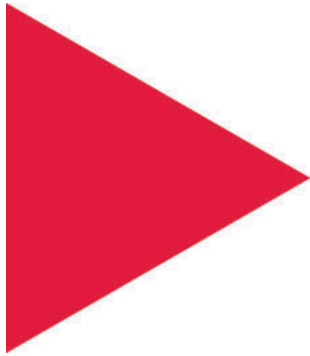




# CON-MBUS

Application Guide

Edition 1.4



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# Contents

<b>Product Description.....</b>	<b>5</b>
Application .....	5
About M-Bus .....	6
Terminology .....	6
CON-MBUS Product Models .....	6
<b>Important Information.....</b>	<b>7</b>
Cautions and Warnings .....	7
<b>Typical Network Architecture with CON-MBUS.....</b>	<b>8</b>
Example 1: Star M-Bus Network .....	9
Example 2: Daisy Chain M-Bus Network .....	10
<b>Principles of Operation.....</b>	<b>11</b>
CON-MBUS Product Layout .....	11
Power over M-Bus Network .....	12
Supported M-Bus Meters .....	12
<b>How to Integrate the CON-MBUS.....</b>	<b>13</b>
Main Steps to Integrate the CON-MBUS .....	13
Step 1: Upgrading the Delta Controller with Customized Firmware.....	13
Step 2: Installing the Customized Object Dialogs on OWS .....	14
Saving the customized GWT dialog for Version 3.33 .....	14
Saving the customized GWT and GW dialogs for Version 3.40 .....	14
Step 3: Connecting and Configuring the CON-MBUS .....	15
To configure the CON-MBUS: .....	16
Step 4: Adding a Meter to the Network .....	17
Role of the Gateway Translation object.....	17
Obtaining the primary meter address .....	17
Creating the GWT object and adding a meter to the network .....	19
Addressing a Meter .....	19
To add a meter to the network: .....	19
Set GCL Wait Time for Meter Queries.....	20
Step 5: Choosing How to Configure the GWT Object to Translate Meter Data .....	21
Step 6: Configuring the GWT Object Obtained from the CON-MBUS Product Page .....	21
Creating the BACnet objects .....	22

## Contents

<b>Step 7: Configuring the GWT Object that You Created .....</b>	<b>22</b>
About the GWT object translation programming fields.....	22
About the GWT Reliability Timer setting and status alarming .....	24
<b>Configuring data translation and BACnet objects.....</b>	<b>24</b>
Sontex Supercal 531 data elements for first two pages only.....	25
Example 1: Configuring the Sontex Supercal 531 for a power consumption application using an existing GWT as a template.....	27
Example 2: Configuring the Sontex Supercal 539 for a cooling coil application by creating a new GWT...	30
Sontex Supercal 539 data elements for first page only. ....	30
<b>BACnet Objects: Naming Scheme for Objects.....</b>	<b>34</b>
<b>Available BACnet Objects .....</b>	<b>34</b>
<b>Tables of Supported BACnet Objects and Addressing Schemes .....</b>	<b>35</b>
3.33 R2 and R3 Firmware .....	36
3.40 R1 Firmware .....	36
3.40 R2 and R3 Firmware .....	39
<b>Managing GWT Object Configurations .....</b>	<b>41</b>
Saving the GWT Object.....	41
Loading the GWT Object .....	42
Removing a Meter from the Network .....	42
<b>Troubleshooting .....</b>	<b>43</b>
CON-MBUS Status Indicators Table .....	45
<b>Document Revision History .....</b>	<b>46</b>

## Product Description

The CON-MBUS is a level converter used to bring data from M-Bus (Meter-Bus) products into a BACnet controller. The CON-MBUS can be used with any Delta Controls product that has an available MS/TP port. The CON-MBUS is capable of supplying power to the meters and can support up to 150 meters.

The CON-MBUS brings the M-Bus protocol directly into DAC, DSC and enteliBUS controllers. The mapped data from a meter comes in through a Gateway Translation (GWT) object. The GWT object instance matches the meter address so that it is clear which meter is communicating with the CON-MBUS. Required BACnet objects such as AV, BV, BI, AI objects are automatically created when the data is mapped into the GWT object.



## Application

The CON-MBUS brings M-Bus meters into a BACnet network. One CON-MBUS can communicate with up to 150 M-Bus meters. The information from the meters can be customized and mapped into BACnet objects through a gateway object and thus providing the ability to view only specific information from the meters. The update time for the meters is adjustable to suit a variety of installations

The M-Bus protocol was developed to fill the need for a system for the networking and remote reading of utility meters. For example, the consumption of gas, water or electricity in the home can be measured. M-Bus fulfills the special requirements of remotely powered or battery driven systems, including consumer utility meters. When interrogated, the meters deliver the collected data to a common master. At periodic intervals, a hand-held computer, or a control system could read all the utility meters of a building.

## About M-Bus



The M-Bus® (Meter Bus) allows remote reading of consumption meters such as gas, water, heat or electricity meters. The M-Bus communicates over two wires and is a low-cost solution.

M-Bus is a European standard: EN 13757-2 physical and link layer, EN 13757-3 application layer. The standard is defined on <http://www.m-bus.com/>

## Terminology

M-Bus refers to the Meter-Bus protocol standard.

CON-MBUS refers to the level converter product manufactured by Delta Controls that allows communication between a BACnet controller and M-Bus meters. We avoid using M-Bus or MBUS to refer to the CON-MBUS.

Gateway refers to the software special interface that is flash loaded into the host eBCON/DAC/DSC controller. The gateway is viewed as a purely software entity.

Meter ID# refers to the unique ID assigned to a meter by the manufacturer. With CON-MBUS software, this information is displayed in the Description tab of the GW object. For example, a Meter Id# might be 10510405

Primary Address refers to the network address assigned to the meter in the factory. The meter documentation includes address information. A new meter from the factory generally has a primary address of 0. Primary addresses are in the range of 1 – 250.

Secondary Address refers to the physical address assigned to the meter. It provides a way to search for a meter even though they all have the same primary address. The primary address can be changed if the meter supports secondary addressing. Delta Controls products do not support secondary addressing.

## CON-MBUS Product Models

The CON-MBUS is available in the several models that support different numbers of M-Bus meters. For details, see the CON-MBUS catalog sheet found on the CON-MBUS product page on George.

## Important Information

Find these documents on the CON-MBUS product page on George.

- CON-MBUS Application Guide
- CON-MBUS Catalog Sheet
- CON-MBUS Release Notes
- CON-MBUS Installation Guide
- Delta Controls Wiring and Installation Guidelines

