

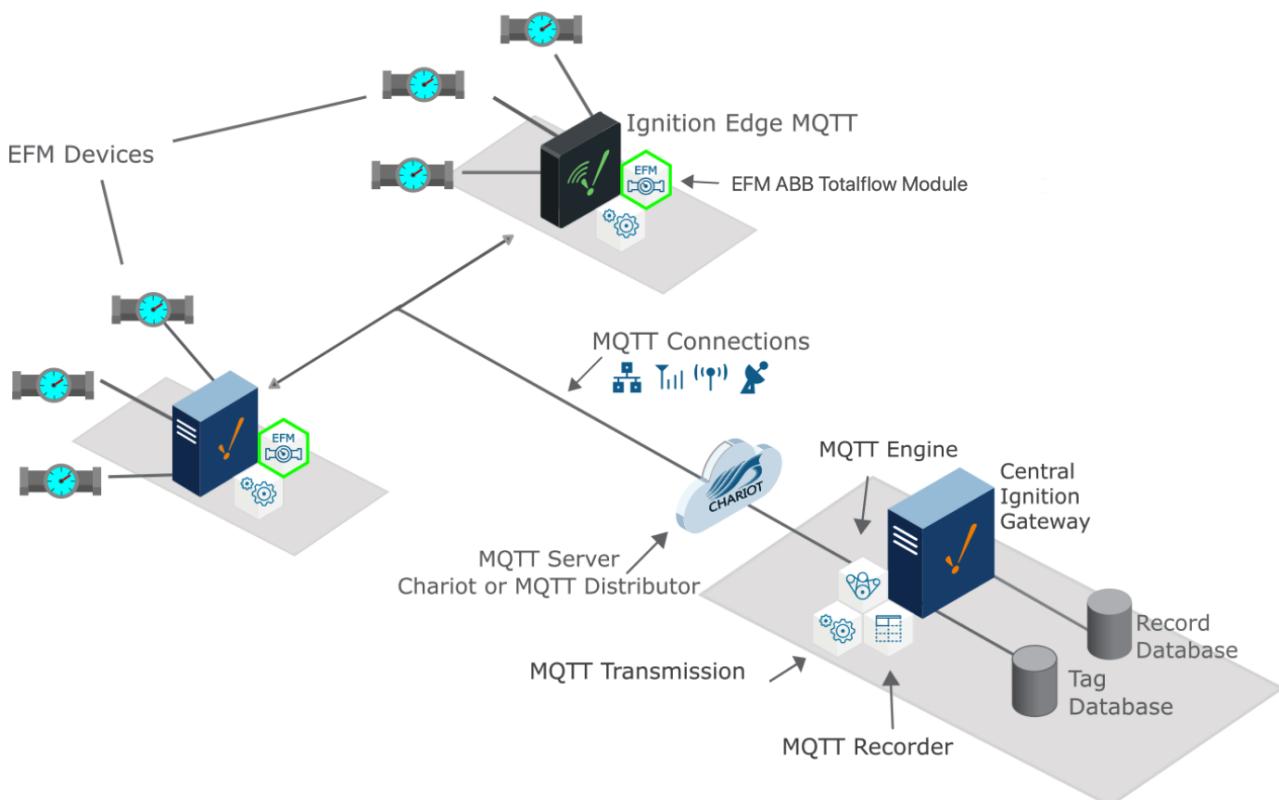
Sending ABB Totalflow History to a Central Ignition Gateway

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.

