink="0" />
    <state mask="3" value="1" forecolor="#000000" backcolor="#FF0000" blink="1" />
    ...
</alarmstates>
<texts>
    <text name="user" value="Username" />
    <text name="password" value="password" />
    <text name="ackall" value="Ack All" />
    ...
</texts>
</framework>

Figure 3-9: Framework XML response

Languages

The languages web-service can be used to obtain the supported languages and/or the language texts for each language.

Request

Obtaining the language data can be done by specifying "/languages" in the URL. The following arguments can be specified in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Type of data to request. When omitted, all language data is returned, including the languages and the texts.</td>
</tr>
<tr>
<td>1</td>
<td>Returns both the languages and the texts.</td>
</tr>
<tr>
<td>2</td>
<td>Returns the languages only.</td>
</tr>
<tr>
<td>3</td>
<td>Returns the texts only.</td>
</tr>
<tr>
<td>Language</td>
<td>ID of the requested language (number). When omitted, all language data is returned.</td>
</tr>
</tbody>
</table>

Table 3-7: Languages request arguments

Response

The response from the server is an XML-stream of the following layout (example):
Type = 1

```xml
<multilingual>
  <languages>
    <language id="1" name="English" />
    <language id="2" name="Nederlands" />
    ...
  </languages>
  <texts>
    <text key="tag.gv_inc" L1="Gross vol increment" />
    <text key="tag.comp2_c2cur" L1="Ethane in use" L2="Ethaan in gebruik" />
    ...
  </texts>
</multilingual>
```

Figure 3-10: Language XML response (Type 1)

Type = 2

```xml
<languages>
  <language id="1" name="English" />
  <language id="2" name="Русский" />
  ...
</languages>
```

Figure 3-11: Language XML response (Type 2)

Type = 3

```xml
<texts>
  <text key="tag.gv_inc" L1="Gross vol increment" />
  <text key="tag.comp2_c2cur" L1="Ethane in use" L2="Ethaan in gebruik" />
  ...
</texts>
```

Figure 3-12: Language XML response (Type 3)

Note that only those texts are returned that exist. For instance, if a language is defined (2 = Dutch) and a translation exists for a certain text, then an attribute “L2” is returned containing the translation.

Logs

The logs web-service returns the event-log.

Request

Reading log-entries can be done by specifying “/logs” in the URL. The following arguments can be specified in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>Optional number containing the maximum number of items to return. When omitted, returns all items matching the query.</td>
</tr>
<tr>
<td>ChronDir</td>
<td>Indicates direction of search: if set, search is performed in chronological direction (from old towards more recent items). If set to “0” or omitted, search is performed in anti-chronological direction (from recent towards older items).</td>
</tr>
<tr>
<td>Time</td>
<td>Optional string containing timespan specification to match log-entries against. Only log-entries within the timespan will be returned, separate from content-filtering (described hereafter). The string may be of the form</td>
</tr>
<tr>
<td>Filter</td>
<td>Optional string containing a filter expression (e.g.</td>
</tr>
<tr>
<td>Module</td>
<td>Optional string containing a filter expression for filtering on specific modules (e.g. &quot;</td>
</tr>
<tr>
<td>Fields</td>
<td>Optional Integer mask which specifies the fields to return. When omitted only the timestamp and text are returned: 0x0001 Timestamp, 0x0002 Text in the requested language, 0x0004 Location (string), 0x0008 Module ID (number).</td>
</tr>
<tr>
<td>Argument</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
</tr>
<tr>
<td>0x0010</td>
<td>Log tags (snapshot of tag values when entry was created).</td>
</tr>
<tr>
<td>0x0020</td>
<td>The unique id of the current log entry, the unique id of the previous log entry, the sequential number and the random noise used for unique id generation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Language</th>
<th>Optional ID of the requested language (number). When omitted the default language is used.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iterator</td>
<td>String indicating the result-window (startitem..enditem) of the last search-operation; to the user, this is an ‘anonymous’ string, resulting from a previous search operation. A search operation continues from the position indicated by the specified iterator, if present; if missing, search is started at either the most recent or oldest item in the log, according to the ‘ChronDir’ field.</td>
</tr>
</tbody>
</table>

| Userkey | This is the user key of the user currently logged on. The server is aware of its user level and therefore will only return allowed data. |

Table 3-8: Logs request arguments

The following keywords can be used in the filter-argument:

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOC</td>
<td>String</td>
<td>Location-string from the actual log-entry.</td>
</tr>
<tr>
<td>SEV</td>
<td>Integer</td>
<td>Severity-indicator; see following table for more information.</td>
</tr>
<tr>
<td>TEXT</td>
<td>String</td>
<td>Translated text, according to the Language-field in the request.</td>
</tr>
</tbody>
</table>

Table 3-9: Logs filter keywords

The following keywords can be used in the module-argument:

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODULE</td>
<td>Integer</td>
<td>ID of the module.</td>
</tr>
</tbody>
</table>

Table 3-10: Logs module keywords

The following severity constants can be used in combination with the “SEV” keyword:

<table>
<thead>
<tr>
<th>Constant</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBUG</td>
<td>Severity: debug-messages (lowest priority).</td>
</tr>
<tr>
<td>INFO</td>
<td>Severity: informational messages.</td>
</tr>
<tr>
<td>WARNING</td>
<td>Severity: warnings.</td>
</tr>
<tr>
<td>ERROR</td>
<td>Severity: errors.</td>
</tr>
<tr>
<td>FATAL</td>
<td>Severity: fatal errors (highest priority).</td>
</tr>
</tbody>
</table>

Table 3-4: Logs severity constants

The severity-constants are listed in ascending order, and have operators ‘<’ and ‘>’, ‘<=" and ‘>=" defined.

**Example #1**

/logs?Time=01-07-2010 16:00:00|01-08-2010 00:00:00

Returns all events of the specified period, e.g.

- `<log time="01/07/10 16:11:02" text="Flow rate hi alarm changed from Normal to Alarm" />`
- `<log time="01/07/10 16:11:02" text="Parameter Flow rate hi limit was changed from 1000000 to -1 by a (5000)" />`
- `<log time="01/07/10 16:10:50" text="Parameter Station totals and rates was changed from Disabled to Enabled by a (5000)" />`
- `<log time="01/07/10 16:10:45" text="User a (Touchscreen) has logged in" />`

**Example #2**

/logs?Filter=text like "parameter"

Returns all events which start with the word ‘parameter’.

