

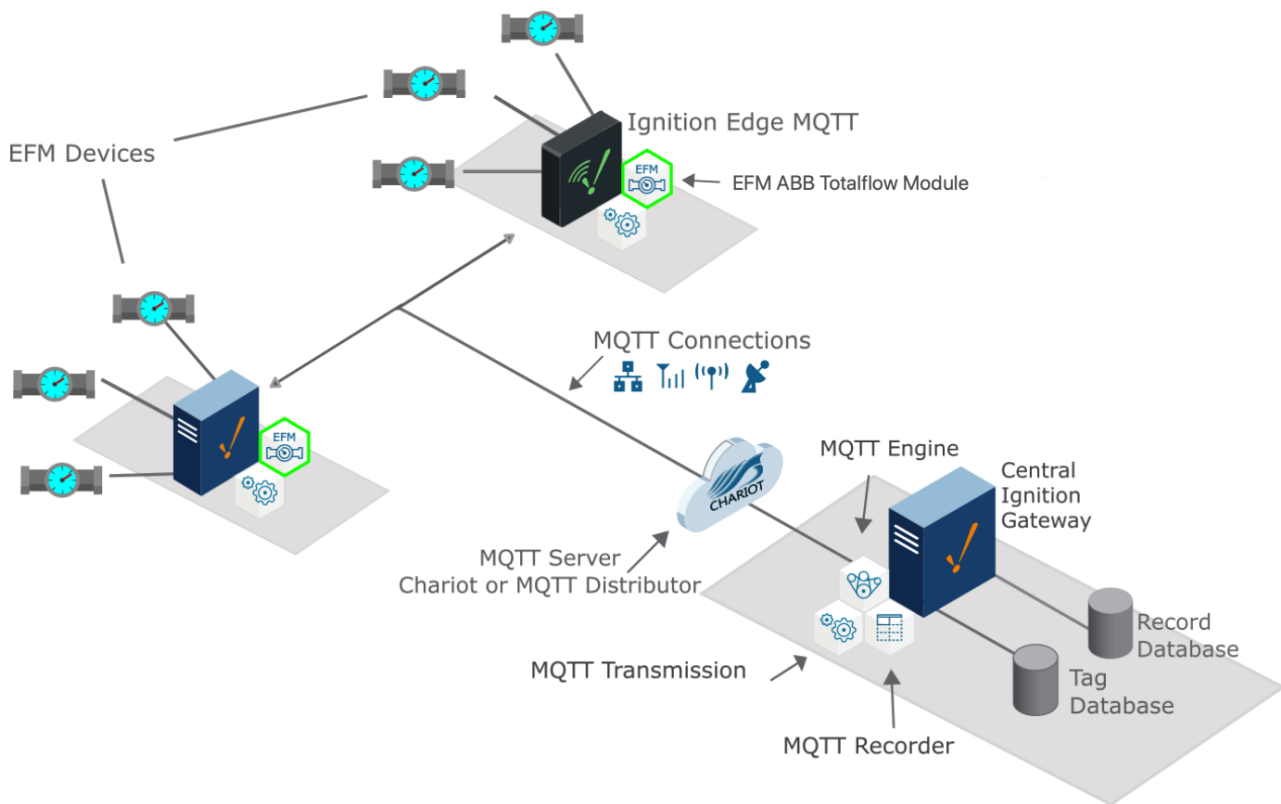
Sending ABB Totalflow Alarms to a Central Ignition Gateway

Prerequisites

- [Installing the Java Runtime Environment](#)
- [Installing Ignition](#)
- [Installing the following MQTT Modules](#) on two Ignition systems
 - Ignition System 1 (Central Ignition Gateway)
 - MQTT Distributor
 - MQTT Engine
 - MQTT Recorder
 - Ignition System 2 (Remote/Edge Ignition Gateway)
 - MQTT Transmission
 - EFM ABB Totalflow driver module

Overview

The EFM ABB Totalflow module is capable of polling alarms from an ABB Totalflow device based on a specified polling rate. With MQTT Transmission, these alarms can be published as Sparkplug records to an MQTT server. Any client subscribed on Sparkplug RECORD messages can receive these objects. In addition, MQTT Engine when combined with MQTT Recorder can also receive these messages and store these objects in a configured Ignition database. The following drawing shows the general architecture used to do this. This tutorial outlines the process of getting alarms to the central Ignition gateway.