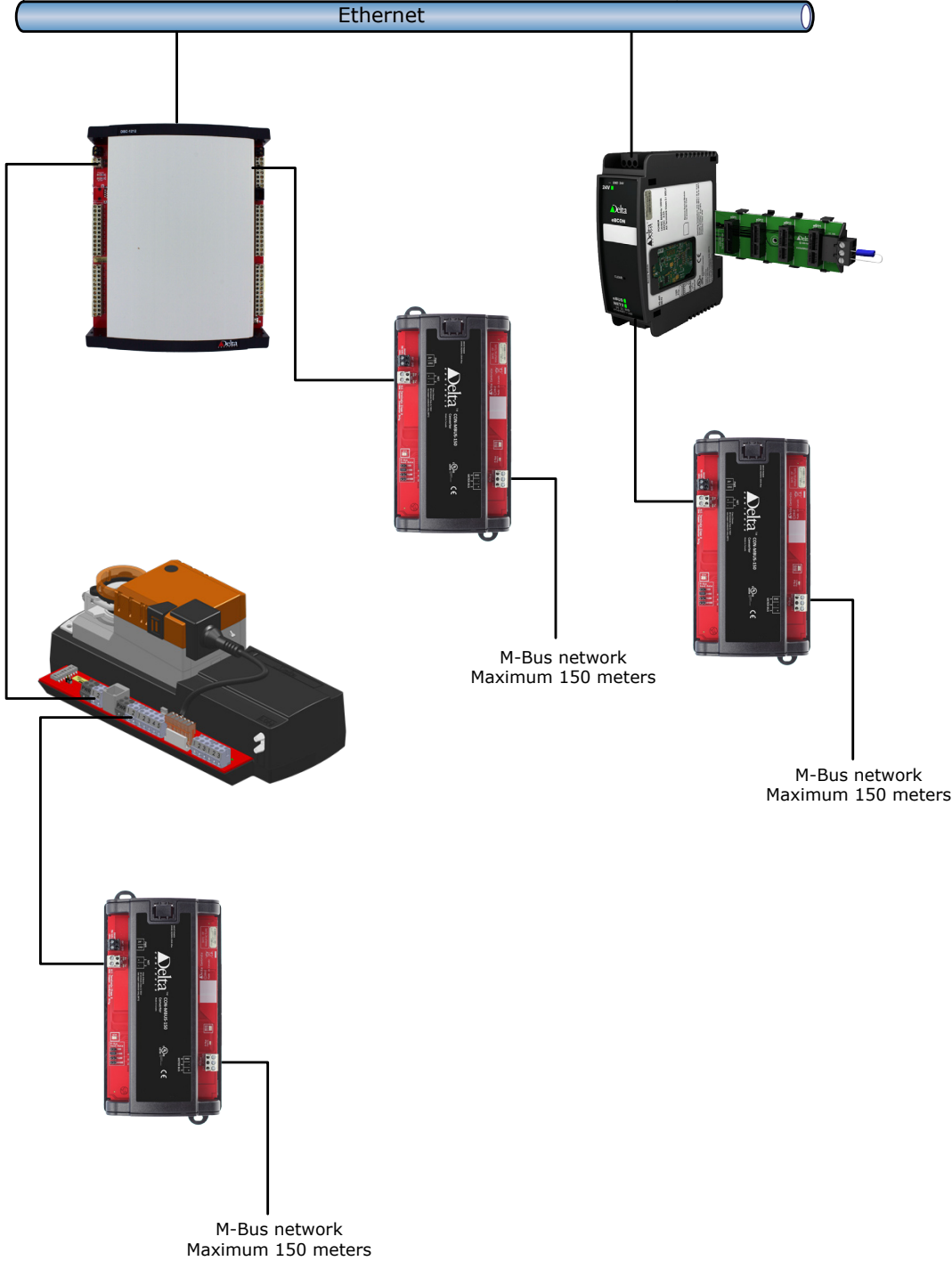
## Cautions and Warnings



These controllers are electrostatic-sensitive devices. Proper ESD protection (ground strap) should be used when installing this product so that damage to the product does not occur. Equipment damage or loss of data may occur if these procedures are not followed as specified.

Installations requiring CE conformance: All wiring for CE rated products must use a separated extra low voltage (SELV) or protective extra low voltage (PELV) transformer. Use safety-isolating transformers, (Class II transformer) per EN61558. The transformer must be rated for 100% duty cycle.

# Typical Network Architecture with CON-MBUS

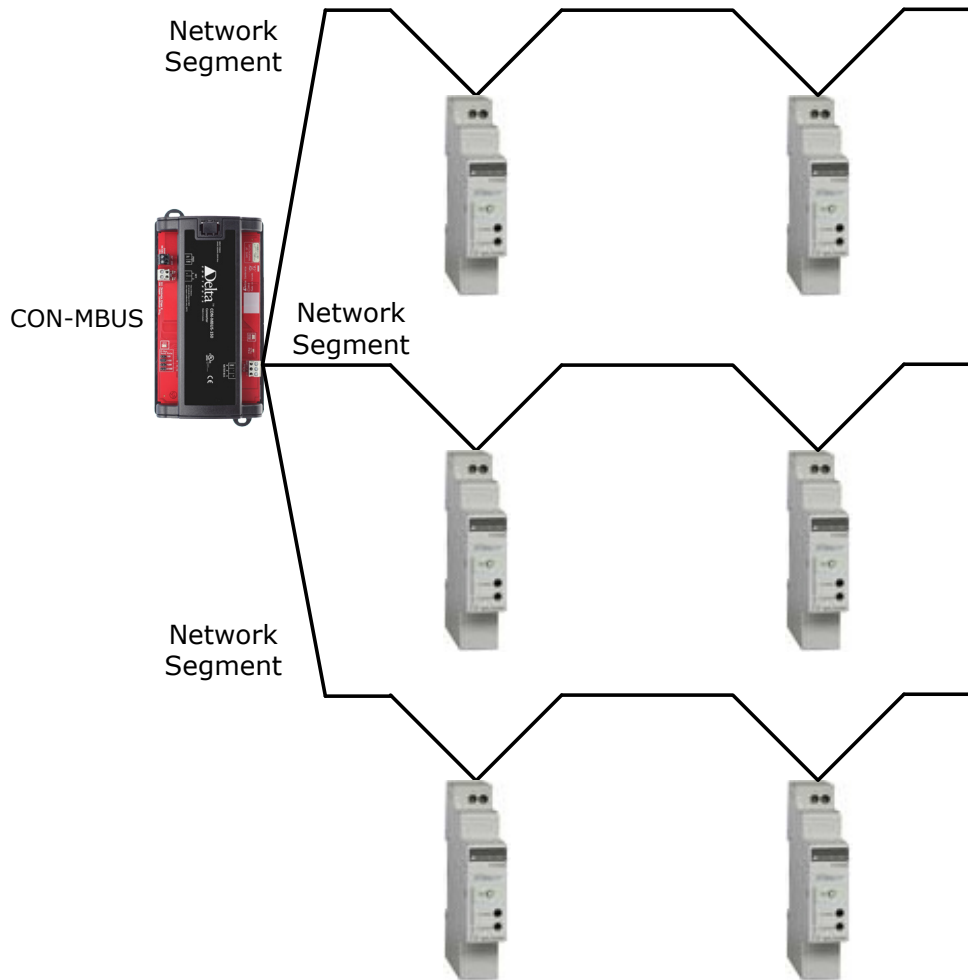




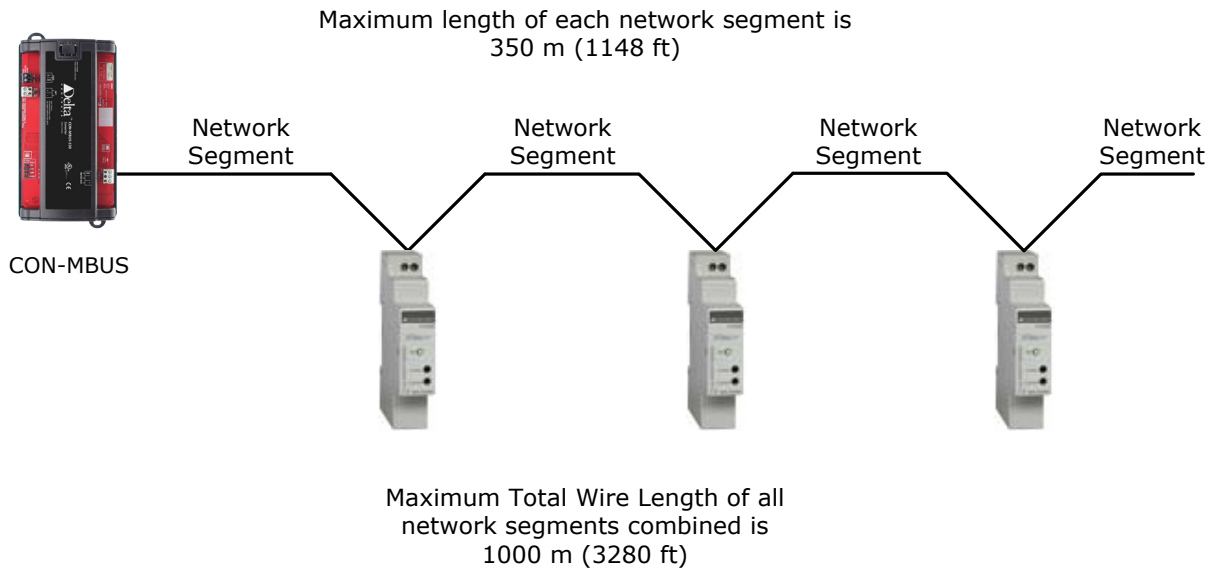
## Example 1: Star M-Bus Network

Maximum length of  
each network segment is  
350 m (1148 ft)

Maximum Total Wire Length of all  
network segments combined is  
1000 m (3280 ft)



## Example 2: Daisy Chain M-Bus Network



## Principles of Operation

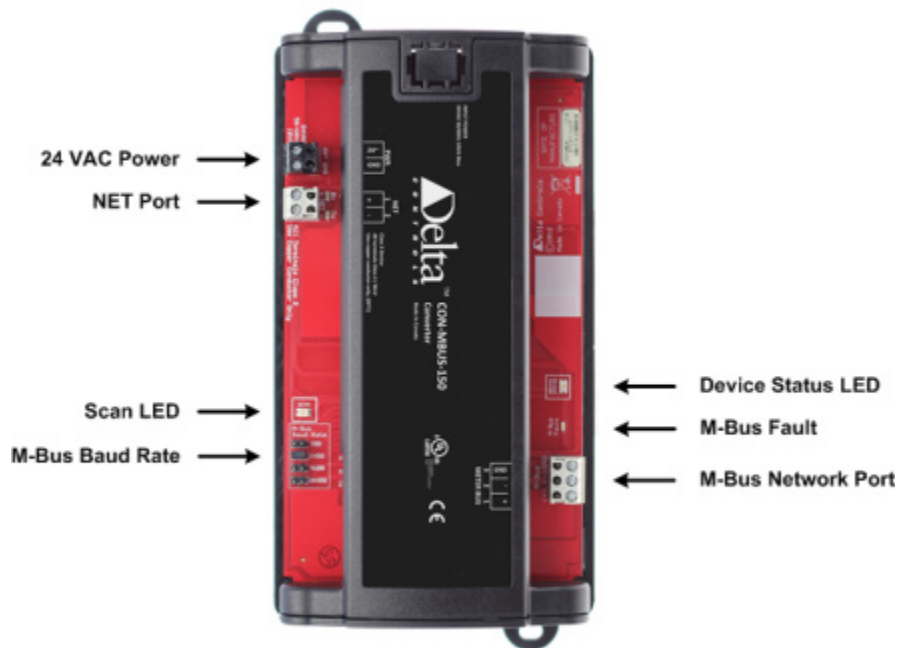
The CON-MBUS allows you to collect multiple types of data from M-Bus meters wired to an Delta installation.

