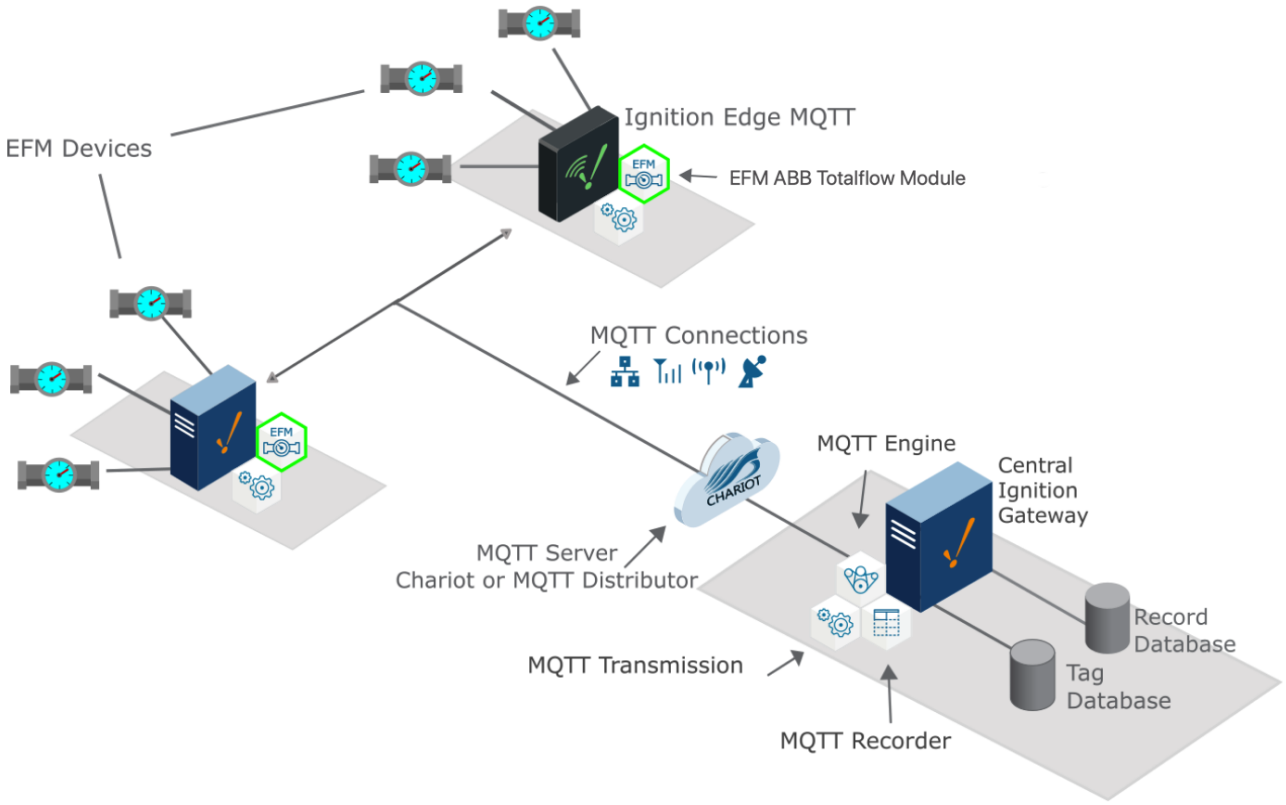
Sending ABB Totalflow History to a Central Ignition Gateway

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 history data from an ABB Totalflow device based on a specified polling rate. With MQTT Transmission, this history data 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 history to the central Ignition gateway.



Sending ABB Totalflow History to a Central Ignition Gateway

We must configure a total of five Cirrus Link modules on two different Ignition gateways to get history 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.