Sending ABB Totalflow Alarms to a Central Ignition Gateway

We must configure a total of five Cirrus Link modules on two different Ignition gateways to get alarm data flowing from an ABB Totalflow device to a central database. These are:

- Central Ignition Gateway
 - MQTT Distributor
 - MQTT Engine
 - MQTT Recorder
- Remote/Edge Ignition Gateway

- MQTT Transmission
- EFM ABB Totalflow

The configuration of each of these modules is covered below based on the Ignition gateway they're installed on.

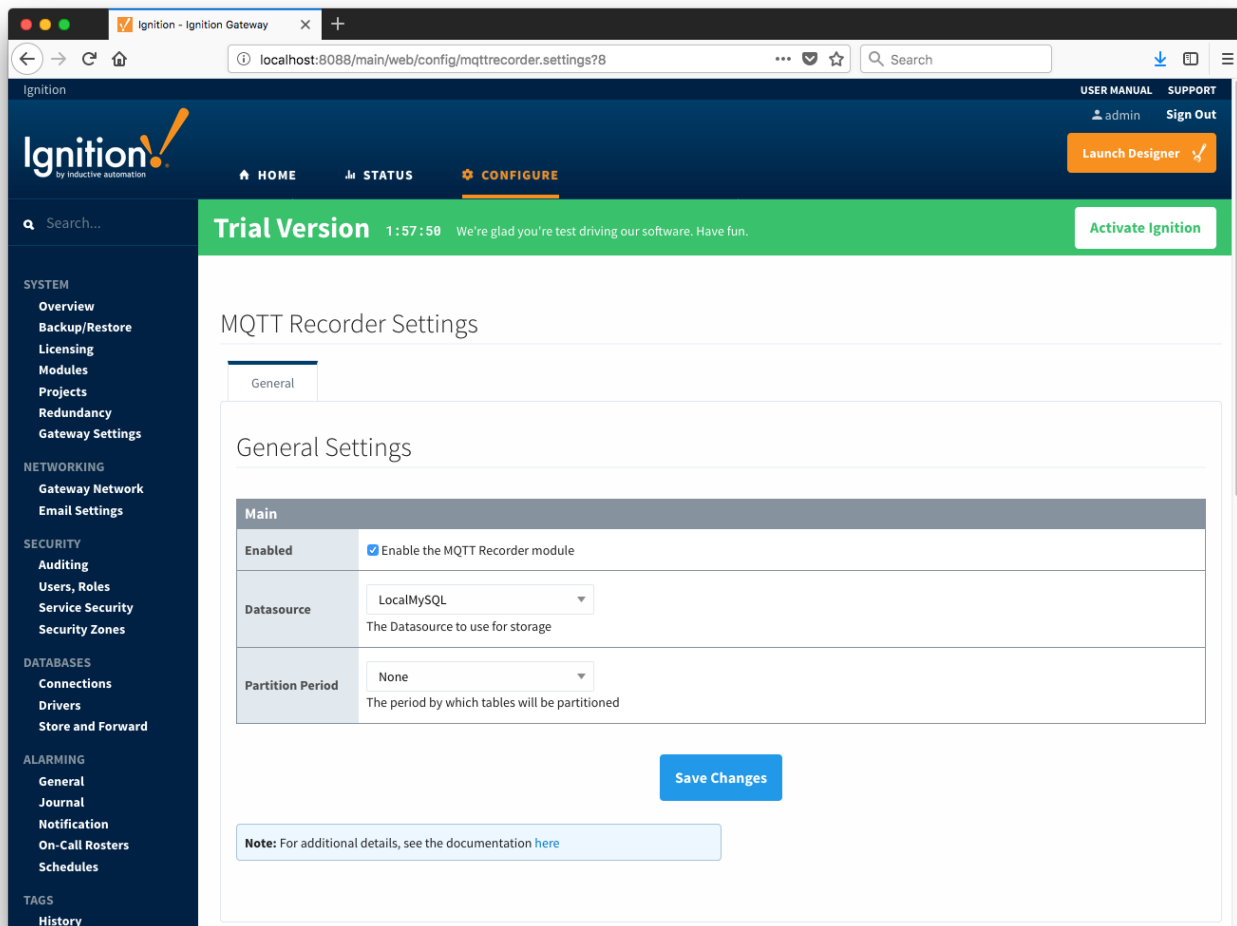
Central Ignition Gateway Setup

MQTT Distributor can be left in its default configuration. Note in a production system you would likely want to set up TLS especially if MQTT connections are using the Internet.

MQTT Engine can also be left in its default configuration.

MQTT Recorder requires that a database be set up in Ignition. That can be done as described in the 'Connect to a Database' section [here](#). Note Ignition supports additional database types. For more detailed information about supported types, take a look at the information provided [here](#). Once a database is set up, MQTT Recorder can be configured. Do so by opening the Ignition Gateway Web UI and browsing to the Configure tab at the top of the screen and then selecting 'MQTT Recorder Settings'.

Once there, select a Datasource as shown in the image below. This drop-down will be populated with any database connections set up in Ignition. Optionally, a Partition Period can be selected to segregate tables by time periods.