The CON-MBUS Solution consists of the following components:

- Delta enteliBUS, DSC or DAC controller
- Custom Delta Gateway object and Gateway Translation objects residing in the Delta controller
- CON-MBUS converter handles M-Bus communication
- Up to 150 M-Bus meters, depending on CON-MBUS product model being used

The Delta controller and objects translate data passed through the CON-MBUS from the M-Bus meters . The data is represented as BACnet objects in the BACnet network.

## CON-MBUS Product Layout



See the [CON-MBUS Status Indicators Table](#) for information of the LED function.

### Power over M-Bus Network

The CON-MBUS can supply power to meters over the M-Bus network. The CON-MBUS can power up to 150 meters that each use 1 unit load of power. A unit load is equivalent to 1.5 mA. Some meters use more than 1 unit load and this affects the total number of the meters that can be powered.

When the total power consumption for the connected meters exceeds the 150 unit loads limit of the CON-MBUS, then the M-Bus Fault LED is illuminated.

For detailed information about power over the M-Bus network, see the CON-MBUS Installation Guide which is found on the CON-MBUS product page on George.

### Supported M-Bus Meters

The CON-MBUS can support any meter that adheres to the M-Bus protocol standard. The CON-MBUS product page on George downloadable GWT objects as POB files that are configured for use with common M-Bus meters. It is much easier to use these GWT objects rather than to create and configure new GWT objects.

Common M-Bus meters and manufacturers include:

- Sontex Supercal 531
- Sontex Supercal 539
- Siemens SITRANS FUE950
- Siemens UH50-A22c-AT06-F
- Apator LQM-III
- CALEC ST
- DHZ-NZR
- Schneider Electric iEM3135

## How to Integrate the CON-MBUS

The CON-MBUS is integrated into a Delta building automation system via an enteliBUS, DSC or DAC controller. The DCU and enteliTOUCH do not support CON-MBUS integration.

### Main Steps to Integrate the CON-MBUS

To integrate the CON-MBUS into a Delta building automation system, follow these main steps. Each step is detailed in sections titled Step1 ..., Step 2... and so on. If you choose to download GWT objects from the CON-MBUS page on the George site, then you would follow the first four steps and then Step 6. These GWT objects are already configured for a specific product from a manufacturer.

1. Upgrade the Delta controller with customized firmware that supports the wired CON-MBUS.
2. Install the customized Gateway (GW) and Gateway Translation (GWT) object dialogs on the ORCAview OWS.
3. Connect and configure the CON-MBUS converter using the GW object.
4. Add M-Bus meters to the network using GWT objects.
5. If using GWT objects from the CON-MBUS page on George (recommended approach). Configure the GWT object to translate data in the meter's data packet.
6. If creating your own GWT object: Configure the GWT object to translate data in the meter's data packet.
7. Configure BACnet objects corresponding to the meter data.

### Step 1: Upgrading the Delta Controller with Customized Firmware

Customized firmware is required to enable CON-MBUS converter integration. See the CON-MBUS page on George for this firmware. Use Flash Loader or System Loader to upgrade the controller firmware.

When the firmware upgrade is completed, the controller database contains the CON-MBUS Interface (GW1) object.

## Step 2: Installing the Customized Object Dialogs on OWS

In Version 3.33 you need to install the customized Gateway Translation (GWT) object dialog.

In Version 3.40, you need to install both the customized Gateway (GW) object and the Gateway Translation (GWT) object dialogs.

Download the customized dialogs as POB files from the CON-MBUS support page on the George support site.

After the required customized dialog(s) has been downloaded and saved as described in following sections, restart the OWS for the changes to take effect.

### Saving the customized GWT dialog for Version 3.33

For Version 3.33 the dialog is saved to:

C:\Program Files\Delta Controls\3.33\Dialogs\Vendor8\DAC

For Version 3.33 (64 bit Windows), the dialog is saved to:

C:\Program Files (x86)\Delta Controls\3.33\Dialogs\Vendor8\DAC

You may need to rename the dialog file; the required name after download is: vn8dacv3gwt.dlg

### Saving the customized GWT and GW dialogs for Version 3.40

For Version 3.40 the two dialogs are saved to:

- Windows 7/Vista – C:\Users\Public\Delta Controls\3.40\Dialogs\Vendor8\DAC
- Windows XP – C:\Documents and Settings\Public\Delta Controls\3.40\Dialogs\Vendor8\DAC

You may need to rename the dialog files; the required names after download are:

VN8dacv3gwt.dlg and VN8dacv3gw.dlg

## Step 3: Connecting and Configuring the CON-MBUS

The CON-MBUS is wired to a Delta controller via RS-485 cabling. See the CON-MBUS Installation Guide on George for more information about this connection.

The two objects used to configure the M-Bus interface are the Gateway (GW) object and the Gateway Translation (GWT) object. Each meter has a corresponding GWT object that contains the configuration information needed to extract data from that meter.

The GW object:

- Enables / disables the interface
- Sets the Port as NET1 or NET2
- Sets the Baud rate (must be 38400 and this is the speed between the controller and the CON-MBUS)
- Provides diagnostic statistics about communications
- Provides a way to change the primary meter address from an old to a new value (e.g. From 1 to 5).

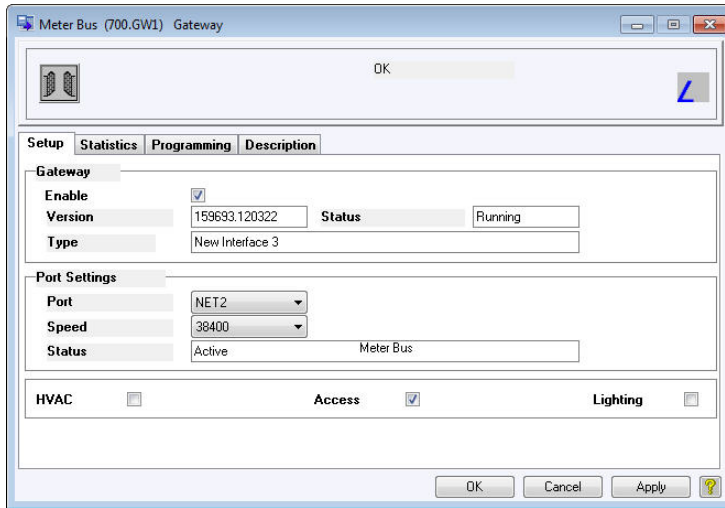
The GWT object:

- Provides Scan Counter (counts down the Scan Timer) and Reliability fields
- Defines the Scan Timer in the first row in the table.
- Provides a table that holds a list of row entries that define the data to get from the M-BUS meter.
- Creates BACnet objects as data destinations for each Page #, Record #, and Multiplier entry. See the [About the GWT object translation programming fields](#) section for more information.

## How to Integrate the CON-MBUS

### To configure the CON-MBUS:

1. From ORCAview, open the CON-MBUS Interface (GW1) object and select the Setup tab. In the Port Settings section, set Port to the one that the CON-MBUS is connected to. The default is NET2. Reset the device after saving the GW1 settings if you choose to use NET1.



2. Ensure that the Speed of the port is set to 38,400. The CON-MBUS requires this 38,400 baud rate. The default speed is 38,400 baud in the GW object. Click Apply.

To verify that the CON-MBUS is communicating with the controller, select the Statistics tab and wait a few moments. A Total Received value greater than zero indicates proper communications is established. The main indication of initial communication is that the Total Received is greater than zero with lesser emphasis on the Sent failures which may be a large number. The CON-MBUS does not send messages itself, it only receives them. It is the received packets that are of interest.