- `<log time="01/07/10 16:11:02" text="Parameter Flow rate hi limit was changed from 1000000 to -1 by a (5000)" />`
- `<log time="01/07/10 16:10:50" text="Parameter Station totals and rates was changed from Disabled to Enabled by a (5000)" />`

**Example #3**

/logs?Time=01-01-2013 01:00:00|01-02-2013 00:00:00&Filter=loc like "parchanged"

Returns all parameter changes of January 2013

**Response**

The response from the server is an XML-stream of the following layout:
Figure 3-13: Logs XML response

The ‘EndReached’ flag (either ‘0’ or ‘1’) indicates the last search hit the end of the log (corresponding to the specified search direction). Only those fields are returned that were specified in the request.

The ‘Version’ flag indicates the current version of the web service. The version will be increased each time any modifications to the service’s public interface are made.

Navigation

The navigation web-service returns the whole navigation tree of the application depending on the user-level and language.

Request

Obtaining the navigation structure can be done by specifying “/navigation” in the URL. The following arguments can be specified in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fields</td>
<td>Optional integer mask which specifies the special fields to return. When omitted, no special fields are returned.</td>
</tr>
<tr>
<td></td>
<td>0x0000</td>
</tr>
<tr>
<td></td>
<td>0x0001</td>
</tr>
<tr>
<td>Userkey</td>
<td>This is the user key of the user currently logged on. The server is aware of its user level and therefore will only return the pages applicable for the current user. When omitted, the navigation tree is returned that is visible to not logged in users.</td>
</tr>
<tr>
<td>Language</td>
<td>Optional ID of the requested language (number). When omitted the default language is used. The specific language-texts are returned in the “text” attributes as seen below in the XML stream.</td>
</tr>
</tbody>
</table>

Table 3-11: Navigation request arguments

Response

The response from the server is an XML-stream of the following layout (example):

```xml
<navigation cacheid="56" >
  <folderpage
    id="1" name="home"
    text="Thuis" location="Thuis" icon="page" />
  <alarmpage
    id="2" name="alms"
    text="Alarmen" location="Alarmen" icon="alarms"
    filter="( ACTIVE OR NOT(ACKED) ) AND NOT(DISABLED) AND NOT(SUPPRESSED)"
```
sortorder="STATE, ACTIVETIME DESC, TEXT" />

<tagpage
  id="4" name="str1"
  text="Stroom 1" location="Location" icon="tags"
  shorttexts="1" tags="1,2,3,4,5" count="5" />

<reportpage
  id="5" name="rep"
  text="Report 1" location="Report 1" icon="reports"
  shorttexts="1" mod="-1" type="-1:"
>

<logpage
  id="6" name="log"
  text="Logs" location="Logs" icon="logs"
  filter="1"
>
</navigation>

Figure 3-14: Navigation XML response

Note: icon will always be at "<web-server>/data/icons/<icon>.png".

Folder-pages are hierarchical which means that any page-type can be placed under a folderpage. The following example shows a hierarchy of pages. Attributes have been omitted for clarity of the example:

<navigation cacheid="56" >
  <folderpage id="1" name="page1" />
  <folderpage id="2" name="page2" />
  <folderpage id="3" name="nested page" >
    <tagpage id="4" name="tagpage" />
    <folderpage id="5" name="nested page 2" >
      <logpage id="6" name="logpage" />
    </folderpage>
  </folderpage>
</navigation>

Figure 3-15: Navigation-hierarchy XML response

Caching
The cacheid indicates the number of times the navigation tree has been changed. The navigation tree is dependent on parameters and therefore when a parameter is changed, the navigation tree may change as well.

The “/dashboard” web-service can be used to check whether the navigation-tree has changed. It returns the cacheid of the navigation tree, and when that returned cacheid differs from the cached, then the navigation tree must be reloaded. See the Dashboard web-service for further reference.

Perfcounters
This web service provides system specific diagnostic data, such as detailed cycle-time statistics.

Request
Getting the performance counters can be done by specifying “/perfcounters” in the URL. The performance counters are in fact a tree of subsystems, and each sub-system has its own performance counters. When plain “/perfcounters” is specified on the URL, the counters of all sub-systems are returned. By specifying the name of the sub-system (e.g. “/perfcounters/comm”) it is possible to drill down to only that sub-system.
The following arguments can be specified in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counter</td>
<td>Optional name of the counter(s) to filter on. The filter can contain wildcards '*' and '?'.</td>
</tr>
</tbody>
</table>

Table 3-12: Perfcounters request arguments

**Example #1**

```
/perfcounters
```

Returns all performance counters.

**Example #2**

```
/perfcounters/spreadsheet
```

Returns all performance counters for the spreadsheet sub-system.

**Example #3**

```
/perfcounters?counter=*lastcycletime
```

Returns all performance counters which end with the name “lastcycletime” for all sub-systems.

**Response**

The response from the server is an XML-stream of the following layout:

```xml
<counters n="">
  <counters n="system">
    <c n="MaxCycleTime" v="1.3959" u="ms"/>
    <c n="DiskUsage" v="6.98" u="%"/>
    <c n="LastCycleTime" v="133.5266" u="ms"/>
    ...
  </counters>
  ...
</counters>
```

Figure 3-16: Perfcounters XML response

**Print**

The print web-service gives access to printing reports on the flow computer.

**Request**

Reading reports can be done by specifying “/print” in the URL. The following arguments can be specified in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report</td>
<td>Instance-name of the archived-report (e.g. &quot;1:Run_Daily-1.20100623.fxr&quot;). The instance-name of a report can be obtained through the “/reports” web-service. The instance-name consists of the module-id and the file-name of the report (&lt;mod&gt;:&lt;file&gt;).</td>
</tr>
<tr>
<td>Printer</td>
<td>Optional name of the printer to be used for printing. When omitted, the default printer that was specified for the report is used.</td>
</tr>
<tr>
<td>Userkey</td>
<td>Required Userkey of the logged on user.</td>
</tr>
</tbody>
</table>

Table 3-13: Print request arguments

**Response**

No XML-stream is returned for this request.

**Report**

The report web-service returns a report from the device.

**Request**

Reading a manual report can be done by specifying “/report” in the URL. The following arguments can be specified in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Format-type to return the report in (default “fxr”).</td>
</tr>
<tr>
<td></td>
<td>fxr</td>
</tr>
</tbody>
</table>

Table 3-14: Report request arguments
### Reports

This reports web-service allows for getting a list of the existing reports on the device.