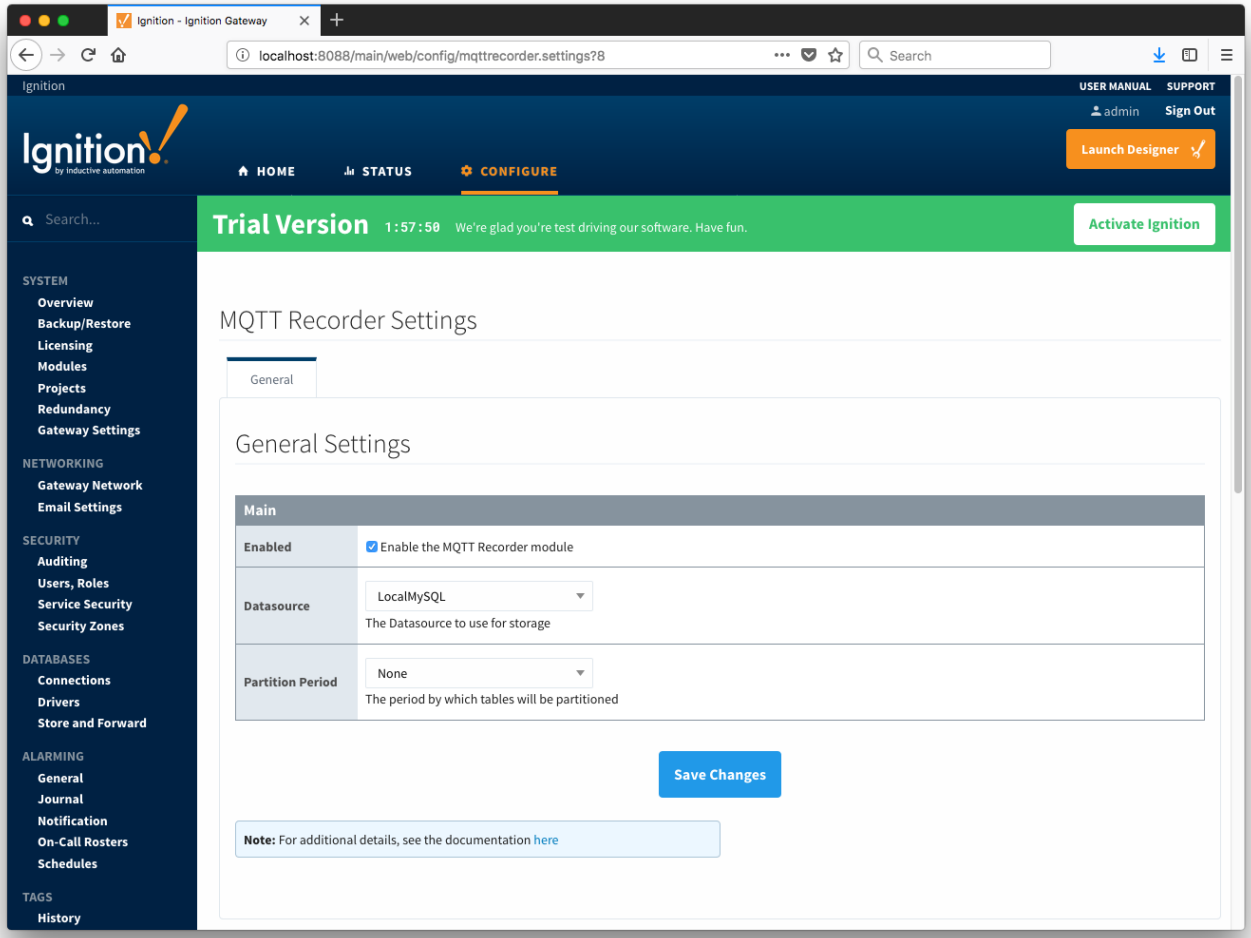
Central Ignition Gateway Setup

MQTT Distributor can be left in its default configuration.

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' as shown in the lower left below.

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 segregated tables by time periods.