Ignore the dialog Header area when confirming communications with the CON-MBUS. In the Version 3.33 GW object dialog, you may see No Data Received; this is not relevant.

Total Sent	0	Total Received	30
Send Failures	0	Invalid Received	0
Protocol Errors	0	GWT Update Interval	0 Seconds

3. Click OK.



## Step 4: Adding a Meter to the Network

Before you can add an M-Bus meter to the wired network, you need to know the address of the M-BUS meter. The primary address can be obtained in either of two ways described in the [Obtaining the primary meter address](#) topic later in this section.

### Role of the Gateway Translation object

The CON-MBUS uses custom Gateway Translation (GWT) objects to represent the M-BUS meter. One GWT object represents one meter. Up to 150 GWT objects and therefore 150 meters, can be created on the controller per CON-MBUS.

A GWT object represents all data elements available from one wired meter. For example, a meter could have the following information:

- Temperature
- Flow
- Volume

The GWT object in this case contains three entries, one for each data element. Corresponding BACnet objects are created in the Delta controller for each entry to expose the data.

### Obtaining the primary meter address

There are multiple approaches to obtain the address:

- Check documentation with meter for address information. A new meter from the factory generally has a primary meter address of 0.
- Display the information on the LCD screen of the meter. Consult meter documentation for the procedure.
- Use a third party optical interface with software to get the meter information.
- With one meter connected to the CON-MBUS, enter a meter number and check for communication. Check the Description tab of the GWT objects for information such as the Meter ID#. This guess and check approach is the least preferred one.

## How to Integrate the CON-MBUS

*To obtain a Meter ID from a meter.*

The best approach is to identify the meter in the field. The GW object shows meter information such as the Meter ID# for a specific meter, while a GWT shows the specified number of records for the GWT where the GWT instance corresponds to the primary address.

1. Open the gateway GW object in the controller and select the Description tab.
2. Create a GWT object with an instance number that corresponds to the primary meter address (e.g. GWT4 for a meter with a primary address of 4).
3. Open the GWT object.
4. On the Setup tab, add the following entry.

The screenshot shows the 'Setup' tab of a GWT object configuration. It includes fields for 'Name' (Sortext 539), 'Reliability', and 'Scan Counter' (0). A 'Create BACnet Objects' button is visible. Below these fields is a table with columns: Name, Reference, Page #, Record #, Multiplier, and Scan Timer. The first row contains the values: \*, 0, 0, 0, 1.

Name	Reference	Page #	Record #	Multiplier	Scan Timer
*	0	0	0	1	

The entry in the first row defines the Scan Timer value. In a typical application, this value is typically 20 seconds or longer. As more meters are connected, then the Scan Timer value may require an increase.

5. Click Apply.
6. Wait for the information to display in the Description tab of the GWT object. You may have to wait for 10 or more seconds.

The meter transmits identification information which is displayed in the GWT object dialog's Description tab. Determine the Meter ID# from this information. In the example below, the Meter Id# is 10241505.

The screenshot shows the 'Description' tab of the GWT object configuration. It displays the following information:

```
Meter Id# = 10241405
Manufacturer = ee 4d
MeterVersion = 4
MeasuredMedia = HEAT

Max Meters = 150, Retry Timer = 5
```

If the information is not displayed, this may be because the meter is already represented by a GWT object. To confirm that the meter is transmitting, observe the LEDs in the CON-MBUS and also the M-Bus meter. The presence of information in the Description tab of the GWT confirms that the meter is communicating.

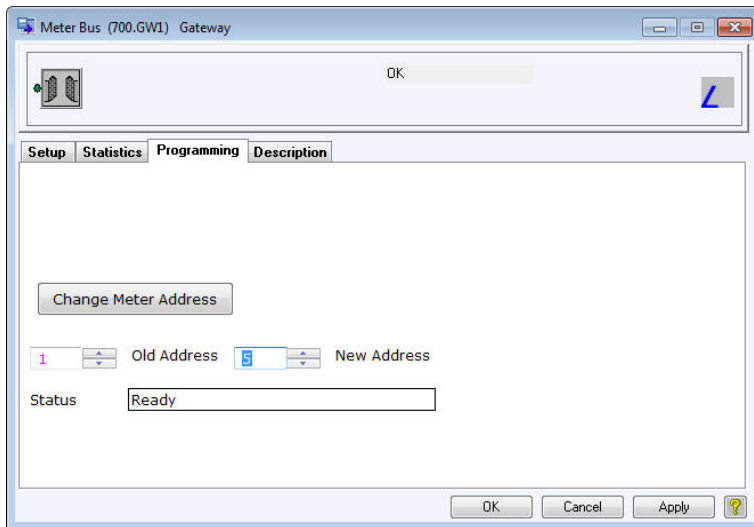
## Creating the GWT object and adding a meter to the network

A new meter from the factory generally has a primary address of 0. Change the address by going to the Programming tab on the GW object.

## Addressing a Meter

To change the primary address of a M-BUS meter:

1. Open the Programming tab on the GW object.
2. Enter the Old Address and a New Address. Click Change Meter Address.
3. Click Apply.

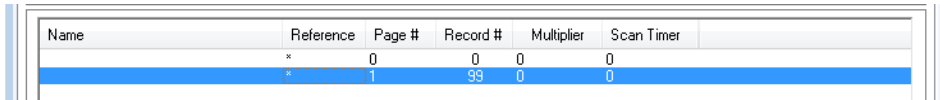


To add a meter to the network:

1. Create a Gateway Translation (GWT) object to represent the meter. There are two methods for getting a GWT object, described below as method A and method B:
  - A. Obtain the GWT object from the CON-MBUS page on George and load it into the Delta controller. Using GWT objects from this George page is the recommended approach. These objects are already configured by Delta for the data elements available from the meter, which saves you the time.
  - B. Use ORCAview to create a GWT object to represent the meter.
2. Open the GWT object dialog and select the Setup tab.

## How to Integrate the CON-MBUS

3. If necessary, create an entry in the first row that defines the Scan Timer. Leave the name field blank. Enter \* in the reference field. Enter a value, 1 second or higher in the Scan Timer column. Enter 0 in the Page #, Record #, and Multiplier fields of the first row entry.



Name	Reference	Page #	Record #	Multiplier	Scan Timer
	*	1	99	0	0

A Scan Timer of 0 seconds gets the record information once and does not update it. If a Scan Timer of 1 second was used, the information would update frequently making it difficult to read. After this operation, change the Scan Timer to an acceptable value such as 20 or 30 seconds.

4. Wait for the meter to transmit a message and observe that, in a few seconds, the Reliability field displays Connected. A Reliability field equal to Connected confirms that you have added the meter to the network successfully.



Setup	Description
Name	Soritext 539
Reliability	Connected
Scan Counter	0
<input type="button" value="Create BACnet Objects"/>	

To verify that you are indeed causing the meter to transmit a message, observe the LEDs in the CON-MBUS: when a meter transmits a message, the amber LEDs illuminate briefly. This approach is only valid with a few meters connected but is not useful with many meters connected, as the LEDs blink all the time.

5. Click OK to save and close.

## Set GCL Wait Time for Meter Queries

The Setword6 property allows you to set a retry timeout for querying meters. Adding wait time before a query allows for slower meters, for example, some Apator meters. The CON-MBUS sends the query to the meter three times but some meters need more time to respond.

The Setword6 property affects the retry timeout for all meters on the MBUS network.

In a GCL program, you manipulate the following Gateway object property:

700.GW1.setword6.value

The value has a range of 5 to 45 which corresponds to a retry timeout of 0.5 to 5 seconds.

## Step 5: Choosing How to Configure the GWT Object to Translate Meter Data

M-Bus meters transmit data packets containing various types of encoded information. The GWT object dialog includes multiple fields that you use to program it to translate the meter data you are interested in and to expose the translated data through a BACnet object.

There are two methods for configuring the GWT object to translate the meter data: the easy way and the hard way:

- **Recommended method: (easy way)** Following Step 4: since you obtained the GWT object for this meter from the CON-MBUS page on George, the GWT object is ready-to-use and is configured to translate the meter data. All you need to do is to click the Create BACnet Objects button to map the data. Go to Step 6.
- **Basic Method: (hard way)** Following Step 4, because you created the GWT object yourself, you therefore need to add the translation programming to it and then map the data to BACnet objects. Go to Step 7

See [Tables of Supported BACnet Objects and Addressing Schemes](#) for more information.

## Step 6: Configuring the GWT Object Obtained from the CON-MBUS Product Page

No configuration is required; the translation programming is done for you in the GWT object. However, you need to specify the BACnet object that represents the data.

To verify that you selected the correct GWT object from the product page on George, observe the GWT object dialog Value field change as you manipulate the meter.