### Request

Reading a manual report can be done by specifying “/reports” in the URL. The following arguments can be specified in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
</table>
| Filter   | Optional filter which specifies which reports to return. Syntax: 
<mod>[:<filter>]
| Count    | Optional maximum number of reports to return (default 20). The number of reports returned by a single request is limited to 100 reports. |
| Skip     | Optional parameter to specify the position of the returned list of reports in the list of existing reports. This must be a string representing the date and time of the first or last report in the returned list. By default, the current time is used. |
| Before   | Optional parameter to specify the meaning of the time specified by “skip”, default is 0. 0: reports created AFTER that time will be returned 1: reports created BEFORE that time will be returned |
| DateTimeFormat | Optional date/time format to use for the reports (default “YYYY/MM/DD hh:mm:ss”). |
| Language | Optional ID of the requested language (number). When omitted the default language is used. |

#### Example #1

Request: `/reports?filter="Daily"`

This request retrieves all reports with the word “Daily” in its name, e.g.

```xml
<report time="2010/07/01 16:00:00" file="Daily-0.20100701160000.fx" mod="0" />
<report time="2010/07/01 16:00:00" file="Daily-0.20100701160000.fx" mod="0" />
<report time="2010/07/01 15:00:00" file="Daily-0.20100701150000.fx" mod="0" />
<report time="2010/07/01 15:00:00" file="Daily-0.20100701150000.fx" mod="0" />
<report time="2010/07/01 14:00:00" file="Daily-0.20100701140000.fx" mod="0" />
```

#### Example #2

Request: `/reports?count=20&skip=now`

This request retrieves 20 last reports. It is equivalent to simply /reports.

#### Example #3

Request: `/reports?skip=2011/08/12 14:46:59&before=0&count=5`

This request retrieves 5 oldest reports generated after 2011/08/12 14:46:59.

### Response

The response from the server is an XML stream of the following layout (example):
<report xml:prefix="x" time="2011/08/12 14:46:59" file="Snapshot-1.20110812144659.fxr" mod="1" text="Snapshot"/>
<report time="2011/08/12 14:46:56" file="Snapshot-1.20110812144656.fxr" mod="1" text="Snapshot"/>
<report time="2011/08/12 14:46:54" file="Snapshot-1.20110812144654.fxr" mod="1" text="Snapshot"/>
<report time="2011/08/12 14:46:52" file="Snapshot-1.20110812144652.fxr" mod="1" text="Snapshot"/>
<report time="2011/08/12 14:46:49" file="Snapshot-1.20110812144649.fxr" mod="1" text="Snapshot"/>
</reports>

Figure 3-17: Reports XML response

The following values are returned:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oldest</td>
<td>Oldest existing report matching the filter.</td>
</tr>
<tr>
<td>Latest</td>
<td>Latest existing report matching the filter.</td>
</tr>
<tr>
<td>First</td>
<td>First (by time; last by position) report in the returned list. Not available when the list is empty.</td>
</tr>
<tr>
<td>Last</td>
<td>Last (by time; first by position) report in the returned list. Not available when the list is empty.</td>
</tr>
<tr>
<td>Skip</td>
<td>Repeats the request parameter &quot;skip&quot;</td>
</tr>
<tr>
<td>Before</td>
<td>Repeats the request parameter &quot;before&quot;</td>
</tr>
<tr>
<td>Count</td>
<td>Number of returned reports</td>
</tr>
<tr>
<td>Time</td>
<td>Time when the report was generated</td>
</tr>
<tr>
<td>File</td>
<td>File id to be used to retrieve or print the report</td>
</tr>
<tr>
<td>Mod</td>
<td>Id of the module where the report is stored</td>
</tr>
<tr>
<td>Text</td>
<td>Display text (depends on the selected language)</td>
</tr>
</tbody>
</table>

Table 3-16: Reports response values

Security

The Security web-service handles login and logout operations. After a user logs in, a user-key is returned which can be used in requests to other web-services.

Request

Authentication can be done by specifying "/security" in the URL. The following arguments can be specified in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>Action to perform: &quot;login&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;logout&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;verify&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;autologin&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;downloadconfig&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;uploadconfig&quot;</td>
</tr>
<tr>
<td>Username</td>
<td>This is the username of the user (required when action=&quot;login&quot;).</td>
</tr>
<tr>
<td>Password</td>
<td>This is the password of the user (required when action=&quot;login&quot;).</td>
</tr>
</tbody>
</table>
| Userkey     | Existing user-key currently in use by the web-application. This argument is required when action="logout" or "verify" or "uploadconfig".

Table 3-17: Security request arguments

Response

The response from the server is an XML-stream of the following layout:

Action = Login/Autologin

```xml
<user
  authenticated="1"
  userlevel="1000"
```
userkey="uazeicOAc2UA"
username="Operator"
message="User has successfully logged in"

Figure 3-18: XML response when login is successful

Or

<user
    authenticated="0"
    userlevel="0"
    username="Guest"
    message="Access denied (invalid username/password)"
/>  

Figure 3-19: XML response when login has failed

Action = Logout

<user
    authenticated="0"
    userlevel="0"
    username="Guest"
/>  

Figure 3-20: XML response when logging off

Action = Verify

<user
    authenticated="1"
    userlevel="30"
    username="Admin"
/>  

Figure 3-21: XML response when user-key was successfully verified

Or

<user
    authenticated="0"
    userlevel="0"
    username="Guest"
    message="Invalid userkey specified (it may have expired)"
/>  

Figure 3-22: XML response when verification of user-key failed

Action = downloadconfig

<security version="3">
    <users>
        <u n="a" fn="Test development user" pw="$spirit-sha512$..." pin="$spirit-sha512$..." l="20000" />
        <u n="admin" fn="Administrator" pw="$spirit-sha512$..." pin="$spirit-sha512$..." l="5000" />
        <u n="operator" fn="System Operator" pw="$spirit-sha512$..." pin="$spirit-sha512$..." l="1000" />
    </users>
    <levels>
        <paramseallock v="1000" />
        <printreports v="1000" />
        <readapplication v="-1" />
        <writeapplication v="20000" />
    </levels>
</security>
Snapshots

The snapshots web-service can be used to retrieve historical data and is a replacement for the /archive web-service. The main difference is another way of addressing snapshots: snapshots are addressed by their unique identifiers (strings) rather than by their timestamps. This is more convenient for automated downloading and processing of snapshots from the flow computer, albeit less human readable. The advantage is that it is known exactly which snapshots have been retrieved, and which are not. This allows for automatic retrieval of snapshots without the risk of either duplicate or missing snapshots.

