

sip+ Data-IF/EMT/EMT-IF

Technical Guide

Issue 2, Jun. 2023

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Contents

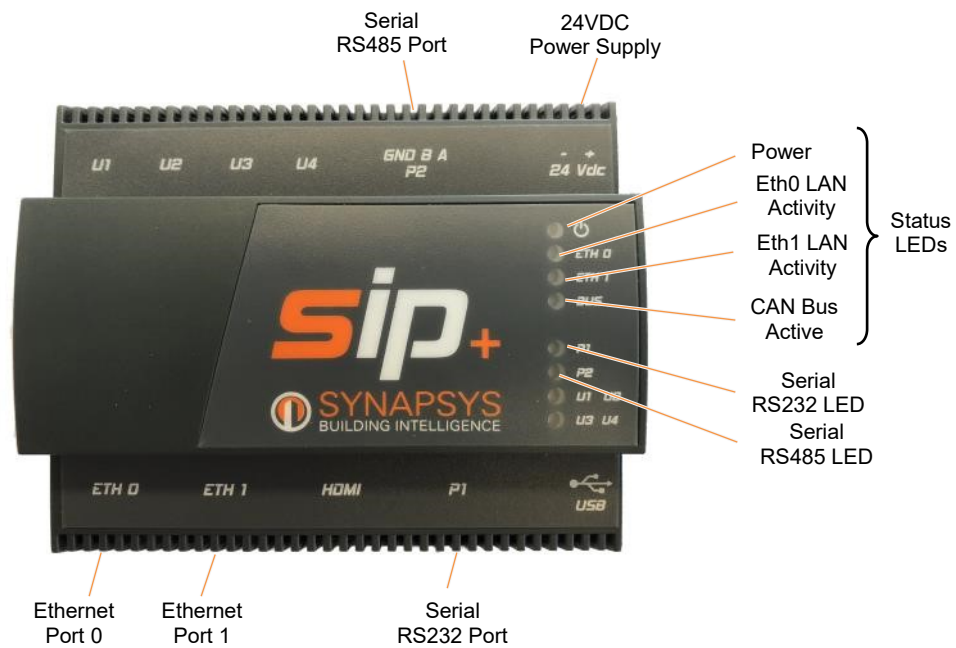
1 INTRODUCTION	1
1.1 THE UNIT.....	3
1.2 SYSTEM OVERVIEW.....	4
2 CONFIGURATION	5
2.1 CONNECT TO THIS HARDWARE.....	6
2.2 CONFIGURE THE IP SETTINGS.....	8
2.3 CONFIGURE THE GLOBAL SETTINGS.....	11
2.3.1 Change the Site name and SIP name details	11
2.3.2 Change the local Time settings	11
2.3.3 Use the Ping command	12
2.3.4 Use the Reboot.....	12
2.3.5 Installing Webserver certificates	13
2.3.6 Email Settings.....	14
2.4 MANAGE DRIVERS	21
2.4.1 Manage the BACnetIP Driver Settings	23
2.4.2 Manage BACnet MSTP Driver Settings	27
2.4.3 Manage Data Acquisition Driver Settings	29
2.4.4 Manage EMT Driver Settings - Settings	30
2.4.5 Manage EMT Driver Settings – User Manager	38
2.4.6 Manage MBus Driver Settings	47
2.4.7 Manage ModBus Master Driver Settings	50
2.4.8 Manage ModBus Slave Driver Settings	55
2.4.9 Manage MQTT Driver Settings	56
2.4.10 Manage REST Client Driver Settings	58
2.4.11 Manage REST Server Driver Settings	58
2.4.12 Manage Trend Driver Settings	58
2.4.13 Manage Trend Client Driver Settings.....	59
2.4.14 Manage vIQ Driver Settings.....	62
2.4.15 Identify the required Slice	67
2.4.16 Duplicate an existing driver.....	67

2.5	DEFINE POINTS.....	68
2.5.1	Define BACnetIP and/or BACnet MSTP Client Driver Points.....	68
2.5.2	Define BIC (BACnet Server) Driver Points.....	71
2.5.3	Define Data Acquisition Driver Points.....	84
2.5.4	Define EMT Driver Points.....	95
2.5.5	Define MBus Serial, or TCP/IP Master Driver Points.....	119
2.5.6	Define ModBus RS232, RS485 or TCP/IP Master Driver Points.....	121
2.5.7	Define ModBus Slave Driver points.....	136
2.5.8	Define MQTT Driver Points.....	140
2.5.9	Define REST Client Driver Points.....	142
2.5.10	Define REST Server Driver points.....	149
2.5.11	Define Trend Driver Points.....	150
2.5.12	Define Trend Client Driver Points.....	152
2.5.13	Define vIQ Driver Points.....	155
2.6	LINK POINTS.....	175
2.6.1	Use the Link defined points.....	175
2.7	MANAGE CONFIGURATION TRANSFER.....	178
2.7.1	Backup and restore unit configuration.....	178
3	ORDER CODE.....	179
3.1	SIP+ DATA-IF.....	179
3.2	SIP+ EMT/SIP+ EMT-IF.....	179
3.3	ACCESSORIES.....	180

1 INTRODUCTION

This is a miniature computing platform that can be installed as part of the Building energy Management System (BeMS), and depending on the product, includes a dedicated Energy Monitoring and Targeting (EMT driver) or data reporting (Data Acquisition driver) functionality.

It can also provide a direct interface between the building systems, e.g. metering networks, UPS (Uninterruptable Power Supply), AHU (Air Handling) units, CRAC (Computer Room Air Conditioning) units, and Chiller Units on a Serial protocol or TCP/IP (Transmission Control Protocol/Internet Protocol) network as a master to Fieldbus open protocol networks, i.e. ModBus or MBus, and the BeMS and/or as part of a BACnet and/or Trend Building energy Management System (BeMS), Supervisory Computer and Data Acquisition (SCADA) package or IoT platform.

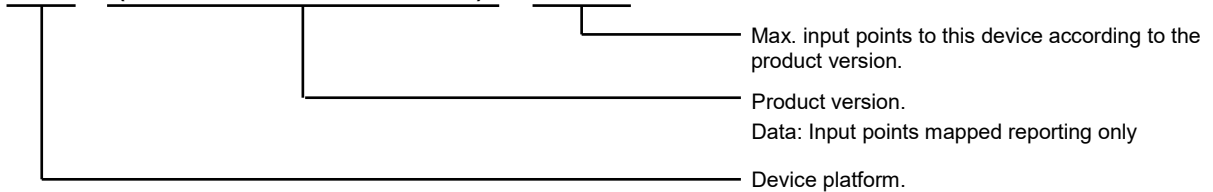


Remember

Building Analytics is the single most powerful tool that facilities can use to make informed decisions to meet their energy goals.

The maximum number of data source points is limited according to the product variant licence (see [Order Code](#)), and appropriate protocol (Drivers) where applicable, e.g., MBus networks require an appropriate Level Converter. Additional ModBus RTU networks require a further Serial Slice. A maximum of 16 slices can be connected, via the DIN Rail connectors on the CAN bus, where 1 (one) slice is equal to 1 (one) driver.

SIP+ / (Data-IF/EMT/EMT-IF) / nnnnP



AVAILABLE PROTOCOL/DRIVER	SERIAL	ETHERNET	LICENCED
BACnet MSTP	P2		Yes
BACnetIP Client		Eth0/Eth1	Yes
BACnetIP Server		Eth0/Eth1	No
Data Reporting		Eth0/Eth1	No
EMT (Dashboard)		Eth0/Eth1	Yes
IoT: MQTT		Eth0/Eth1	Yes
IoT: REST Client		Eth0/Eth1	Yes
IoT: REST Server		Eth0/Eth1	No
MBus	P1/P2/Slice	Eth0/Eth1	Yes
ModBus RTU and TCP/IP	P1/P2/Slice	Eth0/Eth1	Yes
ModBus Slave	P1/P2	Eth0/Eth1	No
Trend	P1	Eth0/Eth1	Yes
Trend Client	P1	Eth0/Eth1	Yes
viQ (Synapsys Solutions Trend connection)		Eth0	No

Collected values are held in the MySQL database and selected points sent to specific recipients via email or FTP, including Secure FTP, providing data

- for actionable intelligence
- for continuous commissioning
- to identify and prioritize cost-saving opportunities
- to identify mechanical system inefficiencies
- for predictive maintenance monitoring/scheduling
- for advising personnel of preventative actions across facilities management

1.1 THE UNIT

These products have a smart casing which permits for safe, quick and simple installation on DIN rail in an enclosure.

The hardware includes an internal web-based Configuration pages, designed to simplify the engineering and configuration of the product, recording values and numerical states. This set of pages simplifies the configuration of communication requirements for each selected driver and allows the value of each input point to be linked to the output points of the selected driver.

It provides a web page used to

- define the connection to the local IP network
- select required drivers (according to the connected slices if appropriate), and define the communication requirements for the selected driver
- create/define the required points from the selected driver
- link selected input point of the Data Acquisition driver
- define recipient details

The SIP+ Data-IF includes data logging functionality. The product records and stores values from requested points on networks connected to this controller (Serial and/or TCP/IP (Transmission Control Protocol/Internet Protocol)) or a Serial protocol slice connected via the DIN rail bus. The recorded values are then available for analytical purposes via the Reporting driver.

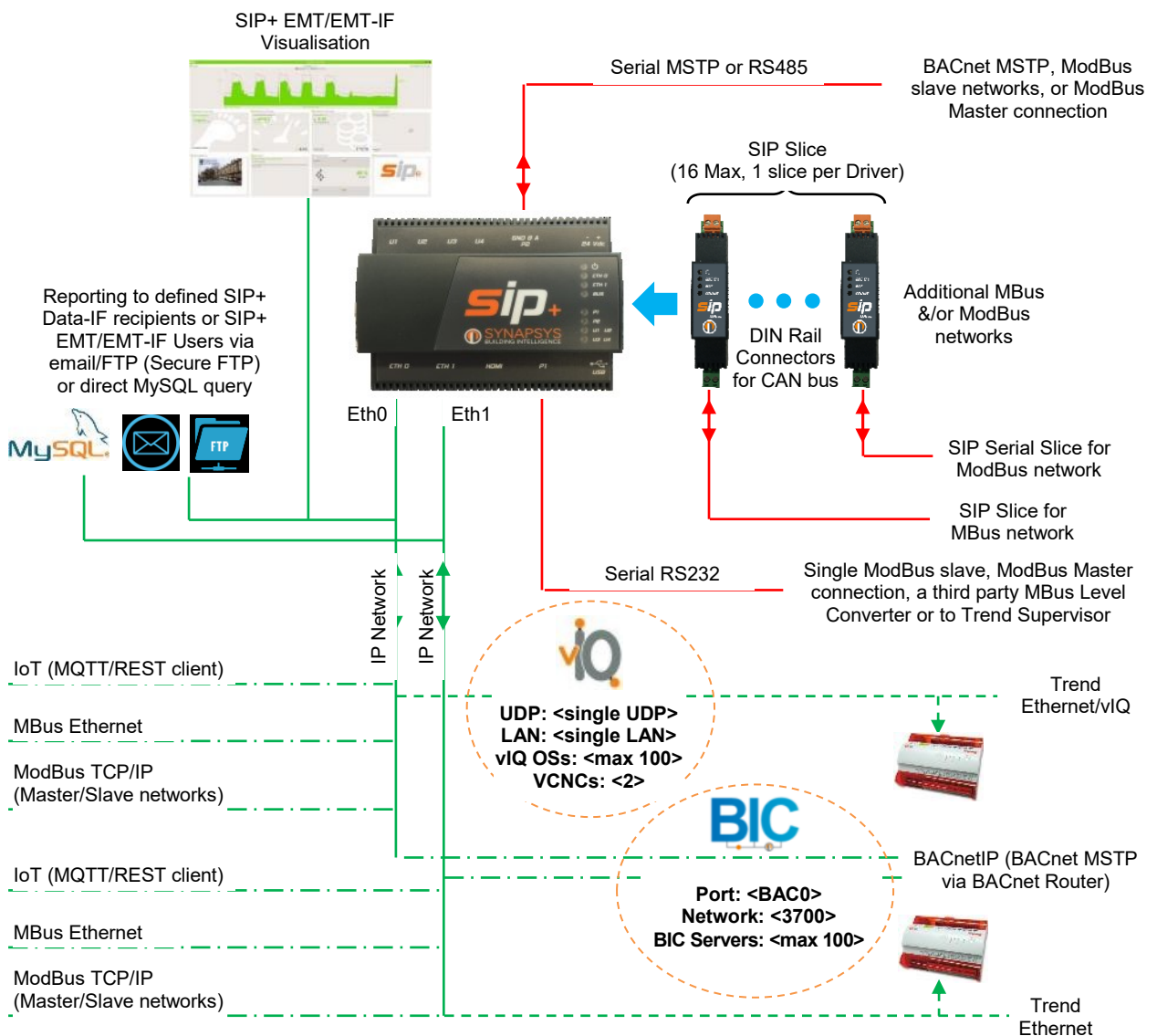
The SIP+ EMT/EMT-IF includes energy dashboard functionality. The product records and stores values from requested points on networks connected to this controller (Serial and/or TCP/IP (Transmission Control Protocol/Internet Protocol)) or a Serial protocol slice connected via the DIN rail bus. The recorded values are available to the on board EMT and/or the reporting function as 30 minute usage and 5 minute instantaneous values.



1.2 SYSTEM OVERVIEW

The unit provides a hardware and software connection between devices communicating via a Data source protocol and the output protocol, Data Acquisition and/or EMT driver providing reporting file only.

Tip! Contact Synapsys Solutions about future protocol availability.



Caution Existing SIP Easy and backup files **MUST** be converted to suit this product. Restoring a second file will overwrite the existing configuration.

2 CONFIGURATION

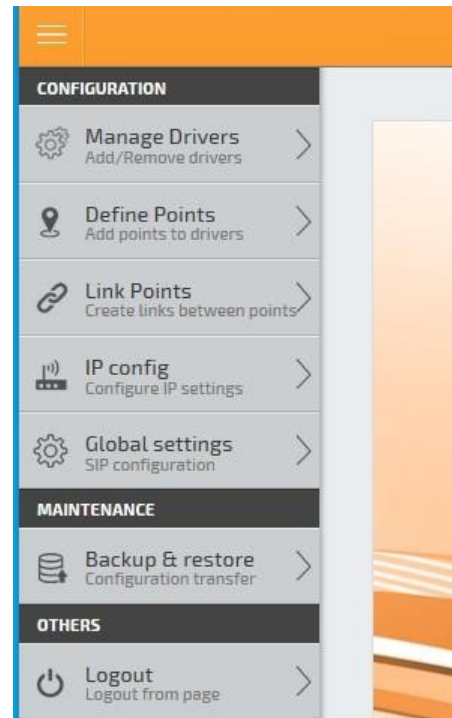
This section describes the process of allowing the data recorded by devices related to input protocol drivers to be used for reporting to defined recipients via the Data Acquisition driver. It explains the specific configuration.

Each product is password protected to prevent unauthorised access to the parameters that define the operation of this product.

Remember **The SIP+ Data Tool is NOT required for v1.26 or later.**

The Configuration pages include the

- **Local IP settings** used to configure the unique identity of this product connected to an IP (Internet Protocol) network.
- **Global settings** page used to configure details that relate to the hardware for reporting.
- **Manage drivers** page used to determine the required drivers and configure the communications parameters (**Comms settings**) ensuring compatibility with required protocols.
- **Define points** page used to create/define the data source, Input protocol driver, Data Acquisition and EMT driver points, with additional protocol specific parameters to ensure correct values are transferred between linked drivers.
- **Link points** page is used to link a data source, Input protocol driver point to an Output protocol driver point, including the EMT and Data Acquisition driver reporting datapoints, with appropriate security parameters if necessary.
- **Admin** page used to configure the login security of this product.



Tip! **To configure this product, follow the Contents page and/or section headers as a basic level of commissioning instructions.**

2.1 CONNECT TO THIS HARDWARE

When this product has been correctly installed the communication protocols and the required parameters must be configured.

Remember If this unit is installed in a system, the controllers must also be configured.

Note Each product is supplied with a default IP address. This is used to identify the product on the IP network, and it must be changed and assigned a unique IP address according to local company network policy.

Before configuring this product, ensure it and the computer are in the same IP range. Typically, a fixed IP address is used because the computer performs communications with individual products. The computers' IP address is displayed on the 'TCP/IP Properties' dialog by selecting,

Start > Control Panel > Network Connections > Local Area Connection > Properties > TCP/IP > Properties

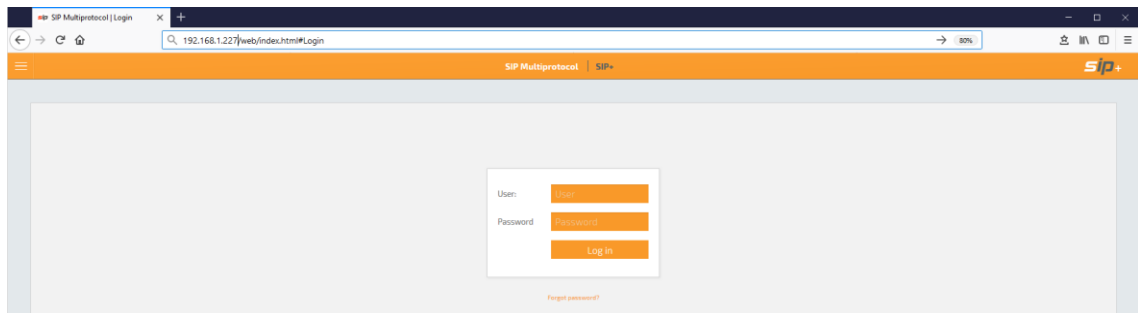
To connect to this product

1. After physically connecting the computer to this product using an appropriate Cat 5e cable, open a web browser application.

Tip! Mozilla Firefox and Chrome is commonly used by our engineers. Other browsers can be used but may display unexpected problems.

2. Type the required IP address. An IP address must be entered using the standard 32-bit dotted-decimal notation.

Default IP address - **192.168.1.128 (255.255.255.0)**



The 'Login' page will appear.

- ◆ Alternatively, launch the default web browser by selecting

Start > All Programs > Accessories > Run

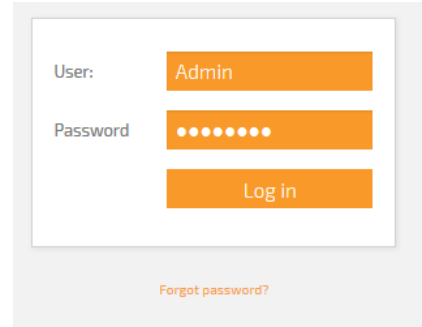
and type `http://<IP address>` in the dialog that appears. Press 'OK' to confirm.

Tip! The product can also be installed in a secure site. Type `https://<IP address>` and confirm the secure certification request as necessary.

- ◆ Enter the **'User'** name and **'Password'** and press 'Login' to display the landing page.

Tip!

If the valid **'User'** name and **'Password'** fails to launch the configuration page, check this product is connected and IP communication has been established. Press **'Refresh'** to verify the connection. Clear the web browser cache (generally **<Ctrl>+<Shift>+** will display the **'Delete browsing history'** dialog).



- If necessary, acknowledge the **'Time mismatch'** warning dialog. This indicates the time currently set in this product differs from the time currently set in the PC by more than 5 minutes.

Note

This warning only appears after the correct Username and password is entered on the **'Login'** page and will not appear again until the browser is reloaded or refreshed.

Remember

If the Timezone is set to Universal, the date/time may be incorrect when the times are changed according to Daylight Saving times.

2.2 CONFIGURE THE IP SETTINGS

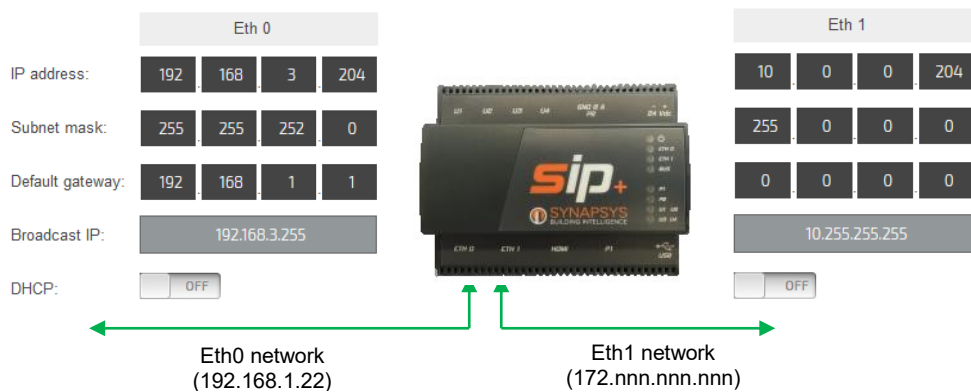
The IP config parameters make this unit compatible with the connected IP network.

1. Press **'IP config'** to display the Transmission Control Protocol and Internet Protocol (TCP/IP) parameters that identify this unit on an IP Network.

Note TCP/IP is the communication protocol used for networks, including the Internet. A specific range of configured IP addresses can be used to group units in networks or subnets.

- ◆ If necessary, change the **'Hostname'**. This is a 15 character label (including '-' and '_') and numbers, assigned to this product and linked to the IP address related to Eth1. The IP address may be derived from the DHCP (**'DHCP enabled'** is)

Tip! The Hostname is common across both Eth0 and Eth1 ports.



Note The **'Broadcast IP'** is the logical address used for datagrams to all connected IP devices.

Caution Ensure IP address subnet range are unique on both Eth0 and Eth1, eg Eth0: 192.168.1.nnn/255.255.252.0 and Eth1: 10.0.0.22/255.0.0.0.

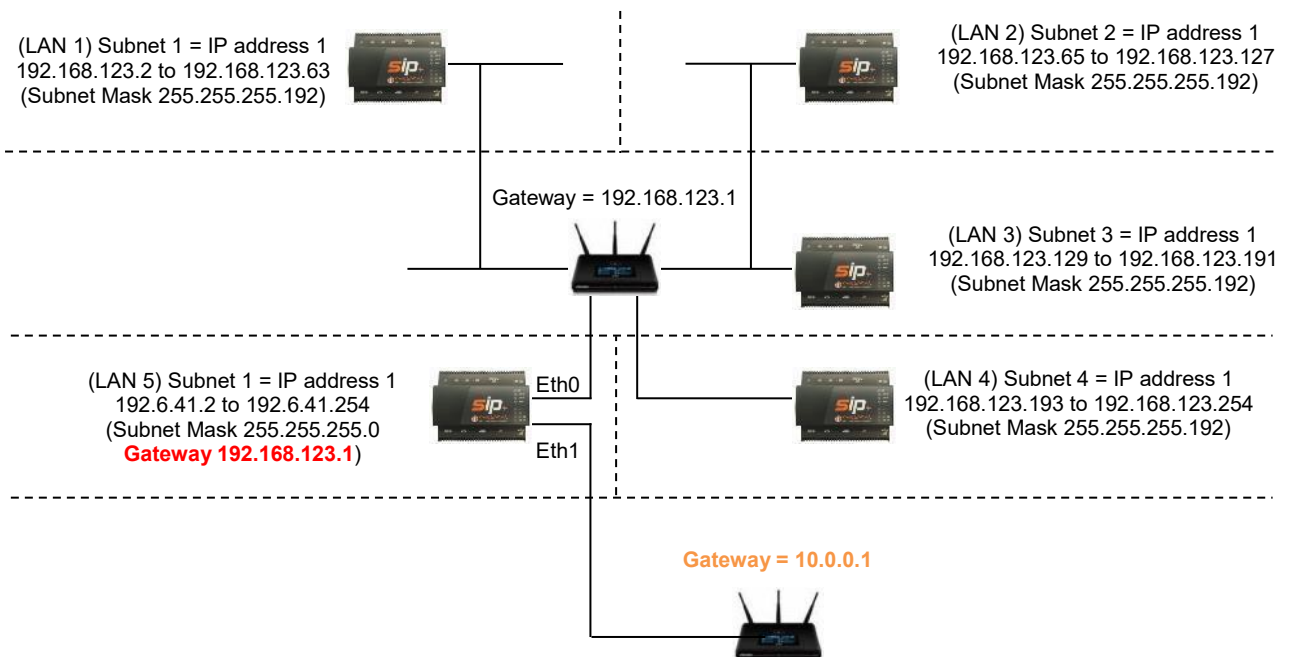
2. Change the 'IP address', 'Subnet mask', and 'Default gateway' of 'Eth1', typically the fieldbus IP address range, (and 'Eth0', typically for the BMS IP address range) according to local network policy.

The IP address provides a unique identification of a product on the IP network. The Subnet Mask is a configurable range of accessible IP addresses, and the Default Gateway is used to direct communications to IP addresses not in the defined Subnet Mask.

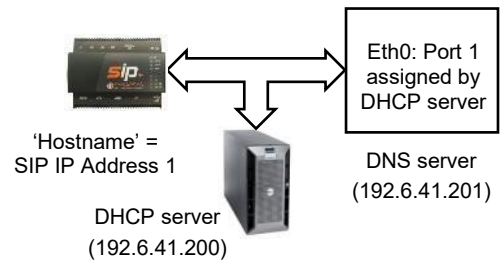
Hostname:	Supp-SIPENTIF							
	Eth 0				Eth 1			
IP address:	192	168	3	204	10	0	0	204
Subnet mask:	255	255	252	0	255	0	0	0
Default gateway:	192	168	1	1	0	0	0	0
Broadcast IP:	192.168.3.255				10.255.255.255			
DHCP:	<input type="checkbox"/> OFF				<input type="checkbox"/> OFF			

Tip! 'SIP Search' discovers other Synapsys Solutions designed products if connected to a compatible IP address range.

Only a single Default Gateway is permitted. This should be assigned according to the IP path to the internet.



DHCP (Dynamic Host Configuration Protocol) configuration. This is a computer networking protocol used by devices (DHCP clients, i.e., this product) on a network to automatically obtain IP address from a DHCP server. When the IP network parameters are assigned by the DHCP server.



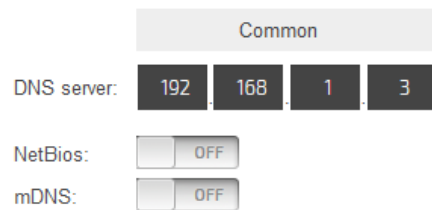
Caution The DHCP Server can be configured to assign an IP address as required. The IP network MUST be managed appropriately by qualified personnel.

- ◆ If necessary, change the **'DNS server'** (Domain Name System), the **'NetBIOS'** (Network Basic Input/Output System) and the **'mDNS'** (multicast DNS).

Tip! The **'DNS Server'** applies to both Eth0 and Eth1 port. Use on site DNS Server where possible.

DNS server (Domain Name System). This is the IP address of the server that manages the translation of the configured **'Hostname'** into an **'IP Address'** that may change if **'DHCP Enabled'** is set .

Remember The **'DNS server'** may need to be configured to support non-Microsoft clients. It may also be integrated with the DHCP Server.