To understand in detail how the translation is implemented, review the section [Step 7: Configuring the GWT object you created](#). See also the first example that follows step 7.

Now you need to specify and create the BACnet object that represents the data, as described in the following procedure.

## Creating the BACnet objects

1. Open the GWT object dialog.
2. Enter the object instance in each row of the Reference column.  
For AV or BV objects, enter AV20 or BV20 for example. See [Tables of Supported BACnet Objects and Addressing Schemes](#) for more information.
3. Click the Create BACnet Objects button. Click Apply.  
The referenced objects are created and displayed in Navigator. The full name for the object is created by the GWT object when the object is created.  
The object instance entry on the Setup tab of the GWT changes to the object reference of the BACnet object. The GWT object Name text is added to the variable name as a prefix at the start of each entry in the Name column.  
The full name consists of the GWT object name, an underscore character, and the name in the Name column.
4. Review the GWT Description tab for possible errors when creating the BACnet objects.  
The object name is greater than 67 characters.  
The object instance number is not in the specified range.

## Step 7: Configuring the GWT Object that You Created

Before you can start on the GWT configuration, you need to understand how to translate the data contained in the M-Bus data packets sent by the meter .

### About the GWT object translation programming fields

Vendors of M-Bus meters tend to do different implementations of function. The structure of documentation about the information for Page # and Record # tends to vary widely. With M-Bus meters from multiple manufacturers, it helps to get the data and to interpret and present all the data in a consistent normalized manner.



Some M-Bus meters may change the record numbers on a page if an additional connection is made to the meter. For example, if a temperature sensor is added to a particular M-Bus meter, then all the values are offset by 1 record. The page with 14 items will now have 15 with the temperature record added. This means the following records are all off by one, causing potentially serious problems with the data.

The GWT object dialog provides several fields that you use to program the GWT to translate the meter data before it is supplied to a BACnet object. The fields are arranged in tabular form with multiple rows. The column headings and role in the translation are:

**Name** – Type the name you want for this data element; it becomes part of the referenced BACnet object name. For example, you could put: Volume Liters

**Reference** – BACnet object reference for object that represents the translated data element value.

With an AV or BV object, you enter the object instance in the Reference column. You might enter: AV1. This object instance entry is then converted into a full object reference when you click the Create BACnet Objects button and click Apply.

See [Tables of Supported BACnet Objects and Addressing Schemes](#) for more information.

**Page #** – The information about the data values provided by the manufacturer of the meter is organized in pages.

**Record #** – Each page in the information provided by the manufacturer contains numbered records.

**Multiplier** – Shows the scale factor applied by the meter to the basic data. For example, a multiplier of 100 indicates that the raw data was multiplied by a factor of 100 by the meter. The meter might display 1877 Kwh.

Sontex-Supercal531_GwT9 - Energy...	AV10904	1	4	100	0
Sontex-Supercal531_GwT9 - Volum...	BV10905	1	5	0.001	0
Sontex-Supercal531_GwT9 - Enhan...	AV10906	1	6	1	0
Sontex-Supercal531_GwT9 - Volum...	AV10907	1	7	0.01	0
Sontex-Supercal531_GwT9 - Enhan...	MV10908	1	8	1	0

With a multiplier of 100, the value of the meter AV would be 187,700 WH in Navigator.

Sontex-Supercal531_GWT9 - Energy Watts	200.AV10904	187700 Wh
--	-------------	-----------

To get back to the raw data unit, a GCL program would divide the data by a 100.

One potential problem is that the internal meter behavior can be specific to the particular meter or manufacturer. The value from the meter could be Kwh, but if it increases beyond an upper range then the meter might internally change to Mwh and this is very difficult, if not impossible to handle in a program on a controller.

Scan Timer – Defines the time in seconds between data scans. For example, a value of 10 seconds means that the meter wants to send data every 10 seconds. If there are many meters, this data rate might be too high. Put in a value of several minutes or more, to ensure that the CON-MBUS can handle the data flow.

### About the GWT Reliability Timer setting and status alarming

The Reliability Timer setting informs the GWT object about how often it should expect a data packet from the meter. When the GWT object receives a data packet within the Reliability Timer time interval, it maintains its Reliability status as Connected. When the GWT object doesn't receive a data packet within the time interval, it sets its Reliability status to Not Connected.

Here are some example specifications and recommended Reliability Timer setting:

#### *Link Reliability Status Alarming*

For meters that support a periodic heartbeat data packet, you can use the Reliability status to monitor the link status and cause an alarm when it goes to the Not Connected state. Reliability status is available in the GWT object's Flag property; Reliability status = Connected when Flag = 1; Reliability status = Not Connected, when Flag = 0.

To implement alarm reporting for Reliability status:

1. For each GWT object for which you want to monitor Reliability status, create a BV object and a BDC object set up with Active State = Connected, and Inactive State = Not Connected.
2. Create corresponding EV objects to report a Change of State alarm when a BV object transitions to the Not Connected state.
3. In a GLC+ program, include a statement as follows for each GWT object:

```
BV# = GWT#.Flag
```

### Configuring data translation and BACnet objects

This section describes how to configure the GWT objects needed to translate the data elements for two example meters and how to create a BACnet object for each data element.

Example 1 assumes that you use an existing GWT1 object as a template. You could download something similar to this from the CON-MBUS product page on George.

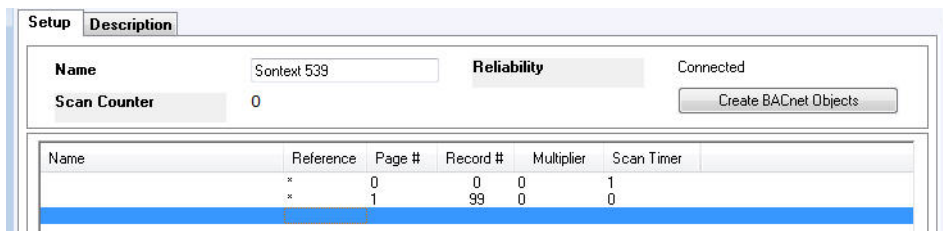
Example 2 assumes that you create and configure a new GWT, rather than download an existing GWT from the George support site. The intention is to show how a GWT is configured for a particular meter.



Many M-Bus meters have many available pages with many records, but usually the majority of these are of low relevance for an application.

### Sontex Supercal 531 data elements for first two pages only.

The following GWT gets the data elements for a meter. The first row defines the Scan Timer to a value of 1. For a typical application, this value would typically be at least 20. The second row requests all the records (actually less than 99) for Page #1.



The results from the data records requested in the Setup tab of the GWT object are shown in the Description tab of the GW object and not in the GWT Description tab. This behavior is contrary to expectation. It is important to remove the second row before you specify data points to read. A page 1 record 99 entry would cause the reading of data to stop. See the [Troubleshooting](#) section of this document for more information.

Gwt=1 Page=1

- R1 EXT\_VIF CODE2 Ext Error Flags
- R2 ACTUALITY DURATION
- R3 TIME POINT
- R4 ENERGY WATT-HR
- R5 VOLUME M^3
- R6 ENHANCED ID#
- R7 VOLUME M^3
- R8 ENHANCED ID#
- R9 VOLUME M^3

## How to Integrate the CON-MBUS

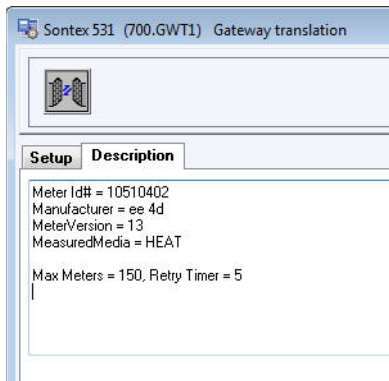
Gwt=1 Page=2

R1	FLOW TEMPERATURE	
R2	RETURN TEMP.	
R3	VOLUME FLOW	
R4	POWER WATTS	
R5	Manufacturer Specific	
R6	VOLUME M <sup>3</sup>	Inc/Pulsep Chn 0
R7	Manufacturer Specific	
R8	Manufacturer Specific	
R9	Manufacturer Specific	
R10	EXT_VIF CODE2	Hw Sw
R11	EXT_VIF CODE2	Hw Ver
R12	On time	
R13	AVERAGING DURATION	
R14	EXT_VIF CODE2	Storage
R15	EXT_VIF CODE2	Storage
R16	TIME POINT	Future Use
R17	TIME POINT	Future Use
R18	TIME POINT	Future Use

## Example 1: Configuring the Sontex Supercal 531 for a power consumption application using an existing GWT as a template

This example shows how to use an existing GWT object for a Sontex Supercal 531 meter. You can download a GWT object for a particular meter from the CON-MBUS page on George.