Notes
1. This web-service does not support on-the-fly translation of tag names. I.e. this web service returns snapshot data using tag names, rather than the tag descriptions. Should user need such a translation, tag names must be translated after downloading snapshots.
2. This web-service does not support Old style archives. Only SQLite type archives can be retrieved from this web-service.

Request

Reading historical archives can be done by specifying “/snapshots” in the URL. The following optional arguments can be specified in the query string:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>archive</td>
<td>String specifying the name of the archive for which the snapshots should be returned (e.g. “mod1_Hourly_Run”). When omitted, snapshots of all archives will be returned. When the archive cannot be found, the web server will return a “HTTP 404 not found” response.</td>
</tr>
<tr>
<td>ascending</td>
<td>Number specifying the search-direction. Must be either ‘1’ or ‘0’. When ‘1’, the result is returned in ascending order (oldest first). When ‘0’, the result is returned in descending order (most recent first). When the given value cannot be converted to either a ‘1’ or a ‘0’, the web server will return a “HTTP 400 Bad Request” response. The default value for this parameter is ‘1’.</td>
</tr>
<tr>
<td>count</td>
<td>Number specifying the maximum number of snapshots to return per request. This value must be between 0 and 100, inclusive. If the value is less than 0, or greater than 100, the web server will return a “HTTP 400 Bad Request” response.</td>
</tr>
<tr>
<td>iterator</td>
<td>String specifying the unique identifier of the newest snapshot already retrieved by the client. Only snapshots created after (or before, depending on the value of the ascending parameter) that snapshot will be returned. The snapshot with the given iterator is not returned. If no snapshot can be found with the given unique identifier, the web server will return a “HTTP 404 not found” response. If the iterator does not follow the correct format, the web server will return a “HTTP 400 Bad Request” response.</td>
</tr>
</tbody>
</table>
| type    | Type specifying the format that the result is returned in. This must be one of the following formats: 
|          | json Returns the result as a JSON encoded object.
|          | jsonstream Same as ‘json’, except that when requested from a browser, ‘jsonstream’ causes the result to be opened inside the browser rather than showing the “Save As” dialog. If the requested type is not one of the supported formats, the web server will return a “HTTP 400 Bad Request” response. The default value for this parameter is ‘jsonstream’. |