NetBIOS (Network Basic Input/Output System) configuration. This manages the IP address and Hostname (NetBIOS name) resolution of each device via the **'DNS server'**. Typically, this will only be enabled () when multiple SIP products have the same 15 character Hostname.

mDNS (multicast DNS). This is a computer protocol that resolves hostnames to IP addresses within the local.

Caution Ensure the mDNS hostname includes **'.local'** when defining a connection to a device which has mDNS enabled, e.g. SIPIP-E3-00-00.local.

Do NOT enable both NetBIOS, and mDNS at the same time.

3. Press **'Save'** to confirm the changes, as necessary.

2.3 CONFIGURE THE GLOBAL SETTINGS

These parameters are used to manage details used to identify each device on the IP network, the source of report files sent via email or FTP and ensure the report timestamps are as correct.

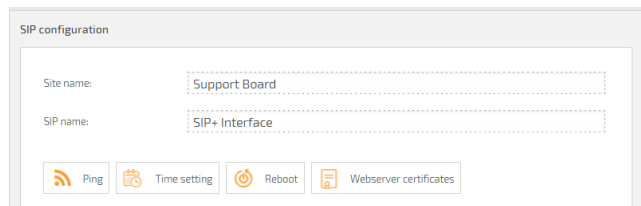
Tip! These parameters can also be changed using the SIP Data Tool.

2.3.1 Change the Site name and SIP name details

- If necessary, configure the 'Site name' and 'SIP name' for identifying this hardware in the browser, and the generated report files.

Site name. Used to identify the site via a web browser and is the first section of the report filename.

SIP name. Used to identify each hardware device via a web browser and is the first section of the report filename.



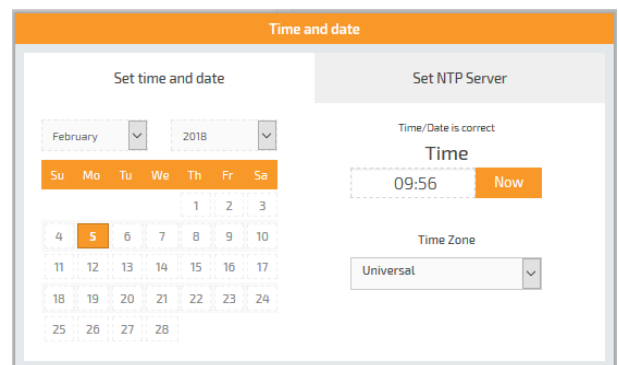
Note Both parameters support a maximum of 64 (UTF-8) characters and numbers.

2.3.2 Change the local Time settings

- Press 'Time setting' to display the hardware applicable clock settings. These values are used for the Timestamp details in the reports derived from the Data Acquisition, EMT drivers and vIQ plot.

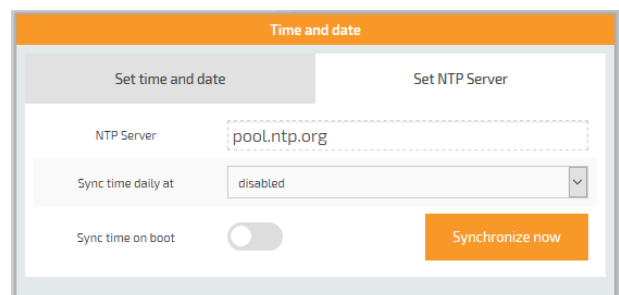
Caution Ensure the time is set correctly, to provide valid reporting data.

- Change the local Time settings on the 'Set time and date page'.
 - Press 'Now' to update the time and date according to the time and date of the PC connected to this hardware.
 - If necessary, set the 'Time Zone' according to the site.
- Alternatively, define an NTP Server on the use 'Set NTP Server' page to manage the local time settings.



Caution Do NOT configure an NTP Server if using the SIP+ Time zone setting, BACnet time synchronisation or Trend Timemaster.

- Press 'Save' to confirm changes.

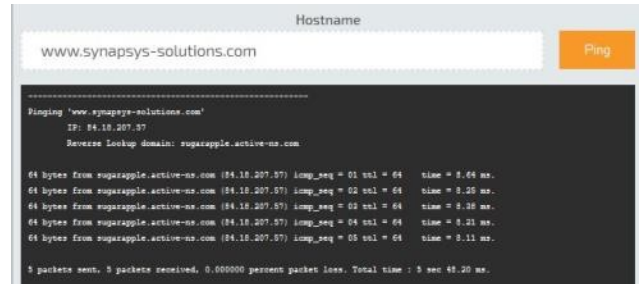


2.3.3 Use the Ping command

The Ping feature can be used to confirm connectivity to a defined host on an Internet Protocol (IP) network.

1. Press **'Ping'**, to display a page used to confirm the valid IP connection to a specified IP host device.
2. Enter the required web url, IP address or Hostname.
3. Press **'Ping'**, and ensure the dialog shows the number of sent packets matches the number of received packets.

Caution Some IP networks may NOT permit a response to a Ping command.



2.3.4 Use the Reboot

The Reboot feature simply performs a power cycle of this device.

2.3.5 Installing Webserver certificates

The Webserver certificates feature is used to add compatibility for secure communication using Transport Layer Security (TLS), IP port 443, over a defined domain on a site computer network.

Caution Internet access is required. The site IT team **MUST** provide appropriate https 'base64 pem format' certificates, a valid url for the device, and ensure the site DNS server is set correctly. Do **NOT** distribute certificates without consent from the site IT team.

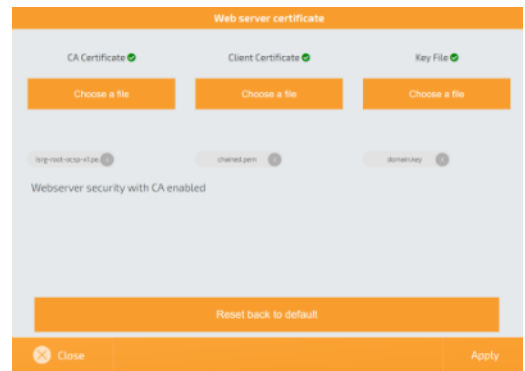
Remember This hardware is supplied with a self-signed certificate, which only permits secure access to the web page after the user has accepted the risk, as shown in the browser.

1. Press **'Webserver Certificates'** to show a page used to install https certificates applicable to the site domain.
2. Press the appropriate button and select the relevant https security certificate.

- i. Press Client certificate, choose a file button to show the Open dialog used to locate and select the required Client certificate.

Caution The Client certificate file is used to validate the Key file and CA certificate on selection.

Tip! Choose the Key file first if it includes the Client certificate file, as confirmed by the site IT team.



- ii. Press Key file and CA certificate, choose a file button to show the Open dialog used to locate and select the required Client certificate.

3. Press **'Apply'** to confirm this certificate and close the page.

Tip! The https web page access can be removed by pressing the 'Reset back to default' button. The hardware will then use the self-signed certificate. If the hardware fails to respond via https secure web browser access, please have a USB available and contact the office.

4. Use the product hostname, provided by the site IT team, to access this device.

2.3.6 Email Settings

The **'email settings'** feature is used to define the smtp mail server details required to send (csv) reports to designated email accounts.

The mail process supports standard mail server login process, and OAuth2 authentication standard.

Standard authentication, allowing a simple username and/or password to access the mail server.

OAuth open standard for authentication allowing users to grant third-party access without sharing their credentials. MFA uses a combination of a password, hardware token, and/or a biometric scan to verify the user's identity. OAuth uses tokens to authenticate users.

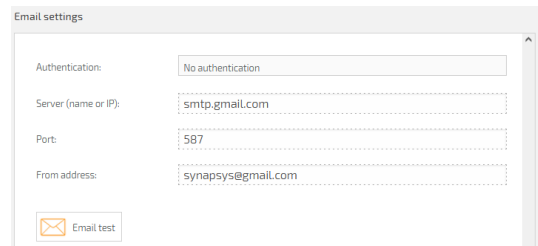
Tip! Having access to the define mail server account, Sent folder, will assist in confirming the test report has been sent.

1. Define the required mail server settings.

Authentication. Used to define the authentication required to send email reports.

- ◆ **No authentication.** Used if the email account on the defined mail server does not require a password.

Server (name or IP). Used to define the mail server used to send reports via email. Set as the Server name, i.e., smtp.gmail.com or local IP address according to local IP Policy.



Tip! A domain mail server (e.g., Office365) or a public mail server (e.g., Gmail, can be used.

Port. Used to define the IP port required to access the defined mail server.

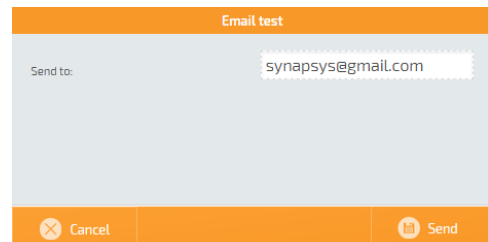
Tip! Typically Port 25 is used for onsite mail server, Port 465 is used for SSL secure encryption connection type and Port 587 is used to TLS (StartTLS) secure encryption connection type.

From address. Used to define the email account in the mail server for sending csv files.

Caution This MUST be a valid/registered email address in the defined mail server.

Email test. Used to launch a page, used to define a mail account that receive a test email, and is used to test the mail server details.

Press the Email test button, enter the mail account used to test the mail server details, and press Send to send the test report.



- ◆ **Login and CRAM-MD5.** Used if the email account on the defined mail server requires a password for the Login to send an email.

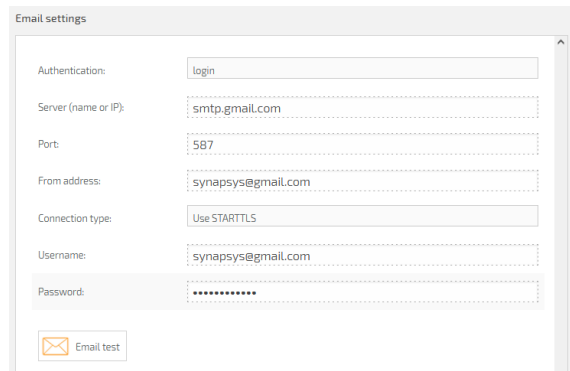
Set mail server details as required.

Server (name or IP). As above.

Port. As above.

Tip!

Typically Port 25 is used for onsite mail server, Port 465 is used for SSL secure encryption connection type and Port 587 is used to TLS (StartTLS) secure encryption connection type.



From address. Shows an email address used to define which device sent the report.

Caution

This MUST be a valid/registered email address if using a local email server.

Connection type. Used to define the secure encryption connection type required by the mail server. Typically, this corresponds to the **Port** settings.

Tip!

Typically Port 25 is used for onsite mail server, Port 465 is used for SSL secure encryption connection type and Port 587 is used to TLS (StartTLS) secure encryption connection type.

Username and Password. Used to define the login credentials required to access the mail account in the defined mail server.

Email test. See above.

- ◆ **Generic OAuth 2.** Used if the email account on the defined mail server requires multi-factor authentication as specified by OAuth2.

Configure mail server as required.

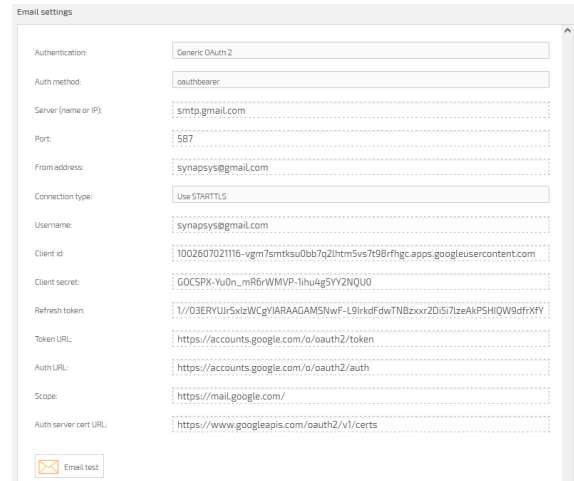
Server (name or IP). As above.

Auth method. Used to define the authentication method required for using the defined mail server.

Port. As above.

Tip!

Typically, Port 25 is used for onsite mail server, Port 465 is used for SSL secure encryption connection type and Port 587 is used to TLS (StartTLS) secure encryption connection type.



From address. Shows an email address used to define which device sent the report.

Caution

This MUST be a valid/registered email address if using a local email server.

Connection type. Used to define the secure encryption connection type required by the mail server. Typically, this corresponds to the **Port** settings.

Username. Used to define the mail account requesting access to the defined mail server.

Tip!

Ensure a valid Username is defined, and is the same as the From address.

Client id. Used to define the string of characters/numbers identifying this device to the mail server. This is provided when configuring the mail server.

Client secret. Used to define the code required to verify/authenticate the **Client id** to the mail server via a string of characters/digits. This ensures the access token request is made only from the configured application, and not from an unauthorised site. This is provided when configuring the mail server.

Refresh token. Used to show the token required to allow the application to access an API and accept new access token.

Token URL Used to define the resource server providing the access token.

Auth URL. Used to define resource server for exchanging an authorization code with an access token.

Scope. Used to define the resource server that specifies what APIs are permitted by this account.

Auth server cert URL. Used to define the resource server certifying the connection to the API.

Email test. See above.

- ◆ **Google OAuth 2.** Used when accessing the Google email account on the defined mail server requires multi-factor authentication as specified by OAuth2.

Caution

Configure the Google mail portal (available from the hyperlink below) before configuring this product mail server settings.

This provides the Client ID and Client secret as required to use the Gmail OAuth 2 authentication and may have already been completed by the site IT team.

<https://console.cloud.google.com/welcome>

Configure the Gmail server as required

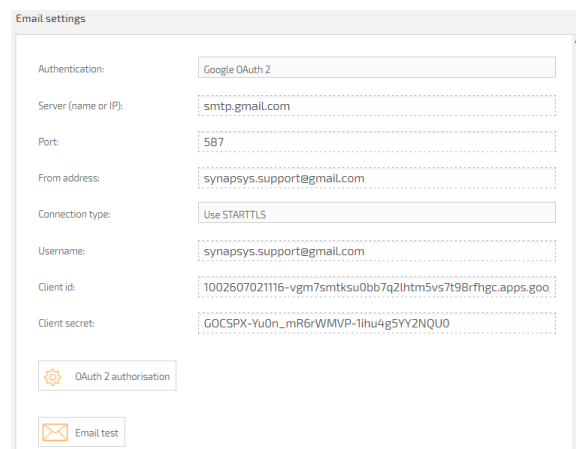
Server (name or IP). As above.

Port. As above.

Tip!

Typically, Port 25 is used for onsite mail server, Port 465 is used for SSL secure encryption connection type and Port 587 is used to TLS (StartTLS) secure encryption connection type.

From address. Shows an email address used to define which device sent the report.



The screenshot shows an 'Email settings' form with the following fields:

- Authentication: Google OAuth 2
- Server (name or IP): smtp.gmail.com
- Port: 587
- From address: synapsys.support@gmail.com
- Connection type: Use STARTTLS
- Username: synapsys.support@gmail.com
- Client id: 1002607021116~vgm7smtksu0bb7q2lhtm5vs7t98rfhgc.apps.goo
- Client secret: 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

There are also two buttons at the bottom: 'OAuth 2 authorisation' and 'Email test'.

Caution

This MUST be a valid/registered email address if using a local email server.

Connection type. Used to define the secure encryption connection type required by the mail server. Typically, this corresponds to the **Port** settings.

Username. Used to define the mail account requesting access to the defined mail server.

Tip!

Ensure a valid Username is defined.

Client id. Used to define the string of characters/numbers identifying this device to the mail server. This is provided when configuring the mail server.

Client secret. Used to define the code required to verify/authenticate the **Client id** to the mail server via a string of characters/digits. This ensures the access token request is made only from the configured application, and not from an unauthorised site. This is provided when configuring the mail server.

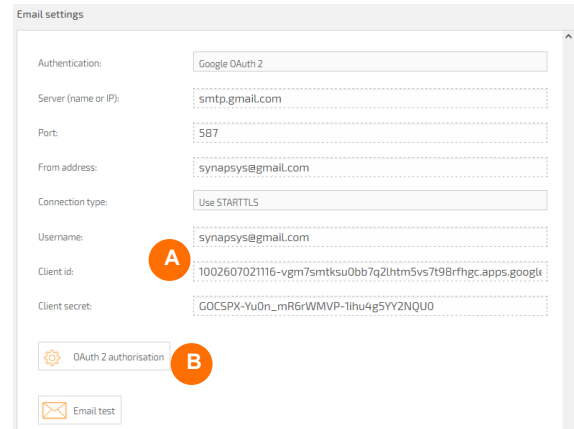
OAuth 2 authorisation. Used to complete the Google Mail server authorisation using the configured Client ID and Client secret to validate this account with the API, see below.

Email test. See above.

To configure **Google OAuth 2** mail server settings, after completing the Google Mail server setup

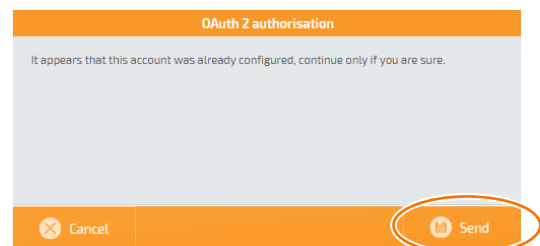
Enter your **Client id (A)** and **Client secret (A)** obtained during the configuration of the Google mail server portal.

Press **Save** to confirm the changes.

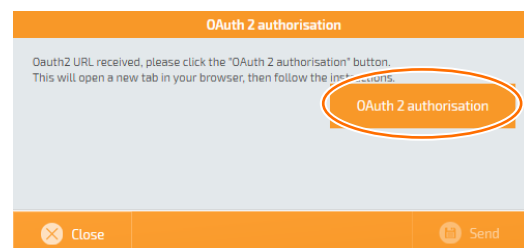


Press **OAuth2 authorisation (B)**, to show a message confirming the mail account is already configured via the Google mail portal.

Press **Send** to overwrite any existing **Client id** and **Client secret** and show a message confirming the OAuth 2 URL has been received.



Press **OAuth 2 authentication** to open a browser and show the Google mail server sign in page.



Tip! **Immediate access is granted if this account is green logged in.**

On the web page, ignore the '**Google has not been verified this app**' message and press **Advanced** to show a '**go to (the name of your app) (unsafe)**'. Select '**go to (the name of your app) (unsafe)**' option, read the instructions, press '**Continue**', and wait for the browser to show it is unable to connect.

Ensure the browser shows the product IP Address, edit as necessary.

Example <http://localhost/?code=4/0AWgavddwz...> **should** **read**
<http://192.168.11.62/?code=4/0AWgavddwz...>

Refresh the browser to show the '**Authorization process completed**' message.

Close all unnecessary pages, and test the email process.

- ◆ **Microsoft OAuth 2.** Used if the mail account on the defined Microsoft mail server requires multi-factor authentication.

Caution

Configure the Microsoft Azure portal to provide the Client ID and Client secret as required to use the Microsoft Domain OAuth 2 authentication (available from the link below) before configuring the Microsoft Admin Portal.

<https://portal.azure.com/#home>

Configure the Microsoft Admin portal before configuring this product mail server settings. It may have already been completed by the site IT team.

<https://admin.microsoft.com>

Configure the Microsoft Domain mail server as required

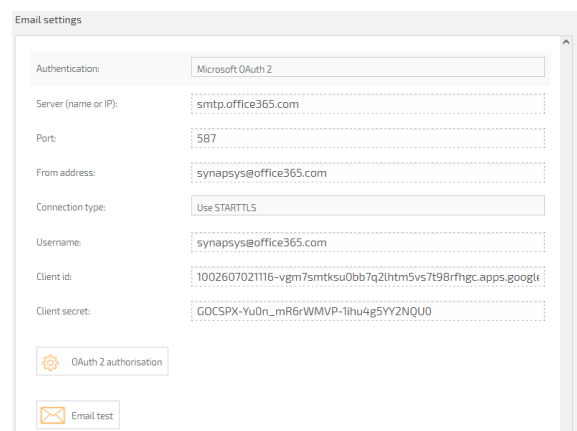
Server (name or IP). As above.

Port. As above.

Tip!

Typically, Port 25 is used for onsite mail server, Port 465 is used for SSL secure encryption connection type and Port 587 is used to TLS (StartTLS) secure encryption connection type.

From address. Shows an email address used to define which device sent the report.



Caution

This MUST be a valid/registered email address if using a local email server.

Connection type. Used to define the secure encryption connection type required by the mail server. Typically, this corresponds to the **Port** settings.

Username. Used to define the mail account requesting access to the defined mail server.

Tip!

Ensure a valid Username is defined.

Client id. Used to define the string of characters/numbers identifying this device to the mail server. This is provided when configuring the mail server.

Client secret. Used to define the code required to verify/authenticate the **Client id** to the mail server via a string of characters/digits. This ensures the access token request is made only from the configured application, and not from an unauthorised site. This is provided when configuring the mail server.

- ◆ **OAuth 2 authorisation.** Used to complete the Google Mail server authorisation using the configured Client ID and Client secret to validate this account with the API, see below.
- ◆ **Email test.** See above.

To configure **Microsoft Oauth 2** mail server settings

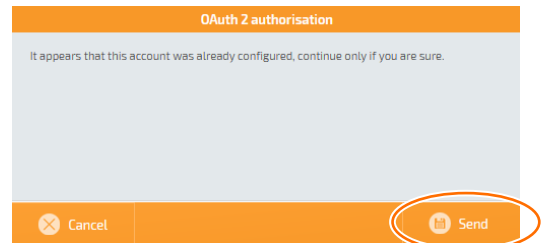
Enter your **Client id (A)** and **Client secret (A)** obtained during the configuration of the Microsoft Azure portal.

Press **Save** to confirm the changes.

Press **OAuth2 authorisation (B)**, to show a message confirming the mail account is already configured via the Microsoft Azure portal.

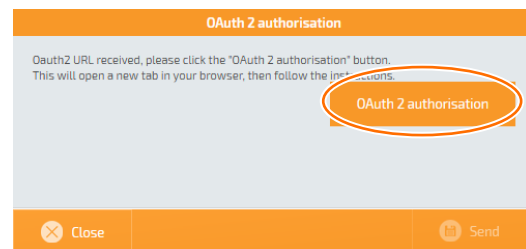
Press **Send** to overwrite any existing **Client id** and **Client secret** and show a message confirming the OAuth 2 URL has been received.

Press **OAuth 2 authentication** to open a browser.



Tip!

Immediate access is granted if this account is already logged in.



The Microsoft Domain Azure portal will show '**Permission requested**', and wait for the browser to show it is unable to connect.

Ensure the browser shows the product IP Address, edit as necessary.

Example

http://localhost/?code=4/0AWgavddwz... should read **http://192.168.11.62/?code=4/0AWgavddwz...**

Refresh the browser to show the '**Authorization process completed**' message.

Close all unnecessary pages, and test the email process.


2.4 MANAGE DRIVERS

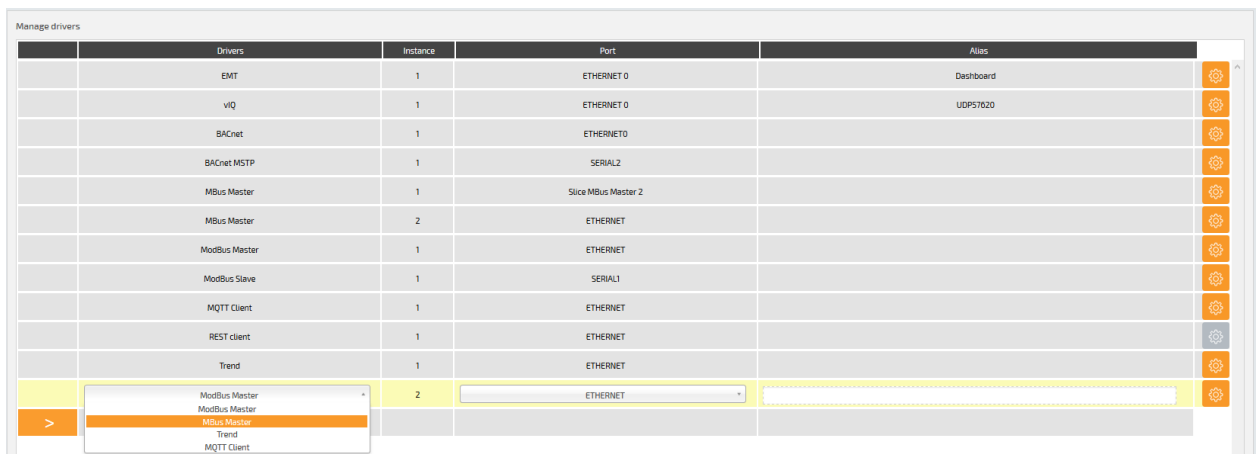
The **'Manage Drivers'** page is used to select the protocol drivers, i.e. BACnet MSTP client, BACnetIP client, BACnetIP server, EMT (Energy Monitoring and Targeting), IoT (MQTT/REST client/server), MBus Master (Serial or TCP), ModBus Master (Serial or TCP/IP), Trend client (Serial or Ethernet), Trend server (Serial or Ethernet), or vIQ, applicable to the input points required, and define the communications network parameter.

These products support a maximum 16 driver instances per protocol, e.g., ModBus Master driver includes 1 (one) RS232 driver instance, 1 (one) RS485 driver instance, and 14 ModBus TCP/IP driver instances, and up to 16 SIP Slice products can be connected via the DIN Rail connectors.

Caution Only a single vIQ driver instance is permitted. 1 x vIQ is 1 Trend LAN.

Tip! Press **'Save'** frequently, to avoid losing unsaved configuration changes.

1. From the main menu, select **'Manage Drivers'** to a page that permits the specification of the required Drivers.
2. Press  to automatically add a default driver.



Drivers	Instance	Port	Alias
EMT	1	ETHERNET 0	Dashboard
vIQ	1	ETHERNET 0	UDP57620
BACnet	1	ETHERNET0	
BACnet MSTP	1	SERIAL2	
MBus Master	1	Slice MBus Master 2	
MBus Master	2	ETHERNET	
ModBus Master	1	ETHERNET	
ModBus Slave	1	SERIAL1	
MQTT Client	1	ETHERNET	
REST client	1	ETHERNET	
Trend	1	ETHERNET	

The screenshot shows a dropdown menu for the 'Drivers' column of the second 'ModBus Master' instance (Instance 2). The dropdown options are: ModBus Master, ModBus Master, ModBus Master, Trend, and MQTT Client. The 'ModBus Master' option is currently selected.

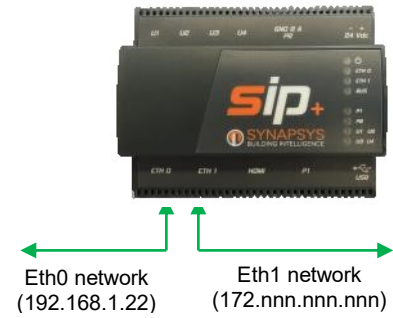
3. Select the required Driver from the available options. Up to 16 drivers 'Instances' of each type can be added, i.e., 1 Instance of the BACnet MSTP (RS485 P2), 13 Instances of the ModBus Master Ethernet, 1 (one) ModBus Master RS232, and 1 (one) ModBus Master RS485, or 16 slices connected via the DIN Rail.