MQTT Recorder Settings

Main

Enabled	<input checked="" type="checkbox"/> Enable the MQTT Recorder module
Datasource	LocalMySQL
Partition Period	None

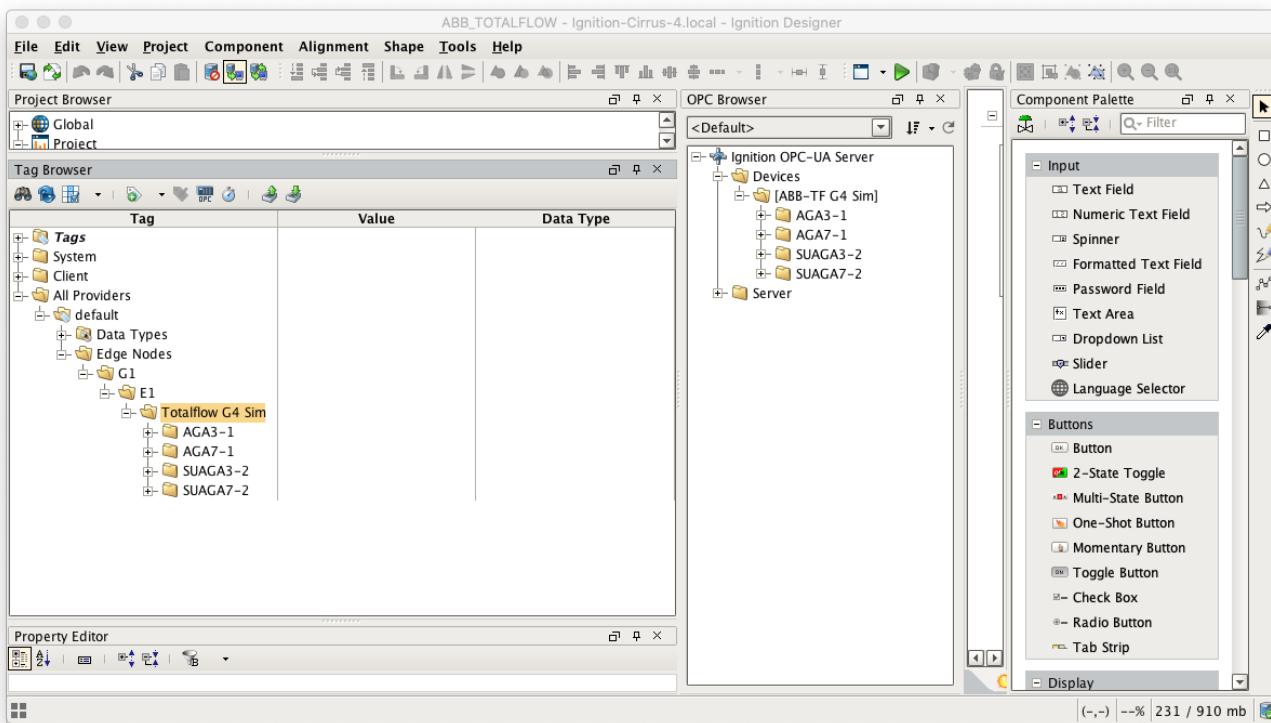
Note: For additional details, see the documentation [here](#)

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 screenshot shows the Ignition Gateway configuration interface. The top navigation bar includes links for HOME, STATUS, and CONFIGURE, with CONFIGURE being the active tab. A banner at the top indicates it's a Trial Version. The left sidebar contains a navigation menu with sections like SYSTEM, NETWORKING, SECURITY, DATABASES, and ALARMING. The main content area is titled "MQTT Transmission Settings". It features a table with one row for "Chariot SCADA" with the URL "tcp://192.168.1.2:1883", Server Type "MQTT_Distributor", Server Set "Default", Username "admin", and "Connected" status "1 of 1". Below the table is a link to "Create new MQTT Server...". A note at the bottom of the page provides documentation on configuring MQTT transmission.

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 an 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 its 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 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 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 screenshot shows the Ignition software interface with the title "Ignition-Cirrus-4.local - Ignition" at the top. The URL in the address bar is "localhost:8088/main/web/config/opcua.devices?22". The main content area is titled "Records" and contains the following configuration options:

	Setting	Description
Alarm Source	PERIODIC_HISTORY_RECORDS	Alarm Source Selector (i.e. Periodic History or Alarm Log record). (default: PERIODIC_HISTORY_RECORDS)
Alarm Scan Rate	-1	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	0	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	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. (default: 0)
Daily History Scan Rate	60	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 -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.