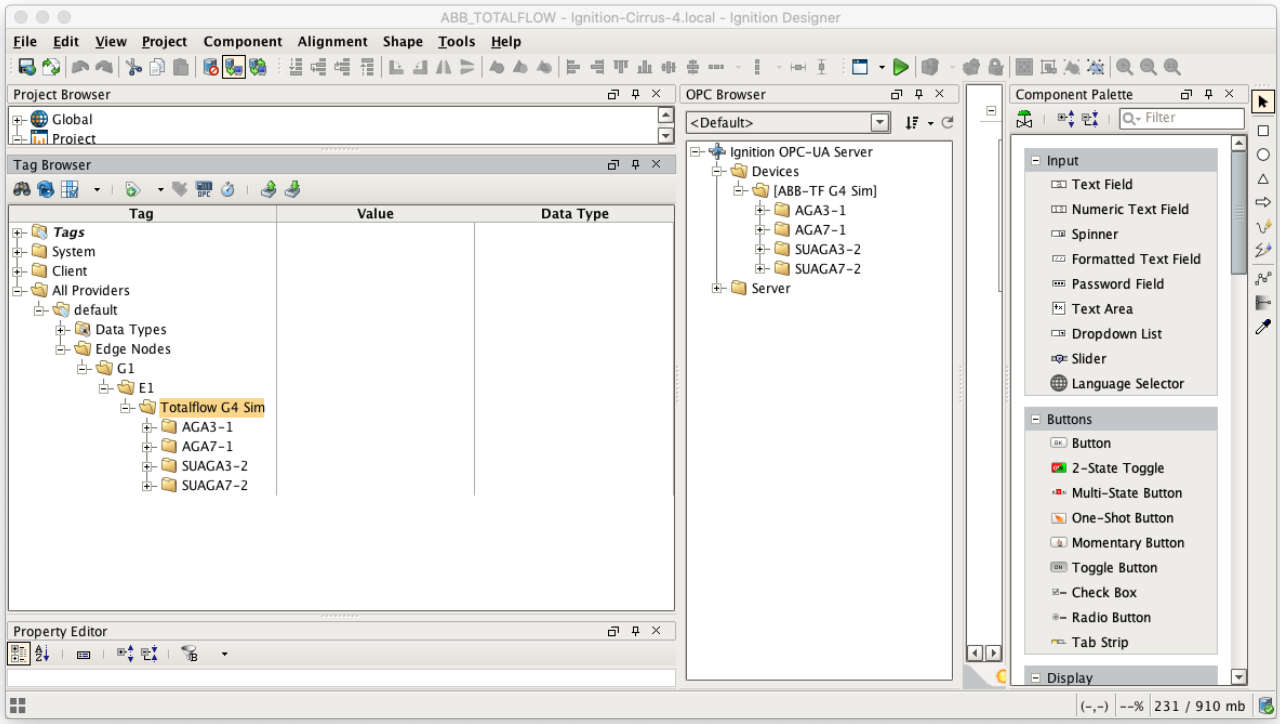


At this point, the Central Ignition Gateway with MQTT Distributor, MQTT Engine, and MQTT Recorder is fully configured and ready to receive MQTT Sparkplug messages from the Remote/Edge Ignition Gateway. MQTT Distributor listens on TCP port 1883 by default for inbound MQTT connections. Make sure the Operating 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]/...

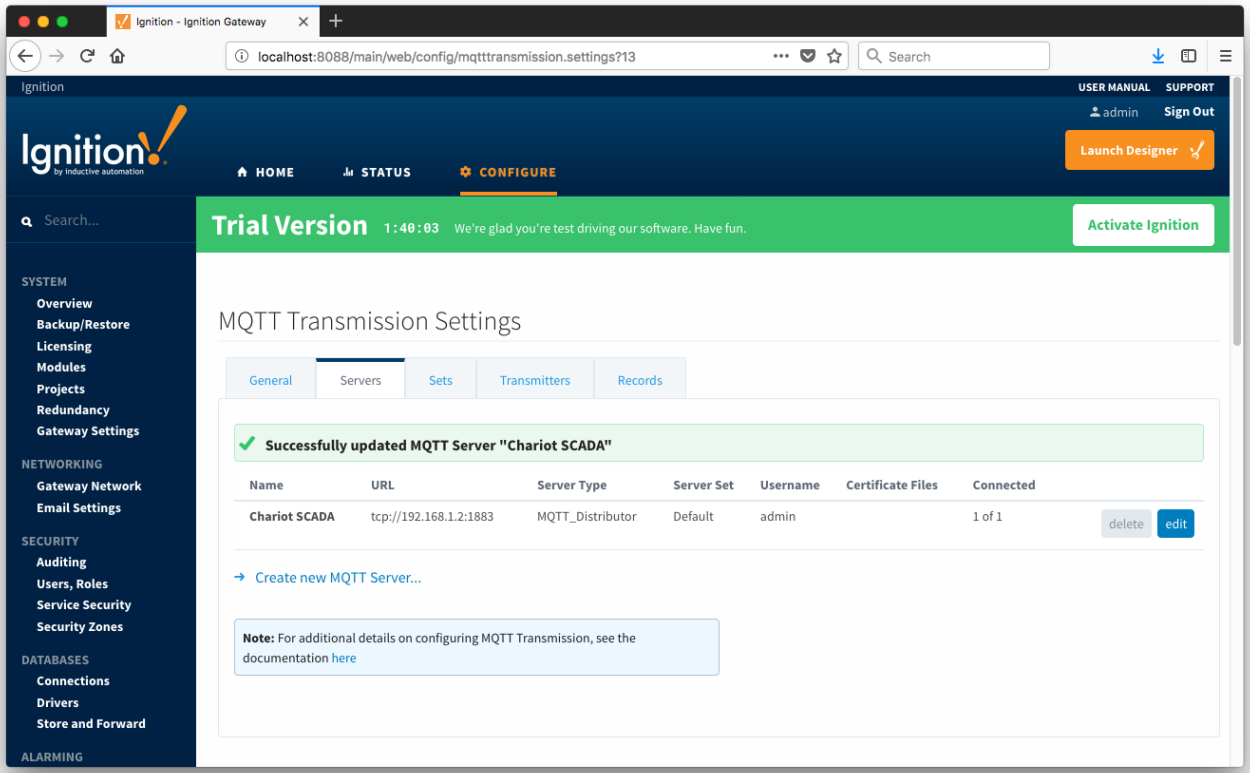
In the example below this implies the following definitions:

- [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.



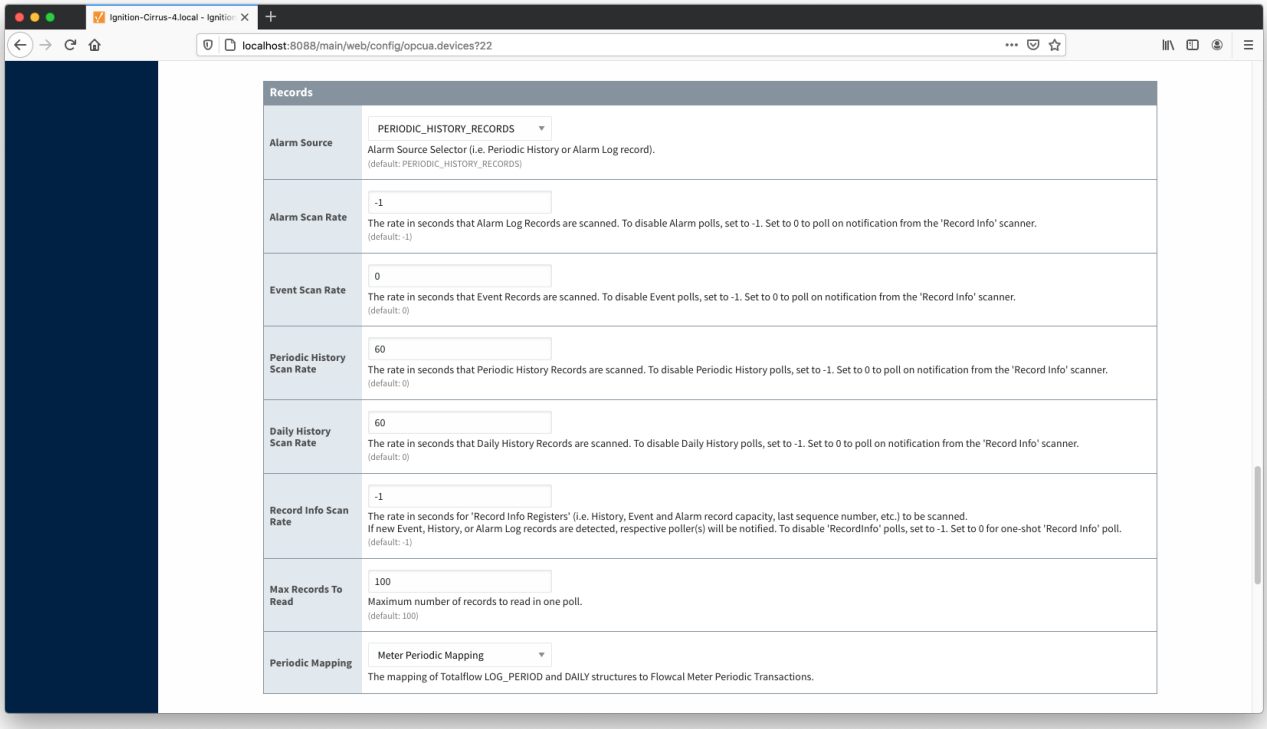
The next step is configuring the ABB Totalflow module. This is done as described in the ABB Totalflow Configuration manual. In going through the basic setup and configuration for History configuration the following steps must be performed:

- 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 desired history data (i.e. Periodic, Daily or both).