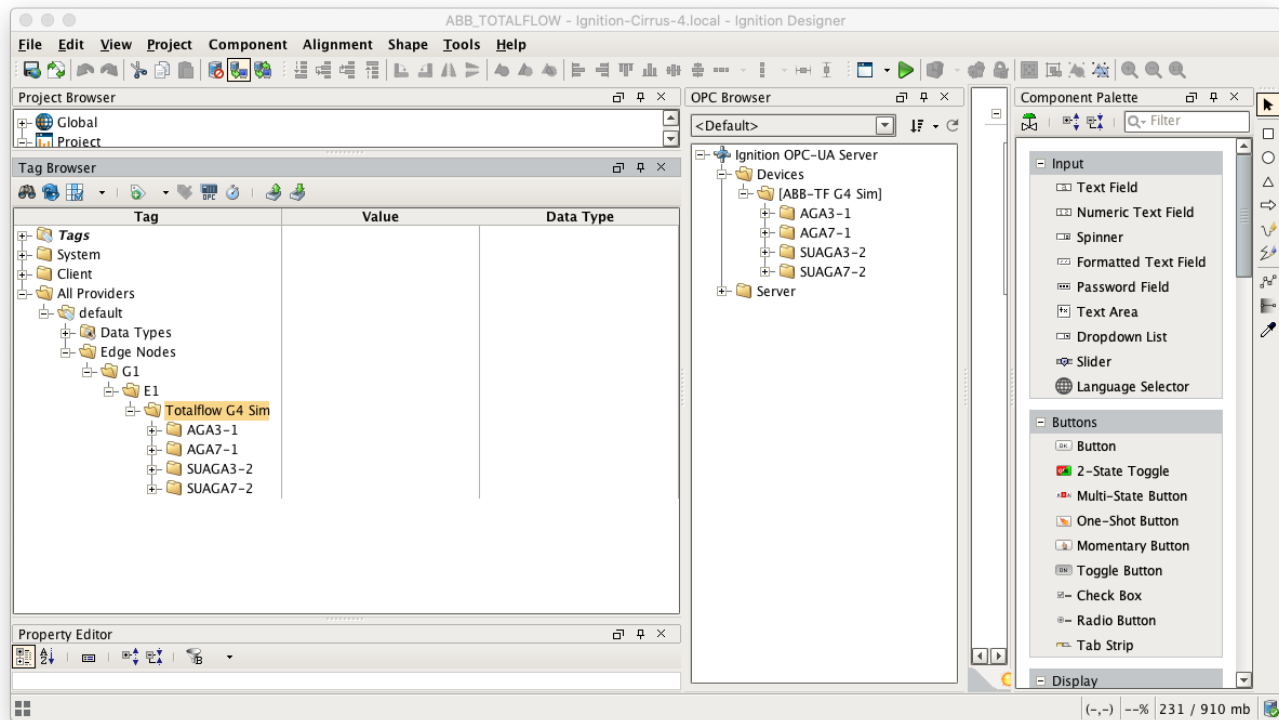


At this point, the Central Ignition Gateway with MQTT Distributor, MQTT Engine, and MQTT Recorder is fully configured and ready to receive MQTT Sparkplug messages from the Remote/Edge Ignition Gateway. MQTT Distributor listens on TCP port 1883 by default for inbound MQTT connections. Make sure the Operating System's Firewall, Antivirus, and Malware protection services allow inbound connections on port 1883/TCP before proceeding.

Remote/Edge Ignition Gateway Setup