Screenshot of the Ignition-GUI configuration interface showing the 'Records' configuration page. The page contains several configuration options for different types of records:

- Alarm Source**: Set to `PERIODIC_HISTORY_RECORDS`. Description: Alarm Source Selector (i.e. Periodic History or Alarm Log record). (default: PERIODIC_HISTORY_RECORDS)
- Alarm Scan Rate**: Set to `-1`. 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**: 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**: Set to `0`. 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**: Set to `0`. 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**: 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**: Set to `100`. Description: Maximum number of records to read in one poll. (default: 100)
- Periodic Mapping**: 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 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.

Screenshot of MySQL Workbench showing the 'rs_efm_meter_history_periodic' table. The table structure is as follows:

```

CREATE TABLE `rs_efm_meter_history_periodic` (
  `rs_id` int(11) NOT NULL,
  `rs_type` enum('G1','E1') NOT NULL,
  `rs_group` int(11) NOT NULL,
  `rs_edge_node` int(11) NOT NULL,
  `rs_device` int(11) NOT NULL,
  `rs_record_time` timestamp NOT NULL,
  `rs_recorder_time` timestamp NOT NULL,
  `rs_fields` longtext NOT NULL,
  `volume` double NOT NULL,
  `temp_avg` double NOT NULL,
  `sp_avg` double NOT NULL,
  `fl_rate` double NOT NULL,
  `mtr_id` int(11) NOT NULL,
  `fk` int(11) NOT NULL
)

```

The table contains numerous rows of historical data for various EFM Meters. The columns represent fields such as record time, volume, average temperature, specific gravity, flow rate, meter ID, and a foreign key. The data is organized by meter ID (rs_device) and recording time.