As en example, let's configure the driver to poll for Periodic and Daily History and disable polling for Alarms and Events. This can be done in two ways:

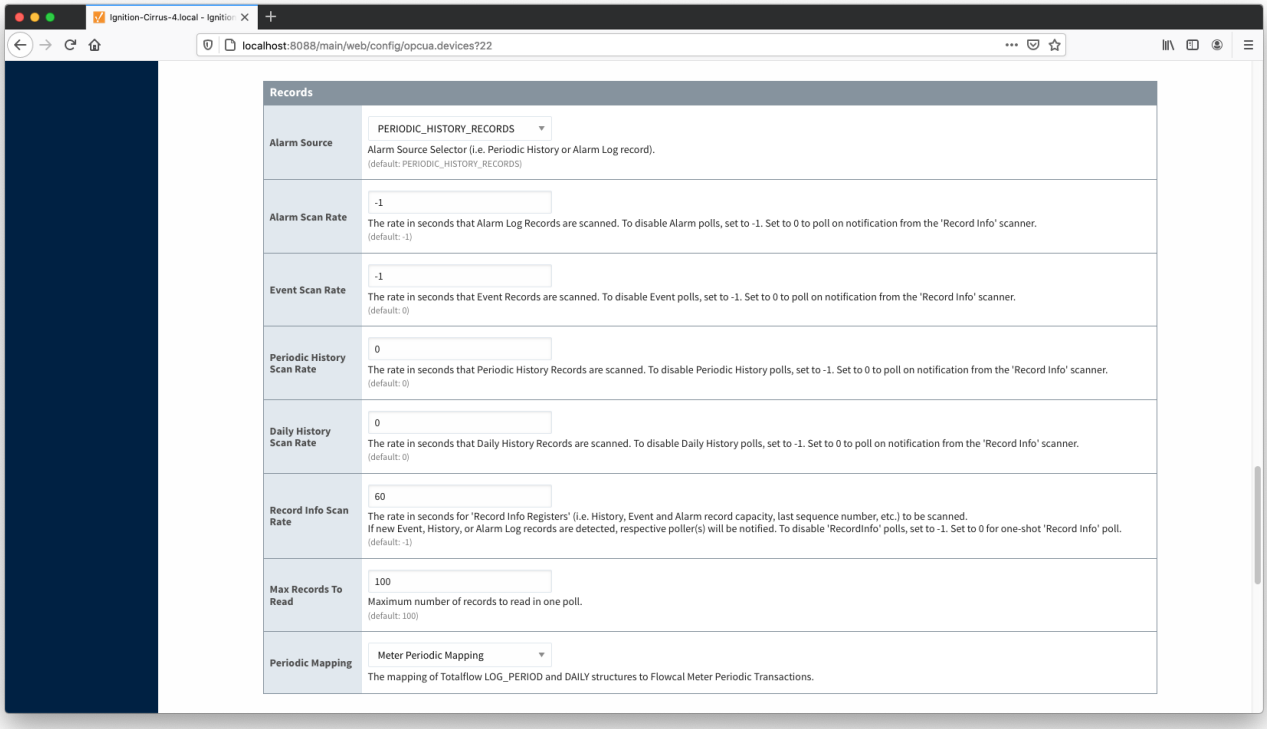
The first way to do it is to configure scan rates as shown below:

- **Alarm Scan Rate**
  - Set to -1 to disable polling for Alarms. If Alarms are not needed it is the best practice to set the 'Alarm Scan Rate' to -1. With this setup, alarm records are not going to be pushed to the rs_efm_meter_alarm database table regardless of the alarm source setting (i.e. PERIODIC_HISTORY or ALARM_LOG_RECORDS).
  - If the 'Alarm Source' is set to the 'ALARM_LOG_RECORDS' and the 'Record Info Scan Rate' is set to -1, the 'Alarm Scan Rate' can be set to 0. With this setup, the AlarmPoller will not run on it own nor will it poll on notifications from the RecordInfoPoller.
- **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 a positive number to launch the PeriodicHistoryPoller with specified poll rate.
- **Daily History Scan Rate**
  - Set to a positive number to launch the DailyHistoryPoller with specified poll rate.
- **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.