Note Observe the **'Instance'** increase as the same driver type is added multiple times and that EMT and vIQ driver are locked to Ethernet 0.

- Select the **'Port'** type related to the specified driver, e.g., ModBus Master driver with 'Ethernet' port will communicating with ModBus TCP/IP slaves according to the same IP address range of the selected IP port.

Caution **EMT (SIP+ EMT/EMT-IF product) and vIQ driver networks MUST be physically connected to 'Eth0' and in a compatible IP address range.**

- Select Ethernet for the connection via either **'Eth0'** or **'Eth1'** port, typically ModBus TCP/IP or BMS connection.



- Select Serial 1 for the connection via the RS232 port.
 - Select Serial 2 for the connection via the RS485 port, for either BACnet MSTP or ModBus RTU RS485.
- If necessary, type a meaningful label in the **'Alias'** field. This provides a simple method of identifying the corresponding driver.
- Press  to show a page used to define the communications setting according to the selected driver and port combination.

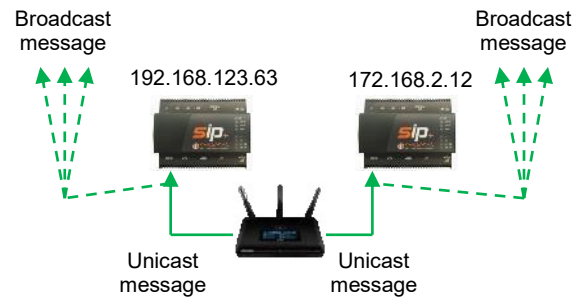


2.4.1 Manage the BACnetIP Driver Settings

When the driver is 'BACnet', the 'Port' is either Ethernet 0 or Ethernet 1, configure the BACnetIP comms settings.

Remember The SIP+ Data-IF/EMT/EMT-IF only permits 1 (one) BACnet driver instance.

BBMD enable. Used to allow this device to receive a unicast 'Who-is' message from a device on a different subnet range and send a 'Who-is' broadcast message to devices in this subnet range. It is used in conjunction with the 'BDT List' and 'FD List' pages shown beside the 'Settings' option.



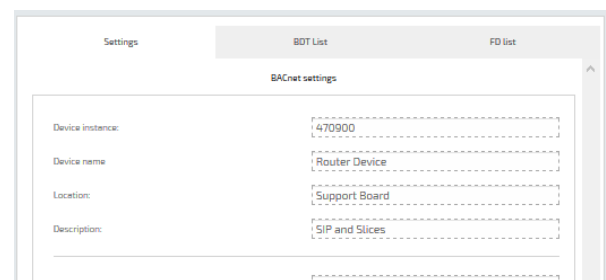
Tip! IP routers do NOT permit broadcast messages. A BBMD (BACnet Broadcast Message Device) sends a unicast message to the specified BBMD device on the other subnet range.

Note A 'Who-is' message is sent by other BACnet devices that need to acquire the address information of other devices without creating more network traffic. Other BACnet devices respond with an 'I-am' message. This hardware automatically send an 'I-am' message on startup.

On the 'Settings', if necessary, change the BACnet 'Device instance', 'Device name', 'Location' and 'Description' to identify this specific device on the BACnetIP Network.

Device instance (range 0 to 4194303), Used to identify this device in the BACnetIP network via a numeric reference.

Tip! Use the first 4 digits as a reference to the BACnet network, i.e., Network 4709 is Device instance 4709000.



Device name. Used to identify this device in the BACnetIP network via a Human readable identifier.

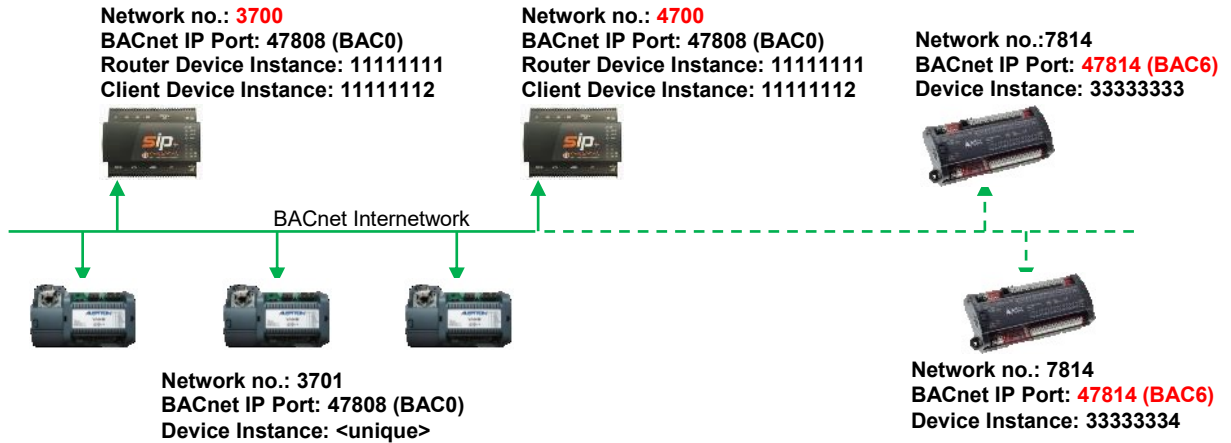
Caution Use third party BACnet explorer to ensure the 'Device instance' and the 'Device name' is unique.

Location. A freeform location text used to indicate the physical location of this product in the BACnet/IP based control system.

Description. A freeform text field.

On the 'Settings', if necessary, change the BACnet 'Network number', 'BACnet IP Port', 'DCC Password', 'Time sync' and 'Accept object changes from BACnet' settings.

Network number (range 1 to 65534, default: 0)) and **BACnet IP Port** (range 0 to 65535, default: 47808(BAC0)). Used to define the connection of this device and the virtual BACnet client device on the BACnetIP network.



Caution

Ensure a unique 'Network number' is configured for each SIP+ Data-IF/EMT/EMT-IF on the BACnetIP network and all devices that need to communicate with each other are using the same 'BACnetIP Port'.

DCC Password. Used to permit the DCC (Device Communication Control) and RD (Reinitialise Device) operations.

Time sync. Used to enable/disable a time synchronization broadcast message from a Time Master device (client) to adjust the time and date in this device.

Accept object changes from BACnet (i.e., Read Only). Used to enable/disable changes to Object instance values in this device.

Description:	<input type="text"/>
Network number:	<input type="text" value="3708"/>
BACnet IP port:	<input type="text" value="47808"/>
DCC password:	<input type="text"/>
Time sync:	<input checked="" type="checkbox"/>
Accept object changes from BACNet:	<input checked="" type="checkbox"/>
When in min.	<input type="text" value="0"/>

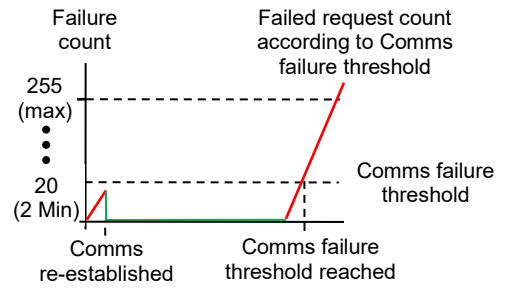
Who-is min and **Who-is max** (Service Parameters). Used to define the range of addresses that are expected to respond to the **Who-is** message sent from this device.

APDU Timeout and **APDU retries**. Used to define the number of ms this device will wait until repeating the request, and the number attempts the request will be made respectively.

Tip! Only set 'Slow mode' following instruction from Synapsys Solutions.

Accept object changes from BALNET:	<input checked="" type="checkbox"/>
Who is min:	0
Who is max (max 4194303):	4194303
APDU timeout (milliseconds):	3000
APDU Retries:	2
Slow mode:	<input type="checkbox"/> OFF
Points fail treshold:	20

Points failure threshold. Used to define the number of consecutive failed requests from a device to determine when a communications failure state is indicated.



On the 'BDT List', change as necessary.

- ◆ Press '**BDT List**' manage the BBMD references for devices on different subnet ranges.

Press '+' to add a BBMD reference. Enter the BACnet BBMD IP Address.

If necessary, change the Remote UDP (BACnet network number).

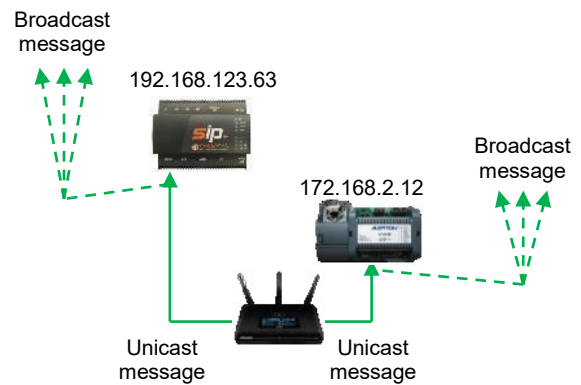
Tip!

The 'Remote subnet' should remain at 255.255.255.255. This will allow the broadcast 'Who-is' message across the entire 'Remote IP Address' range.

Press '-' to remove a selected BBMD reference.

Caution

Ensure the BACnet Device on the other subnet range is suitable.



On the 'FD List', change as necessary.

- ◆ Press '**FD List**' (Foreign Device List) showing a list of devices on different subnet ranges, the TTL (Time To Leave) and Seconds Remaining.

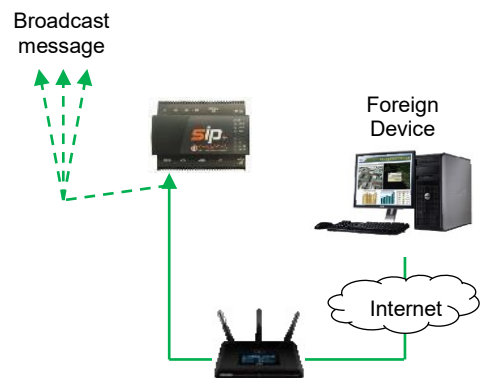
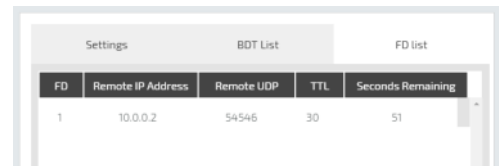
Note

The details will be removed when the TTL has occurred.

- ◆ Press 'Cancel' or 'OK' as appropriate.

Caution

Appropriate IT rules will be required for inbound BACnet connectivity.



2.4.2 Manage BACnet MSTP Driver Settings

When the driver is 'BACnet MSTP', the 'Port' is 'Serial 2' set the BACnet MSTP RS485 comms settings.

Remember The SIP+ Data-IF/EMT/EMT-IF only permits 1 (one) BACnet MSTP driver instance. Any ModBus RS485 networks will require an additional ModBus Serial Slice.

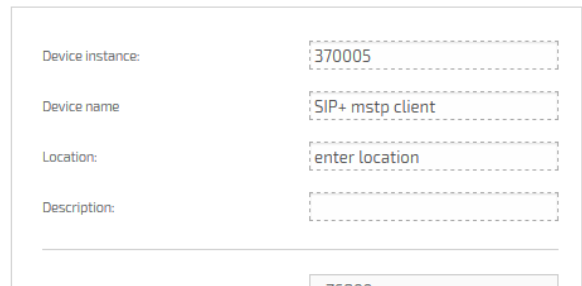
On the 'Settings', if necessary, change the 'Device instance', 'Device name', 'Location', and 'Description' to identify this specific device on the BACnet MSTP network.

Device instance (range 0 to 4194303): Used to identify this device in the BACnetIP network via a numeric reference.

Device name. Used to identify this device in the BACnetIP network via a Human readable identifier.

Location. A freeform location text used to indicate the physical location of this product in the BACnet/IP based control system.

Description. A freeform text field.



A screenshot of a configuration form for a BACnet MSTP driver. The form contains the following fields:

- Device instance: 370005
- Device name: SIP+ mstp client
- Location: enter location
- Description: (empty)

On the 'Settings', if necessary, change the 'Baudrate', 'MSTP MAC', 'Max info frames', and 'Max master' to configure the Master/Slave Token passing communications of the BACnet MSTP network.

Caution These parameters MUST be the same for all connected MSTP devices and are used to optimise the BACnet MSTP network.

Baudrate. Used to define the Data transmission speed in bps (bits per second).

MSTP MAC. Used to define this device addresses on a single RS485 subnet.

Max info frames. Used to define how many messages that the controller can send out to other controllers when it has the token on the network.

Max master. Used to define the highest allowable device address range 0 to 127 for the master node, i.e. this device.



A screenshot of a configuration form for a BACnet MSTP driver. The form contains the following fields:

- Description: (empty)
- Baudrate: 76800
- MSTP MAC: 5
- Max info frames: 1
- Max master: 127
- PLC password: (empty)

On the 'Settings', if necessary, change the '**DCC Password**', '**Who-is min**', '**Max info frames**', and '**Max master**' to configure to device network compatibility details.

DCC Password. Used to allow other BACnet devices to disable and re-enable the BACnet communication via the DCC (Device Communication Control) and RD (Reinitialise Device) operations.

Who-is min and **Who-is max.** Used to define the range of addresses that are expected to respond to the **Who-is** message sent from this device.

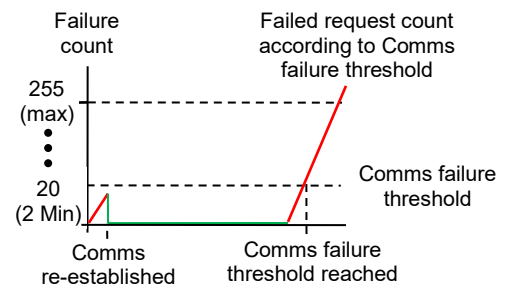
Who-is max:	147
DCC password:	*****
Who is min:	0
Who is max (max 4194303):	4194303
APDU timeout (milliseconds):	5000
APDU Retries:	2
Points fail treshold:	20

Note

A 'Who-is' message is sent by other BACnet devices that need to acquire the address information of other devices without creating more network traffic. Other BACnet devices respond with an 'I-am' message. This hardware automatically sends an 'I-am' message on start up.

APDU Timeout and **APDU retries.** Used to define the number of ms this device will wait until repeating the request, and the number attempts the request will be made respectively.

Points fail threshold. Used to define the number of consecutive failed requests from a device to determine when a communications failure state is indicated.



- Press 'Cancel' or 'OK' as appropriate.

Tip! Press 'Save' frequently, to avoid losing unsaved configuration changes.

2.4.3 Manage Data Acquisition Driver Settings

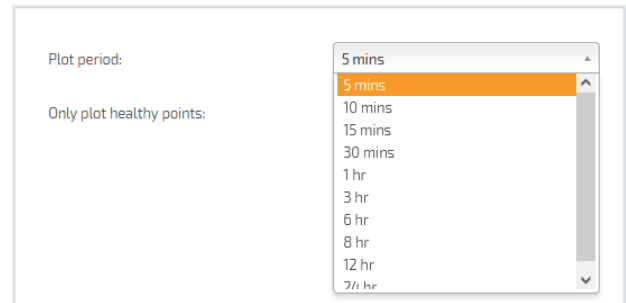
When the driver is 'Data Acquisition' and the 'Port' is 'Ethernet', set the Data Reporting settings.

On the 'Settings', if necessary, change the 'Plot period', and the 'Only plot healthy points' to define the data reporting file constraints.

Plot period. Used to define when the value is logged to the database.

Tip!

The relationship between the Plot period and the total number of datapoints being plotted determines the amount of historic data that is stored.



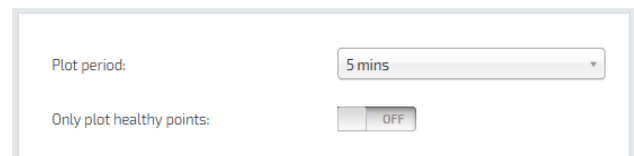
Plot period: 5 mins
 Only plot healthy points:

- 5 mins
- 10 mins
- 15 mins
- 30 mins
- 1 hr
- 3 hr
- 6 hr
- 8 hr
- 12 hr
- 7 1/2 hr

Only plot healthy points. Used to set a report field to null/empty if the data source fails to provide a value.

Tip!

A synchronised timestamp and a real timestamp are logged in the internal database.



Plot period: 5 mins
 Only plot healthy points: OFF

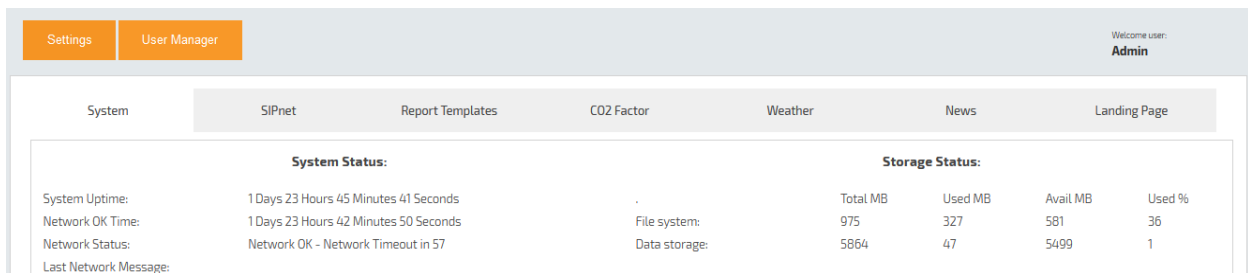
- Press 'Cancel' or 'OK' as appropriate.

2.4.4 Manage EMT Driver Settings - Settings

When the driver is **EMT** and the 'Port' is 'Ethernet0', set the Dashboard and reporting settings.

On the 'Settings', if necessary, access each tab option to configure the EMT driver.

The 'Settings' page is used to show the **'System'**, **'SIPnet'**, **'Report Templates'**, **'CO2 Factor'**, **'Weather'**, **'News'**, and **'Landing page'** details.



System	SIPnet	Report Templates	CO2 Factor	Weather	News	Landing Page
System Status:		Storage Status:				
System Uptime:	1 Days 23 Hours 45 Minutes 41 Seconds	.	File system:	Total MB	Used MB	Avail MB
Network OK Time:	1 Days 23 Hours 42 Minutes 50 Seconds		Data storage:	975	327	581
Network Status:	Network OK - Network Timeout in 57			5864	47	5499
Last Network Message:					Used %	Used %
					36	1

On the **'System'** tab, inspect the **'System Uptime'**, **'Network OK Time'**, **'Network Status'** and **'Last Network Message'** to see the current SIPNet status, and the **'File system'** and the **'Data Storage'** to see the current hardware status.

System Uptime. Used to show the amount of time this product has been operating, i.e. since the product was last turned on or rebooted.

Network OK Time. Used to show the amount of time the network has been successfully communicating, i.e., since the last build process was successful.

Network Status. Used to show the current condition of the network according to this product and the time remaining until a **'Timeout'** will occur with the following conditions.

MESSAGE	DESCRIPTION
Network DISABLED	The SIPNet settings prevent this unit communicating with other SIP+ EMT and/or SIP+ EMT-IF products on the same UDP group and Domain.
Network POWERUP	The network build process is starting.
Network DEAF	The comms with other network devices is not applicable (only 1 (one) device in network) or not available (more than 1 (one) device in network, see <i>'Network BROKEN'</i>).
Network BROKEN	A comms failure with other devices on the network. Typically, due to a timeout caused by Ethernet wiring or connection problem, an IP address that is sending but not receiving messages, duplicate OS numbers from identified IP address on the network or when a network is changed, i.e., identified IP address is added or removed.
Network BUILT	The network build process is successful.
Network OK!	Successful comms are detected if product is not alone on the network or if it can communicate with other devices on the local network.

Last Network Message. Used to show the last message describing the Network status, see above.

Storage Status. Used to show the condition of the 2 storage areas. The storage areas retain data used to generate the graphs, and data used for the plots in the BeMS.

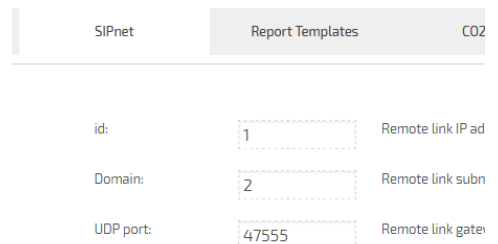
PARAMETER	DESCRIPTION
Total MB	The total amount of storage space allocated to the storage section.
Used MB	The amount of used storage space.
Avail MB	The remaining storage space available.
Used (%)	The current amount (%) of used storage space.

On the 'SIPNet' tab, if necessary, change the 'Id', 'Domain' and the 'UDP port' to configure the identification of each SIP+ EMT and SIP+ EMT-IF on the SIP network communicating via IP.

Tip! The 'SIPNet' also supports SIPE B-Logger, SIPE IF-Logger and SIPE M-Logger products.

Caution The 'SIPNet' is NOT compatible with SIP+ Data-IF products.

Id. Used to configure the unique numerical identifier (in the range 1 to 255) for each the SIP+ EMT or SIP+ EMT-IF on the SIP network Domain. To disable the networking for a SIP+ EMT or SIP+ EMT-IF product set as 0 (zero).



The screenshot shows a configuration window for 'SIPnet'. It has three tabs: 'SIPnet', 'Report Templates', and 'CO2'. The 'SIPnet' tab is active. Below the tabs, there are three rows of configuration fields:

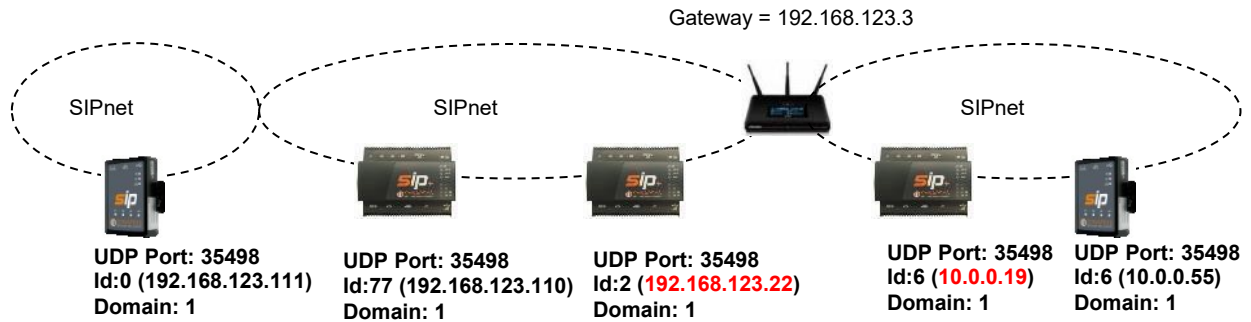
- id:** A text input field containing the number '1'. To its right is the label 'Remote link IP ad'.
- Domain:** A text input field containing the number '2'. To its right is the label 'Remote link subn'.
- UDP port:** A text input field containing the number '47555'. To its right is the label 'Remote link gate'.

Tip! Date and time are synchronised via the SIP+ EMT or SIP+ EMT-IF product with the lowest IP address, e.g., 01 Jan 2012, 00:00 on 192.168.123.22 is synchronised to all connected SIP+ EMT or SIP+ EMT-IF in that 'Domain'.

Caution Each SIP+ EMT or SIP+ EMT-IF MUST have a unique 'Id' in the specified 'Domain'.

Domain. Used to configure the unique numerical identifier (in the range 1 to 255) for each the group of SIP+ EMT or SIP+ EMT-IF on the SIP network. To disable the networking for a set as 0 (zero).

UDP Port. Used to configure the UDP port on the Ethernet protocol used for transmitting IP packets to SIP+ EMT or SIP+ EMT-IF in the same 'Domain'. Unique 'UDP Port' configurations operate as individual networks.



Note The 'Remote link IP address' is highlighted red.

Remote link IP address. Used to define the IP address of a SIP+ EMT or SIP+ EMT-IF on a different subnet.

1	Remote link IP address:	192	168	123	22
2	Remote link subnet address:	255	255	255	0
47555	Remote link gateway address:	192	168	123	3

Remote link subnet mask. Used to define the subnet of a SIP+ EMT or SIP+ EMT-IF on a different subnet.

Remote link gateway address. Used to define the IP address of a device providing communications between 2 (two) IP networks via a router.

Tip! A minimum of 2 (two) SIP+ EMT or SIP+ EMT-IF products per IP address range are required when multiple IP address ranges are used.

On the 'Report Templates' tab, if necessary, change the 'Data orientation', 'Data content', 'Data format', 'Report header', 'Blank rows', 'Data' and the 'Header' to customise a usage report format.

Usage reports are .csv (Comma Separated Variable) files containing 30 minute energy (electric, gas or water) usage values for selected Group(s) or Device(s). They can be sent to a designated email address via an internal SMTP (Simple Mail Transfer Protocol) or public SMTP (e.g., gmail account) or FTP (File Transfer Protocol) at a specified time and frequency as necessary.

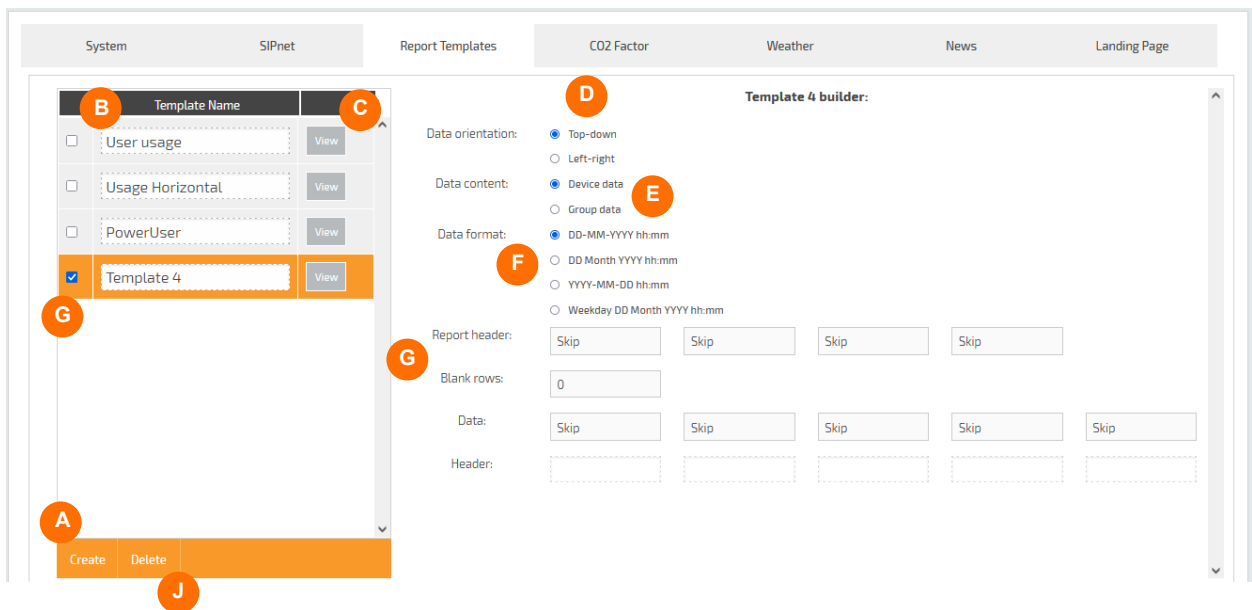
A maximum of 10 Report templates can be saved. This provides the flexibility required by third party energy billing companies.