With the Central Ignition Gateway ready to receive MQTT/Sparkplug RECORD objects, the EFM ABB Totalflow and MQTT Transmission modules can be configured on the Remote/Edge Ignition Gateway.

Start by configuring the MQTT Transmission module. Do so by opening Ignition Designer and creating a tag structure similar to what is shown below.



Note this structure is based on usage of the 'Default Transmitter' in MQTT Transmission. So, the directory structure is very important. Note the structure.

- tag provider/Edge Nodes/[Group ID]/[Edge Node ID]/[Device ID]/...

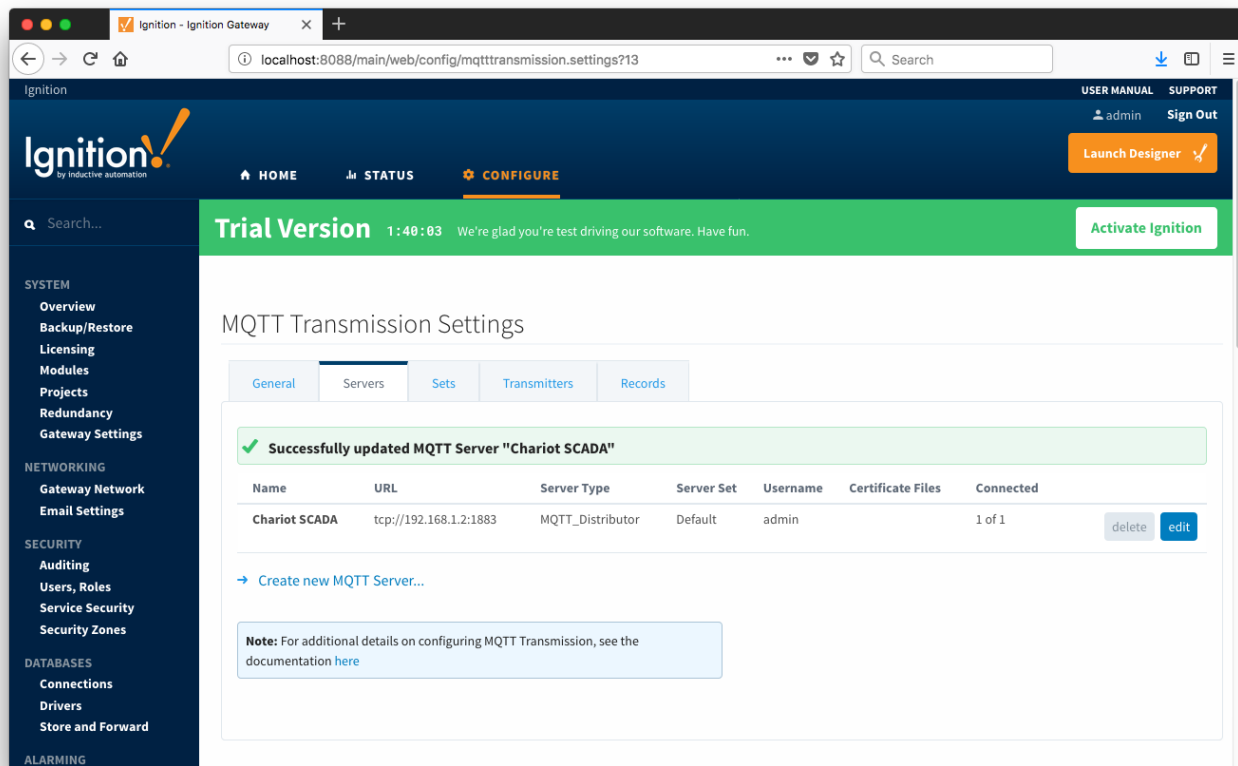
In the example below this implies the following definitions:

- [Group ID] = G1
- [Edge Node ID] = E1
- [Device ID] = Totalflow G4 Sim

These exact values will be used for the EFM ABB Totalflow connection Sparkplug parameters to tell the EFM ABB Totalflow which MQTT Transmission Transmitter configuration to use and, in turn, which MQTT connection to use to send the history data on.

Next the MQTT Transmission server configuration must be modified to point to the Central Ignition Gateway we set up earlier. To do so, in the Ignition Gateway Web UI browse to the Configure tab on the top and then to MQTT Transmission Settings in the lower left as shown below.

In the MQTT Transmission Settings configuration, click the Servers tab. Then click 'edit' on the Chariot SCADA MQTT Server definition. Modify the URL to match the URL of the Central Ignition Gateway. In this example, MQTT Distributor is installed on a Central Ignition Gateway at the IP address of 192.168.1.2. Once the URL is modified to match the configuration, there should be a '1' of '1' in the Connected column as shown below.



The next step is configuring the ABB Totalflow module. This is done as described in the [ABB Totalflow Configuration](#) manual. In going through the basic setup and configuration for Alarms configuration the following steps must be performed:

- Define the global Array-Registers definitions available for all ABB Totalflow devices in this Ignition instance.
 - This step can be skipped if not configuring the driver to poll for AAR data.
- Upload the Periodic Mappings for all ABB Totalflow devices in this Ignition instance.
 - This step can be skipped if default mapping provided by the driver is ok.
- Create the base device connection to the ABB Totalflow device.
- Specify the subset of global Array-Register definitions that this specific ABB Totalflow device uses.
 - This step can be skipped if not configuring the driver to poll for AAR data.
- Reconfigure device connection to enable polling for Alarms.

As an example, let's configure the driver to get Alarms and disable polling for Events and History. First of all, alarms can come from two sources:

- Alarm flags in Periodic History Records (Array 250)
- Alarm Log Record (i.e. Array 245)
 - The Alarm Log structure is returned from meters with the enhanced option turned on.

If the 'Alarm Source' device configuration option is set to PERIODIC_HISTORY_RECORDS, the scan rates can be set as shown below:

The first way is to set Periodic History scan rate as shown below:

- **Alarm Scan Rate**
 - Set to 0 to indicate that alarms are required.
- **Event Scan Rate**
 - Set to -1 to disable polling for Events.
 - If the 'Record Info Scan Rate' is set to -1, the 'Event Scan Rate' can be set to 0. With this setup, the EventPoller will not run on its own nor will it poll on notifications from the RecordInfoPoller.
- **Periodic History Scan Rate**
 - Set to a positive number to launch the PeriodicHistoryPoller with specified poll rate.
- **Daily History Scan Rate**
 - Set to -1 to disable polling for Daily History records.
 - If the 'Record Info Scan Rate' is set to -1, the 'Daily History Scan Rate' can be set to 0. With this setup, the DailyHistoryPoller will not run on its own nor will it poll on notifications from the RecordInfoPoller.
- **Record Info Scan Rate**
 - Set to -1 to disable the RecordInfoPoller so that there will be no notifications to Alarm, Events and History pollers on any 'RecordInfo' change such as 'Last Record Sequence number Used', etc.