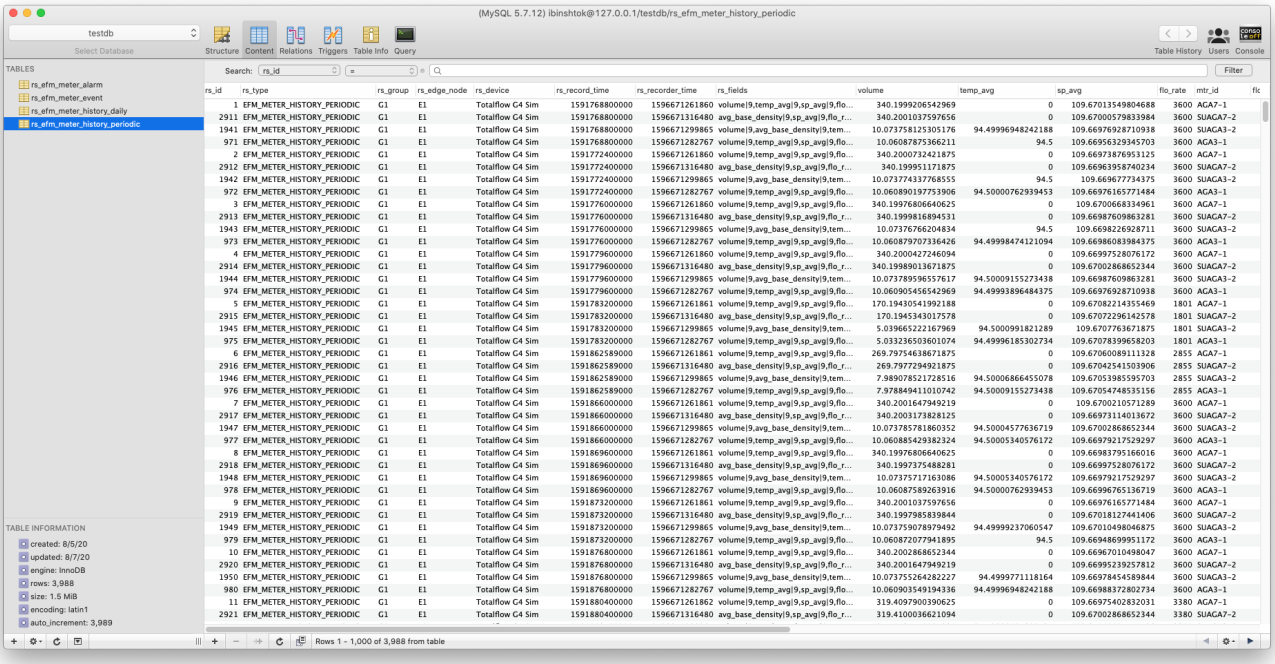
The second way to do it is to configure scan rates as shown below:

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

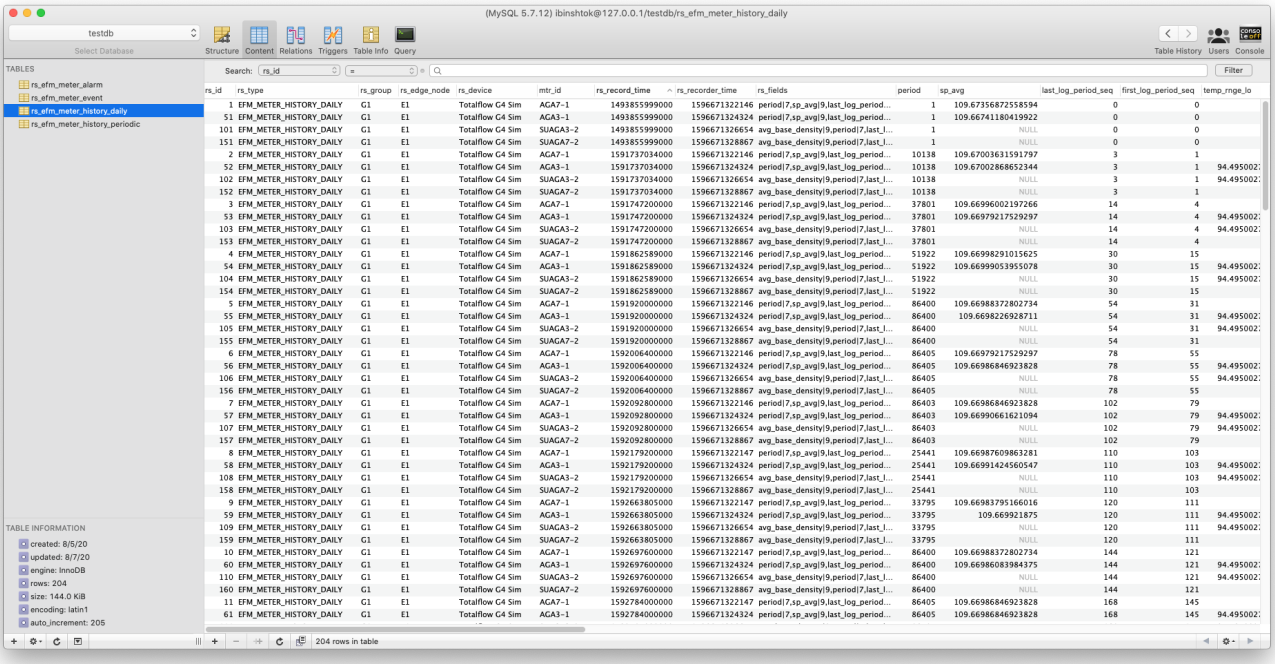


At this point the EFM ABB Totalflow driver is configured and is polling for history data at the rate specified in the EFM ABB Totalflow device configuration.

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 are a few views of some history records using a third party database viewing tool.