### Sontex 531



The following records are used in this application:

#### Page # 1:

R4 ENERGY WATT-HR

#### Page# 2:

R1 FLOW TEMPERATURE

R2 RETURN TEMP.

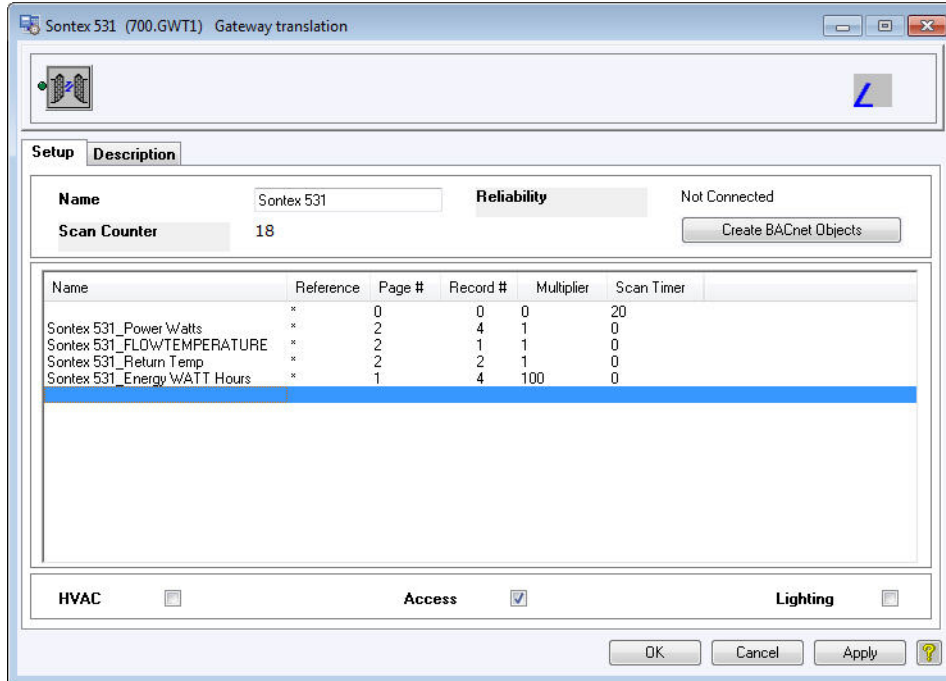
R4 POWER WATTS

The results from the data records requested in the Setup tab of the GWT object are shown in the Description tab of the GW object and not in the GWT Description tab. This behavior is contrary to expectation. It is important to remove the second row before you specify data points to read. A page 1 record 99 entry would cause the reading of data to stop. Refer to the [Troubleshooting](#) section of this document for more information.

## How to Integrate the CON-MBUS

To configure an existing GWT object for the Sontex Supercal 531:

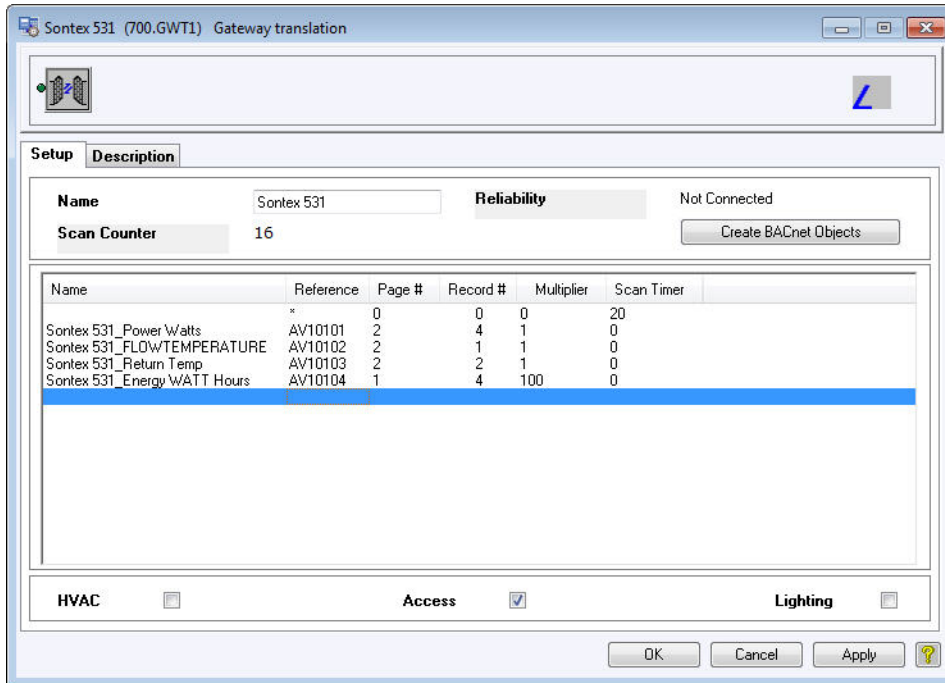
1. Open the existing GWT1 object dialog. This dialog can serve as a template for the Sontex 531 meter.



2. Starting in the second row of the Reference column, enter an object instance, such as AV1 to replace the asterisk \* character. Enter AV2, AV3 and AV4 in the other rows in the Reference column.
3. Click Apply to save configuration

The Name consists of the GWT object name, an underscore character, and the previous name in the Name column.

- Click Create BACnet Objects and then click Apply to create the BACnet object. The Reference column changes to display the object references of the new BACnet objects.



The References in the previous figure are formed using this relationship: YYY ZZ

Where:

YYY = (GWT instance + 100)

ZZ = BACnet object instance

For example: GWT2 and an object instance of 01 yields AV10201.

See [Tables of Supported BACnet Objects and Addressing Schemes](#) for more information.

- Observe in Navigator that the AV objects are created. Navigator displays any changes in the AV object value that correspond with changes in the M-Bus meter.
- Add any other row entries as required.

## Example 2: Configuring the Sontex Supercal 539 for a cooling coil application by creating a new GWT

This basic example shows how to create and configure a new GWT object for a Sontex Supercal 539 meter.

Typically, the flow rate and temperature of the supply water might be measured. On the water return pipe, the flow and temperature of the water return might be measured.

Sontex 539

Meter Id# = 10241405

Manufacturer = ee 4d

MeterVersion = 4

MeasuredMedia = HEAT

Max Meters = 150, Retry Timer = 5

### Sontex Supercal 539 data elements for first page only.

Gwt=2 Page=1

- R1 ENERGY WATT-HR
- R2 VOLUME M^3
- R3 On time
- R4 FABRICATION NUMBER
- R5 TIME POINT
- R6 FLOW TEMPERATURE
- R7 RETURN TEMP.
- R8 VOLUME FLOW
- R9 POWER WATTS
- R10 Manufacturer Specific
- R11 Manufacturer Specific

R12	EXT_VIF CODE2	Ext Error Flags
R13	ACTUALITY DURATION	
R14	AVERAGING DURATION	
R15	Manufacturer Specific	
R16	EXT_VIF CODE2	Hw Sw
R17	EXT_VIF CODE2	Hw Ver
R18	EXT_VIF CODE2	Hw M Ver
R19	ENHANCED ID#	
R20	VOLUME M^3	
R21	VOLUME M^3	Inc/Pulsep Chn 0
R22	ENHANCED ID#	
R23	VOLUME M^3	
R24	VOLUME M^3	Inc/Pulsep Chn 0

The results from the data records requested in the Setup tab of the GWT object are shown in the Description tab of the GW object and not in the GWT Description tab. This behavior is contrary to expectation. It is important to remove the second row before you specify data points to read. A page 1 record 99 entry would cause the reading of data to stop. Refer to the [Troubleshooting](#) section of this document for more information.