Response

The response from the server is a stream of the following layout (example).

```json
{
  "version" : "1.0.0",
  "uuid" : "0123456789ABCDEF0123456789ABCDEF01234567",
  "timestamp" : "2003-01-01 00:00:00",
  "name" : "tag_name",
  "id" : 1,
  "archive" : "mod1_Daily_Run",
}```
Figure 3-24: Snapshots JSON response

The following is a brief overview of the fields that can be returned for each snapshot.

<table>
<thead>
<tr>
<th>Section</th>
<th>Field</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta data</td>
<td>version</td>
<td>Introduced in Flow-Xpress 2.0. Indicates the format of the snapshot entry. If changes are made to the layout, the version number will updated to reflect this. The version number is stored per snapshot entry.</td>
</tr>
<tr>
<td></td>
<td>uuid</td>
<td>Universally unique identifier for this snapshot. This can be used to uniquely identify any snapshot generated by any Flow-X flow computer.</td>
</tr>
<tr>
<td></td>
<td>timestamp</td>
<td>The date and time that the snapshot was generated. Note: This field is provided for convenience only, and mirrors the “ts” field in the snapshot. Always prefer to use the “ts” field, as that field is covered by the snapshot’s UUID and is therefore traceable.</td>
</tr>
<tr>
<td></td>
<td>name</td>
<td>The “name” of the snapshot. This is the value of the tag that is configured in Flow-Xpress as the archive’s id tag.</td>
</tr>
<tr>
<td></td>
<td>id</td>
<td>The id field is the internal database id of the snapshot. This field gives an indication of how many snapshots (in total over all archives) the flow computer has created since the last time the “Clear archives” command was issued.</td>
</tr>
<tr>
<td></td>
<td>archive</td>
<td>The name of the archive to which this snapshot belongs.</td>
</tr>
<tr>
<td>Snapshot</td>
<td>PN</td>
<td>The Product Number of the flow computer that generated this snapshot.</td>
</tr>
<tr>
<td></td>
<td>SN</td>
<td>The Serial Number of the flow computer that generated this snapshot.</td>
</tr>
<tr>
<td></td>
<td>rnd</td>
<td>A random number, which is used to guarantee that every snapshot can be uniquely identified, even if all tag values would be the same (see uuid above).</td>
</tr>
<tr>
<td></td>
<td>ts</td>
<td>The date and time that the snapshot was generated. The values in the snapshot represent the state of the tags at this moment in time.</td>
</tr>
<tr>
<td>Tags</td>
<td>-</td>
<td>For each tag in the archive there will be an object in the snapshot’s “tags” field. The key of each tag object represents the name of the tag. E.g. “mod1_LU_Run!API_OBS_DYAVG_FWD_PRV” : { “v” : 136.88 }. Note that the tag object may omit fields which are not applicable. E.g. when the tag’s value is empty, the “v” (value) field will be omitted.</td>
</tr>
<tr>
<td></td>
<td>u (optional)</td>
<td>A string representing the unit of the tag as configured in the flow computer. E.g. “sm3” or “mbar_d”. Omitted when no unit was configured for the tag.</td>
</tr>
<tr>
<td></td>
<td>v (optional)</td>
<td>The value of the tag. Depending on the data type that has been configured for the tag this may be a natural number, a string, or some other datatype. Omitted when the tag value is empty.</td>
</tr>
</tbody>
</table>

Examples

Example #1
Request: /snapshots
This request returns at most 100 snapshots (the default value for “count”), sorted by oldest first. Snapshots are returned from all archives.

Example #2
Request: /snapshots?archive=mod1_Batch
This request returns at most 100 snapshots (the default value for “count”) from archive “mod1_Batch”, sorted by oldest first.

Example #3
Request: /snapshots?count=10
This request returns at most 10 snapshots, sorted by oldest first. Snapshots are returned from all archives.

Example #4
Request: /snapshots?ascending=0
This request returns at most 100 snapshots (the default value for “count”), sorted by newest first. Snapshots are returned from all archives.
Example #5
Request: /snapshots?iterator=0123456789ABCDEF0123456789ABCDEF01234567
This request returns at most 100 snapshots (the default value for “count”, sorted by oldest first, starting after the snapshot with the given iterator. Snapshots are returned from all archives.

Example #6
Request: /snapshots?archive=mod1_Batch&count=10&ascending=0&iterator=0123456789ABCDEF0123456789ABCDEF01234567
This request returns at most 10 snapshots from archive “mod1_Batch”, sorted by newest first, starting after the snapshot with the given iterator.

Working with the /snapshots service
Uniquely identifying snapshots
When using the /snapshots web service, each snapshot can be uniquely identified, even among different applications and flow computers using the snapshot’s UUID. This works as follows. The UUID is calculated by taking the SHA1 hash over the contents of the object in the snapshot field in the JSON output. Each snapshot contains a number of fields to ensure that each snapshot will generate a unique hash value; even if all the tag values in the snapshot are identical. The most important field to mention is the “rnd” field, which contains a sequence of random data. This helps to ensure that even two snapshots taken on the same flow computer (PN/SN combination) at the same time with the same tag values can be distinguished from one another.

Retrieving all snapshots from a flow computer
In order to retrieve the full set of snapshots stored on a flow computer, start by simply requesting the /snapshots web service with no parameters. Optionally, you may specify the name of an archive to retrieve only snapshots belonging to a specific archive. See Example #1 or Example #2. This will return the first set of snapshots. After this initial request you can use the UUID of the last snapshot that was returned as the “iterator” parameter for the next request. See Example #5. This process can be repeated until a request returns an empty list (“[]”), indicating no snapshots newer than the snapshot with the given UUID exist.

Monitoring for new snapshots
You can monitor for new snapshots by requesting only snapshots newer than a given snapshot UUID, as per the previous section. Since snapshot UUIDs are stable, the web service will return the empty list as long as no new snapshots have been created.

Retrieving snapshots in a multi-module set up
The /snapshots web service operates on a per-module basis. It is therefore not possible to retrieve snapshots from a different module. In order to retrieve snapshots from a multi-module set up you need to retrieve the snapshots from each module individually.

Tags
Tags encompass all values that are externally readable and writable. These include communication tags, parameters and system settings.

Request
Reading tags can be done by specifying “/tags” in the URL. The following arguments can be specified in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFilter</td>
<td>Optional string argument containing the ID’s of the requested tags. Multiple ID’s can be separated using a comma-character. A range of ID’s can be specified using the dash-character (e.g. “1,2,3-5,80-100”). When omitted all tags are returned.</td>
</tr>
<tr>
<td>Filter</td>
<td>Optional string argument for filtering out tags. It can be the name of a predefined set of tags or a custom filter expression (e.g. “(ID &lt; 100) AND (LEVEL = 100)”). This argument is ignored when IDFilter is specified. Supported predefined sets are: “params” Returns all parameters. “writable” Returns all tags that are writable. “local” Returns all tags that are located on the module being queried.</td>
</tr>
<tr>
<td>Units</td>
<td>Optional string argument for obtaining tags in a specific unit (only applicable when IDFilter is specified). Multiple units can be separated using a comma-character (e.g. “16892156,0.,13849028”). The position of the unit in the comma-separated string corresponds to the tag at the same position in the IDFilter string.</td>
</tr>
<tr>
<td>Formats</td>
<td>Optional string argument for obtaining tags formatted with a specific format (only applicable when IDFilter is specified). Multiple formats can be separated using a comma-character (e.g. “%M:4wMA==, %yM”). The position of the format in the comma-separated string corresponds to the tag at the same position in the IDFilter string. The format (e.g. “##.##”) is BASE64 encoded. This is necessary so that it can be encoded safely in a comma-separated string which is to be placed in an URL.</td>
</tr>
<tr>
<td>Fields</td>
<td>Optional integer mask which specifies which fields to return. When omitted the ID, value, name, unit and text are returned. Instead of an integer mask it is also possible to specify the string “all” which returns all fields.</td>
</tr>
<tr>
<td>ID</td>
<td>(ID's of the requested tags).</td>
</tr>
<tr>
<td>Name</td>
<td>Name as configured in the application.</td>
</tr>
<tr>
<td>Text</td>
<td>Text in the requested language.</td>
</tr>
<tr>
<td>Multi-lingual text key</td>
<td>Multi-lingual text key (e.g. “%tag.pt1% 1”).</td>
</tr>
<tr>
<td>Units</td>
<td>(e.g. “kg/s”).</td>
</tr>
</tbody>
</table>
## Table 3-19: Tags request arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00000020</td>
<td>Unit-ID (e.g. “16802891”, see Units web-service). If the Unit-ID = 16777218, the tag is considered a text-value and should be edited through a regular keyboard. In all other cases the value should be edited through a numerical keypad.</td>
</tr>
<tr>
<td>0x00000040</td>
<td>Description (description in the requested language).</td>
</tr>
<tr>
<td>0x00000080</td>
<td>Multi-lingual description-key (e.g. “tagdesc.pt1”).</td>
</tr>
<tr>
<td>0x00000100</td>
<td>Address (e.g. “Sheet1!B7”)</td>
</tr>
<tr>
<td>0x00000200</td>
<td>Value.</td>
</tr>
<tr>
<td>0x00000400</td>
<td>Format (e.g. “#.##”)</td>
</tr>
<tr>
<td>0x00000800</td>
<td>Writable level (-1=not externally writable, 0=required level for writing to the tag/parameter).</td>
</tr>
<tr>
<td>0x00001000</td>
<td>Writable flag (0=not writable, 1=writable)</td>
</tr>
<tr>
<td>0x00002000</td>
<td>Default tag-value (used for auto-reset tags).</td>
</tr>
<tr>
<td>0x00004000</td>
<td>Node-Id on which the tag lives (panel=0, module1=1, etc..).</td>
</tr>
<tr>
<td>0x00008000</td>
<td>Auto-reset flag (0=regular tag, 1=auto-reset tag).</td>
</tr>
<tr>
<td>0x00100000</td>
<td>Retentive flag (0=not retentive, 1=retentive)</td>
</tr>
<tr>
<td>0x00000001</td>
<td>Prevents the value from being formatted in any way (see ‘RawValues’ argument below).</td>
</tr>
<tr>
<td>0x00000002</td>
<td>Returns the XML-tags in compact form (e.g. &lt;t&gt; instead of &lt;tag&gt;).</td>
</tr>
<tr>
<td>0x00000004</td>
<td>Includes an index attribute for all requested tags.</td>
</tr>
<tr>
<td>0x00000008</td>
<td>Returns the configuration signature of the tags (the value of the tag is not included in this signature). This value is useful for detecting whether the tags configuration has changed.</td>
</tr>
<tr>
<td>0x00000010</td>
<td>Returns the configuration signature of all the parameter-tags (the value of the parameter is not included in this signature).</td>
</tr>
<tr>
<td>0x00000020</td>
<td>Returns the start date/time of the tags-subsystem. This value is useful for detecting whether the device has been restarted which causes the ‘cacheds’ to be reset.</td>
</tr>
<tr>
<td>0x00000040</td>
<td>Prevents conversion of enumeration values to their textual form. E.g., when specified, returns ‘1’ instead of ‘Enabled’.</td>
</tr>
<tr>
<td>0x00000001</td>
<td>Optional integer mask which specifies additional options.</td>
</tr>
<tr>
<td>0x00000002</td>
<td>Returns the value in its raw form, and no unit-conversion, enumeration-translation, number-formating or date/time formatting is performed. Using ‘RawValues=1’ is the equivalent to enabling bit 0x00000001 in the ‘options’ field.</td>
</tr>
</tbody>
</table>

### Response

The response from the server is an XML-stream of the following layout (example):