Tip! The configured usage Report Templates are available from the Template option on the Reporting Schedule according to the Profile.

Usage report templates can be created by Administrator and Power user profiles.

1. Press 'Create' (A) to show the default Report Template and edit the 'Template name' (B) as required.

Use the 'View' button (C) to select an existing template and edit a 'Template name' (B) to identify this template.



Tip! To remove a Template, tick the required Template, and press 'Delete' (J).

Data orientation. Used to change the orientation of the recorded values (**D**), i.e., Top-down indicates each timestamp is displayed in portrait (down the file) or Left-right indicates each timestamp is displayed in landscape (across the file).

Tip! The page will change according to the selected 'Data orientation'.

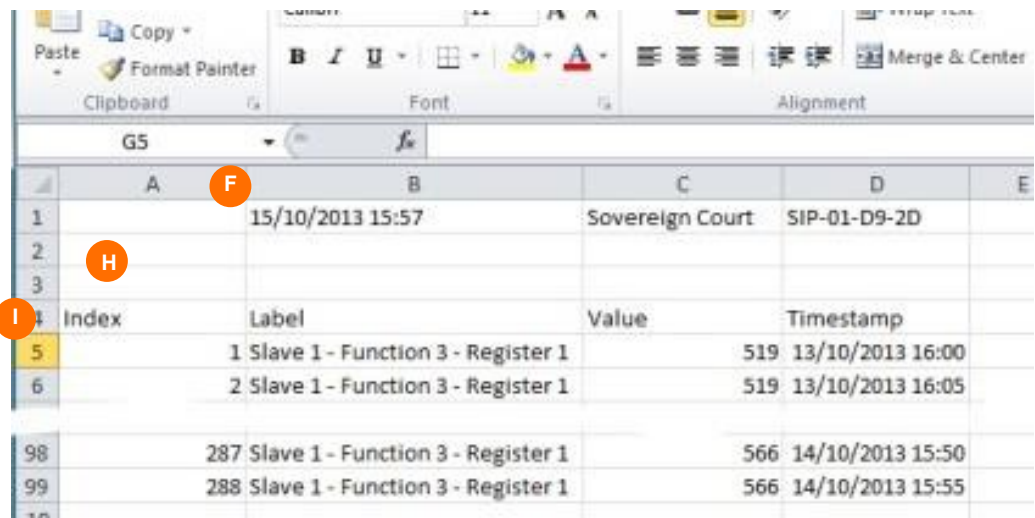
Data content. Used to change the content of the recorded data (**E**), i.e., Device data indicates an energy usage .csv Report file for each device in the 'Group', or Group data indicates an energy usage .csv Report file for the 'Group'.

Data format. Used to change the Date format (F) for the usage .csv Report.

Report header. Used to change the order of the Report date (**G**), Site name and SIP name in the scheduled energy Report.

Tip! Only set each 'Report header' option once.

Example This is an example of an Energy Report based on a configured template in Top-down orientation.



	A	B	C	D	E
1		15/10/2013 15:57	Sovereign Court	SIP-01-D9-2D	
2					
3					
4	Index	Label	Value	Timestamp	
5		1 Slave 1 - Function 3 - Register 1	519	13/10/2013 16:00	
6		2 Slave 1 - Function 3 - Register 1	519	13/10/2013 16:05	
98		287 Slave 1 - Function 3 - Register 1	566	14/10/2013 15:50	
99		288 Slave 1 - Function 3 - Register 1	566	14/10/2013 15:55	
100					

Blank rows. Used to change the number of empty rows (H) after the 'Report header'.

Data. Used to change the order of the Timestamp, Value, Label, and Index information in the scheduled energy Report according to the selected 'Data orientation' (I).

Header. Used to show a preview of how the Data will appear in the energy usage report.

On the 'CO2' tab, if necessary, change the 'Grid Electricity', and the 'Natural Gas' used for calculating the information for the Carbon Footprint of the energy (kWh) usage dashboard widget.

Grid Electricity. Used to calculate the CO2 footprint related to energy (kWh) derived from electricity.

Natural Gas. Used to calculate the CO2 footprint related to energy (kWh) derived from natural gas.



Tip! The Carbon Trust provides the values used to calculate the Carbon Footprint.

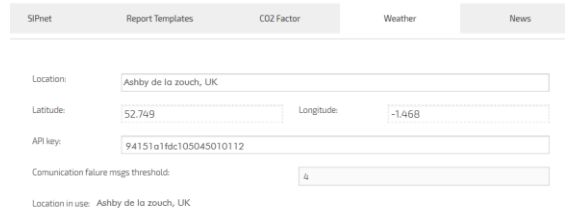
On the 'Weather' tab, if necessary, change the 'Location', 'Latitude', 'Longitude', 'API key', and the 'Communication failure msgs threshold' used to relate local weather conditions that may affect energy usage to the locality of this system.

Remember A valid World Weather Online API key is required, available from www.worldweatheronline.com, or an associated partner.

Location. Used to define the area where the weather information required.

Note A valid post code can be used but it will not resolve the place name and corresponding county.

Caution Ensure the defined 'Location' is correct. The Internet weather data provider collects worldwide weather information which will be used if the 'Location' is spelt incorrectly. Check verified 'Location in use'.



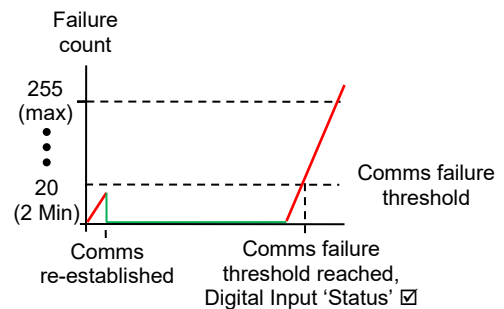
Latitude. Used to define the North-South geographical location of where this product is installed.

Longitude. Used to define the East-West geographical location of where this product is installed.

API key. Used to permit access to the Internet weather data provider.

Comms failure threshold. Used to define the number of consecutive failed requests from the Internet weather data provider required to determine a communications failure state.

Location in use. Shows the 'Location' has been defined correctly.



On the 'News' tab, if necessary, manage the available news feeds, and add news feeds accordingly. Selected news feeds are shown on the RSS (Really Simple Syndication) Feed widget.

The table shows 'Name', 'Url', 'Delete' and 'Selected' (A) options.

Name. Shows the meaningful name used to identify the associated RSS feed.

Url. Shows the URL (Uniform Resource Locator) of the associated RSS feed.

Delete. Used to remove the associated RSS feed from the configuration. This will also remove the related news from the RSS Feed widget.

Selected. Used to add the associated news feed to the RSS Feed widget.



The 'Add News Feed' (B) section is used to configure a specifically required RSS feed.

Name. Used to define meaningful name used to identify the specifically required RSS feed.

Url. Used to define the URL (Uniform Resource Locator) of the specifically required RSS feed.

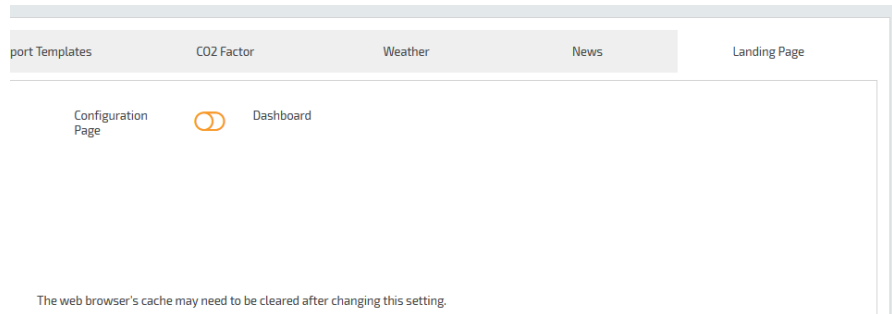
Add New. Used to add the specifically defined new RSS feed to the list of available RSS feeds that can be shown in the RSS widget.

On the 'Landing page' tab, if necessary, set the page shown by default when entering the IP address in the browser.

Configuration page/Dashboard. Used to define which page shown by default when entering the IP address into the browser.

If set to Configuration page, by default the browser will show the login page used to configure the drivers.

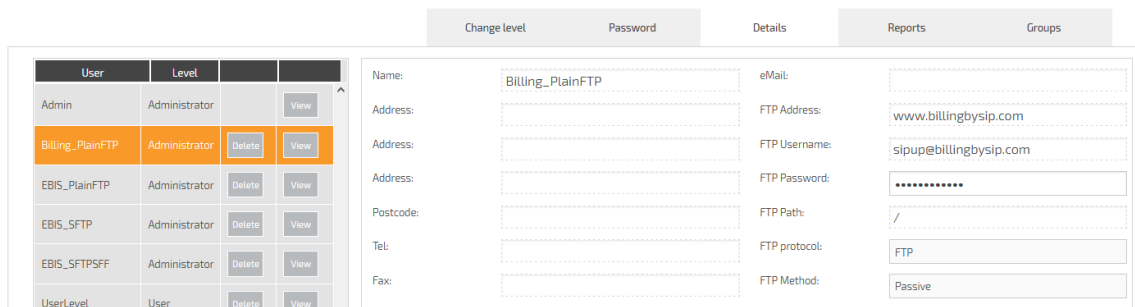
If set to Dashboard, by default the browser will show the EMT driver dashboard.



Remember Logout and clear browser history (All time), after changing the Landing page setting.

2.4.5 Manage EMT Driver Settings – User Manager

The ‘User Manager’ page is used to control and manage the authorised access to designated levels of commissioning and permits that authorised user to edit the associated ‘**Change level**’, ‘**Password**’, ‘**Details**’, ‘**Reports**’, and ‘**Group**’ configuration, of each configured user profile. After a Profile has been created, the authorised user may also edit the associated Details, required Reports, Reporting method and Reporting Schedule, as necessary.



User	Level		
Admin	Administrator		View
Billing_PlainFTP	Administrator	Delete	View
EBIS_PlainFTP	Administrator	Delete	View
EBIS_SFTP	Administrator	Delete	View
EBIS_SFTPSFF	Administrator	Delete	View
UserLevel	User	Delete	View

Change level Password Details Reports Groups

Name: Billing_PlainFTP eMail:

Address: FTP Address: www.billingbysip.com

Address: FTP Username: sipup@billingbysip.com

Address: FTP Password:

Postcode: FTP Path: /

Tel: FTP protocol: FTP

Fax: FTP Method: Passive

On the ‘**Details**’ tab, if necessary, change the contact details of the selected User.

On initial configuration, only the ‘Admin’ User is available. Each subsequent User added by the Administrator will require individual configuration details. These details are used to manage how this user will receive the recorded data.

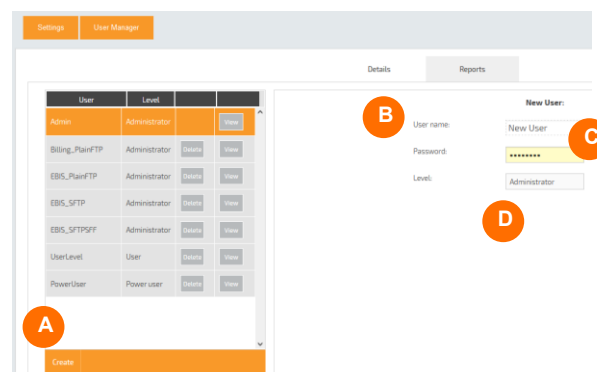
1. Press ‘**User Manager**’ to display the Contact Details of the default Admin (Administrator) user.
2. Press ‘**Users**’ tab to reveal the ‘**Manage Users**’ settings, showing a list of all existing users.

Caution Use the default ‘Admin’ user to manage User accounts, do not assign as a reporting user.

- i. Press ‘**Create**’ (A). Used to add a User that requires a report, or access to the on-board dashboard.

This will change to the page to show a request ‘**User name**’, associated ‘**Password**’ and ‘**Access level**’ required by this User.

- ii. Enter the ‘**User name**’ (B), associated ‘**Password**’ (C) and ‘**Access level**’ (D) required by this user.



Settings User Manager

Details Reports

User	Level		
Admin	Administrator	Delete	View
Billing_PlainFTP	Administrator	Delete	View
EBIS_PlainFTP	Administrator	Delete	View
EBIS_SFTP	Administrator	Delete	View
EBIS_SFTPSFF	Administrator	Delete	View
UserLevel	User	Delete	View
PowerUser	Power user	Delete	View

A Create

B User name: New User

C Password:

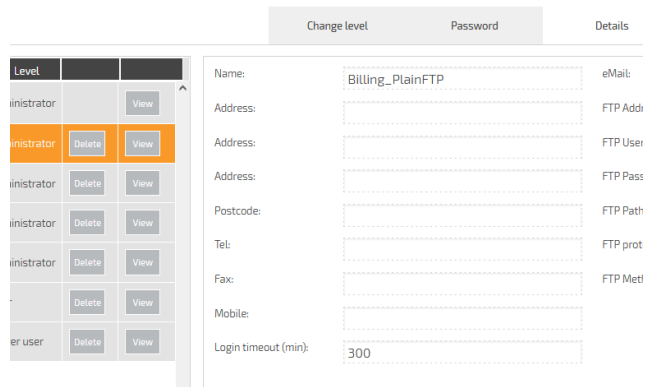
D Level: Administrator

- iii. Press ‘**Save**’. Used to confirm User login details.

Tip! Use ‘**View**’ to show the Contact details of the selected User and Delete to remove the selected User.

Name, Address (1, 2, and 3), Postcode, Tel, Fax and Mobile. Used to define the contact details of the selected User.

Login Timeout. Used to define the number of seconds of inactivity before this User will be automatically logged out.



The screenshot shows a user management interface. On the left is a table with columns for 'Level', 'Name', and 'Action'. The 'Action' column contains 'Delete' and 'View' buttons. The 'Billing_PlainFTP' user is highlighted. On the right is a configuration form with tabs for 'Change level', 'Password', and 'Details'. The 'Details' tab is active, showing fields for Name (Billing_PlainFTP), Address (three fields), Postcode, Tel, Fax, Mobile, and Login timeout (min) (300). Labels on the right side of the form include eMail, FTP Addr, FTP User, FTP Pass, FTP Path, FTP prot, and FTP Met.

eMail. Used to define the credentials required to successfully transfer reports using the defined mail server (see Global Settings page).

Caution **A valid email account is required when using a domain mail server e.g., Office365.**

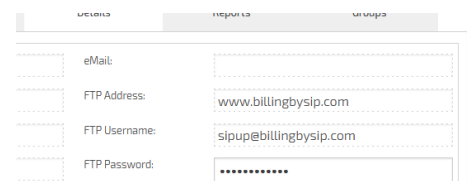
Consider all security constraints when using public mail server, e.g., 2-step or multi-factor authentication.

FTP Address, FTP Username, FTP Password, FTP Path, FTP protocol and FTP Method. Used to define the credentials required to successfully transfer reports using the FTP/SFTP (FTPS) details of the selected User.

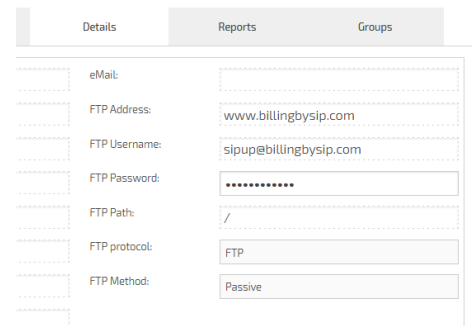
Caution **Internet access is essential if sending reports to a third party 'Energy Billing/Management' provider. The Report recipient details must be supplied by the customer or the third party 'Energy Billing/Management' provider.**

Remember **The FTP/SFTP (FTPS) credentials will be provided by whoever is managing the FTP server.**

Tip! **FTP Method is only applicable when using Plain FTP and must be set according to the details provided by whoever is managing the FTP server.**



This screenshot shows the 'eMail' configuration section. It includes fields for eMail, FTP Address (www.billingbysip.com), FTP Username (sipup@billingbysip.com), and FTP Password (masked with dots).

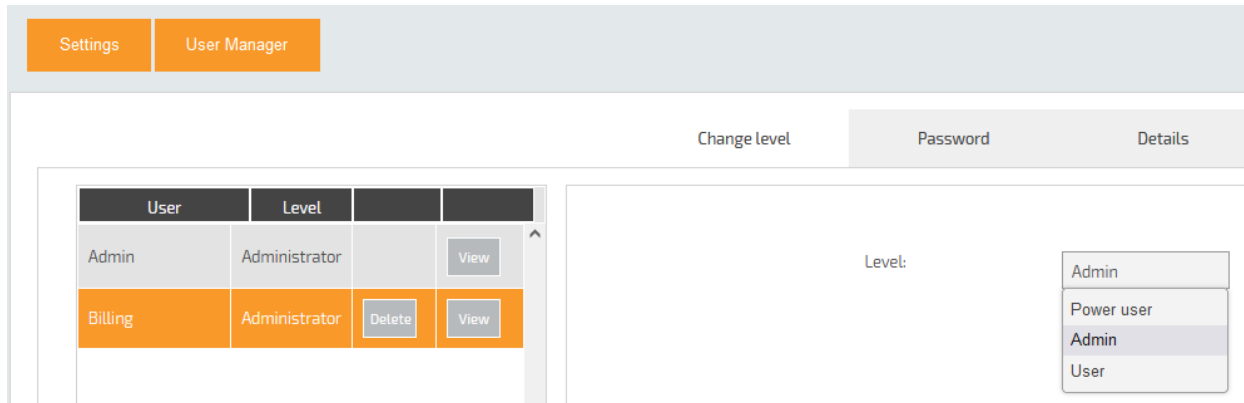


This screenshot shows the FTP configuration section. It includes fields for FTP Address (www.billingbysip.com), FTP Username (sipup@billingbysip.com), FTP Password (masked with dots), FTP Path (/), FTP protocol (FTP), and FTP Method (Passive).

On the 'Change Level' tab, if necessary, change the authorised access for the associated User.

Caution Only an authorised user with 'Administrator' access can change a User 'Level'. Ensure there is always 1 (one) 'Administrator' configured.

1. Press 'View' for the required User.
2. Select the 'Level' required (see below) for the selected User, and press 'Save'.



Remember Inform the associated user of the changes to the commissioning level authorisation.

CONFIGURATION PAGE	USER	POWER USER	ADMINISTRATOR
Global Settings	✗	✓	✓
IP Settings	✗	✓	✓
Manage Drivers	✗	✓ (EMT Only)	✓
EMT Settings - System	✗	✓ (Read Only)	✓
EMT Settings - Network	✗	✗	✓
EMT Settings - Report Template	✗	✓	✓
EMT Settings - CO2 Factor	✗	✓	✓
EMT Settings - Weather	✗	✗	✓
EMT Settings - News	✗	✓	✓
EMT Settings - Landing Page	✗	✗	✓
User Manager - Change Level	☐	☐	☐
User Manager - Password	☐	☐	☐
User Manager - Details (Contact details &	☐	✓	✓
User Manager - Reports (Report Schedule	☐	✓	✓

...continued

CONFIGURATION PAGE	USER	POWER USER	ADMINISTRATOR
...continued			
Define points			
EMT (only)	☐	☐	☐
Link points	☐	☐	☐
Backup and Restore	☐	☐	☐
Logout	☐	☐	☐
Dashboard			
Public	✗	✓ (Widgets)	✓
Layout	✗	✓ (Local Only)	✓
Preferences	✗		
General	✗	✓	✓
Public	✗	✓	✓
Local	✓	✓	✓
Utility	✗	✓	✓
Preferences Access	✗	✓	✓
Custom Datatypes	✗	✓	✓
Local	✓ (View Only)	✓	✓

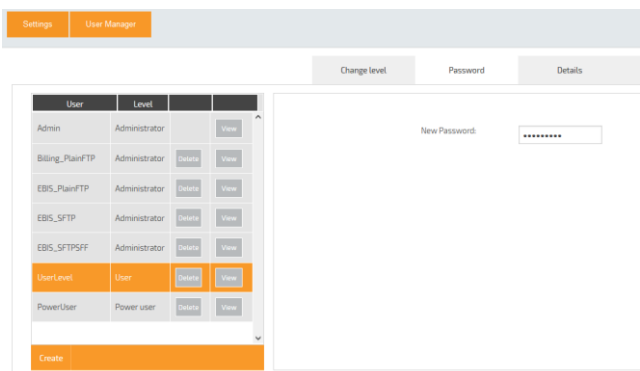
On the ‘**Change password**’ page, if necessary, change the authorised access password for the associated User. Changing the Password after the Profile has been created by the ‘Administrator’, will ensure the Profile Login details are secure and will prevent any further unauthorised access.

Caution **Login security can only be successfully controlled if the password is carefully distributed.**

1. Press ‘**View**’ for the required User and select the ‘**Password**’ page.

New Password. Used to define the password (15 characters max.), for the selected User.

Tip! **An ‘Administrator’ user can change any password, but ‘Power User’ user can only change their own. A ‘User’ does not have access to these pages.**

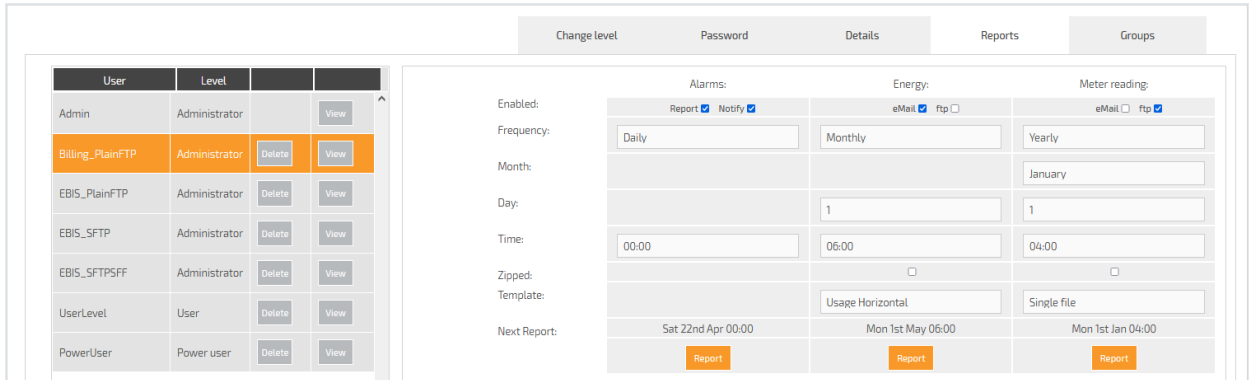


2. Press ‘**Save**’ to confirm changes.

Remember **If necessary, inform the associated user of the changes to the ‘Password’.**

On the **'Report'** page, if necessary, change the report format as required by the selected User.

1. Press **'View'** for the required User and select the **'Reports'** page.



User	Level		
Admin	Administrator		View
Billing_PlainFTP	Administrator	Delete	View
EBIS_PlainFTP	Administrator	Delete	View
EBIS_SFTP	Administrator	Delete	View
EBIS_SFTPSFF	Administrator	Delete	View
UserLevel	User	Delete	View
PowerUser	Power user	Delete	View

Enabled:

Frequency: Daily

Month:

Day: 1

Time: 00:00

Ziped:

Template: Usage Horizontal

Next Report: Sat 22nd Apr 00:00

Alarms: Report Notify

Energy: eMail ftp

Meter reading: eMail ftp

Frequency: Monthly

Month: Yearly

Day: 1

Time: 06:00

Ziped:

Template: Single file

Next Report: Mon 1st May 06:00

Meter reading: eMail ftp

Frequency: Yearly

Month: January

Day: 1

Time: 04:00

Ziped:

Template: Single file

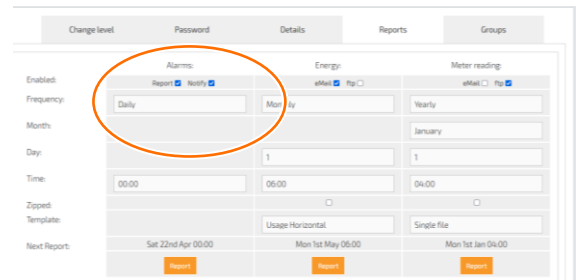
Next Report: Mon 1st Jan 04:00

If necessary, configure the Alarm **'Report'** and/or **'Notify'** email.

- i. Set **'Report'** and/or **'Notify'** to in the **'Alarm Report'** section. This will automatically generate and transmit an **'Alarm Report'** or **'Notification'** to the email address configured in the Profile.

An **'Alarm Report'** contains a record of all alarms/events since the last report was generated alarm messages, including system and database status.

Frequency. Used to define when the report will be generated, and when the report will be generated using the **'Month'**, **'Day'** and **'Time'** options.



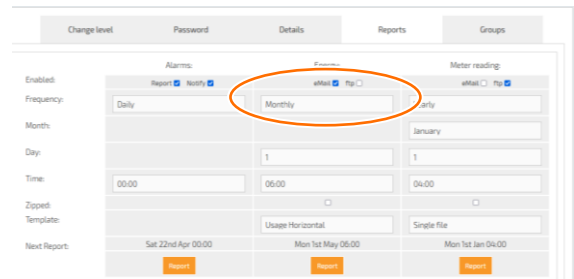
Tip!

Press 'Report' button to send a report immediately. The 'Next report' parameter shows when the next scheduled report will occur.

If necessary, configure the 'Energy usage Report' and/or 'Meter reading Report'.

- ii. Set 'Email' and/or 'ftp' to in the 'Energy Report' and/or or 'Meter reading Report' section. This will automatically generate and transmit the defined report to the email address and/or ftp server configured in the Profile.

An 'Energy Report' is/are csv files containing calculated Energy, Gas or Water Datatype usage values recorded at 30 minute intervals as per the graph, and Power and Custom Datatype instantaneous values recorded at 5 minute intervals as per the graph.



Default. Generates a single report file per Datapoint, with the filename derived from <Site name>_<SIP name>_<Datapoint label>_<Report period>. The content includes 30min TimeStamp (Col:A), DataValue (Col:B) as the Energy/Gas/Water usage for each 30min period as logged in the internal MySQL database, and MeterID (Datapoint Label, Col:C). Power/Custom values are logged at 5min intervals.

