



Pushing Performance

People | Power | Partnership

User Guide

Monitor Service

1st Edition 2019

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1 Introduction

1.1 About the Monitor Service

Monitor Service is a MICA container that lets you monitor MQTT subscription endpoint, filter them and trigger alerts that can be sent to message brokers using a variety of protocols.

It is especially useful for monitoring the behavior of machines and sensors and for creating notifications if values change or certain conditions occur. The Monitor Service also provides a REST interface to let you access its services remotely.

1.2 Monitor Service Features

The Monitor Container lets you:

- Monitor multiple inputs and MQTT topics on your MICA.
- Create and combine rules and filters.
- Monitor states and sensor data and send alerts if values or conditions change.

1.3 Monitor Service Limitations

The Monitor Service currently only accepts MQTT telegrams that follow the HARTING MQTT message format as inputs.

2 General Overview

2.1 Operation Requirements and Conditions

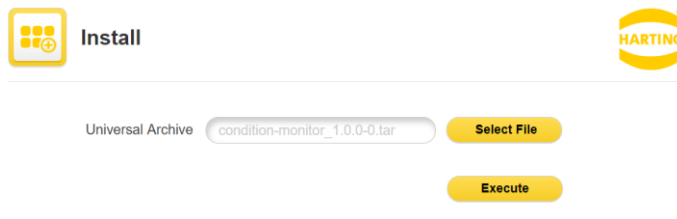
Monitor Service requires a MICA with firmware version 7 or higher and access to a MQTT broker either on the MICA or a wider network.

3 Installation, Initial Setup and Configuration

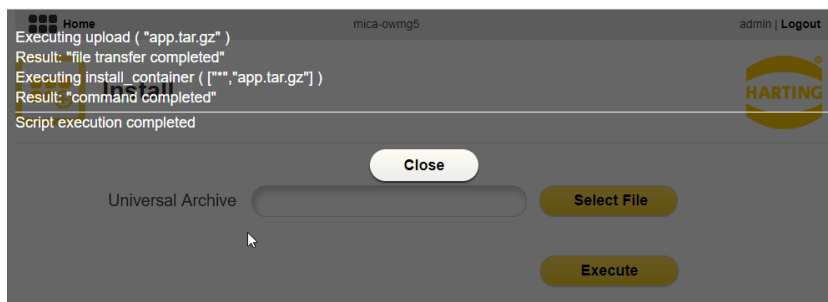
3.1 Installation of Monitor Service

3.1.1 Default Installation

With this software package, you can install the Monitor Service on a MICA.



1. Log in to the MICA with admin rights.
2. Click *Install*.
3. Click *Select File* and select the installation archive.
4. Click *Execute* to start the installation.
5. The installer will display the readme file with information about the installation archive.

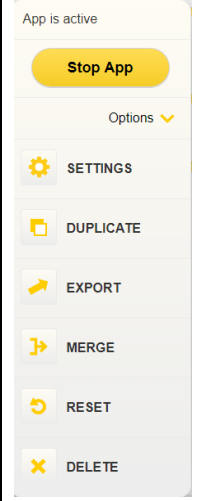


6. Wait until the installation is finished and click *Close*.

The installed container (*Monitor*) is initially turned off. Right click on the container and press *Start App* button to start the container.

4 Basic Container Operations

Right clicking the Monitor Service tile opens the context menu. Press *Options* to access the following functions:

	<ul style="list-style-type: none">• <i>Start App / Stop App</i>: Starts or stops the container.• <i>Options</i>: Expands or hides the basic container functions.• <i>Settings</i>: Shows the container information and lets you configure the IPv4 / IPv6 settings, an Additional Network Interface and the Single Sign On Mode.• <i>Duplicate</i>: Duplicates the container on your MICA.• <i>Export</i>: Exports the container to your PC or a network drive. All configurations you set will be kept.• <i>Merge</i>: Overwrites the reset point of the Container with its current configuration.• <i>Reset</i>: Resets the configuration of the Monitor Service to the last reset point (factory default if no merge was executed before).• <i>Delete</i>: Deletes the Container including all its configuration and user data.
---	---

5 Using the Monitor Service



ConditionMonitor



> Rules

> Subscribers

Expand Log 

The Monitor Service lets you create rules and subscriptions. Rules monitor data coming from a MQTT broker and raise alerts if the predefined conditions are met. Subscriptions specify where the Monitor Service listens and sends the alerts.