Records	
Alarm Source	PERIODIC_HISTORY_RECORDS Alarm Source Selector (i.e. Periodic History or Alarm Log record). <small>(default: PERIODIC_HISTORY_RECORDS)</small>
Alarm Scan Rate	0 The rate in seconds that Alarm Log Records are scanned. To disable Alarm polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. <small>(default: -1)</small>
Event Scan Rate	-1 The rate in seconds that Event Records are scanned. To disable Event polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. <small>(default: 0)</small>
Periodic History Scan Rate	60 The rate in seconds that Periodic History Records are scanned. To disable Periodic History polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. <small>(default: 0)</small>
Daily History Scan Rate	-1 The rate in seconds that Daily History Records are scanned. To disable Daily History polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. <small>(default: 0)</small>
Record Info Scan Rate	-1 The rate in seconds for 'Record Info Registers' (i.e. History, Event and Alarm record capacity, last sequence number, etc.) to be scanned. If new Event, History, or Alarm Log records are detected, respective poller(s) will be notified. To disable 'RecordInfo' polls, set to -1. Set to 0 for one-shot 'Record Info' poll. <small>(default: -1)</small>
Max Records To Read	100 Maximum number of records to read in one poll. <small>(default: 100)</small>
Periodic Mapping	Meter Periodic Mapping The mapping of Totalflow LOG_PERIOD and DAILY structures to Flowcal Meter Periodic Transactions.

The second way is to set Record Info scan rate and obtain alarms from Periodic History records on notifications from the 'Record Info' poller as shown below:

- **Alarm Scan Rate**
 - Set to 0 to indicate that alarms are required.
- **Event Scan Rate**
 - Set to -1 to disable polling for Events.
- **Periodic History Scan Rate**
 - Set to 0 to poll on notification from the 'Record Info' poller.
- **Daily History Scan Rate**
 - Set to -1 to disable polling for Daily History records.
- **Record Info Scan Rate**
 - Set to a positive number to launch the RecordInfoPoller with specified poll rate. With this setup, Periodic History poller will be notified on any 'RecordInfo' change such as 'Last Record Sequence number Used', etc.

Records	
Alarm Source	PERIODIC_HISTORY_RECORDS Alarm Source Selector (i.e. Periodic History or Alarm Log record). <small>(default: PERIODIC_HISTORY_RECORDS)</small>
Alarm Scan Rate	0 The rate in seconds that Alarm Log Records are scanned. To disable Alarm polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. <small>(default: -1)</small>
Event Scan Rate	-1 The rate in seconds that Event Records are scanned. To disable Event polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. <small>(default: 0)</small>
Periodic History Scan Rate	0 The rate in seconds that Periodic History Records are scanned. To disable Periodic History polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. <small>(default: 0)</small>
Daily History Scan Rate	-1 The rate in seconds that Daily History Records are scanned. To disable Daily History polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. <small>(default: 0)</small>
Record Info Scan Rate	60 The rate in seconds for 'Record Info Registers' (i.e. History, Event and Alarm record capacity, last sequence number, etc.) to be scanned. If new Event, History, or Alarm Log records are detected, respective poller(s) will be notified. To disable 'RecordInfo' polls, set to -1. Set to 0 for one-shot 'Record Info' poll. <small>(default: -1)</small>
Max Records To Read	100 Maximum number of records to read in one poll. <small>(default: 100)</small>
Periodic Mapping	Meter Periodic Mapping The mapping of Totalflow LOG_PERIOD and DAILY structures to Flowcal Meter Periodic Transactions.