Example **Default: Usage report - Energy, Gas and Water**

	A	B	C
1	TimeStamp	DataValue	MeterID
2	20/09/2017 10:30	0	Slave 1 - Point 1
3	20/09/2017 11:00	0	Slave 1 - Point 1
4	20/09/2017 11:30	0	Slave 1 - Point 1
5	20/09/2017 12:00	0	Slave 1 - Point 1
6	20/09/2017 12:30	0	Slave 1 - Point 1
7	20/09/2017 13:00	0	Slave 1 - Point 1
8	20/09/2017 13:30	0	Slave 1 - Point 1

Example **Default: Usage report - Power and Custom**

	A	B	C	D
1	Time stamp	Value	Point name	
2	31/07/2018 00:05	16.01	L1O1S1 - OAT	
3	31/07/2018 00:10	16.41	L1O1S1 - OAT	
4	31/07/2018 00:15	15.45	L1O1S1 - OAT	
5	31/07/2018 00:20	14.45	L1O1S1 - OAT	
6	31/07/2018 01:25	19.5	L1O1S1 - OAT	
7	31/07/2018 01:30	24.45	L1O1S1 - OAT	

Default Linear. Generates 1 (one) report file per Datapoint, with the filename derived from <Site name>_<SIP name>_<Datapoint label>_<Report period>. The content includes Datapoint label (Col:A), end of period date (Col:B) and the usage value between 00:30 and 00:00 (Col:C to Col:AX) as the Energy/Gas/Water usage for every 30 minute n period as logged in the internal MySQL database, and MeterID (Datapoint Label, Col:C). Power/Custom values are logged at 5min intervals.

Example **Default Linear**

	A	B	C	D	E	F	G	H	I	J	K
1	S06R05F04	26/04/2023	0.4	0.4	0.4	0.4	0.4	1.4	0.4	0.4	0.4

Report Template. Generates 1 (one) report file per Datapoint, with the filename derived from <Site name>_<SIP name>_<Datapoint label>_<Report period>. The content is formatted according to the Report Template configuration.

Example

This is an example of an Energy Report based on a configured template in Top-down orientation.

Index	Label	Value	Timestamp
1	1 Slave 1 - Function 3 - Register 1	519	13/10/2013 16:00
2	2 Slave 1 - Function 3 - Register 1	519	13/10/2013 16:05
98	287 Slave 1 - Function 3 - Register 1	566	14/10/2013 15:50
99	288 Slave 1 - Function 3 - Register 1	566	14/10/2013 15:55

The 'Meter reading Report' includes the actual value at 30 minute intervals or at the defined report time.

Snapshot. Generates a single report file including all Datapoints, with the filename derived from <Site name>_<SIP name>_<Datapoint label>_<Report period> (milliseconds since last report). The content includes 30 minute TimeStamp (Col:A), DataValue (Col:B) as logged in the internal MySQL database, and MeterID (Datapoint Label, Col:C).

Example

(Default: Meter reading report - Snapshot)

	A	B	C	D	E	F	G	H	I
	Monday	17 July 2017 4:00:00	Synapsys	Plot A6	Plot A33	Plot A14	Plot A56	Plot A13	Plot A4
				SN53199054	SN53199056	SN53199059	SN53199060	SN53199061	SN5319
4	Used Energy	17/07/2017	04:00:00	7831	6055	2367	1622	1454	
5									

Labels: Site Name (C), Datapoint Label (D), Group Name (F), Time/Date (B), Meter Reading (D-I)

Billing/Half Hourly Log. Generates 1 (one) report file per Datapoint, with the filename derived from <MAC - Auto included>_<Site name>_<SIP name>_<Datapoint label>_<Report period> (milliseconds since last report). The content includes 30 minute TimeStamp (Col:A), DataValue (Col:B) as logged in the internal MySQL database, and MeterID (Datapoint Label, Col:C).

Example Half hourly log (Synapsys Solutions SaaS compatibility)

	A	B	C
1	TimeStamp	DataValue	MeterID
2	17/04/2023 13:00	3005	E016B0-Synapsys_Office_HM_kWh_11600501
3	17/04/2023 13:30	3005	E016B0-Synapsys_Office_HM_kWh_11600501
4	17/04/2023 14:00	3005	E016B0-Synapsys_Office_HM_kWh_11600501
5	17/04/2023 14:30	3005	E016B0-Synapsys_Office_HM_kWh_11600501
6	17/04/2023 15:00	3005	E016B0-Synapsys_Office_HM_kWh_11600501
7	17/04/2023 15:30	3005	E016B0-Synapsys_Office_HM_kWh_11600501
8	17/04/2023 16:00	3005	E016B0-Synapsys_Office_HM_kWh_11600501
9	17/04/2023 16:30	3005	E016B0-Synapsys_Office_HM_kWh_11600501

Single File. Generates a single report file for all Datapoints with the filename derived from <Site name>_<SIP name>_<Recipient>_<Report date>. The content includes 30 minute Time stamp (Col:A) and Datapoint labels (Row:1).

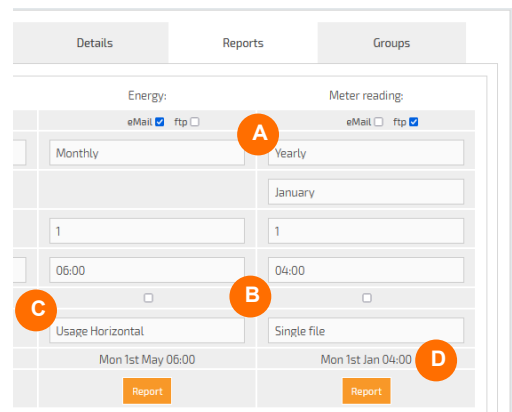
Example Single File

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	
1	Time stamp	L1O1S1 - Sensor 1	L1O1S2 - Sensor 2	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1
2	31/07/2018 00:15	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
3	31/07/2018 00:30	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
4	31/07/2018 00:45	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
5	31/07/2018 01:00	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
6	31/07/2018 01:15	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
7	31/07/2018 01:30	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
8	31/07/2018 01:45	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
9	31/07/2018 02:00	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	

Frequency (A). Used to define when the report will be generated, using the 'Month', 'Day' and 'Time' options.

Tip! Press 'Report' button to send a report immediately. The 'Next report' parameter shows when the next scheduled report will occur.

Zipped (B). Used to control the compression requirements of the .csv (Comma Separated Variable) report. If Off, the report will be sent as a .csv file. If On, the .csv reports will be sent in a single compressed .zip file.



The screenshot shows a web interface for configuring reports. It has tabs for 'Details', 'Reports', and 'Groups'. Under 'Reports', there are sections for 'Energy:' and 'Meter reading:'. The 'Energy:' section has radio buttons for 'eMail' (checked) and 'ftp'. Below it, there are dropdown menus for 'Monthly' and 'Yearly', and a text input for 'January'. The 'Meter reading:' section has a text input for '1'. Below that, there are two time range inputs: '06:00' and '04:00'. There are checkboxes for 'Usage Horizontal' and 'Single file'. At the bottom, there are two 'Report' buttons. Callout A points to the 'Monthly' dropdown, B points to the 'Single file' checkbox, C points to the 'Usage Horizontal' checkbox, and D points to the 'Report' button.

Template (C). Used to define the format of the report being sent.

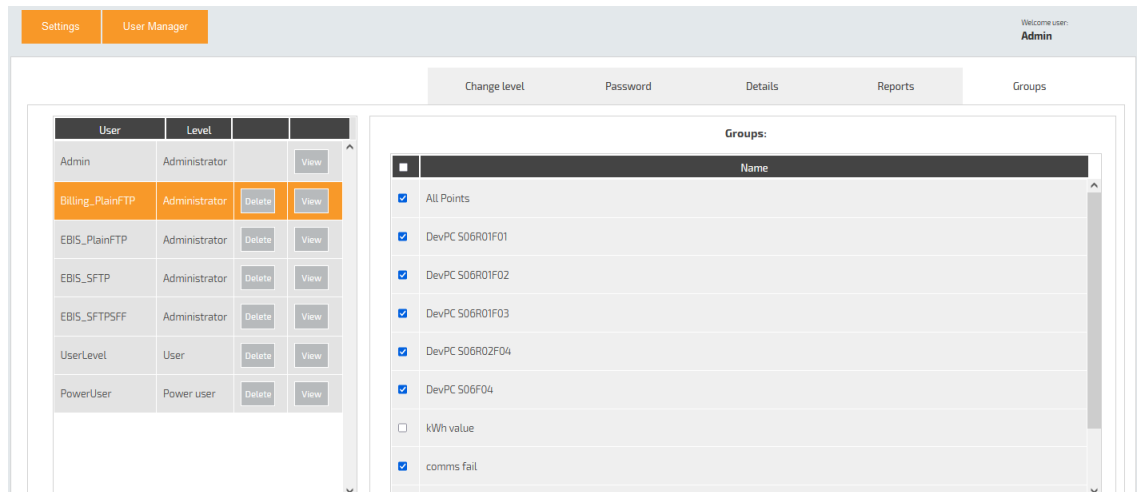
Next Report (D). Shows when the next report is scheduled, or the current time when the Report button is used to activate the reports on demand.

On the 'Group' page, if necessary, change the 'Groups' that are permitted to send csv file reports to the selected User.

Caution Only an authorised user with 'Administrator' access can configure the User Report 'Groups'. Ensure there is always 1 (one) 'Administrator' configured.

1. Press 'View' for the required User, to show the Details page with configured information related to that user.
2. Press 'Group' page to display the list of Groups currently configured.

Tip! An 'Administrator' user can change any Group configuration requirement, but 'Power User' user can only change their own. A 'User' does not have access to these pages.



Select the required 'Groups' from the 'Name' list using the tick box option. All data in the enabled groups will be sent to the defined user, using the defined method, in the configured format.

Tip! An 'Administrator' user will always include data for all groups.

2.4.6 Manage MBus Driver Settings

When the driver is **'Mbus Master'** and the 'Port' is

- 'Slice Mbus Master 'n', set the Mbus slice comms settings
- 'Serial 1' set the RS232 comms settings
- 'Serial 2' set the RS485 comms settings

Remember The Mbus RS232 and RS485 driver is a single one to one connection with a third party level converter. The Slice Mbus Master is a one-to-one connection with each SIP Mbus slice connected on the DIN Rail.

On the 'Settings', if necessary, change the **'Baudrate'**, **'Polling interval'**, **'Post-init delay'** **'Zero values on comms failure'**, **'Comms failure threshold'**, **'Max. number telegrams'**, **'Ignore checksum'** and **'Use secondary addressing'** to configure the network communications requirements.

Baudrate. Used to define is used to define the Data transmission speed in bps (bits per second).

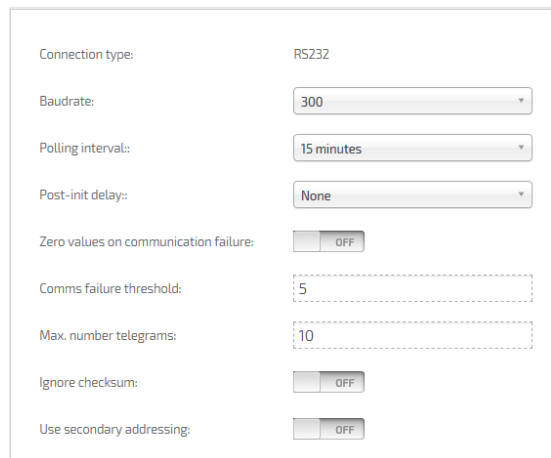
Tip! Typically, meters should be able to auto-negotiate between 300 and 2400 Baud.

Polling interval (minimum). Used to define the minimum period each meter may be polled, i.e., each meter will be polled every 15 minutes or more.

Post-init delay. Used to define the minimum period between a message used to prepare the meter and a second message used to request the value.

Caution Some Mbus meters have strict initialisation requirements.

Zero values on comms failure, and **Comms failure threshold** as appropriate, see above.

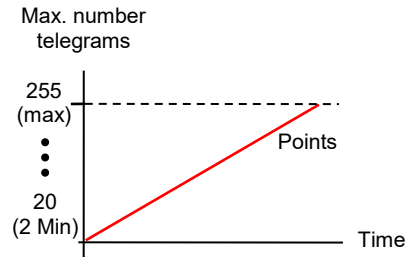


The screenshot shows a configuration interface for an Mbus driver. The settings are as follows:

Connection type:	RS232
Baudrate:	300
Polling interval:	15 minutes
Post-init delay:	None
Zero values on communication failure:	<input type="checkbox"/> OFF
Comms failure threshold:	5
Max. number telegrams:	10
Ignore checksum:	<input type="checkbox"/> OFF
Use secondary addressing:	<input type="checkbox"/> OFF

Caution Always adhere to the strict polling frequency necessary to prolong the life of Battery powered meters.

Max. number telegrams. Used to define the maximum number of telegram messages used when requesting meter information. Typically used when a meter contains a high number of points transferred using a number of telegrams. However, it can also be used to read only the first defined number of telegrams which will reduce the number of points displayed when reading the meter.



Ignore checksum. Used to provide compatibility with legacy sites. Enable (*On*) to force this product to ignore the checksum part of the MBus telegram. If disabled (*Off*) the checksum part of the MBus telegram will include the checksum.

Tip! The 'Ignore checksum' may be used to provide compatibility with legacy sites.

Use secondary addressing. Used to make MBus telegrams to the meter serial number (8-digit number on external label), NOT the meter Primary address (1 (one) to 250, configured as necessary).

Tip! Using the SecondaryIds should reduce commissioning time, because it eliminates having to change Primary addresses for all connected meters.

Remember A Post-init delay is always applied when communicating via SecondaryIds.

- Press 'Cancel' or 'OK' as appropriate.

Tip! Press 'Save' frequently, to avoid losing unsaved configuration changes.

When the driver is **MBus Master** and the 'Port' is 'Ethernet' set the MBus TCP comms settings.

Note Each MBus TCP/IP driver supports multiple MBus Ethernet Level converter connections, like the ModBus TCP/IP configuration.

On the **'Settings'**, if necessary, change the **'Polling interval'**, **'Post-init delay'**, **'Zero values on comms failure'**, **'Comms failure threshold'**, **'Max. number telegrams'**, **'Ignore checksum'** and **'Use secondary addressing'** to configure the network communications requirements.

Polling interval (minimum). Used to define the minimum period each meter may be polled, i.e., each meter will be polled every 15 minutes or more.

MBus timeout. Used to define the required number of ms (milliseconds) necessary to determine when a transmission error will be detected, i.e., when a message is addressed to a non-existent slave.

Tip! Ensure the Timeout in all Ethernet connected MBus Masters to allow for network cycle time for all connections, considering Baud, and Post-Init Delay requirements, e.g.

Meters using Baud 300 and 1 min Post-Init Delay is about 1 min and 20 sec (80 sec) Polling period for a single MBus Master. This must be multiplied for each additional MBus Master plus a contingency 10 secs, which is 4 x MBus Master is 3 x (80 + 10) 270 sec Timeout for each.

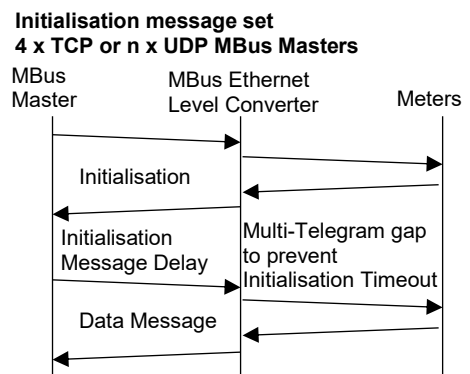
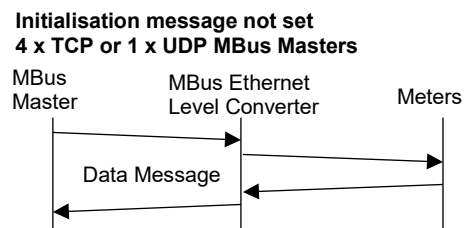
Post-init delay, Zero values on comms failure, and Communications failure threshold, Max. number telegrams, Ignore checksum, Use secondary addressing, according to the details previously stated.

- Press 'Cancel' or 'OK' as appropriate.

Caution Battery powered meters have a strict polling frequency, necessary to prolong the life of the meter battery.

MBus TCP Masters are expected to maintain the TCP connection at all times, and automatically reconnect after network failure. Data collection may not reliable if one or more of the connected MBus Masters disconnect after each request.

Only a single MBus UDP Master is supported if initialisation messages are required. The initialisation message requirement is dependent on the meter and is always applied when communicating via SecondaryIds.



2.4.7 Manage ModBus Master Driver Settings

When the driver is **ModBus Master** and the **Port** is **Serial 1** set the ModBus RS232 comms settings.

On the **Settings**, if necessary, change the **Baudrate**, **Parity**, **Data bits**, and **Stop bits**, **Timeout**, **Polling period**, **Protocol**, **Zero values on comms failure**, **Comms failure threshold**, and **Always use Function 16 for writing** to configure the slave communications requirements.

Remember **ModBus RS232 is a one-to-one connection with a slave from Serial P1 port.**

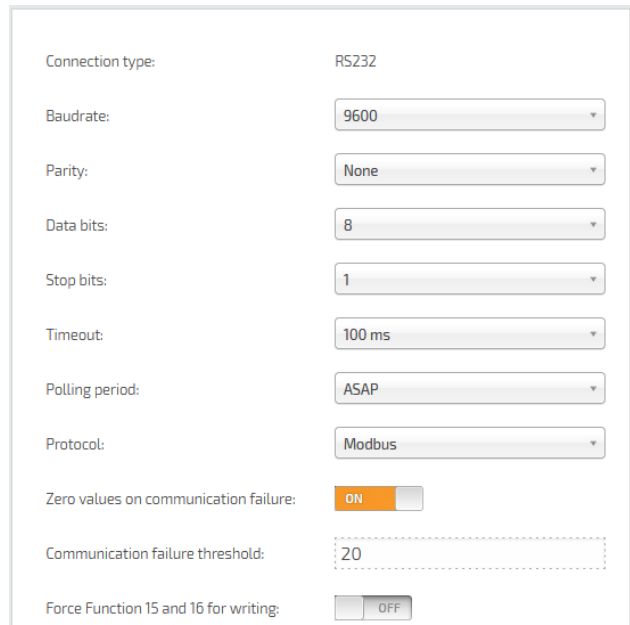
Baudrate. Used to define is used to define the Data transmission speed in bps (bits per second).

Parity. Used to define the Request Packet checking.

Data bits. Used to define the number of bits used for the data.

Stop bits. Used to define the number of bits used to signify the end of the ModBus message.

Timeout. Used to define the required number of ms (milliseconds) necessary to determine when a transmission error will be detected, i.e., when a message is addressed to a non-existent slave.



The screenshot shows the configuration interface for the ModBus Master Driver. The settings are as follows:

- Connection type: RS232
- Baudrate: 9600
- Parity: None
- Data bits: 8
- Stop bits: 1
- Timeout: 100 ms
- Polling period: ASAP
- Protocol: Modbus
- Zero values on communication failure: ON
- Communication failure threshold: 20
- Force Function 15 and 16 for writing: OFF

Tip! **To prevent unnecessary invalid responses from a slave, increase the 'Timeout' value (e.g., 300ms to 450ms), when the 'Baudrate' value (e.g., 19200 to 9600) is decreased. Use the Diagnostics page to determine this value.**

Polling period. Used to define the required number of ms (milliseconds) necessary for the request to each ModBus slave.

Tip! Use **Diagnostics>Last 100 Feedback messages** to ensure 100% response from the ModBus network.

Protocol. Used to provide simple compatibility with slaves using either JBus or ModBus register tables.

Tip! Protocol will be set according to the ModBus slave manufacturer documentation. JBus registers start at 0 (zero), ModBus registers start at 1 (one).

On networks that included both JBus registers slaves and ModBus registers slaves offset the Register as necessary.

Example JBus

MODBUS REGISTER ADDRESSES LIST
Readable parameters for Communication Mode] Only : [Length (Reg)

Address	Hex Address	Parameter
30000	0x00	Voltage V1N
	0x01	Voltage V2N

Example ModBus

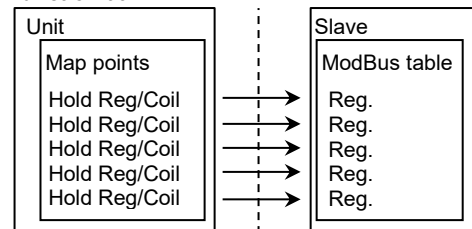
Description				Regist	INT16	Data Typ	Access
Total active Energy	Y	Y	Y	1	2	INT32U	R

Zero values on comms failure, and **Communications failure threshold** as appropriate, see above.

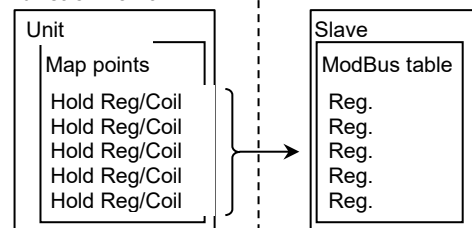
Force Function 15 and 16 for writing. Enable (*On*) to write the analogue output values from multiple 'Holding registers' (Function 16) and Coils (Function 15) to the ModBus slave. If disabled (*Off*) the default Function 06 (Holding Registers) and Function 05 (Coils) are used.

- Press 'Cancel' or 'OK' as appropriate.

Function 06



Function 15/16



When the driver is **'ModBus Master'** and the 'Port' is 'Serial 2' set the ModBus RS485 comms settings.

On the 'Settings', if necessary, change the **'Baudrate'**, **'Parity'**, **'Data bits'**, and **'Stop bits'**, **'Timeout'**, **'Polling period'**, **'Protocol'**, **'Zero values on comms failure'**, **'Comms failure threshold'**, and **'Always use Function 16 for writing'** to configure the slave communications requirements.

Remember **ModBus RS485 is a daisy-chained network of up to 32 unique slave addresses.**

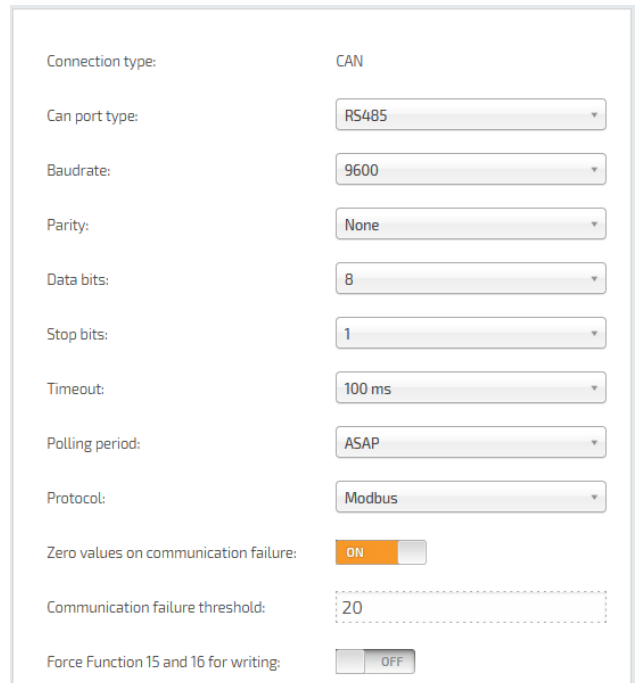
Baudrate. Used to define is used to define the Data transmission speed in bps (bits per second).

Parity. Used to define the Request Packet checking.

Data bits. Used to define the number of bits used for the data.

Stop bits. Used to define the number of bits used to signify the end of the ModBus message.

Timeout. Used to define the required number of ms (milliseconds) necessary to determine when a transmission error will be detected, i.e., when a message is addressed to a non-existent slave.



The screenshot shows a configuration interface for ModBus settings. The settings are as follows:

- Connection type: CAN
- Can port type: RS485
- Baudrate: 9600
- Parity: None
- Data bits: 8
- Stop bits: 1
- Timeout: 100 ms
- Polling period: ASAP
- Protocol: Modbus
- Zero values on communication failure: ON
- Communication failure threshold: 20
- Force Function 15 and 16 for writing: OFF

Tip! **To prevent unnecessary invalid responses from a slave, increase the 'Timeout' value (e.g. 300ms to 450ms), when the 'Baudrate' value (e.g. 19200 to 9600) is decreased. Use the Diagnostics page to determine this value.**

Polling period. Used to define the required number of ms (milliseconds) necessary for the request to each ModBus slave.

Tip! **Use Diagnostics>Last 100 Feedback messages to ensure 100% response from the ModBus network.**

Protocol. Used to provide simple compatibility with slaves using either JBus or ModBus register tables.

Tip!

Protocol will be set according to the ModBus slave manufacturer documentation. JBus registers start at 0 (zero), ModBus registers start at 1 (one).

Example JBus

Readable parameters for Communication Mode[Only : [Length (Regi		
Address	Hex Address	Parameter
30000	0x00	Voltage V1N
...	...	Voltage V2N

Example ModBus

Description	Y	Y	Y	Y	Y	Regist	SIZE	(INT16)	Data Typ	Access
	Y	Y	Y	Y	Y	1		2	INT32U	R
Total active Energy	Y	Y	Y	Y	Y					

Zero values on comms failure, Communications failure threshold and Force Function 15 and 16 for writing, see above.

- Press 'Cancel' or 'OK' as appropriate.

When the driver is '**ModBus Master**' and the 'Port' is 'Ethernet' set the ModBus TCP/IP comms settings.

On the 'Settings', if necessary, change the '**TCP Timeout**', '**Polling period**', '**Zero values on comms failure**', '**Comms failure threshold**', and '**Always use Function 15 and 16 for writing**' to configure the slave communications requirements.

Protocol. Used to provide simple compatibility with slaves using either JBus or ModBus register tables.

Tip!

Protocol will be set according to the ModBus slave manufacturer documentation. JBus registers start at 0 (zero), ModBus registers start at 1 (one).

Connection type: TCP/IP

Protocol:

TCP timeout:

Polling Period:

Zero values on communication failure: ON

Communication failure threshold:

Force Function 15 and 16 for writing: OFF

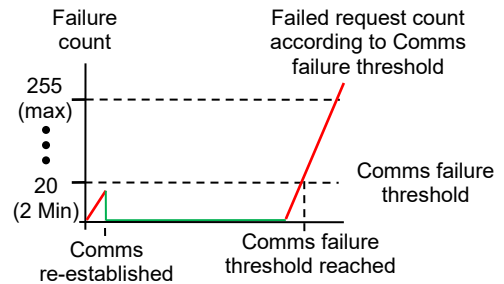
TCP Timeout. Used to define the required number of ms (milliseconds) necessary to determine when a transmission error will be detected, i.e., when a message is addressed to a non-existent slave.

Polling period. Used to define the required number of ms (milliseconds) necessary for the request to each ModBus slave.

Tip! Use **Diagnostics>Last 100 Feedback messages to ensure 100% response from the ModBus network.**

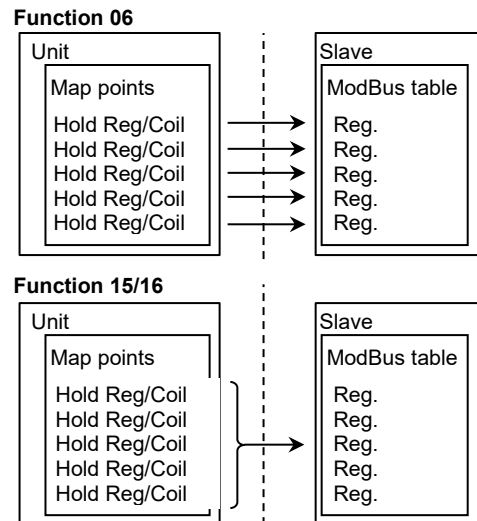
Zero values on Comms failure. Used to define the action required when a communications failure is detected. If enabled (*On*) the logged values will be set as 0 (zero) when a communications failure is detected. If disabled (*Off*) the displayed values remain at the last logged value.