Rules and subscriptions can be created independently, but at least one rule and one associated subscription are needed to send an alert.

The Monitor Service also lets you view detailed logs.

5.1 The MQTT Message Format

Currently, the Monitor Service only accepts MQTT telegrams as input. The messages need to be in the HARTING message format. Specifically, *devices* and *fields* are needed to parse the correct message content. The HARTING MQTT message format is supported by all HARTING gateway containers, so information from a correctly configured gateway container can be used directly in the Monitor Service.

```
{
  "applicationId": "ModbusGateway",
  "reportName": "MICA Energy",
  "date": "2017-11-18T21:13:04.843",
  "totalMilliseconds": 1000,
  "initiation": "REQUESTED",
  "initiator": null,
  "termination": "DURATION",
  "terminator": null,
  "devices": [
    {
      "name": "Janitza 1",
      "fields": [
        {
          "name": "U2,3",
          "value": 162.5906,
          "date": "2017-11-18T21:13:03.959"
        },
        {
          "name": "U3,1",
          "value": 162.60217,
          "date": "2017-11-18T21:13:03.974"
        },
        {
          "name": "E",
          "value": 162.60217,
          "date": "2017-11-18T21:13:03.990"
        },
        {
          "name": "U1,2",
          "value": 0.35030943,
          "date": "2017-11-18T21:13:04.005"
        }
      ]
    }
  ]
}
```

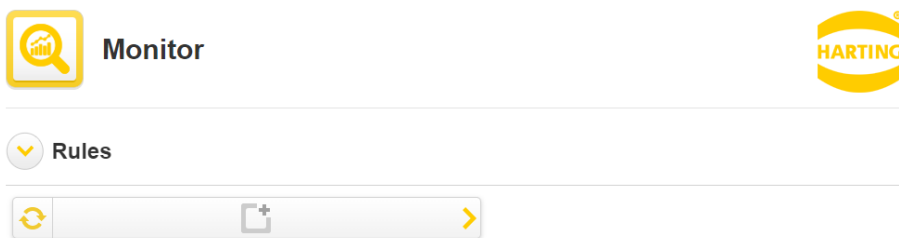
5.2 The Monitor Service Processing Pipeline


The Monitor Service processes received message using Rules. Every Rule consists of three steps:

1. The Window extracts the *device* and *field* from the MQTT telegram and applies a window function to it which returns the maximum, minimum, or average value over a specified time or number of messages.
2. The Filters compare the results of the Window function with a numerical value.
3. Alerts sends messages to defined subscribers if the Filters return true over a specified time or number of counts.

5.3 Creating and Deleting Rules

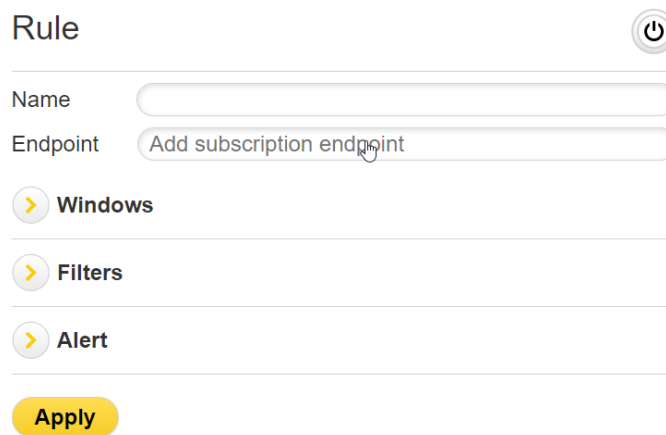
The Monitor Service lets you define rules to monitor data streams. Every rule monitors a MQTT topic and lets you define windows, filters, and alerts for processing the data.



To create a rule, expand the Rules section and click the *Add Rule* button .

5.3.1 Names and Endpoints

In the Rule window, enter a name for the rule and click the *Add subscription endpoint* field to add the MQTT broker and topic the rule will monitor.



The screenshot shows the 'Rule' configuration window. At the top left is the word 'Rule' and at the top right is a power button icon. Below this are two input fields: 'Name' and 'Endpoint'. The 'Endpoint' field contains the text 'Add subscription endpoint'. Below the input fields are three expandable sections: 'Windows', 'Filters', and 'Alert', each with a right-pointing arrow. At the bottom left is a yellow 'Apply' button.

In the *Endpoint Subscription* dialog, choose the subscriber, the path (or topic) to subscribe to and optionally any properties you want to add to the subscription.