```xml
<tags cacheid="32" />
<tag
  index="0"
  id="10"
  name="mod3_mysheet!PT"
  text="Druk opnemer 3"
  shorttext="Druk opnemer"
  desc="Put your description here"
  unit="kg/s"
  unitid="16890281"
  format="#.##"
  address="mod3_mysheet!B17"
  value="6.7899"
  default="100"
  level="1000"
  writable="1"
  autoreset="1"
  retentive="0"
  node="3"
  min="-1000"
  max="1000"
/>
...</tags>
```

Figure 3-25: Tags XML response
Only those fields are returned that were specified in the request.

The cacheid can be used to request new tag data only when needed. When the cacheid is omitted, a fresh result is returned. The cacheid is in fact a very large counter. When a request is made and a cacheid is specified, only the changed tags since the previous cacheid are returned. This makes it possible to efficiently poll the tags on the device.

**Example #1**

**Request:** /tags?idfilter=1,2,3&cacheid=600

**Response:**

```xml
<tags cacheid="605">
  <tag id="1" value="109" />
  <tag id="3" value="66" />
</tags>
```

Figure 3-26: Alarms XML response (example 1)

In the response above, tag 2 is not included because it has not changed since cacheid 600.

**Example #2**

**Request:** /tags?idfilter=1,2,3&cacheid=100

**Response:**

```xml
<tags cacheid="605">
  <tag id="1" value="109" />
  <tag id="2" value="54.6" />
  <tag id="3" value="66" />
</tags>
```

Figure 3-27: Alarms XML response (example 2)

In the response above, all tags are included because they have all changed since cacheid 100.

**Example #3**

**Request:** /tags?idfilter=1,2,3&cacheid=605

**Response:**

```xml
<tags cacheid="610">
</tags>
```

Figure 3-28: Alarms XML response (example 3)

In the response above, no tags are included because they have not changed since cacheid 605. Note that a new cacheid has been returned, this is because other tags have been changed. The client should always use the last returned cacheid for new requests. This is important so that the device can handle the request in the most efficient way possible.

**Units & Enumerations**

Units encompass all units and enumerations supported by the system. Units themselves also support conversion factors for converting a value from one unit to another.

**Unit ID**

An unit ID consists is a 32 bit number, split up into 3 parts: [type][type-id][item-id]

<table>
<thead>
<tr>
<th>Type (8 bits)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0: Regular data-type</td>
<td>Unit or enum <strong>type</strong> ID</td>
</tr>
<tr>
<td>1: unit-item</td>
<td>Unit or enum <strong>item</strong> ID (only used when type is 1 or 2)</td>
</tr>
<tr>
<td>2: enum-item</td>
<td></td>
</tr>
<tr>
<td>3: unit-type</td>
<td></td>
</tr>
<tr>
<td>4: enum-type</td>
<td></td>
</tr>
<tr>
<td>5: unit-types and unit-items</td>
<td></td>
</tr>
<tr>
<td>6: enum-types and enum-items</td>
<td></td>
</tr>
<tr>
<td>all: all unit-types, unit-items, enum-types, enum-items</td>
<td></td>
</tr>
</tbody>
</table>
This structure was chosen to make it possible to quickly determine to which type an item belongs.

**Standard data-types**
The following standard data-types are supported by the flow computer:

<table>
<thead>
<tr>
<th>Unit ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No data type specified (treat as numeric).</td>
</tr>
<tr>
<td>1</td>
<td>Text</td>
</tr>
<tr>
<td>2</td>
<td>Numeric</td>
</tr>
<tr>
<td>3</td>
<td>Date/time</td>
</tr>
<tr>
<td>4</td>
<td>Boolean</td>
</tr>
<tr>
<td>5</td>
<td>Integer</td>
</tr>
<tr>
<td>6</td>
<td>ID of unit item</td>
</tr>
<tr>
<td>7</td>
<td>ID of enumeration type</td>
</tr>
<tr>
<td>8</td>
<td>IP address</td>
</tr>
</tbody>
</table>

Table 3-20: Standard data-types

**Unit types**
A unit-type ID starts with the number 3 in the first byte. A unit-type is called a “unit” in English and “grootheid” in Dutch. Some sample unit type ID’s are:

<table>
<thead>
<tr>
<th>UnitID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x030000100</td>
<td>Acceleration</td>
</tr>
<tr>
<td>0x030000500</td>
<td>Energy</td>
</tr>
<tr>
<td>0x03000e00</td>
<td>Kinematic viscosity</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

Table 3-21: Example unit-type IDs

These unit-types are a resource of the flow computer and can be obtained via a web-service.

**Request**
Reading unit-types can be done by specifying “/units?type=3” in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter</td>
<td>Optional unit-type ID. When omitted all unit-types are returned. The filter can be a specific unit-type ID such as 0x03000500 which when specified will return only that item.</td>
</tr>
<tr>
<td>Fields</td>
<td>Optional integer mask which specifies which fields to return. When omitted or when “all” is specified, all fields are returned: 0x0001 ID (unique ID as a number), 0x0004 Name (e.g. “acceleration”), 0x0008 Text (e.g. “Acceleration”)</td>
</tr>
<tr>
<td>Language</td>
<td>Optional ID of the requested language (number). When omitted the default language is used.</td>
</tr>
</tbody>
</table>

Table 3-22: Unit types request arguments

**Response**