Comms failure threshold. Used according to the details previously stated.



Force Function 15 and 16 for writing. Used to provide compatibility with slaves that require Function 16 to accept the write from a ModBus Master. If enabled (*On*) the ModBus Master can write the analogue output values from multiple 'Holding registers' to the ModBus slave. If disabled (*Off*) the default Function 06 is used. This writes the analogue output value from a single 'Holding register' to the ModBus slave.

- Press 'Cancel' or 'OK' as appropriate.



2.4.8 Manage ModBus Slave Driver Settings

When the driver is **ModBus Slave** and the 'Port' is

- 'Slice ModBus Master 'n', set the ModBus slice comms settings
- 'Serial 1' set the RS232 comms settings
- 'Serial 2' set the RS485 comms settings

When the driver is **ModBus Slave** and the 'Port' is 'Ethernet' set the ModBus TCP/IP comms settings

On the 'Settings', if necessary, change the **Port number** and **TCP Timeout** to configure the slave communications requirements.

Remember **ModBus TCP/IP is an Ethernet network. Multiple masters are permitted but are dependent on connected slaves.**

Port number (default: 502). Used to define the IP Port used for ModBus TCP/IP comms with this SIP+ ModBus Slave driver.

Connection type:	TCP/IP
Port number:	<input type="text" value="502"/>
TCP server timeout (seconds)	<input type="text" value="180"/>

Tip! **Ensure PC firewall is not preventing Modbus TCP/IP comms via port 502.**

TCP server Timeout. Used to define the required number of seconds necessary to determine when this hardware considers the ModBus TCP/IP Master has disconnected.

2.4.9 Manage MQTT Driver Settings

When the driver is 'MQTT' the 'Port' is Ethernet, configure the IoT: MQTT comms settings.

Caution MQTT requires an MQTT Broker. This can be an independent device, or available from the cloud-based application.

Tip! An MQTT connection to Goggle IoT core requires TLS connection using CA certificate. This is generated when creating a Key Pair. The Key pairs can be created using OpenSSL following the guidance given on the Google IoT documentation.


<https://cloud.google.com/iot/docs/how-tos/credentials/keys> --- "Generating an RS256 key with a self-signed X.509 certificate"

On the 'Settings', if necessary, change the 'Client ID', 'Broker Address', 'IP Port', 'Version', 'Keep Alive', and 'Batch Publishing' to configure the connection to the MQTT Broker.

Tip! The MQTT Broker connection details are available from the provider.

Client ID. Used to identify this device to the MQTT Broker.

Example Google IoT Core uses `projects/{project-id}/locations/{cloud-region}/registries/{registry-id}/devices/{device-id}`



Connection configuration

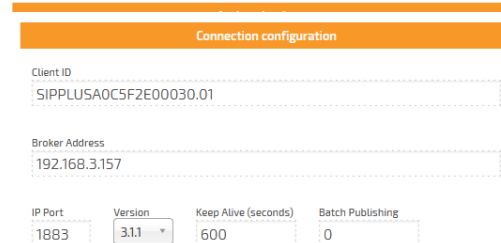
Client ID: SIPPLUSA0C5F2E00030.01

Broker Address: 192.168.3.157

IP Port: 1883 | Version: 3.1.1 | Keep Alive (seconds): 600 | Batch Publishing: 0

Broker Address. Used to identify the MQTT Broker being used, according to the MQTT host name or IP address. This configuration is dependent on the Broker.

Example Google IoT Core uses `mqtt.googleapis.com`



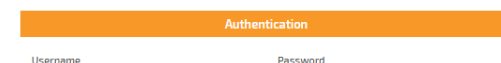
Connection configuration

Client ID: SIPPLUSA0C5F2E00030.01

Broker Address: 192.168.3.157

IP Port: 1883 | Version: 3.1.1 | Keep Alive (seconds): 600 | Batch Publishing: 0

IP Port. Used to define the IP network port used for the MQTT protocol connection. Default: 1883.



Authentication

Username: _____ Password: _____

Caution When using TLS encryption, change IP Port to '8883'.

Version. Used to define the MQTT specification version required to connect to the Broker.

Keep Alive (Seconds). Used to define the period of inactivity in seconds until a 'Keep alive' message is sent to the Broker.

Batch Publishing. Used to define the number of seconds before the last recorded values are Published as a single payload to the Broker.

On the 'Settings', if necessary, change the 'Username', 'Password', 'TLS', and 'CERT/PSK', used to configure the required authentication for the connection to the MQTT Broker.

Tip! The Authentication details should be available from the provider.

Username. Used to identify the user requiring access to the MQTT Broker. This configuration is dependent on the MQTT Broker.

Example Google IoT Core uses
`google-iot-core.jwt`

Microsoft Azure uses

`"{iothubhostname}/{device_id}/?api-version=2018-06-30"`

where the `iothubhostname` is the full name of the IoT Hub and the `device_id` is the client id (as per above).

Password. Used to define the password related to the User requiring access to the MQTT Broker. This configuration is dependent on the MQTT Broker.

Example Google IoT Core uses
`{project-id}`

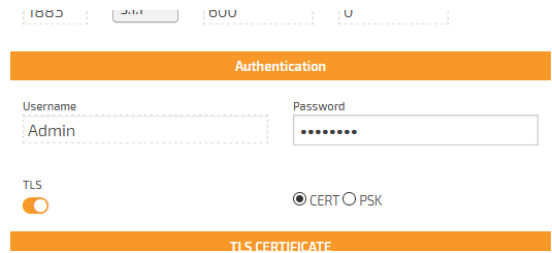
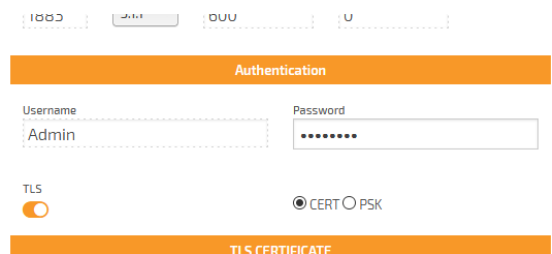
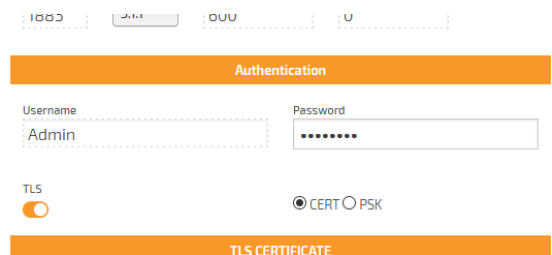
Microsoft Azure uses

SAS Token, refer <https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-mqtt-support>

TLS. Used to define the encryption required for compatibility with the Broker. If enabled (*On*) the TLS security encryption is required by the Broker, and certification will be necessary. If disabled (*Off*) the MQTT does NOT require TLS encryption.

CERT or **PSK.** Used to allow the configuration of the selected TLS security encryption. Enable **CERT** to show each of the forms of certification, and the required password option. Enable **PSK** to show the Pre Shared ID and Pre Shared Key certification option.

Tip! The necessary TLS security certificates are dependent on the Broker and should be available from the provider.

2.4.10 Manage REST Client Driver Settings

When the Driver is 'REST client', the 'Port' is Ethernet, the REST client connection is managed by the Server.

Tip! REST client points count towards the licence limit.

2.4.11 Manage REST Server Driver Settings

When the Driver is 'REST server', the 'Port' is Ethernet, configure the REST comms settings.

https: Defines the type of connection, standard or secure, to the REST client on local IP network. Set *On* to connect via a secure http (https:) using port 443. If *Off* a standard http connection using port 80 is used.



Caution Compatibility with https: networks, requires a secure http certificate and key file. A self-signed certificate is loaded by default. Device dedicated certificates can be uploaded via the Global settings page.

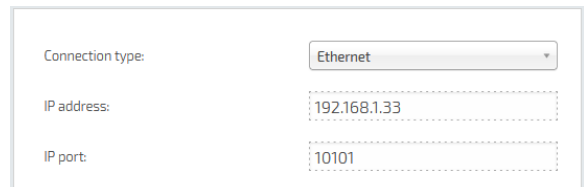
2.4.12 Manage Trend Driver Settings

When the driver is 'Trend' and the 'Port' is 'Ethernet' set the Trend comms settings.

On the 'Settings', if necessary, change the 'Connection type', 'IP address', and 'IP port' to configure the Ethernet connection to the Trend network.

Connection type. Use 'Ethernet' to connect to the specific Trend Ethernet device on the Trend network.

IP address and IP port. Used to define the specific Trend Ethernet device used to connect to the Trend network.



Tip! A 'vIQ' option will be displayed if the 'vIQ' driver is added to the list of available drivers on the 'Manage Drivers' page. If 'vIQ' is selected, the connection details from the 'vIQ' driver will be applied.

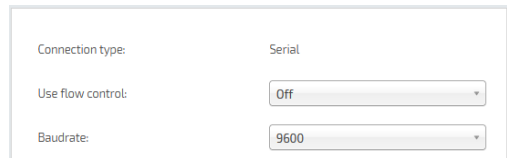
- Press 'Cancel' or 'OK' as appropriate.

When the driver is **Trend** and the 'Port' is 'Serial 1' set the Trend comms settings.

On the 'Settings', if necessary, change the **Use flow control**, 'and **Baudrate** to configure the Serial connection to the Trend network.

Connection type. Shows 'Serial' as determined by the Port setting.

Use flow control. Use to implement RS232 Flow control to connect to the Supervisor port of a specific Trend device on the Trend network.



Baudrate Used to define the communicate speed with the Trend controller.

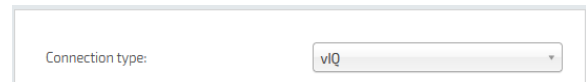
Remember **The Supervisor port of the Trend Serial controller MUST be enabled, and Baud set as required.**

- Press 'Cancel' or 'OK' as appropriate.

When the driver is **Trend** and the 'Port' is 'Ethernet' set the Trend comms settings.

On the 'Settings', if necessary, change the **Connection type** to configure the vIQ connection to the Trend network.

Connection type. Use 'vIQ' to connect to the Trend network via the vIQ driver.



Tip! **This is the recommended means of connecting to a Trend BMS.**

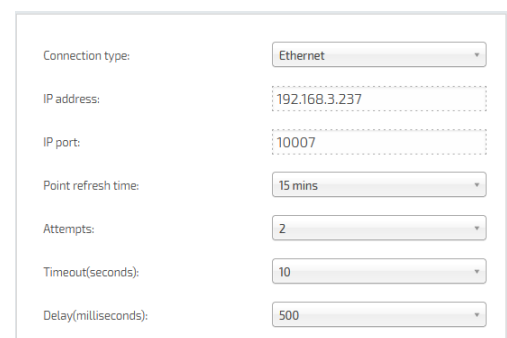
2.4.13 Manage Trend Client Driver Settings

When the driver is **Trend Client** and the 'Port' is 'Ethernet' set the Trend comms settings.

On the 'Settings', if necessary, change the **Connection type**, **IP address**, **IP port**, **Point refresh time**, **Attempts**, **Timeout**, and **Delay**, used to configure the Ethernet connection to the Trend network.

Connection type. Use 'Ethernet' to connect to the specific Trend Ethernet device on the Trend network.

IP address and **IP port.** Used to define the specific Trend Ethernet device used to connect to the Trend network.



Note **The defaults shown define the standard Ethernet loopback settings that are used to transfer the data to the internal vIQ network, see 'vIQ' driver below.**

Point refresh time. Used to define when this device requests data from the Trend Modules configured via this driver.

Caution This is NOT when a value is logged in to the internal MySQL database.

- ◆ If necessary, configure the 'Advanced settings'. Used to improve the successful response statistics of the defined devices.

Attempts. Used to define the required number of requests made to a Trend module before moving to the next Trend Module.

Timeout. Used to define the value in ms (milliseconds) required to determine when a transmission error will be detected, i.e., the controller is NOT responding.

Delay. Used to define the value in ms (milliseconds) required between requesting values from each Trend Module.

Tip! A 'vIQ' option will be displayed if the 'vIQ' driver is added to the list of available drivers on the 'Manage Drivers' page. If 'vIQ' is selected, the connection details from the 'vIQ' driver will be applied.

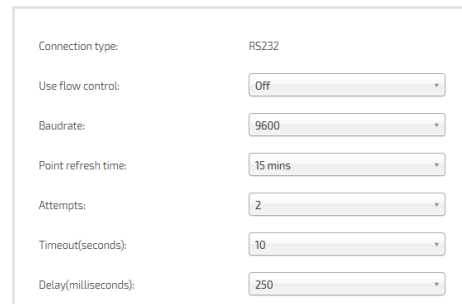
When the driver is 'Trend Client' and the 'Port' is 'Serial P1' set the Trend comms settings.

On the 'Settings', if necessary, change the 'Use flow control', 'Baudrate', 'Point refresh time', 'Attempts', 'Timeout', and 'Delay', used to configure the Serial connection to the Trend network.

Connection type. Use 'Serial' to connect to the Supervisor port of a specific Trend device on the Trend network.

Baudrate Used to define the communicate speed with the Trend controller.

Remember The Supervisor port of the Trend Serial controller MUST be enabled, and Baud set as required.



Connection type:	RS232
Use flow control:	Off
Baudrate:	9600
Point refresh time:	15 mins
Attempts:	2
Timeout(seconds):	10
Delay(milliseconds):	250

- ◆ If necessary, define the 'Default polling period', as above.
- ◆ If necessary, define the 'Advanced settings>', as above.
- ◆ If necessary, configure the 'Advanced settings'. Used to improve the successful response statistics of the defined devices.

Attempts. Used to define the required number of requests made to a Trend module before moving to the next Trend Module.

Timeout (seconds). Used to define the value in ms (milliseconds) required to determine when a transmission error will be detected, i.e., the controller is NOT responding.

Delay (ms). Used to define the value in ms (milliseconds) required between requesting values from each Trend Module.

When the driver is **'Trend Client'** and the 'Port' is 'Ethernet' set the Trend comms settings.

On the 'Settings', if necessary, change the **'vIQ'**, **'Baudrate'**, **'Point refresh time'**, **'Attempts'**, **'Timeout'**, and **'Delay'** to configure the vIQ connection to the Trend network.

Connection type. Use 'vIQ' to connect to the Trend network via the vIQ driver.

Note

The defaults shown define the standard Ethernet loopback settings that are used to transfer the data to the internal vIQ network, see 'vIQ' driver below.



The screenshot shows a configuration interface with the following settings:

- Connection type: vIQ
- Point refresh time: 1 min
- Attempts: 2
- Timeout(seconds): 10
- Delay(milliseconds): 250

Tip!

This is the recommended means of connecting to a Trend BMS.

Point refresh time. Used to define when this device requests data from the defined Trend Modules configured via this driver.

Caution

This is NOT when a value is logged in to the internal MySQL database.

- ◆ If necessary, configure the following settings which are used to improve the successful response statistics of the defined devices.

Attempts. Used to define the required number of requests made to a Trend module before moving to the next Trend Module.

Timeout (seconds). Used to define the value in ms (milliseconds) required to determine when a transmission error will be detected, i.e., the controller is NOT responding.

Delay (ms). Used to define the value in ms (milliseconds) required between requesting values from each Trend Module.

2.4.14 Manage vIQ Driver Settings

When the driver is 'vIQ' and the 'Port' is 'Ethernet 0' set the vIQ comms settings.

Tip! This is the recommended means of connecting to a Trend BMS.

On the 'Settings', if necessary, change the **VCNC** (Virtual Communications Node Controller), parameters '**Node(s)**', '**Port(s)**', and '**Timeout(s)**' to configure the 'vIQ' Trend LAN connection to the Trend network.

Tip! vIQ modules do not count towards the licence limit when used as a connection to the Trend Internetwork.

Node. Used to define a **VCNC** node (1 (one) to 119) for this connection to this Trend LAN on the Trend network.

Caution A Node is equivalent to an OS that is represented by the corresponding OS in the Trend BMS and MUST be unique. Node 2, Node 3 and Node 10 are reserved.

Port. Used to define a **VCNC** IP Port number related to the Node (1 (one) to 119) for this connection to this Trend LAN on the Trend network.

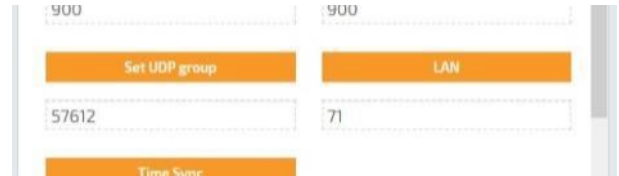
Tip! When adding multiple products to a single Trend LAN, increase the lowest 'Node' and 'Port' number by 1 (one), but decrease the highest 'Node' and 'Port' number by 1 (one).

Timeout. Used as a countdown timer to determine when the connection to the defined UDP group has failed.



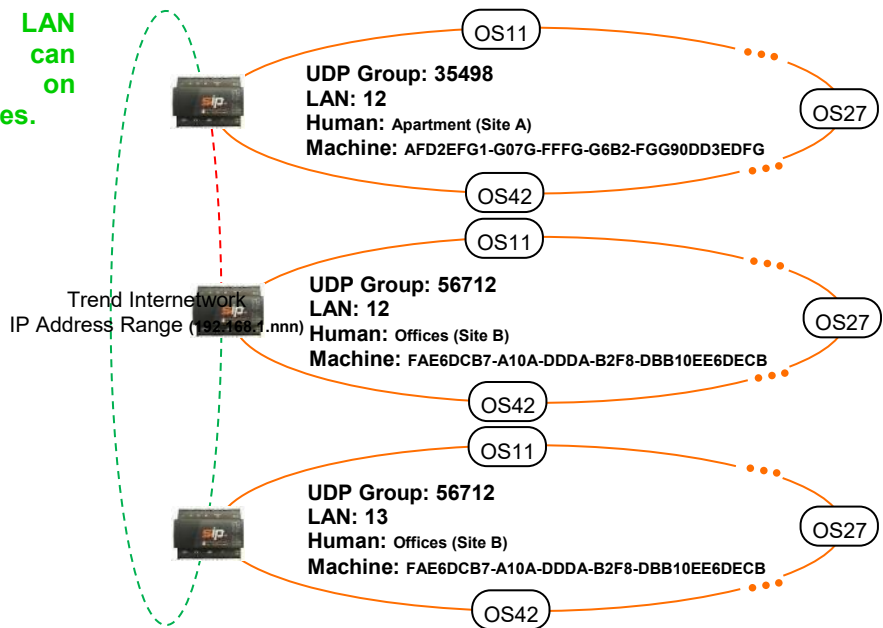
On the 'Settings', if necessary, change the 'Set UDP group', and 'LAN' to define network of compatible Trend devices.

UDP (User Datagram Protocol/group number). Used to establish low-latency and loss-tolerating connections with other Trend devices in the group, on the compatible IP address range.



Tip!

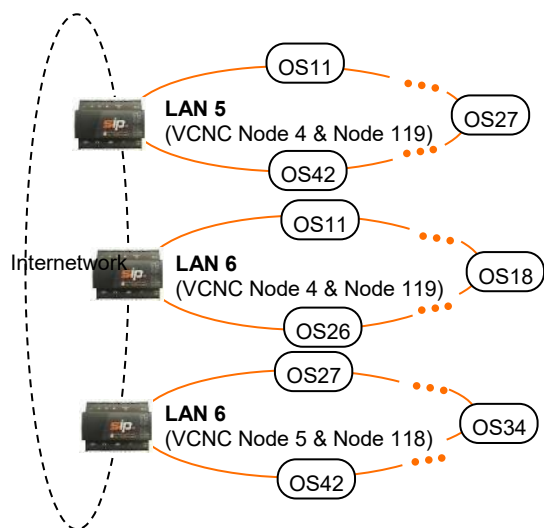
The same LAN number can appear on separate sites.



LAN. Used to identify a group of devices on the Trend network via a numeric reference.

Note

An Internetwork is a communication link between Trend LANs, (Local LAN is local to the connection, and Remote LAN a Local Area Network (LAN) accessed from the reference device via the Internetwork). A Trend LAN is a number of connected nodes; each node is used to connect a LAN, i.e., the VCNC port.



On the 'Settings', if necessary, change the 'Time Sync', used to provide compatibility with a Trend TimeMaster.

Time Sync. Used to allow the internal date/time to be controlled by a Trend Timemaster. Enable (On) the 'Time Sync' to allow the Trend Timemaster to update the internal time settings. If disabled (Off) the Trend Timemaster will NOT change the internal time settings.

Set UDP group: 57612

LAN: 16

Time Sync: ON

GUID: Support

Caution Do NOT configure an NTP Server if using the SIP+ Time zone setting, BACnet time synchronisation or Trend Timemaster.

On the 'Settings', if necessary, change the 'GUID', to provide a meaningful location name for asserted Trend alarms.

Human GUID. Used to identify the Trend BMS site that this product is assigned to.

Machine GUID. Used as a unique site identifier and must be identical in each device.

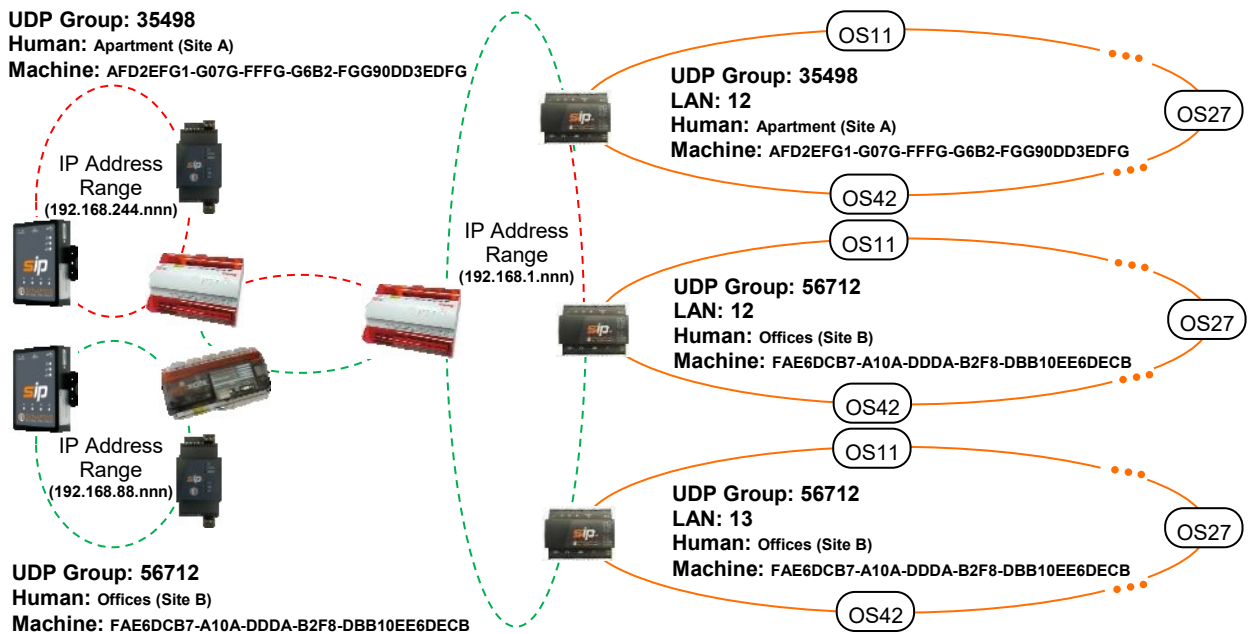
Time Sync: ON

GUID: Support

Human GUID: Support

Machine GUID: FAE6DE7D-A2D0-F13C-C65A-DBC470E6F22D

Trend network status



Caution The GUID MUST be configured to ensure module labels are shown in multi-site system.

The **Trend network status** parameters are used to show the current state of the Trend network.

Trend network status. Used to display a dialog showing the status of the system, LAN and Internetwork. It can be used to diagnose and indicate network problems.

Tip! This  button is also available from the Trend Client driver when vIQ is the connection type.

PARAMETER	DESCRIPTION
System Uptime	The amount of time this product has been operating, i.e., since this product was last turned on or rebooted.
Lan OK Time	The amount of time the Lan has been successfully communicating on the Trend network, i.e., since the last build process was successful.
Lan Status	The current condition of the Lan corresponding to this product and the time remaining until a 'Timeout' will occur.
	Lan POWERUP The Lan build process is starting.
	Lan DEAF The comms with other Trend network devices is not applicable (only 1 (one) device in Lan) or not available (more than 1 (one) device in Lan, see ' <i>Lan BROKEN</i> ').
	Lan BROKEN A comms failure with other devices on the Lan. Typically, due to a timeout caused by Ethernet wiring or connection problem, an IP address that is sending but not receiving messages, duplicate OS numbers from identified IP address on the Lan or when a Lan is changed, i.e., identified IP address is added or removed.
	Lan BUILT The Lan build process is successful.
	Lan OK! Successful Lan comms are detected if product is not alone on local Lan or if it can communicate with other devices on the local Lan.
Last Lan Message	The last message from describing the Lan status, see 'Lan Status'.

continued...

PARAMETER	DESCRIPTION
continued...	
Internetwork OK Time	The amount of time the Internetwork has been successfully communicating, i.e. since the last Internetwork build process was successful.
Internetwork Status	The current condition of the Internetwork assigned to this product and the time remaining until a 'Timeout' will occur.
Internetwork POWERUP	The Internetwork build process is starting.
Internetwork DEAF	The comms with other Trend network devices is not applicable (only 1 (one) device in Internetwork) or not available (more than 1 (one) device in Internetwork, see ' <i>Internetwork BROKEN</i> ').
Internetwork BROKEN	An Internetwork comms failure. Typically, due to a timeout caused by an Ethernet wiring or connection problem, duplicate Lan numbers from an identified IP address on the Internetwork or when the Internetwork is changed, i.e., identified IP address is added or removed.
Internetwork BUILT	The Internetwork build process is successful.
Internetwork OK - Timeout in <i>nn</i>	Successful Internetwork communications and number of seconds until Timeout is detected, i.e., when ' <i>nn</i> ' shows '00'.
Last Internetwork Message	The last message from describing the Internetwork status, see 'Internetwork Status'.

Tip! If necessary, use 'SIP Search' to ensure IP Addresses are unique. Use Trend 'ipTool' to ensure Lan numbers (and VCNC Node numbers where necessary) are unique.

- Press 'Save' to confirm changes.

Tip! Use the context menu and select 'Delete Driver' to remove any driver(s) that is NOT required.



2.4.15 Identify the required Slice

The 'Slices' button (lower left corner) shows a page used to identify all slices connected to this SIP+ hardware.

Tip! All connected slices will be automatically assigned a DIN Rail address on reboot.

1. Press 'Readdress' to identify all slices connected on the DIN Rail and automatically address each according to the position from the SIP+ (1 (one) to 16, left to right).

Address. Shows the position of the slice on the DIN Rail.

Protocol. Shows the protocol related to the slice connected at the specified position.

S/N. Shows the slice hardware serial number.

Status. Shows the condition of the slice.