For this simple example, assume that we are interested in the following Records from Page# 1:

Gwt=2 Page=1

R2	VOLUME M^3
R6	FLOW TEMPERATURE
R7	RETURN TEMP.
R8	VOLUME FLOW

## How to Integrate the CON-MBUS

To create and configure a new GWT object for the Sontex Supercal 539:

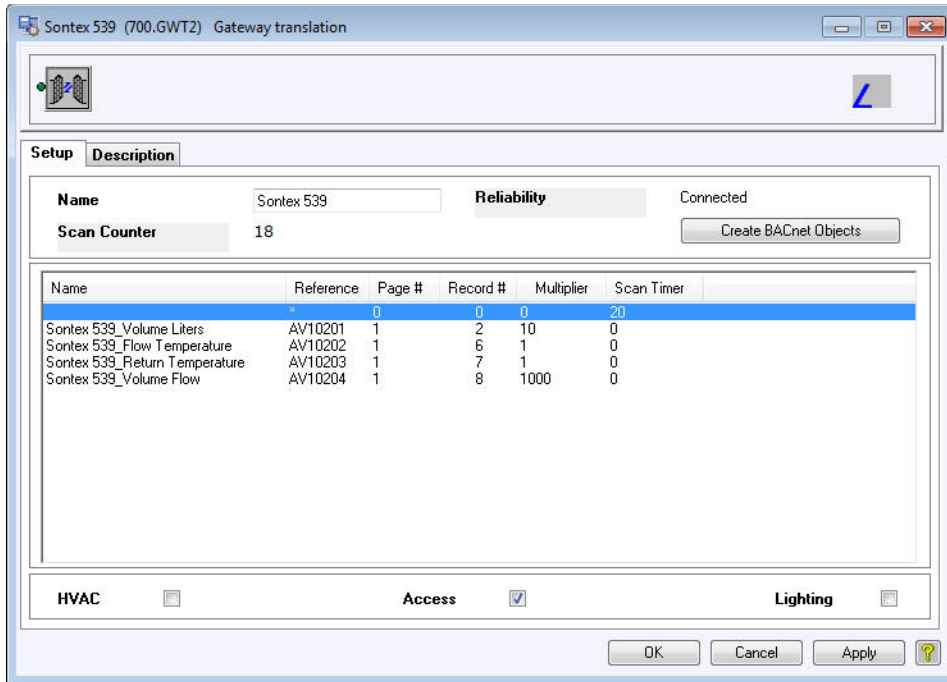
1. Create a new GWT object and open the dialog to the Setup tab. The GWT instance must correspond to the primary address of the M-Bus meter e.g. GWT2 for meter 02.
2. If necessary, create a entry in the first row that defines the Scan Timer. Leave the name field blank. Enter \* in the reference field. Enter a value of 20 seconds or higher in the Scan Timer column. Enter 0 in the Page #, Record # and Multiplier fields of the first row entry.
3. In the second row, enter the name in the Name column for the data element that is being represented by this row, such as Volume Liters. See the [BACnet Objects: Naming Scheme for Objects](#) for more information.
4. In the Reference column in the same row, enter the object instance for the variable, such as AV1. See [Tables of Supported BACnet Objects and Addressing Schemes](#) for more information.
5. In the Page # column in the same row, enter 1.
6. In the Record # column in the same row, enter 2 for the Volume Liters as specified by the manufacturer.
7. In the Scan Timer column in the same row, enter 0 as the first row entry already defines the Scan Timer for the other row entries.
8. Click Apply to save configuration.

Name	Reference	Page #	Record #	Multiplier	Scan Timer
*	0	0	0	0	20
Volume Liters	AV1	1	2	10	0
Flow Temperature	AV2	1	6	1	0
Return Temperature	AV3	1	7	1	0
Volume Flow	AV4	1	8	1000	0

9. Enter other rows as required.



10. Click Create BACnet Objects then click Apply to create the BACnet object.



The References in the previous figure are formed using this relationship:  $YYY ZZ$

Where:

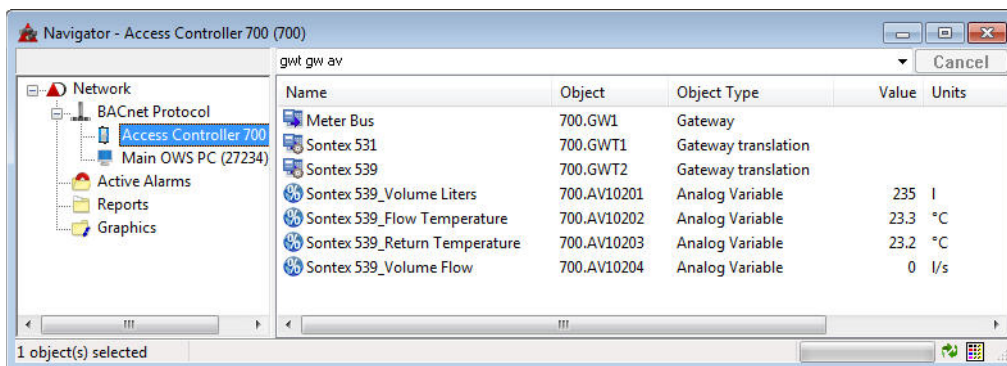
$YYY = (\text{GWT instance} + 100)$

$ZZ = \text{BACnet object instance}$

For example: GWT2 and an object instance of 01 yields AV10201.

See the [Table of Supported BACnet Objects and Addressing Schemes](#) for more information.

11. Observe in Navigator that the AV object is created. Navigator displays any changes in the AV object value that correspond with changes in the M-Bus meter meter.



## BACnet Objects: Naming Scheme for Objects

When the BACnet objects are created on the controller, they employ a naming and an instance numbering scheme. The full name consists of the GWT object name, an underscore, and the name in the Name column. This naming scheme applies to all versions of 3.33 and 3.40 software/ firmware for DAC, DSC and enteliBUS controllers.

For a GWT1 object named Room201, the BACnet objects might be named as follows:

Room201	700.GWT1		GWT1 (100+01=101)
Name	Object Instance	Object Number	Object Reference
Room201_Occupancy	AV1	01	700.BV10101
Room201_Consumption	AV2	02	700.AV10102
Room201_Temperature	AV3	03	700.AV10103

If the GWT name has an underscore, then the underscore and everything to the right of it are ignored in the naming of the associated BACnet objects. In many cases, you might want to avoid underscores in the GWT names.

## Available BACnet Objects

A meter data element is represented by BACnet objects as either hardware points such as analog or binary inputs or as software points such as analog, binary or multi variables, depending on which version of ORCAview and firmware you are using.

For Version 3.33 (R2 and R3) firmware the following BACnet object types are supported:

- Analog Variable
- Binary Variable
- Multi-State Variable

For Version 3.40 firmware the following BACnet object types are supported:

- Analog Variable
- Binary Variable
- Multi-State Variable
- Analog Input
- Binary Input
- Pulse Input object

## Tables of Supported BACnet Objects and Addressing Schemes

A data element is represented by a BACnet object as either a software point, such as an analog or binary variable, or as a hardware physical point, such as analog or binary input. The data representation for inputs depends on which version of ORCAview and firmware that you are using. The data representation for variables, AV and BV objects, is independent of software, controller type, and firmware version. PI also follows the addressing scheme used for variables.

The most common applications use only AV and BV objects and involve retrofits to existing sites with DAC/DSC controllers. The addressing scheme for all variables (AV, BV) is the same for all OWS and firmware versions.

For OWS 3.40 R1, manually assign the object numbers for the inputs. You can assign up to 250 objects and distribute them as required. On a controller, you can assign ten inputs for a GWT and then just one input for another GWT.

### 3.33 R2 and R3 Firmware

Software Version 3.33 R2 / R3	Number GWT Objects	BACnet Objects	Object Types (Instance range)	BACnet Object Address <i>Use this addressing relationship: Add leading zeroes where needed</i>
Variables DAC/DSC	150	01-99	AV, BV (10101-25099)	YYY ZZ Where: YYY = (GWT instance + 100) ZZ = BACnet object instance For example: AV.10199 Defines an analog variable with GWT number 01 and object instance of 99.
Hardware Inputs DAC/DSC			<i>AI, BI (not supported)</i>	

### 3.40 R1 Firmware

Software Version 3.40 R1	Number GWT Objects	BACnet Objects	Object Types (Instance range)	BACnet Object Address Use this addressing relationship: Add leading zeroes where needed
Variables DAC/DSC	150	01-99	AV, BV (10101-25099)	YYY ZZ Where: YYY = (GWT instance + 100) ZZ = BACnet object instance For example: AV.10109 Defines an analog variable with GWT number 01 and object instance of 09.

Software Version 3.40 R1	Number GWT Objects	BACnet Objects	Object Types (Instance range)	BACnet Object Address Use this addressing relationship: Add leading zeroes where needed
PI DAC/DSC	150	01-99	PI (10101-25099)	Same as for Variables AV, BV  Available for use in application that require double word precision such as a totalizer value.
Variables eBCON	150	01-99	AV, BV (10101-10250)	YYY ZZ Where: YYY = (GWT instance + 100) ZZ = BACnet object instance  For example: AV.10199  Defines an analog variable with GWT number 01 and object instance of 99.
PI eBCON	150	01-99	PI (10101-25099)	Same as for Variables AV, BV. Available for use in application that require double word precision such as a totalizer value.

## How to Integrate the CON-MBUS

Software Version 3.40 R1	Number GWT Objects	BACnet Objects	Object Types (Instance range)	BACnet Object Address Use this addressing relationship: Add leading zeroes where needed
Hardware Inputs DAC/DSC	150	01-99	AI, BI (15001-15250) (assign up to 150 inputs and distributes as required.)	You create these objects manually and need to assign and track the object instances. The AI/BI object instance numbers must be in the range 15001 to 15250.  For example: Enter, AI15002 or BI15005. Use each instance number only once on a given controller.
Hardware Inputs eBCON	99	01-99	AI, BI (1400101-1415099) (1500101-1515099)	XX YYY ZZ Where: XX=14 for NET1; 15 for NET2 YYY = GWT number ZZ= BACnet object Instance For example: AI.1400704  Defines an analog input on NET1 (14) with GWT number 007 and physical input 04.