While you can define subscribers for various protocols, only MQTT telegrams using the HARTING MQTT format can be used as inputs. Using other protocols or formats will result in errors.

If you haven't defined a subscriber yet, see section 6.1

Click *Apply* to add the endpoint to the rule and close the window.

5.3.2 Windows

Windows average values over time or determine minima and maxima.

Windows

5 point average	
New Window	

To add a new Window, click the *New Window* field.

In the dialog, enter a name for the window and a *device* and a *field*, these have to match the names nodes inside the *devices* and *fields* of the HARTING MQTT message format described in section 5.1. Using the example in section 5.1, the device would be "Janitza 1" and "U2,3" a possible field.

Window

Name	<input type="text"/>
Device	<input type="text"/>
Field	<input type="text"/>
Size	<input type="text"/> <input type="text" value="v"/>
Method	<input type="text" value="v"/>
<input type="button" value="Apply"/>	

Enter the windows size in counts, seconds, minutes, or hours.

Enter the method of determining the Window output. You can choose either the minimum, the maximum, or the average of the values collected inside the Window.

5.3.3 Filters

Filters let you compare the output value of a windows with a numerical value. To add a filter, expand the Filters section, select a window, type of comparison and enter a numerical value to compare to.

Filters

5 point average	<input type="text" value="EQUALS"/>	<input type="text" value="4"/>
Window	<input type="text" value="EQUALS"/> <input type="text" value="GREATER_THEN"/> <input type="text" value="LESS_THEN"/>	Compare Value
Window	CompareType	Compare Value

Multiple filters can be logically combined by *AND* and *Or*.

- To create filters connected by *AND*, enter them directly underneath each other in the same block.
- To create filters connected by *Or*, enter them in different blocks.

▼ **Filters**

5 point average	▼	EQUALS	▼	4	⊗	AND
	▼		▼		⊗	
Window		CompareType		Compare Value		OR
	▼		▼		⊗	
Window		CompareType		Compare Value		
Window		CompareType		Compare Value		

The Monitor Service will show the type of logical combination with brackets on the right.

Click *Apply* to add the filters to the rule and close the window.

5.3.4 Alerts

To create an alert, enter the desired minimum time or number of counts between two alerts. This setting lets you avoid being flooded by repetitive alerts.

▼ **Alert**

Validity ▼

5.4 Rule Subscriptions

The Monitor Service sends alerts to subscribers. To add a subscription to a rule, click on *Expand* on the left of a rule, then click on *New Subscription*.

▼ **Rules**

☰ **subtemp** ▶ ⏻

In the new window, enter a name for the subscription, which will also be the topic for the subscription. Then choose a subscriber from the drop down or create a new one.

Subscription ⏻

Name

Subscriber ▼

Properties

Property Key	Property Value	⊗
--------------	----------------	---

Apply

You can optionally enter any *Properties* you would like to keep with a subscription as key-value pairs. Properties are not included in alerts and messages but can be read and written using the REST interface.

6 Subscribers

Subscribers specify how the Monitor Service communicates with data sources and data sinks. Every Rule typically has a MQTT Subscriber it receives data from and a Subscriber that it sends messages to.

6.1 Creating Subscribers

You can create a new subscriber by clicking the expand button from the left side of the *Subscribers*.

The following steps are to be done:

1. Left click the *New* tile button.
2. Choose the type of the subscriber. (CUSTOM, MQTT, MQTTS AZURE, HTTP, HTTPS, JDBC, TCP, or UDP)
3. If required, enter the username and password to authenticate the Monitor Service to the Subscriber.
4. Enter protocol specific information.
5. Monitor Service automatically creates the URI for the subscriber and displays it.
6. Left click on *Apply* to create the subscriber and close the window.

Subscribers



Subscriber

Type	<input type="text" value="MQTT"/>
Host	<input type="text" value="mqtt"/>
Port	<input type="text" value="1883"/>
Fragment	<input type="text"/>
Username	<input type="text"/>
Password	<input type="text"/>
Topic	<input type="text" value="topic"/>
Client ID	<input type="text" value="clientid"/>
QoS	<input type="text" value="At most once"/>
URI	<input type="text" value="mqtt://MQTT:1883/topic?qos=0&clientid=cli"/>