Address	Protocol	S/N	Status
1	MBus Master	188	Healthy
2	MBus Master	28	Healthy
3	MBus Master	280	Healthy
4	MBus Master	598	Healthy
5	MBus Master	31	Healthy
6	MBus Master	595	Healthy
7	MBus Master	548	Healthy
8	MBus Master	593	Healthy

The driver MBus Master(14) is using an unavailable Slice Address.
The driver MBus Master(15) is using an unavailable Slice Address.

Tip! See messages showing any slice or DIN Rail issues that may be occurring.

2. Press 'Close' and then 'Save' to confirm changes.

Caution Always power down the SIP+ Data-IF/EMT/EMT-IF before removing, replacing, or adding slices for additional networks.

2.4.16 Duplicate an existing driver

The 'Duplicate drivers' button makes the configuration of drivers including the same input points configuration easy.

1. Select an existing driver.
2. Press 'Duplicate driver' to automatically create a new driver using the next available 'Instance' number that is the same as the originally selected driver.
3. Press 'Save' to confirm changes.

Remember All points are duplicated as well.



Drivers	Instance
viQ	1
BACnet	1
Data Acquisition	1
MBus Master	1
ModBus Master	1
Trend Count	1
Trend Filter	2

Delete driver
 Select all
 Deselect all

2.5 DEFINE POINTS

The 'Define points' menu provides access to each of the protocol Define points pages.

The total number of Input protocol points is determined according to the product code.

1. From the main menu, select '**Define Points**' to a show the next menu that permits the selection of a configured Driver.
2. Select the required driver to show the driver related configuration pages.

Caution **If changing existing 'Defined Points' that are already linked, the input point device configuration MUST be deleted and re-commissioned.**

2.5.1 Define BACnetIP and/or BACnet MSTP Client Driver Points

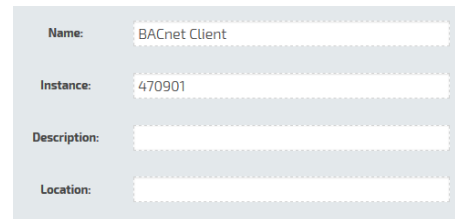
This page is used to discover supported BACnet Object Instances on the compatible BACnet network and define the parameters to be linked for reporting.

1. If the driver is BACnet, press '**Add device**'. This creates the single virtual BACnet (Client) device used to discover all BACnet devices on the BACnet network communicating through the BACnet router defined in the '**Manage Drivers**'.

Tip! **This device is a BACnet MSTP Master on the RS485 network so an additional virtual BACnet device is not required.**

Device instance (range 0 to 4194303). Used to identify this device in the BACnetIP network via a numeric reference.

Device name. Used to identify this device in the BACnetIP network via a Human readable identifier.



Name:	BACnet Client
Instance:	470901
Description:	
Location:	

Caution **Use third party BACnet explorer to ensure the 'Device instance' and the 'Device name' is unique.**

Location. Used to add text describing the physical location of this product in the BACnet/IP based control system.

Description. Used to add text providing useful device information.

Tip! **Use the 'Edit device' and 'Delete device' to amend or remove the virtual BACnet (Client) device from the configuration.**

2. Discover all BACnet network device details.
 - i. Select 'Site' and press 'Refresh' to discover the available BACnet 'Networks', and 'Devices'.
 - ii. Expand the required BACnet network, select 'Device nnnnnnnn' label (highlight label) and press 'Refresh' to discover the available 'Object types'.
 - iii. Press the 'Device' icon to expand the 'Device nnnnnnnn', select required 'Object type' label and press 'Refresh' to discover the details of the selected BACnet 'Object type'.



Tip! Use 'Delete' to remove(hide) BACnet 'Devices' not relevant to the configuration of this product.

OBJECT TYPE	DESCRIPTION
Accumulator	ACC A single Object with an increasing value in a device that can only be read
Analog Input	AI A single Object with an Analog value in a device that can only be read
Analog Output	AO A single Object with an Analog in a device that can only be written to
Analog Value	AV A single Object with an Analog in a device that can be read and written to
Binary Input	BI A single Object with a Binary (1/0) in a device that can only be read
Binary Output	BO A single Object with a Binary (1/0) in a device that can only written to
Binary Value	BV A single Object with a Binary (1/0) in a device that can read and written to
Integer Value	IV A single Object with a value for representing a negative integer such as -1238 or a positive integer such as +8321. This object type can be used to represent positive values for clockwise rpm and negative values for counterclockwise rpm.
Multistate Input	MI A single Object with a defined number of states that can only be read
Multistate Output	MO A single Object with a defined number of states that can only written to
Multistate Value	MO A single Object with a defined number of states that can read and written to

- iv. Press the 'Object type' test (e.g., Analog Inputs) and press 'Refresh' to discover the Label, Value and Units corresponding to each 'Object Instance'.

- v. Drag the required BACnet '**Object Instance**' to the table, as below. A message confirms the point is added to the configuration. Each column is automatically populated according to the BACnet point added and can be edited as required.

Tip! The '**Name**' column shows a unique label, automatically generated relating to the Network details, i.e., <Network no.><Device instance no.><Object type><Object instance no.>.

Remember Alternatively, manually edit the row indicated by '>' if required BACnet '**Object type**' are already known and/or '**Duplicate/move**' if a similar point(s) already exist.

Tip! Press '**Copy/paste data**' button to display a dialog. Use '**Copy to clipboard**' to add page details to the computer clipboard or click the right-hand mouse button in the white square and select '**Paste**' from the context menu to add copied information to the page. Copied information can be edited using .CSV editing software, e.g., Microsoft Excel. A configuration spreadsheet is available from Synapsys Solutions Technical Support.

Point list: Filter:

	Network	Device	ObjectType	Instance	Access	ReadRate	Priority	Name
	0	3	Analog Input	10109	R/O	1min	N/A	N0D3AI10109
	0	3	Analog Input	10209	R/O	1min	N/A	N0D3AI10209
	0	3	Analog Input	10309	R/O	1min	N/A	N0D3AI10309
	0	3	Analog Input	10409	R/O	1min	N/A	N0D3AI10409

Tip! Use the '**Map mismatch**' button to indicate configured BACnet points that are NOT available in the current BACnet explorer map.

Use the '**Filter**' to refine the display of specific BACnet points accordingly.

3. Press '**Save**' to confirm changes.

2.5.2 Define BIC (BACnet Server) Driver Points

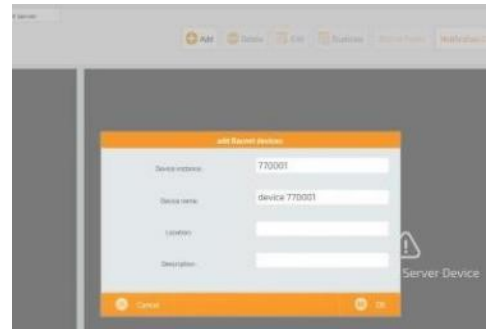
The BACnet Server Driver is the Synapsys Solutions BACnet BMS compatible software. It provides a connection to the BACnetIP network, via the defined network details configured in the Manage Driver, Comms settings. This driver supports interfacing to a maximum 100 BACnet BICs (BACnet Integrated Controllers). Each BIC will appear as an individual BACnet controller.

Caution This product will NOT get values from devices connected on a BACnet BMS.

To create a virtual BACnet (server)

1. Press **'Add'** to display a page required to define the required BACnet Server device details. Each virtual BACnet server supports a full range of BACnet Object types and parameter, Notification classes and Trendlogs.

Tip! A **'Device instance'** and **'Device name'** is automatically set according to previously defined BACnet Router and any existing BACnet servers.



Press **'Delete'** to remove the selected BACnet Server device and any configured BACnet Object types.

Press **'Edit'** to show page used to change the selected the **'Device instance'**, **'Device name'**, **'Location'** and/or **'Description'**.

Press **'Duplicate'** to show a page used to duplicate the selected BACnet Server device and any configured BACnet Object types.

- i. If necessary, edit the **'Device instance'**, **'Device name'**, **'Location'** and/or **'Description'**.

Device instance. This is a maximum 6-digit unique numeric reference that identifies this device on the BACnetIP control system. Initially derived from the Device Instance defined in the Manage Drivers>Comms settings.

Device Name. Unique readable text related to the unique **Device instance**.

Caution Ensure the **'Device instance'** and **'Device name'** are unique.

Location. This freeform location text is used to indicate the physical location of these virtual BACnet servers in the BACnetIP based control system and can be read by the communication partners.

Description. This is a maximum 30 character password used to identify this device, i.e. First Floor.

2. Create the required BACnet Object types for interfacing to a BACnetIP control system. Each Object type has a unique set of properties, according to the type of value, i.e., an analogue read only, read/write, or write only, binary read only, read/write, or write only or multistate read only, read/write, or write only.

OBJECT TYPE	COPY/PASTE REF	DESCRIPTION
Analogue Input	0-AI-analog input	A numeric input value, i.e., a sensor. Read from (R/O) this device by a BACnetIP control system
Analogue Output	1-AO-analog output	A numeric, i.e. a louvre position. Write to (W/O) this device by a BACnetIP control system
Analogue Value	2-AV-analog value	A numeric control input/output value, i.e., a room setpoint. Read from and Write to (R/W) this device by a BACnetIP control system
Binary Input	3-BI-binary input	A single-bit Boolean (True/False, On/Off, or 1/0) input value, i.e., a switch. Read from (R/O) this device by a BACnetIP based control system
Binary Output	4-BO-binary output	A single-bit Boolean (True/False, On/Off, or 1/0) output value, i.e. a relay. Write to (W/O) this device by a BACnetIP control system
Binary Value	5-BV-binary value	A single-bit Boolean (True/False, On/Off, or 1/0) control input/output value, i.e., a control system parameter. Read from and Write to (R/W) this device by a BACnetIP control system
Multistate Input	13-MI-multistate input	A numeric input value showing the current state in the process, i.e., refrigerators On, refrigerators Off, and Defrost state. Read from (R/O) this device by a BACnetIP control system
Multistate Output	14-MO-multistate output	A numeric output value defining the next state in the process, i.e., turn refrigerator On, turn refrigerator Off. Write to (W/O) this device by a BACnetIP control system
Multistate Value	19-MV-multistate value	A numeric control input/output value, i.e., a control system parameter. Read from and Write to (R/W) this device by a BACnetIP control system

Tip! Use the Copy/Paste option to populate the appropriate number of BACnet Servers devices, including the DeviceInstance (CoIA), DeviceName (CoIB), DeviceDescription (CoIC), DeviceLocation (CoID), ObjectType (CoIE), ObjectInstance (CoIF), ObjectName (CoIG), ObjectDescription (CoIH), and Units (Coll) details. Columns A to G are compulsory. DeviceInstance limited 0 – 4194302. DeviceName limited 1 – 63 characters. DeviceDescription limited 1 – 253 characters. DeviceLocation limited 0 – 63 characters. ObjectType can be shown as in table above. ObjectInstance limited 0 – 4194302. ObjectName limited 1 – 63 characters. ObjectDescription limited 1 – 253 characters. Units limited 0 - 65535 (use conversion table).

Caution Ensure Device and Object are unique where necessary, the paste function does not validate duplicates. Using the Copy/Paste option will break all existing links.

CONFIGURE THE ANALOGUE OBJECT TYPES

BACnet Analogue Object types include AI (Analogue Input), AO (Analogue Output) and AV (Analogue Value).

BACnet AI Object type instance provides a read only analogue value to the BACnetIP control system.

BACnet AO Object type instance provides a write only analogue value to the BACnetIP control system.

BACnet AV Object type instance provides a read and write analogue value to the BACnetIP control system.

Caution Each Object Type Instance number **MUST** be unique in this virtual BACnet Server.

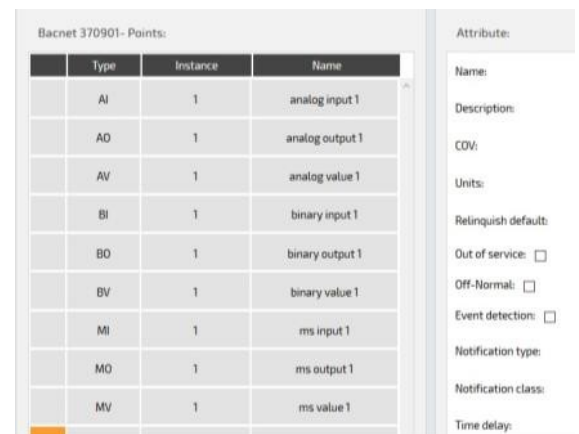
To configure AI, AO, and/or AV Object types

1. Press '>' to insert a pre-configured index row, and change the 'Type' to an AI, AO, and/or AV instance as necessary.

Type. The required Object type.

Instance. The unique numeric reference for this Object type instance. Used to identify the required parameter according to the configured **Object name**. Edit as necessary.

Object name. Readable text identifying this Object type instance. Edit as necessary.



Bacnet 370901- Points:				Attribute:
Type	Instance	Name		Name:
AI	1	analog input 1		Description:
AO	1	analog output 1		COV:
AV	1	analog value 1		Units:
BI	1	binary input 1		Relinquish default:
BO	1	binary output 1		Out of service: <input type="checkbox"/>
BV	1	binary value 1		Off-Normal: <input type="checkbox"/>
MI	1	ms input 1		Event detection: <input type="checkbox"/>
MO	1	ms output 1		Notification type:
MV	1	ms value 1		Notification class:
				Time delay:

2. Edit the Object type instance '**Attributes**'. These are used to define the constraints of the corresponding Object type instance.

- i. Configure the Object type instance '**Attributes**'.

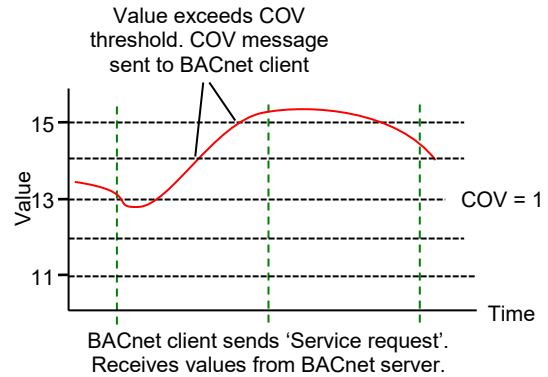
Object name. A unique readable name for this Analogue Object type instance, also shown in the '**Name**' column.

Description. Readable text for this Object type instance, i.e. First Floor.

COV (Change of Value). A threshold value used to determine when this BACnet device sends a COV message to the BACnetIP control system, i.e., if the value has changed by 1 or more, a COV message is sent.

Note

Typically, BACnet servers wait for a BACnetIP control system to request data before responding, but this optional BACnet property sends a COV message when the COV threshold is exceeded.



Tip!

COV is a sub-set of the 'Alarm and Event Services'.

Units and Unit types. Defines a required measurement, i.e., Units = energy, and the required term of measurement, i.e. kilowatt hours.

Relinquish default (AO and AV only). A fallback value used as the present value to resolve command conflicts when connection to the BACnetIP control system fails and the '**Out of service**' is false.

Tip!

The Relinquish default parameter only applies to AO and AV Object types.

Out of service. Shows the Present Value can be overwritten by the BACnetIP control system.

- ii. Configure the **Notification class** requirements. This defines the parameters used to determine when a value will be included in the related Notification class Event or Alarm log.

Off-Normal, Fault, Normal. Defines the **'Event enabled'** types of state that will be logged an Event or Alarm. Set the required parameter as necessary.

Event detection. Shows the enabled type of states will be logged an Event or Alarm. Set 'On' to log the enabled Off-Normal, Fault, and/or Normal states as an Event or Alarm.

Notification type. Defines the type of notification applied to the **'Event enabled'** types of state, Off-Normal, Fault, and/or Normal states. The Event or Alarm type of notification can be used to filter the configured **'Event enabled'** types of state.

Remember Configure the **'Notification classes'** to ensure the **'Event enabled'** types are logged correctly.

Notification class. Identifies the **Notification class** handling the event-initiating object.

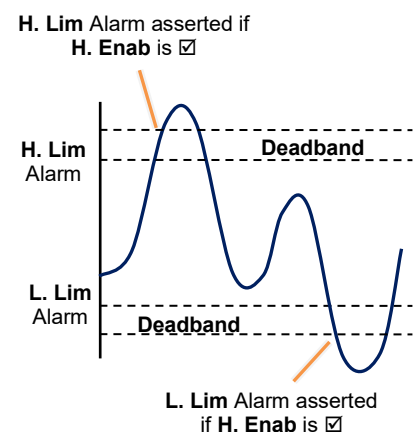
Time delay. Defines the number of seconds that must elapse before an Event or Alarm will be logged in the related **Notification class**. Only values that exceed the defined **High limit** and **Low limit** and exceed this 'Time delay' will be logged in the related **Notification class**.

High limit and **Low limit.** Defines the high alarm limit and/or the low alarm limit. This is used to define the upper and/or lower limits of the value recorded from the parameter. If a limit is exceeded the corresponding alarm in the BACnetIP control system will only be asserted if **'(High limit) Enable'** and/or **'(Low limit) Enable'** is enabled ()

Remember A configured low alarm limit value must be less than the defined high alarm limit.

(High limit) Enable and **(Low limit) Enable.** Determines the value exceeding the specified criteria will/will not assert an Event or Alarm. If necessary, enable () the high alarm limit (**'(High limit) Enable'**) and/or low alarm limit (**'(Low limit) Enable'**). Defines the high alarm and low alarm indication in the BACnetIP control system, when the value recorded from the parameter asserts an alarm state determined by the value defined in **'High limit'** and/or **'Low limit'**. If this field is disabled () an alarm state will not be indicated.

DeadBand. A range of input values that can reduce the frequency of Event or Alarm occurrences if the value fluctuates around the **'High limit'** and/or **'Low limit'**.



CONFIGURE THE BINARY OBJECT TYPES

BACnet Binary Object types include BI (Binary Input), BO (Binary Output) and BV (Binary Value).

BACnet BI (Binary Input) Object type instance provides a read only binary state to the BACnetIP control system.

BACnet BO (Binary Output) Object type instance provides a write only binary state to the BACnetIP control system.

BACnet BV (Binary Value) Object type instance provides a read and write binary state to the BACnetIP control system.

Caution **The Object Type Instance number MUST be unique in this virtual BACnet Server.**

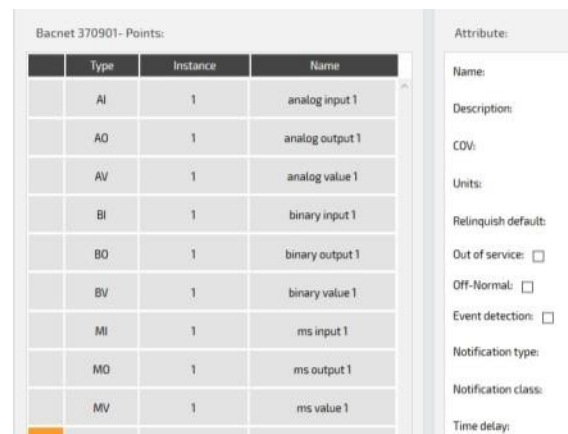
To configure BI, BO, and/or BV Object types

1. Press '>' to insert a pre-configured index row, and change the 'Type' to a BI, BO, and/or BV Object type as necessary.

Type. The required Object type.

Instance. The unique numeric reference for this Object type instance. It is used to identify the required parameter according to the configured **Object name**. Edit as necessary.

Object name. The unique readable name for this Object type instance. Edit as necessary.



The screenshot shows a software interface for configuring BACnet points. On the left, a table titled "Bacnet 370901 - Points:" lists various object types and their instances. On the right, an "Attribute:" panel shows configuration options for the selected object.

Type	Instance	Name
AI	1	analog input 1
AO	1	analog output 1
AV	1	analog value 1
BI	1	binary input 1
BO	1	binary output 1
BV	1	binary value 1
MI	1	ms input 1
MO	1	ms output 1
MV	1	ms value 1

Attribute:

Name:
Description:
COV:
Units:
Relinquish default:
Out of service:
Off-Normal:
Event detection:
Notification type:
Notification class:
Time delay:

2. Edit the Object type instance '**Attributes**'. These are used to define the constraints of the corresponding Object type instance.
 - i. Configure the Object type instance '**Attributes**'.

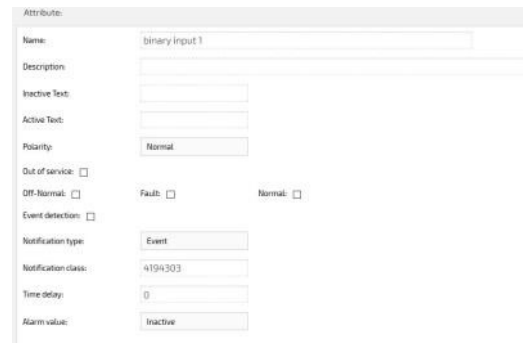
Object name. A unique readable name for this Binary Object type instance, also shown in the '**Name**' column.

Description. Readable text identifying this Object type instance. Edit as necessary, i.e. First Floor.

Inactive Text and Active Text. The intended effect of Inactive and Active state of the present value, i.e., Inactive: Fan 1-Off, Active: Fan 1-On. Enter text for each option, as necessary.

Polarity. Indicates the relationship between the physical Input state and the logical state of the present value, i.e., if Polarity: Normal, the Active state of the present value and the physical Input state will be the same, but if Polarity: Reversed, the Active state of the present value and the physical Input state will be the opposite.

Out of service. Shows the Present Value can be overwritten by the BACnetIP control system.



- ii. Configure the **Notification class** requirements. As per Analogue Object types.

Off-Normal, Fault, Normal (BI and BV only). As per Analogue Object types.

Event detection. As per Analogue Object types.

Notification type. As per Analogue Object types.

Remember Configure the '**Notification classes**' to ensure the '**Event enabled**' types are logged correctly.

Notification class. As per Analogue Object types.

Time delay. As per Analogue Object types.

Alarm value. The state used to determine the alarm condition.

Caution Ensure the combination of **Inactive Text and Active Text**, and **Polarity** are set correctly to assert the necessary alarm.

CONFIGURE THE MULTISTATE OBJECT TYPES

BACnet Multistate Object types include MI (Multistate Input), MO (Multistate Output) and MV (Multistate Value).

BACnet MI (Multistate Input) Object type instance provides a read only numeric reference for 2 (two) or more states to the BACnetIP control system.

BACnet MO (Multistate Output) Object type instance provides a write only numeric reference for 2 (two) or more states to the BACnetIP control system.

BACnet MV (Multistate Value) Object type instance provides a read and write numeric reference for 2 (two) or more states to the BACnetIP control system.

Caution **The Object Type Instance number MUST be unique in this virtual BACnet Server.**

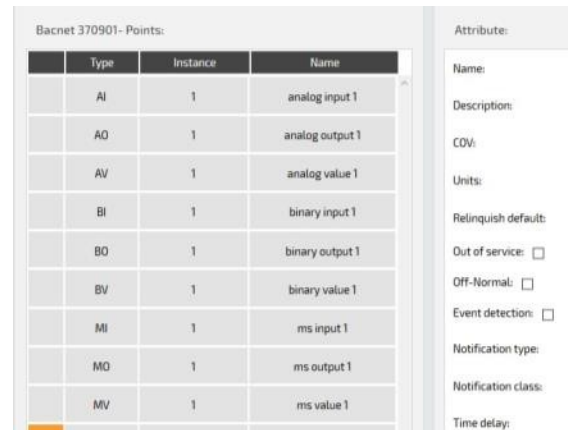
To configure MI, MO, and/or MV Object types

1. Press '>' to insert a pre-configured index row, and change the 'Type' to a MI, MO, and/or MV Object type as necessary.

Type. The required Object type.

Instance. The unique numeric reference for this Object type instance. Used to identify the required parameter according to the configured **Object name**. Edit as necessary.

Object name. The unique readable name for this Object type instance. Edit as necessary.



Bacnet 370901 - Points:				Attribute:	
Type	Instance	Name			
AI	1	analog input 1			
AO	1	analog output 1			
AV	1	analog value 1			
BI	1	binary input 1			
BO	1	binary output 1			
BV	1	binary value 1			
MI	1	ms input 1			
MO	1	ms output 1			
MV	1	ms value 1			

Attributes on the right side of the interface include: Name, Description, COV, Units, Relinquish default, Out of service: , Off-Normal: , Event detection: , Notification type, Notification class, and Time delay.

2. Edit the Object type instance '**Attributes**'. These are used to define the constraints of the corresponding Object type instance.

- i. Configure the Object type instance '**Attributes**'.

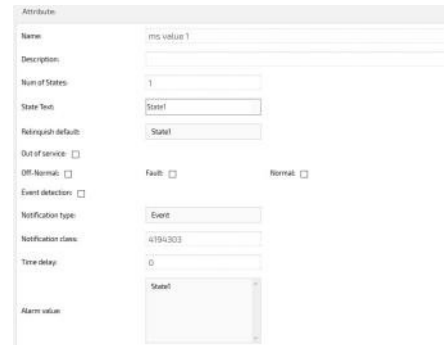
Object name. A unique readable name for this Object type instance, also shown in the '**Name**' column.

Description. Readable text identifying this Object type instance. Edit as necessary, i.e. First Floor.

Number of states. The required number of states related to the present value, i.e., 3 = 1: Hand, 2: Off, 3: Auto. Enter number of states required, as necessary.

State Text. The intended effect of each defined state related to the present value, i.e. 3 = 1: Hand, 2: Off, 3: Auto. Enter required text for each option, as necessary.

Relinquish default (MO and MV only). A fallback state used as the present value to resolve command conflicts when connection to the BACnetIP control system fails and the '**Out of service**' is false.



Tip! **The Relinquish default parameter only applies to MO and MV Object types.**

Out of service. Shows the Present Value can be overwritten by the BACnetIP control system.

- ii. Configure the **Notification class** requirements (MI and MV only). As per Analogue Object types.

Off-Normal, Fault, Normal. As per Analogue Object types.

Event detection. As per Analogue Object types.

Notification type. As per Analogue Object types.

Remember **Configure the 'Notification classes' to ensure the 'Event enabled' types are logged correctly.**

Notification class. As per Analogue Object types.

Time delay. As per Analogue Object types.

Alarm value. The state used to determine the alarm condition.

Caution **Ensure the combination of State Text, and Alarm Value are set correctly to assert the necessary alarm.**

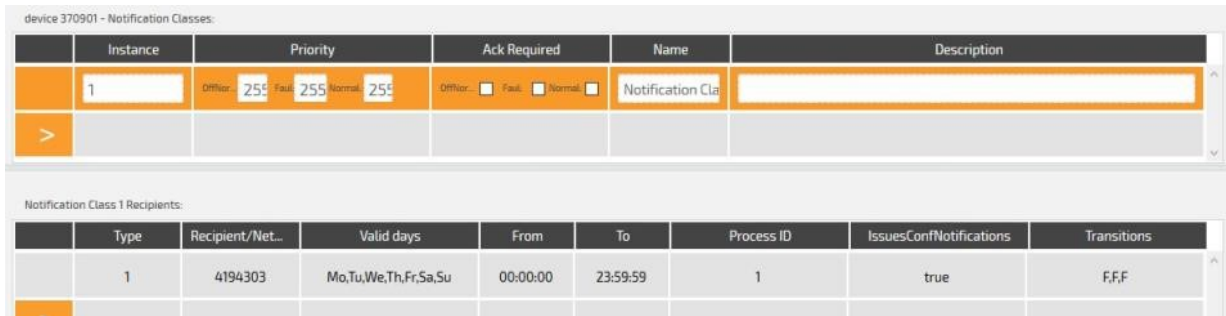
CONFIGURE THE NOTIFICATION CLASS OBJECT TYPES AND RECIPIENTS

BACnet '**Notification Class**' (NC) Object types are used to send Event or Alarm message to a recipient on the BACnet control system. When a BIC shows a present value that has been defined as operating outside the required criteria, a notification object would be used to inform the defined recipient within the BACnet control system that an Event or Alarm has occurred.