### 3.40 R2 and R3 Firmware

Software Version 3.40 R2 / R3	Number GWT Objects	BACnet Objects	Object Types (Instance range)	BACnet Object Address Use this addressing relationship: Add leading zeroes where needed
DAC/DSC	Not supported			
Variables eBCON	150	01-99	AV, BV (10101-10250)	YYY ZZ Where: YYY = (GWT instance + 100) ZZ = BACnet object instance For example: AV.10199 Defines an analog variable with GWT number 01 and object instance of 99.
PI eBCON	150	01-99	PI (10101-10250)	Same as for Variables AV, BV Available for use in application that require double word precision such as a totalizer value.

## How to Integrate the CON-MBUS

Software Version 3.40 R2 / R3	Number GWT Objects	BACnet Objects	Object Types (Instance range)	BACnet Object Address Use this addressing relationship: Add leading zeroes where needed
Hardware Inputs eBCON	150	01-99	AI, BI, (1400101-1415099) (1500101-1515099)	Uses eBUS addressing: XX YYY ZZ Where: XX=14 for NET1; 15 for NET2 YYY = GWT number ZZ= BACnet object Instance For example: AI.1501207 Defines an analog input on NET2 (15) with GWT number 012 and physical input 07



## Managing GWT Object Configurations

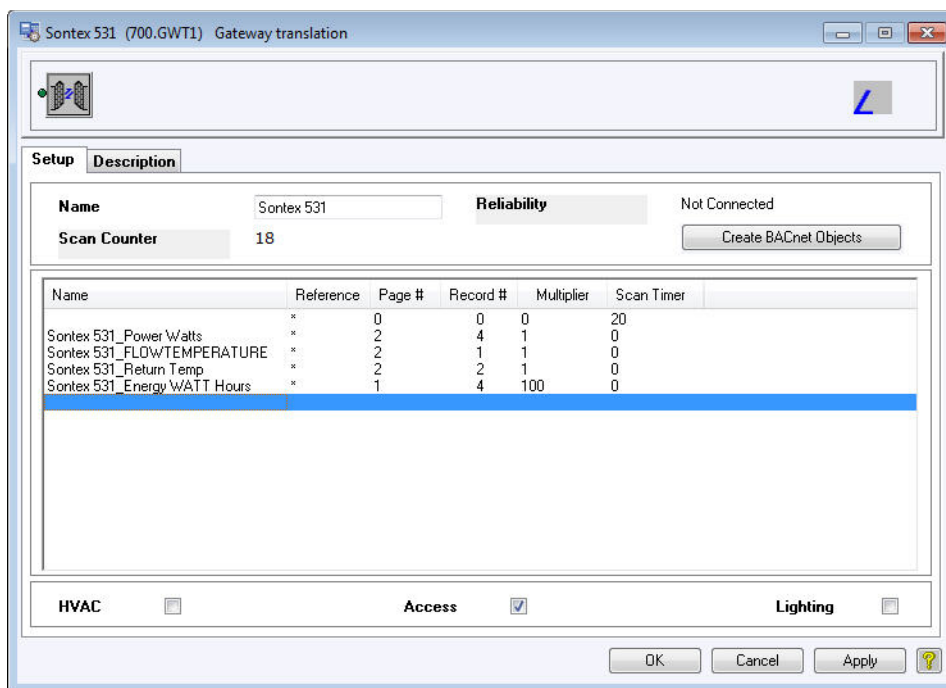
A typical wired M-Bus network consists of many of the same manufacturer’s meters such as, for example, a temperature sensor. Once the first meter is added to the network and the GWT translation is programmed correctly, duplicate the GWT object as a template to replicate this configuration to the other same meter.

### Saving the GWT Object

To save a GWT object, right click on it and select Save As from the pop-up menu. The object is saved as a POB file.

To save a GWT object as a template:

1. Open the GWT object dialog.



2. Replace the asterisk characters with the AV/BV object references in the Reference column (1, 2, 3 etc.).
3. Click OK to save and close the dialog.
4. Right click on template GWT object and select Save As from the popup menu. The object is saved as a POB file.

### Loading the GWT Object

To load a GWT object into a controller right click on the controller and select Load from the popup menu.

### Removing a Meter from the Network

To remove a meter from the network, delete the GWT object and the associated AV, BV, MV, AI and BI objects.

## Troubleshooting

The table below describes common issues and their probable solution. If a solution to an issue isn't listed here please consult <https://support.deltacontrols.com>.

The Description tab on both the GW and GWT objects may contain diagnostic messages.

Troubleshooting Symptom	Solution
CON-MBUS not communicating with Delta controller	Verify Baud Rate and wiring. Verify that jumpers match settings on GW object setup tab and follow the Installation Guide.
No response to a query	Wait when you do a query as the time before response depends on the Baud Rate defined for the communication with M-Bus meters on the CON-MBUS jumpers
BACnet objects don't create from a GWT object	When object reference is already in use then object creation won't complete. Solution: Change the reference or delete the existing reference object. This also applies to objects with the same name. All object names in the controller must be unique.
AI or BI object is created but is in Fault	This symptom is present when you attempt to use an AI or BI object with V3.33. Solution: use AV or BV object with V3.33

## Troubleshooting

Troubleshooting Symptom	Solution
No data is received	<p>Verify that the CON-MBUS is receiving data packets from the M-Bus meter by observing the LEDs in the CON-MBUS. See the <a href="#">CON-MBUS Status Indicators Table</a> or the CON-MBUS Installation Guide for location and function of LEDs.</p> <p>Verify that a Scan Timer value is defined in the first row in the Setup tab of the GWT object.</p> <p>Data destination does not exist.</p> <p>GWT is empty and does not have any rows entered in the table.</p> <p>No GWT objects are present.</p> <p>GWT primary address does not correspond to any M-Bus meter.</p> <p>Confirm that all M-Bus meters have a unique primary address.</p> <p>Verify correct Baud Rate setting on CON-MBUS jumpers.</p> <p>Check that a row entry in the Setup tab of a GWT does not contain anything that requests record 99. A request for record 99 causes the data updates to stop.</p> <p>In addition, make sure that no row in the table on the Setup tab of a GWT has an entry with all zeroes. The GWT seems to use 0 page and/or 0 record number as the flag to stop the record scan .</p>

Troubleshooting Symptom	Solution
Communication problem with an added meter	<p>Check that the M-Bus meter baud rate agrees with the physical Baud Rate setting (300, 2400, 9600, 38,400). All the M-Bus meters need to have the same baud rate. If one meter is incorrect, it does not communicate but the other meters continue to communicate properly.</p> <p>Verify that the power consumption for all meters does not exceed the CON-MBUS's 150 unit load limit. See MBUS Fault LED.</p> <p>Verify that a Scan Timer value is defined in the first row in the Setup tab of the GWT object.</p>

## CON-MBUS Status Indicators Table

LED	Function	Description
Scan	CPU Scan Indicator	This red LED flashes at the CPU scan rate.
Network (NET)	MS/TP (RS-485) Communication Status Indicators	The green LED flashes when the controller is transmitting out the port, and the red LED flashes when the CON-MBUS is receiving data through the port. If communication is good, both LEDs flash at a high rate.
Device Status	CON-MBUS Status	On start-up, the LED cycles through the colors until the processor is fully running and then the LED blinks green. There are no error indications.
MBUS Fault	Fault on MBUS network	This LED illuminates when the M-Bus network is overloaded or short circuited. For example, when the power consumption of M-Bus meters on the network exceeds the CON-MBUS's 150 unit load limit.

## Document Revision History

Document Edition	Date Published	Author	Change Description
1.0	August 8, 2012	R. Barron	Edition for Beta Release. No longer a preliminary document. Includes content for 3.40 R1 and R2 plus 3.33 R2 and R3.
1.1	September 26, 2012	R. Barron	Emphasize that GWT data record query displays in the Description tab of GW. Add troubleshooting for problematic entries in GWT Setup.
1.2	March 27, 2014	J. Halliday	Update CON-MBUS Status Indicators section, Device Status LED Update to current document format Remove Beta from footer
1.3	February, 2016	J. Halliday	Minor changes for 3.40 R3.2 firmware.
1.4	August, 2016	J. Halliday	Updated section <i>Set GCL Wait Time for Meter Queries</i> on page 20 to change from GWT to GW object per Jira issue MBUS-198.





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