If the 'Alarm Source' device configuration option is set to ALARM_LOG_RECORDS (Array 245), the scan rates can be set in two ways:

The first way to do it is to configure scan rates as shown below:

- **Alarm Scan Rate**
 - Set to a positive number to launch the AlarmPoller with specified poll rate.
- **Event Scan Rate**
 - Set to -1 to disable polling for Events.
 - If the 'Record Info Scan Rate' is set to -1, the 'Event Scan Rate' can be set to 0. With this setup, the EventPoller will not run on it own nor will it poll on notifications from the RecordInfoPoller.
- **Periodic History Scan Rate**
 - Set to -1 to disable polling for Periodic History records.
 - If the 'Record Info Scan Rate' is set to -1, the 'Periodic History Scan Rate' can be set to 0. With this setup, the PeriodicHistoryPoller will not run on it own nor will it poll on notifications from the RecordInfoPoller.
- **Daily History Scan Rate**
 - Set to -1 to disable polling for Daily History records.
 - If the 'Record Info Scan Rate' is set to -1, the 'Daily History Scan Rate' can be set to 0. With this setup, the DailyHistoryPoller will not run on it own nor will it poll on notifications from the RecordInfoPoller.
- **Record Info Scan Rate**
 - Set to -1 to disable the RecordInfoPoller so that there will be no notifications to Alarm, Events and History pollers on any 'RecordInfo' change such as 'Last Record Sequence number Used', etc.

The screenshot shows the Ignition-OPC UA configuration web interface. The browser address bar indicates the URL is `localhost:8088/main/web/config/opcua.devices?6`. The main configuration area is titled 'Records' and contains the following settings:

Setting	Value	Description
Alarm Source	ALARM_LOG_RECORDS	Alarm Source Selector (i.e. Periodic History or Alarm Log record). (default: PERIODIC_HISTORY_RECORDS)
Alarm Scan Rate	60	The rate in seconds that Alarm Log Records are scanned. To disable Alarm polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. (default: -1)
Event Scan Rate	-1	The rate in seconds that Event Records are scanned. To disable Event polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. (default: 0)
Periodic History Scan Rate	-1	The rate in seconds that Periodic History Records are scanned. To disable Periodic History polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. (default: 0)
Daily History Scan Rate	-1	The rate in seconds that Daily History Records are scanned. To disable Daily History polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. (default: 0)
Record Info Scan Rate	-1	The rate in seconds for 'Record Info Registers' (i.e. History, Event and Alarm record capacity, last sequence number, etc.) to be scanned. If new Event, History, or Alarm Log records are detected, respective poller(s) will be notified. To disable 'RecordInfo' polls, set to -1. Set to 0 for one-shot 'Record Info' poll. (default: -1)
Max Records To Read	100	Maximum number of records to read in one poll. (default: 100)
Periodic Mapping	Meter Periodic Mapping	The mapping of Totalflow LOG_PERIOD and DAILY structures to Flowcal Meter Periodic Transactions.

The second way to do it is to configure scan rates as shown below:

- **Alarm Scan Rate**
 - Set to 0 to poll on notification from the 'Record Info' poller.
- **Event Scan Rate**
 - Set to -1 to disable polling for Events.
- **Periodic History Scan Rate**
 - Set to -1 to disable polling for Periodic History records.
- **Daily History Scan Rate**
 - Set to -1 to disable polling for Daily History records.
- **Record Info Scan Rate**
 - Set to a positive number to launch the RecordInfoPoller with specified poll rate. With this setup, the AlarmPoller will be notified on any 'RecordInfo' change such as 'Last Record Sequence number Used', etc.

The screenshot shows the 'Records' configuration page in the Ignition-Cirrus-4.local web interface. The page is titled 'Records' and contains several configuration fields:

- Alarm Source:** A dropdown menu set to 'ALARM_LOG_RECORDS'. Below it, a description: 'Alarm Source Selector (i.e. Periodic History or Alarm Log record). (default: PERIODIC_HISTORY_RECORDS)'.
- Alarm Scan Rate:** A text input field set to '0'. Description: 'The rate in seconds that Alarm Log Records are scanned. To disable Alarm polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. (default: -1)'.
- Event Scan Rate:** A text input field set to '-1'. Description: 'The rate in seconds that Event Records are scanned. To disable Event polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. (default: 0)'.
- Periodic History Scan Rate:** A text input field set to '-1'. Description: 'The rate in seconds that Periodic History Records are scanned. To disable Periodic History polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. (default: 0)'.
- Daily History Scan Rate:** A text input field set to '-1'. Description: 'The rate in seconds that Daily History Records are scanned. To disable Daily History polls, set to -1. Set to 0 to poll on notification from the 'Record Info' scanner. (default: 0)'.
- Record Info Scan Rate:** A text input field set to '60'. Description: 'The rate in seconds for 'Record Info Registers' (i.e. History, Event and Alarm record capacity, last sequence number, etc.) to be scanned. If new Event, History, or Alarm Log records are detected, respective poller(s) will be notified. To disable 'RecordInfo' polls, set to -1. Set to 0 for one-shot 'Record Info' poll. (default: -1)'.
- Max Records To Read:** A text input field set to '100'. Description: 'Maximum number of records to read in one poll. (default: 100)'.
- Periodic Mapping:** A dropdown menu set to 'Meter Periodic Mapping'. Description: 'The mapping of Totalflow LOG_PERIOD and DAILY structures to Flowcal Meter Periodic Transactions.'

At this point, the EFM ABB Totalflow driver is configured and is polling for Alarms at the rate specified in the EFM ABB Totalflow device configuration.

MQTT Transmission is connected to the MQTT Server and as a result MQTT Engine is receiving tag change events. In addition, because an EFM ABB Totalflow device has been created and configured with the same Sparkplug Group ID, Edge Node ID, and Device ID, history data will also be pushed to the MQTT server as Sparkplug RECORD objects. When new history data is polled by the EFM ABB Totalflow driver, they will be published to the MQTT server, consumed by MQTT Engine, passed on to MQTT Recorder, and then inserted into the specified database. Below is a view of some events records using a third party database viewing tool.

The screenshot shows a MySQL database viewer displaying the 'rs_efm_meter_alarm' table. The table has 14 columns: rs_id, rs_type, rs_group, rs_edge_node, rs_device, mtr_id, rs_record_time, rs_recorder_time, rs_fields, string_val, condition, timestamp, and alarm_state. The table contains 6 rows of data, all with 'alarm_state' set to 2.

rs_id	rs_type	rs_group	rs_edge_node	rs_device	mtr_id	rs_record_time	rs_recorder_time	rs_fields	string_val	condition	timestamp	alarm_state
1	EFM_METER_ALARM	C1	E1	Totalflow G4 Sim	ACA7-1	1591768800000	1596671261857	string_val12...	Uncorrected volume above high limit	alarm set	1591768800	2
2	EFM_METER_ALARM	C1	E1	Totalflow G4 Sim	ACA7-1	1596643200000	1596671268700	string_val12...	Uncorrected volume above high limit	alarm clear	1596643200	2
3	EFM_METER_ALARM	C1	E1	Totalflow G4 Sim	SUAGA7-2	1591768800000	1596671316480	string_val12...	Uncorrected volume above high limit	alarm set	1591768800	2
4	EFM_METER_ALARM	C1	E1	Totalflow G4 Sim	SUAGA7-2	1596643200000	1596671319664	string_val12...	Uncorrected volume above high limit	alarm clear	1596643200	2
5	EFM_METER_ALARM	C1	E1	Totalflow G4 Sim	SUAGA7-2	1596643200000	1596673810984	string_val12...	Uncorrected volume above high limit	alarm set	1596643200	2
6	EFM_METER_ALARM	C1	E1	Totalflow G4 Sim	ACA7-1	1596643200000	1596673817582	string_val12...	Uncorrected volume above high limit	alarm set	1596643200	2

Additional Resources

- Inductive Automation's Ignition download with free trial
 - <https://inductiveautomation.com/downloads/>
- Azure Injector download with free trial
 - <https://inductiveautomation.com/downloads/third-party-modules>
- Questions about this tutorial?
 - Check out the Cirrus Link Forum: <https://forum.cirrus-link.com/>
 - Contact support: support@cirrus-link.com
- Sales questions
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