rs_id	rs_type	rs_group	rs_edge_node	rs_device	rs_record_time	rs_recorder_time	rs_fields	volume	temp_avg	sp_avg	flo_rate	mtr_id	flc
1	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591768800000	1596671261860	volume|9,temp_avg|9,sp_avg|9,flo...	340.1999206542969	0	109.67013549804688	3600	AGA7-1	
2911	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591768800000	1596671316480	avg_base_density|9,sp_avg|9,flo_r...	340.2001037597656	0	109.67000579833984	3600	SUAGA7-2	
1941	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591768800000	1596671299865	volume|9,avg_base_density|9,tem...	10.073758125305176	94.49996948242188	109.66976928710938	3600	SUAGA3-2	
971	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591768800000	1596671282767	volume|9,temp_avg|9,sp_avg|9,flo...	10.06087875366211	94.5	109.66956329345703	3600	AGA3-1	
2	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591772400000	1596671261860	volume|9,temp_avg|9,sp_avg|9,flo...	340.2000732421875	0	109.66973876953125	3600	AGA7-1	
2912	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591772400000	1596671316480	avg_base_density|9,sp_avg|9,flo_r...	340.199951171875	0	109.66963958740234	3600	SUAGA7-2	
1942	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591772400000	1596671299865	volume|9,avg_base_density|9,tem...	10.073774337768555	94.5	109.66967773437 5	3600	SUAGA3-2	
972	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591772400000	1596671282767	volume|9,temp_avg|9,sp_avg|9,flo...	10.060890197753906	94.50000762939453	109.66976165771484	3600	AGA3-1	
3	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591776000000	1596671261860	volume|9,temp_avg|9,sp_avg|9,flo...	340.19976806640625	0	109.6700668334961	3600	AGA7-1	
2913	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591776000000	1596671316480	avg_base_density|9,sp_avg|9,flo_r...	340.1999816894531	0	109.66987609863281	3600	SUAGA7-2	
1943	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591776000000	1596671299865	volume|9,avg_base_density|9,tem...	10.07376766204834	94.5	109.6698226928711	3600	SUAGA3-2	
973	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591776000000	1596671282767	volume|9,temp_avg|9,sp_avg|9,flo...	10.060879707336426	94.49998474121094	109.66986083984375	3600	AGA3-1	
4	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591779600000	1596671261860	volume|9,temp_avg|9,sp_avg|9,flo...	340.2000427246094	0	109.66997528076172	3600	AGA7-1	
2914	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591779600000	1596671316480	avg_base_density|9,sp_avg|9,flo_r...	340.1998901367875	0	109.67002868652344	3600	SUAGA7-2	
1944	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591779600000	1596671299865	volume|9,avg_base_density|9,tem...	10.073789596557617	94.50009155273438	109.66987609863281	3600	SUAGA3-2	
974	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591779600000	1596671282767	volume|9,temp_avg|9,sp_avg|9,flo...	10.060905456542969	94.49993896484375	109.66976928710938	3600	AGA3-1	
5	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591783200000	1596671261861	volume|9,temp_avg|9,sp_avg|9,flo...	170.1943054199218 8	0	109.67082214355469	1801	AGA7-1	
2915	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591783200000	1596671316480	avg_base_density|9,sp_avg|9,flo_r...	170.1945343017578	0	109.67072296142578	1801	SUAGA7-2	
1945	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591783200000	1596671299865	volume|9,avg_base_density|9,tem...	5.039665222167969	94.5000991821289	109.6707763671875	1801	SUAGA3-2	
975	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591783200000	1596671282767	volume|9,temp_avg|9,sp_avg|9,flo...	5.033236503601074	94.49996185302734	109.67078399658203	1801	AGA3-1	
6	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591862589000	1596671261861	volume|9,temp_avg|9,sp_avg|9,flo...	269.7975463867187 5	0	109.67060089111328	2855	AGA7-1	
2916	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591862589000	1596671316480	avg_base_density|9,sp_avg|9,flo_r...	269.7977294921875	0	109.67042541503906	2855	SUAGA7-2	
1946	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591862589000	1596671299865	volume|9,avg_base_density|9,tem...	7.989078521728516	94.50006866455078	109.67053985595703	2855	SUAGA3-2	
976	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591862589000	1596671282767	volume|9,temp_avg|9,sp_avg|9,flo...	7.978494411010742	94.50009155273438	109.67054748535156	2855	AGA3-1	
7	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591866000000	1596671261861	volume|9,temp_avg|9,sp_avg|9,flo...	340.2001647949219	0	109.67002105712891	3600	AGA7-1	
2917	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591866000000	1596671316480	avg_base_density|9,sp_avg|9,flo_r...	340.2003173828125	0	109.66973114013672	3600	SUAGA7-2	
1947	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591866000000	1596671299865	volume|9,avg_base_density|9,tem...	10.073785781860352	94.50004577636719	109.67002868652344	3600	SUAGA3-2	
977	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591866000000	1596671282767	volume|9,temp_avg|9,sp_avg|9,flo...	10.060885429382324	94.50005340576172	109.66979217529297	3600	AGA3-1	
8	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591869600000	1596671261861	volume|9,temp_avg|9,sp_avg|9,flo...	340.19976806640625	0	109.66983795166016	3600	AGA7-1	
2918	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591869600000	1596671316480	avg_base_density|9,sp_avg|9,flo_r...	340.1997375488281	0	109.66997528076172	3600	SUAGA7-2	
1948	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591869600000	1596671299865	volume|9,avg_base_density|9,tem...	10.07375717163086	94.50005340576172	109.66979217529297	3600	SUAGA3-2	
978	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591869600000	1596671282767	volume|9,temp_avg|9,sp_avg|9,flo...	10.06087589263916	94.50000762939453	109.66996765136719	3600	AGA3-1	
9	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591873200000	1596671261861	volume|9,temp_avg|9,sp_avg|9,flo...	340.2001037597656	0	109.66976165771484	3600	AGA7-1	
2919	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591873200000	1596671316480	avg_base_density|9,sp_avg|9,flo_r...	340.1997985839844	0	109.67018127441406	3600	SUAGA7-2	
1949	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591873200000	1596671299865	volume|9,avg_base_density|9,tem...	10.073759078979492	94.49999237060547	109.67010498046875	3600	SUAGA3-2	
979	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591873200000	1596671282767	volume|9,temp_avg|9,sp_avg|9,flo...	10.060872077941895	94.5	109.66948699951172	3600	AGA3-1	
10	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591876800000	1596671261861	volume|9,temp_avg|9,sp_avg|9,flo...	340.2002868652344	0	109.66967010498047	3600	AGA7-1	
2920	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591876800000	1596671316480	avg_base_density|9,sp_avg|9,flo_r...	340.2001647949219	0	109.66995239257812	3600	SUAGA7-2	
1950	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591876800000	1596671299865	volume|9,avg_base_density|9,tem...	10.073755264282227	94.4999771118164	109.66978454589844	3600	SUAGA3-2	
980	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591876800000	1596671282767	volume|9,temp_avg|9,sp_avg|9,flo...	10.060903549194336	94.49996948242188	109.66988372802734	3600	AGA3-1	
11	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591880400000	1596671261862	volume|9,temp_avg|9,sp_avg|9,flo...	319.4097900390625	0	109.66975402832031	3380	AGA7-1	
2921	EFM_METER_HISTORY_PERIODIC	G1	E1	Totalflow G4 Sim	1591880400000	1596671316480	avg_base_density|9,sp_avg|9,flo_r...	319.4100036621094	0	109.67002868652344	3380	SUAGA7-2	



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
  - Email: sales@cirrus-link.com
  - Phone: +1 (844) 924-7787
- About Cirrus Link
  - https://www.cirrus-link.com/about-us/