(MySQL 5.7.12) ibinshokt@127.0.0.1/testdb/rs_efm_meter_history_daily

rs_id	rs_type	rs_group	rs_edge_node	rs_device	mtr_id	rs_record_time	rs_fields	period	sp_avg	last_log_period_seq	first_log_period_seq	temp_mrg_lo
1	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA7-1	1493855999000	1596671322146 periodid7,sp_avg9,last_log_period...	1	109.67356872558592	0	0	
51	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA3-1	1493855999000	1596671322146 periodid7,sp_avg9,last_log_period...	1	109.66741180419922	0	0	
101	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA3-2	1493855999000	1596671326654 avg_base_density9,periodid7,last...	1	109.66741180419922	0	0	
151	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA7-2	1493855999000	1596671322146 avg_base_density9,periodid7,last...	1	109.66741180419922	0	0	
2	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA7-1	1591737034000	1596671322146 periodid7,sp_avg9,last_log_perio...	10138	109.67003631591797	3	1	
102	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA3-2	1591737034000	1596671326654 avg_base_density9,periodid7,last...	10138	109.67002868652344	3	1	94.495002;
152	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA3-1	1591737034000	1596671326654 avg_base_density9,periodid7,last...	10138	109.669982197266	3	1	94.495002;
3	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA7-1	1591747200000	1596671322146 periodid7,sp_avg9,last_log_perio...	37801	109.66996002197266	14	4	
103	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA3-1	1591747200000	1596671326654 avg_base_density9,periodid7,last...	37801	109.66997217529297	14	4	94.495002;
153	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA3-2	1591747200000	1596671326654 avg_base_density9,periodid7,last...	37801	109.66997217529297	14	4	94.495002;
4	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA7-1	1591862589000	1596671322146 periodid7,sp_avg9,last_log_perio...	51922	109.66998291015625	30	15	
54	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA3-1	1591862589000	1596671326654 avg_base_density9,periodid7,last...	51922	109.6699053955078	30	15	94.495002;
104	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA3-2	1591862589000	1596671326654 avg_base_density9,periodid7,last...	51922	109.6699053955078	30	15	94.495002;
154	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA7-2	1591862589000	1596671326654 avg_base_density9,periodid7,last...	51922	109.66998291015625	30	15	
5	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA7-1	1591920000000	1596671322146 periodid7,sp_avg9,last_log_perio...	86400	109.66998372802734	54	31	
55	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA3-1	1591920000000	1596671326654 avg_base_density9,periodid7,last...	86400	109.66998226928711	54	31	94.495002;
105	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA3-2	1591920000000	1596671326654 avg_base_density9,periodid7,last...	86400	109.66998226928711	54	31	94.495002;
155	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA7-2	1591920000000	1596671326654 avg_base_density9,periodid7,last...	86400	109.66998226928711	54	31	
6	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA7-1	1591920000000	1596671322146 periodid7,sp_avg9,last_log_perio...	86400	109.66998372802734	54	31	
56	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA3-1	1591920000000	1596671326654 avg_base_density9,periodid7,last...	86400	109.66998372802734	54	31	94.495002;
106	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA3-2	1591920000000	1596671326654 avg_base_density9,periodid7,last...	86400	109.66998372802734	54	31	94.495002;
156	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA7-2	1591920000000	1596671326654 avg_base_density9,periodid7,last...	86400	109.66998372802734	54	31	
7	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA7-1	159192092800000	1596671322146 periodid7,sp_avg9,last_log_perio...	86403	109.66998464923828	78	55	
57	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA3-1	159192092800000	1596671326654 avg_base_density9,periodid7,last...	86403	109.66998464923828	78	55	94.495002;
107	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA3-2	159192092800000	1596671326654 avg_base_density9,periodid7,last...	86403	109.66998464923828	78	55	94.495002;
157	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA7-2	159192092800000	1596671326654 avg_base_density9,periodid7,last...	86403	109.66998464923828	78	55	
8	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA7-1	159192092800000	1596671322146 periodid7,sp_avg9,last_log_perio...	25441	109.66987609863281	110	109	
58	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA3-1	159192092800000	1596671326654 avg_base_density9,periodid7,last...	25441	109.66991424560547	110	109	94.495002;
108	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA3-2	159192092800000	1596671326654 avg_base_density9,periodid7,last...	25441	109.66991424560547	110	109	94.495002;
158	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA7-2	159192092800000	1596671326654 avg_base_density9,periodid7,last...	25441	109.66991424560547	110	109	
9	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA7-1	15926638050000	1596671322146 periodid7,sp_avg9,last_log_perio...	33795	109.66983795166016	120	111	
59	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA3-1	15926638050000	1596671322146 periodid7,sp_avg9,last_log_perio...	33795	109.669921875	120	111	94.495002;
109	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA3-2	15926638050000	1596671326654 avg_base_density9,periodid7,last...	33795	109.669921875	120	111	94.495002;
159	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA7-2	15926638050000	1596671326654 avg_base_density9,periodid7,last...	33795	109.669921875	120	111	
10	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA7-1	15926976000000	1596671322147 periodid7,sp_avg9,last_log_perio...	86400	109.66998372802734	144	121	
60	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA3-1	15926976000000	1596671322147 periodid7,sp_avg9,last_log_perio...	86400	109.66998083984375	144	121	94.495002;
110	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA3-2	15926976000000	1596671326654 avg_base_density9,periodid7,last...	86400	109.66998083984375	144	121	94.495002;
160	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	SUAGA7-2	15926976000000	1596671326654 avg_base_density9,periodid7,last...	86400	109.66998083984375	144	121	
11	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA7-1	15927840000000	1596671322147 periodid7,sp_avg9,last_log_perio...	86405	109.66988464923828	168	145	
61	rs_efm_meter_history_daily	G1	E1	Totalflow G4 Sim	AGA3-1	15927840000000	1596671322147 periodid7,sp_avg9,last_log_perio...	86405	109.66988464923828	168	145	94.495002;

TABLE INFORMATION

- created: 8/5/20
- updated: 8/7/20
- engine: InnoDB
- rows: 204
- size: 144.0 KiB
- encoding: latin1
- auto_increment: 205

+ - _ C E [] 204 rows in table

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
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