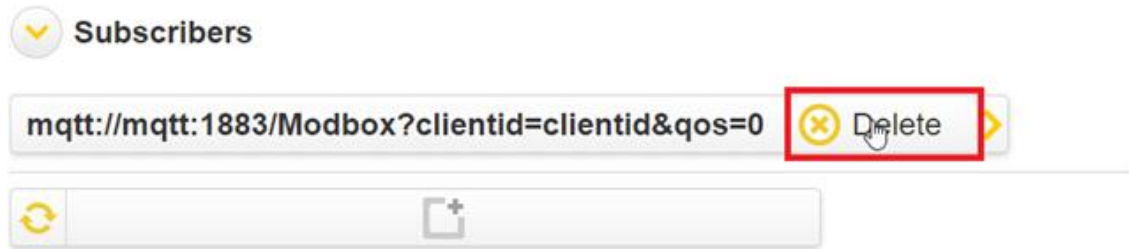
Properties

Property Key	Property Value	
<input type="text"/>		

Apply

6.2 Deleting a Subscriber

You can delete a subscriber by moving your mouse over on a subscriber and clicking the *Delete* button.



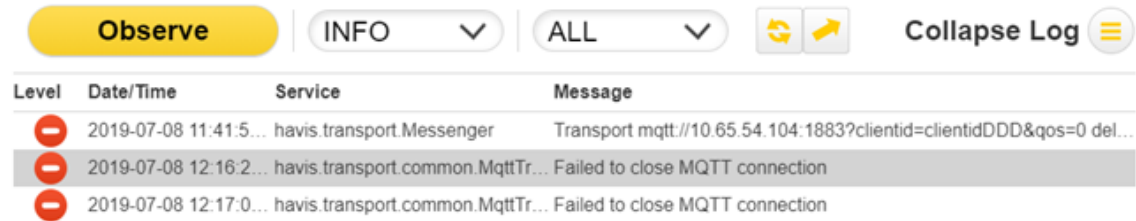
The specific subscriber and all subscriptions associated with the subscriber will be deleted. Please be sure that at least one subscriber is in the subscribers list.




7 Working with Logs

The Monitor Service provides full logging information. To see the log entries click the *Expand Log* button.

The following operations can be done in the Log part:

- Select the types of messages to be displayed
- Reload log information
- Export the log information



Level	Date/Time	Service	Message
	2019-07-08 11:41:5...	havis.transport.Messenger	Transport mqtt://10.65.54.104:1883?clientid=clientidDDD&qos=0 del...
	2019-07-08 12:16:2...	havis.transport.common.MqttTr...	Failed to close MQTT connection
	2019-07-08 12:17:0...	havis.transport.common.MqttTr...	Failed to close MQTT connection

8 REST API

GET/**rules**

Returns the list of all defined rules as a map with the rule ID as the key and the rule object itself as the value.

POST/**rules**

Creates a rule and returns its generated ID.

GET/**rules/{ruleId}**

Returns the requested rule.

PUT/**rules/{ruleId}**

Updates the requested rule.

DELETE/**rules/{ruleId}**

Deletes the requested rule.

GET/**rules/{ruleId}/subscriptions**

Returns the list of all defined subscriptions as a map with the subscription ID as the key and the subscription object itself as the value.

POST/**rules/{ruleId}/subscriptions**

Subscribes a rule.

GET/**rules/{ruleId}/subscriptions/{subscriptionId}**

Returns the requested subscription.

PUT/**rules/{ruleId}/subscriptions/{subscriptionId}**

Updates the requested subscription.

DELETE/**rules/{ruleId}/subscriptions/{subscriptionId}**

Unsubscribes a rule.

GET/**subscribers**

Returns the list of all defined subscribers as a map with the subscriber ID as the key and the subscriber object itself as the value.

POST/**subscribers**

Creates a subscriber and returns its generated ID.

GET/**subscribers/{subscriberId}**

Returns the requested subscriber.

PUT/subscribers/{subscriberId}

Updates the requested subscriber.

DELETE/subscribers/{subscriberId}

Deletes the requested subscriber.

POST/subscribers/{subscriberId}/certs/ca

Creates the certificate files for SSL/TLS.

DELETE/subscribers/{subscriberId}/certs/ca

Deletes the certificate files for SSL/TLS.

POST/subscribers/{subscriberId}/certs/client

Creates the certificate files for SSL/TLS.

DELETE/subscribers/{subscriberId}/certs/client

Deletes the certificate files for SSL/TLS.

POST/subscribers/{subscriberId}/certs/key

Creates the certificate files for SSL/TLS.

DELETE/subscribers/{subscriberId}/certs/key

Deletes the certificate files for SSL/TLS.