```
<units count="4">
  <unit id="3423531" name="energypermass" text="Energy per mass" />
  <unit id="3423532" name="energypermole" text="Energy per mole" />
  <unit id="3423533" name="energypervolume" text="Energy per volume" />
  <unit id="3423534" name="temperature" text="Temperature" />
</units>
```

Figure 3-29: Unit types XML response

**Unit items**
A unit-item ID starts with the number 1 in the first byte. A unit-type is called a “property” in English and “eenheid” in Dutch. Some sample unit item ID’s are:

<table>
<thead>
<tr>
<th>UnitID</th>
<th>Description</th>
<th>Factor</th>
<th>Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x010000101</td>
<td>Meters per second squared (m/s²)</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
These unit-items are a resource of the flow computer and can be obtained via a web-service.

**Request**

Reading unit-items can be done by specifying “/units?type=1” in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter</td>
<td>Optional type-ID. When omitted all unit-items are returned. The filter can be a specific unit-type ID such as 0x030000500 which when specified will return all the unit-items belonging to that type. It can also be a unit-item ID which when specified will return only that item.</td>
</tr>
<tr>
<td>Fields</td>
<td>Optional integer mask which specifies which fields to return. When omitted or when “all” is specified, all fields are returned: 0x0001 ID (unique ID as a number). 0x0002 Parent ID (ID of the unit-type which acts as a parent of the item). 0x0004 Name (e.g. &quot;kg_m3_n&quot;) 0x0008 Text (e.g. &quot;kg/m3(n)&quot;) 0x0010 Description (e.g. &quot;kilogram per normal cubic meter&quot;) 0x0020 Conversion factor (e.g. &quot;0.001&quot;) 0x0040 Conversion offset (e.g. &quot;0&quot;)</td>
</tr>
<tr>
<td>Language</td>
<td>Optional ID of the requested language (number). When omitted the default language is used.</td>
</tr>
</tbody>
</table>

**Response**

```
<units count="3">
  <unit id="15732235" parentid="3423532" name="j_kg"
    desc="joule per kilogram" text="J/kg" factor="1.0" offset="0.0" />
  <unit id="15732236" parentid="3423532" name="kj_kg"
    desc="kilojoule per kilogram" text="KJ/kg"
    factor="1000.0" offset="0.0" />
  <unit id="15732237" parentid="3423532" name="mj_kg"
    desc="megajoule per kilogram" text="MJ/kg"
    factor="1000000.0" offset="0.0" />
</units>
```

**Enumeration types**

An enumeration-type ID starts with the number 4 in the first byte. Some sample enumeration type ID’s are:

<table>
<thead>
<tr>
<th>UnitID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x04000100</td>
<td>Period</td>
</tr>
<tr>
<td>0x04000500</td>
<td>Status</td>
</tr>
</tbody>
</table>

These enumeration-types are a resource of the flow computer and can be obtained via a web-service.

**Request**

Reading enumeration-types can be done by specifying “/units?type=4” in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter</td>
<td>Optional type-ID. When omitted all enumeration-types are returned. The filter can be a specific enumeration-type ID such as 0x04000500 which when specified will return only that item.</td>
</tr>
<tr>
<td>Fields</td>
<td>Optional integer mask which specifies which fields to return. When omitted or when “all” is specified, all fields are returned: 0x0001 ID (unique ID as a number). 0x0004 Name (e.g. &quot;period&quot;) 0x0008 Text (e.g. &quot;Period&quot;)</td>
</tr>
<tr>
<td>Language</td>
<td>Optional ID of the requested language (number). When omitted the default language is used.</td>
</tr>
</tbody>
</table>
Response

```xml
<units count="4">
  <unit id="6423532" name="period" text="Period" />
  <unit id="6423533" name="status" text="Status" />
  ...
</units>
```

Figure 3-31: Enumeration types XML response

**Enumeration items**

An enumeration-item ID starts with the number 1 in the first byte. An enumeration item is analogous to an item in a combo-box. Some sample enumeration item ID's are:

<table>
<thead>
<tr>
<th>UnitID</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x02000101</td>
<td>Second</td>
<td>1</td>
</tr>
<tr>
<td>0x02000102</td>
<td>Minute</td>
<td>2</td>
</tr>
<tr>
<td>0x03000103</td>
<td>Hour</td>
<td>3</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

Table 3-27: Example enumeration-item IDs

These enumeration-items are a resource of the flow computer and can be obtained via a web-service.

**Request**

Reading unit-items can be done by specifying “/units?type=2” in the URL:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter</td>
<td>Optional type-ID. When omitted all enumeration-items are returned. The filter can be a specific unit-type ID such as 0x04000500 which when specified will return all the enumeration-items belonging to that type. It can also be a enumeration-item ID which when specified will return only that item.</td>
</tr>
<tr>
<td>Fields</td>
<td>Optional integer mask which specifies which fields to return. When omitted or when “all” is specified, all fields are returned: 0x0001 ID (unique ID as a number). 0x0002 Parent ID (ID of the enumeration-type which acts as a parent of the item). 0x0004 Name (e.g. “second”) 0x0008 Text (e.g. “Second”) 0x0020 Value (e.g. “1”)</td>
</tr>
<tr>
<td>Language</td>
<td>Optional ID of the requested language (number). When omitted the default language is used.</td>
</tr>
</tbody>
</table>

Table 3-28: Enumeration items request arguments

Response

```xml
<units count="5">
  <unit id="35732235" parentid="6423532" name="second" text="Second" value="1" />
  <unit id="35732236" parentid="6423532" name="minute" text="Minute" value="2" />
  <unit id="35732237" parentid="6423532" name="hour" text="Hour" value="3" />
  <unit id="35732238" parentid="6423532" name="day" text="Day" value="4" />
  <unit id="35732239" parentid="6423532" name="month" text="Month" value="5" />
</units>
```

Figure 3-32: Enumeration items XML response

**WriteTags**

The WriteTags web-service allows for setting tag and parameter values. Only those tags are writable that have been marked as writable in the flow computer configuration. These may include communication tags, parameters alarm limits/deadbands/delays and system settings.

**Request**

Writing tags can be done by specifying “/writetags” in the URL. The following arguments can be specified in the URL:
### Table 3-29: WriteTags request arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Userkey</td>
<td>Required userkey of the logged in user. The tags that are being written must have a level lower or equal to the logged in user.</td>
</tr>
<tr>
<td>ErrorDetails</td>
<td>Optional argument that when set to &quot;1&quot;, returns detailed information about the result of the write-operation. Since multiple tags can be written through this web-service, it is possible than some write-operations are successful and others aren’t. In general, when the write-operation isn’t completely successful, an error is returned (most likely 403 - bad request). When ErrorDetails=1, it is possible that 200 is returned together with an XML stream containing the detailed errors.</td>
</tr>
</tbody>
</table>

**Writing tags by ID** *(e.g. "/writetags?tag677=0.78&unit677=167997907")*

<table>
<thead>
<tr>
<th>Tag[id]</th>
<th>ID and value of the tag to be written. The number followed by the “Tag” text identifies the ID of the tag followed by its new value (e.g. &quot;Tag101=34.4&quot;). This argument can be repeated in order to write multiple tags at once.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit[id]</td>
<td>Optional unit-id of the tag being written. When specified, the value of the tag is interpreted in that unit, rather than the unit of the tag it selves. For instance, if the tag is of unit &quot;kg&quot;, and the value being written is in &quot;mg&quot;, then the server will convert the value from &quot;mg&quot; to &quot;kg&quot;. The number followed by the “Unit” text identifies the ID of the tag followed by the unit-id (e.g. &quot;Unit101=16546743&quot;).</td>
</tr>
<tr>
<td>Format[id]</td>
<td>Optional format of the tag being written. When specified, the value of the tag is interpreted according to that format. When for instance, specifying a date/time value, you can tell the server in what format it is, so it can be interpreted correctly. The number followed by the “Format” text identifies the ID of the tag followed by the format (e.g. “Format5=dd-mm-yyyy%20hh-mm-ss&quot;).</td>
</tr>
</tbody>
</table>

**Writing tags by Name** *(e.g. "/writetags?name=sysglobal!clear_events&value=1")*

<table>
<thead>
<tr>
<th>Name[seq-nr]</th>
<th>Name of the tag to be written. When writing multiple tags, the ‘seq-nr’ can be used to specify which name/value/unit/format combinations belong together. Example: &quot;/writetags?name1=sheet1!mytag&amp;value1=365&amp;name2=sheet2!mytag2&amp;value2=478&quot;.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value[seq-nr]</td>
<td>Value of the tag to be written.</td>
</tr>
<tr>
<td>Unit[seq-nr]</td>
<td>Optional unit-id of the tag being written. When specified, the value of the tag is interpreted in that unit, rather than the unit of the tag it selves. For instance, if the tag is of unit &quot;kg&quot;, and the value being written is in &quot;mg&quot;, then the server will convert the value from &quot;mg&quot; to &quot;kg&quot;.</td>
</tr>
<tr>
<td>Format[seq-nr]</td>
<td>Optional format of the tag being written. When specified, the value of the tag is interpreted according to that format. When for instance, specifying a date/time value, you can tell the server in what format it is, so it can be interpreted correctly.</td>
</tr>
</tbody>
</table>

**Example #1**

Request: `/writetags?tag76=90&tag77=91&userkey=267AB6`

This request writes value “90” to tag with ID 76, and also value “91” to tag with ID 77.

**Example #2**

Request: `/writetags?tag30=76.3&unit30=16783256&userkey=267AB6`

Assume that tag 30 uses the unit “kg/s” in the flow computer.

This request writes value “76.3” (which is in the unit “mg/s” = 16783256) to the flow computer. The flow computer translates “76.3” from “mg/s” to “kg/s” and stores the result in the flow computer.

**Example #3**

Request: `/writetags?tag55=06-06-2009%204:16:56&format55=mm-dd-yyyy%20hh:mm:ss&userkey=267AB6`

This request writes a date/time value in a specific format to tag 55.

**Example #4**

Request: `/writetags?name=sysglobal!clear_events&value=1&userkey=267AB6`

This request write ‘1’ to tag ‘sysglobal!clear_events’.

**File-request**

Besides writing tags through URL commands, it is also possible to send XML data to the server which contains the tags to be written. In order to do this, specify "/writetags" in the URL and submit a form with a file called ‘file’ to the server. The “Userkey” is required in the URL and optionally the “ErrorDetails” argument can be specified in the URL.

Writing a file to the flow computer is not supported through a web browser, but has to be implemented programmatically by posting a file. For example in VB.NET this would look like::

```vbnet
```

The file should contain a XML document with the following layout:

```xml
<tags>
  <t id="5" v="67" />
  <t n="modi_system!ipaddr1" v="168.0.1.2" />
  ...
</tags>
```

**Figure 3-33: WriteTags XML request**
The value of the tag should be in the unit of the tag on the device. A tag can either be identified through its id or its name.

**Response**
When ‘ErrorDetails=1’ and the operation fails (partially), detailed error information is returned. When an operation fails completely, the server can return 400 - Bad Request, indicating that the whole operation failed. When ‘ErrorDetails=1’ and the server returns 200, the following XML stream is returned. Events are only returned for those items that have failed.

```
<events>
  <event time="01/03/2010 11:35:38.534" sev="err" loc="tags"
    msg="tag 78 (calc_Gas_M_Stn!COMP_IC4_CUR) : is not writable" />
  ...
</events>
```

Figure 3-34: WriteTags XML response
4 Revisions

Revision A
Date April 2013

Revision B
Date November 2017
- Update to new ABB lay-out.
- Document code: CM/FlowX/Web-EN.
- Reintroduce revisions chapter.

Revision C
Date February 2018
- Update to Snapshots web-service notes.

Revision D
Date January 2019
- Update the description of the Security web-service.
- Added Cyber-security warnings regarding HTTP and HTTPS

Revision E
Date July 2019
- Describe unique id related arguments of Logs web service.
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