Caution **The Object Type Instance number MUST be unique in this virtual BACnet Server.**

To configure NC Object types

1. Select the required BACnet Server, and press '>' to insert a pre-configured index row and change the parameters as necessary.



Instance	Priority	Ack Required	Name	Description
1	Off-normal: 255, Fault: 255, Normal: 255	Off-normal: <input type="checkbox"/> , Fault: <input type="checkbox"/> , Normal: <input type="checkbox"/>	Notification Cla	

Type	Recipient/Net...	Valid days	From	To	Process ID	IssuesConfNotifications	Transitions
1	4194303	Mo,Tu,We,Th,Fr,Sa,Su	00:00:00	23:59:59	1	true	F,F,F

2. Edit the Object type instance parameters. These are used to define the constraints of the corresponding Object type instance.

Instance. The unique '**NC**' Object type Instance number. Used to identify a configuration defining specific Event/Alarm message criteria. Edit as necessary.

Priority. The level of importance for Off-normal, Fault, and/or Normal Events, 0 (low) to 225 (high). Used to ensure a specific Event/Alarm with critical time constraints are not delayed. Edit as necessary.

Ack required. Shows an acknowledgement for Off-normal, Fault, and/or Normal Events from the BACnet control system is required.

Name. A unique '**NC**' name for the Object type instance.

Description. Readable text identifying this Object type instance. Edit as necessary, i.e. First Floor.

- Press '>' to insert a 'NC' Recipient details associated with the selected 'NC'. These are used to determine, when and where Event/Alarm will be shown.

Type. A BACnet identifier of the Recipient showing the Event/Alarm.

Recipient/Network. The Event/Alarm recipient as determined by the 'Type' configuration and defined in the 'Recipient Attributes'.

Days. The days of the week when an Event/Alarm will be passed to the BACnet recipient defined in the 'Type' and 'Recipient/Network' configuration as defined in the 'Recipient Attributes'.

From and To. The start and stop time of the day, when an Event/Alarm will be passed to the BACnet recipient defined in the 'Type' and 'Recipient/Network' configuration as defined in the 'Recipient Attributes'.

Process ID. The Event/Alarm recipient order when more than one recipient is used, i.e., Process ID 1, Process ID 2, etc as defined in the 'Recipient Attributes'.

IssuesConfNotifications. A confirmation message from BACnet recipient is required, as defined in the 'Recipient Attributes'.

Transitions. An Event/Alarm notification will occur when the values has changed between the enabled conditions as defined in the 'Recipient Attributes'.

Select the required 'NC' Recipient row to show the 'Recipient Attributes'. Edit as necessary.

Event Days. The days of the week when the Event/Alarm can be sent. Set *On*, an Event/Alarm will be sent to the BACnet Recipient. Set *Off*, an Event/Alarm will be sent to the BACnet Recipient.

From and To. The start and stop time of the day when the Event/Alarm can be sent. Set *On*, an Event/Alarm will be sent to the BACnet Recipient. Set '**From**' (e.g., 08:00) and '**To**' (e.g., 20:00) with a time according to the 24 hour clock.

Type. A BACnet identifier of the Recipient showing the Event/Alarm. Edit as necessary.

- ◆ If '**Device**', define the unique numeric Device Instance number to determine the Recipient showing the Event/Alarm.
- ◆ If '**Address**', define the '**Net number**' and '**MacToIP(Hex)**' to determine the Recipient showing the Event/Alarm.

Tip!

'Net number' is the BACnet Network number and 'MacToIP(Hex)' is the BACnet device IP address and BACnet port displayed in hex.



The screenshot shows a configuration form for a BACnet Recipient. It includes the following fields and options:

- Event days:** A row of checkboxes for Mo, Tu, We, Th, Fr, Sa, and Su, all of which are checked.
- From:** A time input field set to 00:00:00.
- To:** A time input field set to 23:59:59.
- Recipients:** A section with two columns: 'Type' and 'Process'.
- Type:** A dropdown menu currently showing 'address'.
- Process:** A dropdown menu currently showing '1'.
- Net number:** An input field containing the value '0'.
- IssuesConfNotifications:** A checkbox that is checked.
- MacToIP(Hex):** An input field containing the hexadecimal value 'C0A80BD6BAC0'.
- Transitions:** A section with three checkboxes: 'Off-normal', 'Fault', and 'Normal', all of which are currently unchecked.

Process ID. The Event/Alarm recipient order when more than one recipient is required. Set the number in order of priority required by the recipients.

IssuesConfNotifications. A confirmation message from BACnet recipient is required. Set *On*, a confirmation messages is expected from the recipient. Set *Off*, a confirmation messages is not expected from the recipient.

Transitions. An Event/Alarm notification will occur when the values has changed between the enabled conditions. Set **Off-Normal**, **Fault** and/or **Normal On**, an Event/Alarm notification will be sent to the recipient. Set **Off-Normal**, **Fault** and/or **Normal Off**, an Event/Alarm notification will not be sent to the recipient.

CONFIGURE THE TRENDLOG OBJECT TYPES

The Trendlog object (similar to Trend Plot data) monitors and records changes in the behaviour of an individual supported object type over time. The Trendlog object collects sample values at timed intervals or only upon changes in the given value.

Tip! **Useful for diagnosing behavioural characteristics, i.e., room air temperature.**

To configure Trendlog Object types

1. Select the required BACnet Server, and press '>' to insert a pre-configured index row, in the Trendlog List' and change the parameter attributes as necessary.

Instance. The unique numeric reference for this Trendlog Object type instance. Edit as necessary.

Name. The unique readable name for this Trendlog Object type instance. Edit as necessary.



Trendlog List: +	
Instance	Name
1001	Trendlog 1001
>	

- ◆ Press '+' to automatically create Trendlogs associated with selected Object types.
- ◆ Select 'Delete' from the available menu option to remove the selected Trendlog.

- Edit the Trendlog Object type instance '**Attributes**'. These are used to define the constraints of the corresponding Object type instance.

Name. Used to define unique readable name for this Object type instance, also shown in the '**Name**' column. Edit as necessary.

Description. Used to define readable text identifying this Object type instance, i.e., First Floor. Edit as necessary.

Source Type. Used to define the Object type being monitored by the Trendlog. Edit as necessary.

Source Instance. Used to define the unique numeric reference for the Object type being monitored by the Trendlog. Edit as necessary.

TL Type. Used to define how a value will be included in this Trendlog according to the defined action. If '**Poll**' the value is added to this Trendlog according to the defined interval (see **Interval** below). If '**Trig**' the value is added to this Trendlog according to change of value.

TL Instance. Used to define the unique numeric reference for this Trendlog Object type instance. Edit as necessary.

Enable. Used to define how this Trendlog will be used. If *On*, this Trendlog Object will be including values according to the '**TL Type**'. If *Off*, this Trendlog is NOT including values.

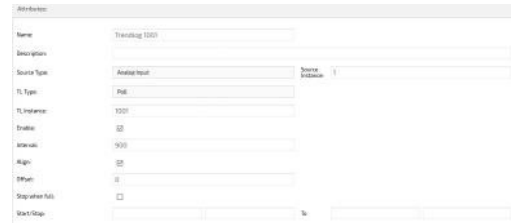
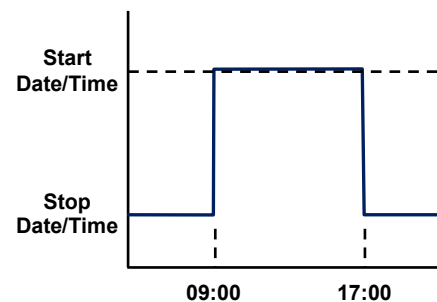
Interval. Used to define the number of seconds between logging the associated Object type in this Trendlog. Edit as necessary.

Align (Intervals). Used to define that a clock-aligned periodic logging is enabled. If clock-aligned periodic logging is enabled and the value of Log Interval is a factor of a second, minute, hour, or day, then the beginning of the period specified for logging shall be aligned to the second, minute, hour, or day, respectively.

Offset (Intervals). Used to define the delay in ms from the beginning of the period specified for logging until the actual acquisition of a log record begins.

Stop when full. Shows if historic values will be overwritten or not. If *On*, values will stop being added to the Trendlog when it is full. If *Off*, historic values will be overwritten by the latest values.

Start/Stop. Shows when the Trendlog will be active. Set '**Date**' using the calendar option and '**Time**' as hh:mm:ss for the '**Start**' period, and Set '**Date**' using the calendar option and '**Time**' as hh:mm:ss for the '**Stop**' period.

2.5.3 Define Data Acquisition Driver Points

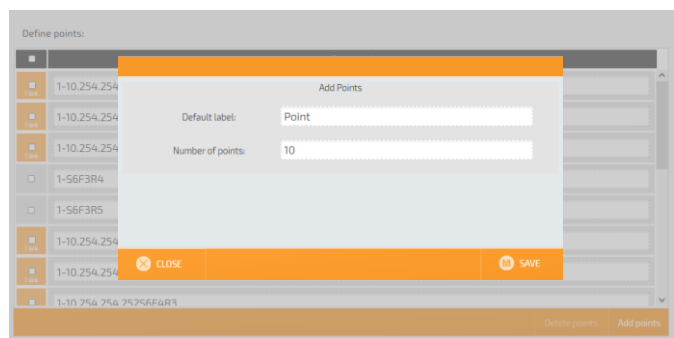
This page is used to define the required Datapoint labels (according to the licence limit) and, if necessary, assign to required groups via the Group mode option.

Note Group mode is used for the ‘Single File Grouped’ report.

Tip! Before starting, make a note of total number of points required for reporting.

1. If the driver is Data Acquisition (Basic mode), press ‘Add points’. This displays the ‘Default label’ and ‘Number of points’ options.

Default label. Used to prefix the automatically generated Data Acquisition Datapoints labels e.g., ‘Point’ to give a default Datapoint label of ‘Point nn’.



Tip! Amend the ‘Label prefix’ for each new range of Data Acquisition Datapoints labels to provide a specific identification.

Label the Data Acquisition Datapoints in the same order as the defined parameters from the fieldbus protocol drivers were configured.

Number of points. Used to define the required number of Data Acquisition Datapoints which will be available for reporting or via a MySQL query.

Tip! Press ‘Copy/paste data’ button to display a dialog. Use ‘Copy to clipboard’ to add page details to the computer clipboard or click the right-hand mouse button in the white square and select ‘Paste’ from the context menu to add copied information to the page. Copied information can be edited using .CSV editing software, e.g., Microsoft Excel. A configuration spreadsheet is available from Synapsys Solutions Technical Support.

Caution Label prefixes will be overwritten if labels are obtained automatically from the linked prefixes.

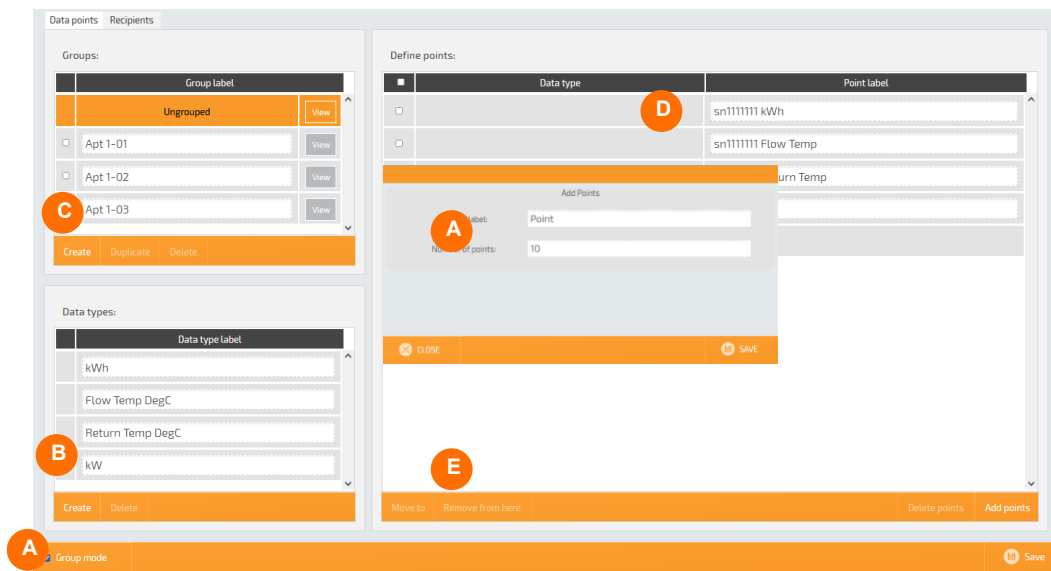
USE GROUP MODE

The Group mode option is used to assign the values from a determined range of identical parameters to a user defined group to support the Single File Grouped report format.

Tip! Using Group mode can make data analysis easier. Points can also be grouped via a defined data type.

1. If the driver is Data Acquisition (Group mode is Enabled) (A), press 'Add points' to the 'Default label' and 'Number of points' options.

Tip! New Datapoints are added to 'Ungrouped'.



Default label. Used to prefix the automatically generated Data Acquisition Datapoints labels e.g., 'Point' to give a default Datapoint label of 'Point nn'.

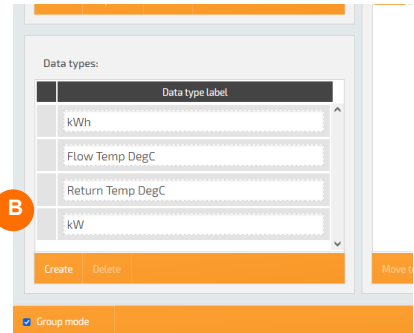
Tip! Amend the 'Label prefix' for each new range of Datapoints labels to provide a specific identification.

Label the Datapoints in the Data Acquisition protocol driver in the same order as the defined parameters from the fieldbus protocol drivers were configured.

Number of points. Used to define the required number of Data Acquisition Datapoints which will be available for reporting or via a MySQL query.

2. Add a **'Data type label'** (B). Used to define Data type to be associated with a specific Datapoint in a specific Group when using the Single File Grouped report format.

- i. Press **'Create'** to add a default Data type label row.
- ii. Select the **'Data type label'** and edit as necessary. This label will be an option in the Define points Data type list.
- ◆ If necessary, select the Data type that is not required, and press Delete.



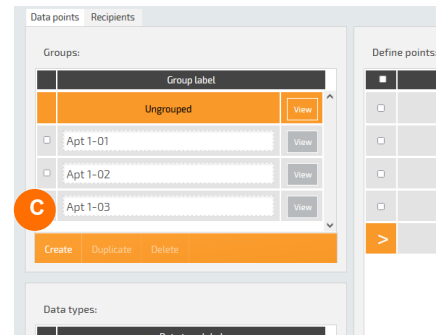
3. Add a **'Group'** (C). Used to define a Group label for 1 (one or more) defined Data type labels when using the Single File Grouped report format.

View. Used to show the Datapoints assigned to the selected Group.

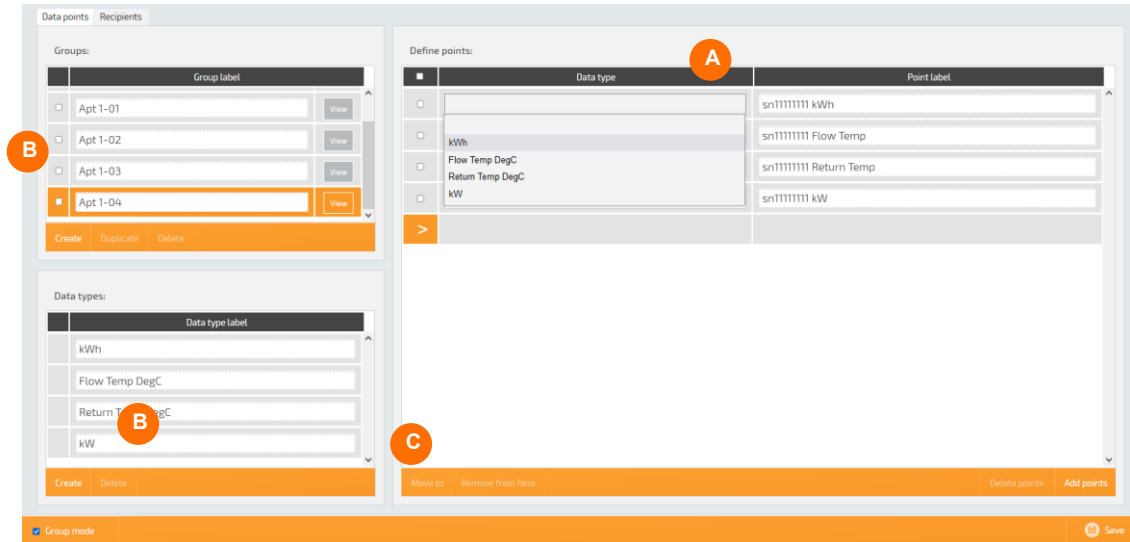
If necessary, use the tick box to select a Group that is not required, and press Delete.

Tip!

To ensure a clear report filename, use a unique, meaningful name for the Datapoint and Group labels and Data type labels.

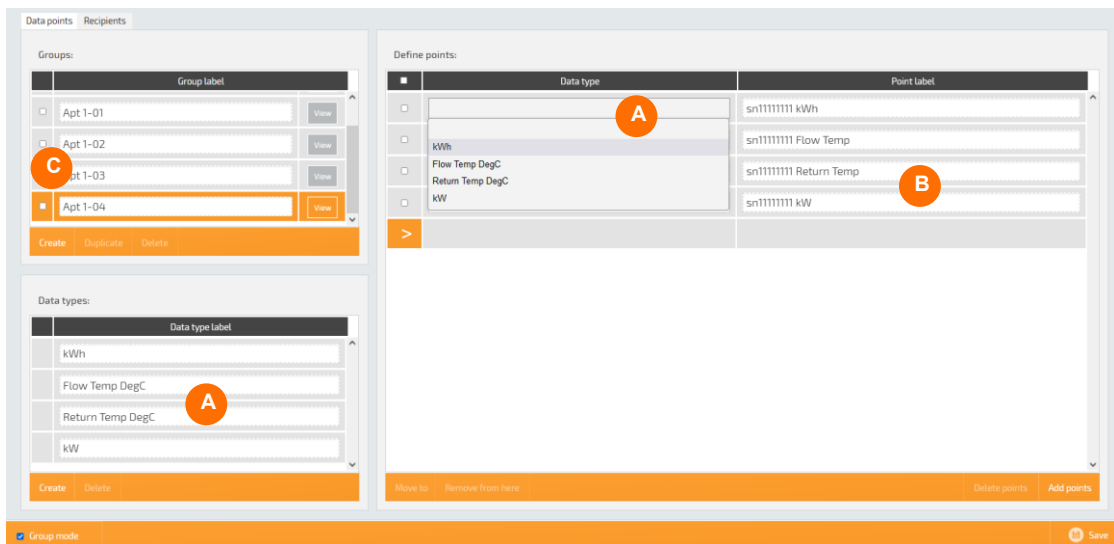


4. In 'Define points', assign the Datapoint to the required Groups.



- i. Use the tick box to select Datapoints (A), then use the tick box to select a Group (B) for the selected Datapoints and press the '**Move to**' (C) button.
- ii. Press View to confirm the Datapoints have been moved to the selected Group.
If necessary, use the tick box to select a Group that is not required, and press Delete.

5. Use the Data type drop down (A) to select the data type for the selected datapoint (B) in the group displayed.



MANAGE RECIPIENTS AND REPORTS

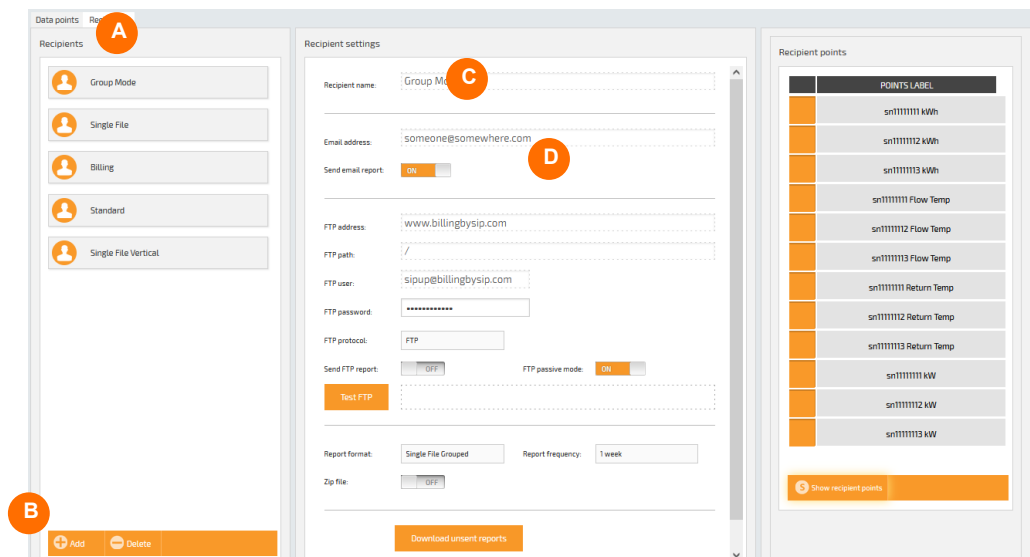
The Recipients page is used to define the 'Recipients', 'Recipient settings' (including 'Recipient name', 'Report type', 'Report format' and 'Recipient points').

1. Select 'Recipients' (A). Shows the page used to configure the reporting requirements of that recipient.
2. Press 'Add' (B) to create a new FTP or email report recipient.

If necessary, select the Recipient, that is not required, and press Delete.

Caution Use unique names to avoid files being overwritten.

3. In 'Recipient settings', edit as necessary.

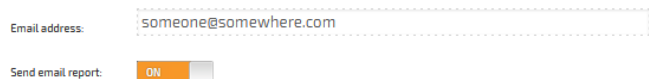


Recipient name (C). Used to provide a unique name for a defined FTP or email report recipient.

Note The 'Recipient name' is used within the filename when the 'Single File', 'Single File Vertical', or 'Single File Grouped' report format are selected.

Email address (D). Used to define the email address receiving reports. Edit as necessary.

Send email report (D). Used to control email reporting. If On, reports will be emailed via the email server define in the Global settings. If Off, email reporting is disabled.



Remember A valid email account is required, according to the mail server settings defined in the Global Settings page.

FTP Address. Used to define the home directory in the Fully Qualified Address or the IP Address of the FTP Server receiving reports for the selected recipient. Edit as necessary.

Tip!

Non-standard ports can be used.

File path. Used to define any additional Directory structure used. Edit as necessary.

FTP user and FTP password. Used to define the FTP Server login credentials.

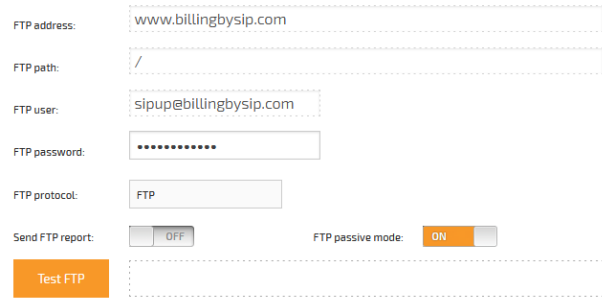
Send FTP report. Used to control FTP reporting. If On, reports will be transferred using FTP to the defined FTP Server. If Off, FTP is disabled.

FTP Protocol. Used to define the FTP Protocol required by the FTP Server. Set FTP, to use plain FTP (unsecure), FTPS, to use FTP with TLS security, and SFTP to use FTP with SSH security.

Tip!

Use 'Test FTP' to send a test file using the FTP details entered.

Use a third party FTP Client to prove connectivity to defined FTP Server.

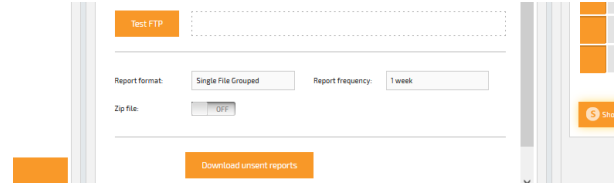


The screenshot shows a configuration form for an FTP server. The fields are as follows:

- FTP address:
- FTP path:
- FTP user:
- FTP password:
- FTP protocol:
- Send FTP report: OFF
- FTP passive mode: ON
- Test FTP:

- In the Report settings, edit as necessary.

Report format. Used to define the report format required by the Recipient. The selected Report format shows additional related parameters.



- ◆ **Standard.** Generates a single report file per Datapoint, with the default filename (milliseconds since last report). The content includes Time stamp (Col:A), Value (Col:B) as logged in the internal MySQL database, and Point name (Datapoint Label, Col:C).

Example

	A	B	C
1	Time stamp	Value	Point name
2	31/07/2018 00:15	23	L1O1S1 - Sensor 1
3	31/07/2018 00:30	23	L1O1S1 - Sensor 1
4	31/07/2018 00:45	23	L1O1S1 - Sensor 1
5	31/07/2018 01:00	23	L1O1S1 - Sensor 1
6	31/07/2018 01:15	23	L1O1S1 - Sensor 1
7	31/07/2018 01:30	23	L1O1S1 - Sensor 1

Report Frequency. Used to define when the selected reports are sent.

ZIP each file. Used to control the compression requirements for individual .csv (Comma Separated Variable) reports. If Off, each individual report will be sent as a .csv file. If On, each individual .csv report will be sent in a compressed .zip file.

ZIP all file. Used to control the compression requirements of all .csv (Comma Separated Variable) reports. If Off, all report will be sent as a .csv file. If On, all .csv reports will be sent in a single compressed .zip file.

Meaningful filename. Used to manage the **Standard** report filename. If Off, the report filename is derived from the number of milliseconds since last report. If On, the report filename is derived by <Site name>_<SIP name>_<Datapoint label>_<Report period>.

Synchronised timestamps Used to define the timestamp in the report. If Off, the report will show the real time the value was logged in the database, e.g. 00:01, 00:17, ..., 23:33, 23:41. If On, the report will show the timestamp synchronised to the defined Plot period, e.g. Manage drivers>Data Acquisition>Plot period shows 15mins, the timestamp would show 00:00, 00:15, ..., 23:30, 23:45.

- ◆ **Single File.** Generates a single report file for all Datapoints with the filename derived from <Site name>_<SIP name>_<Recipient>_<Report date>. The content includes driver defined plot interval Time stamp (Col:A) and Datapoint labels (Row:1).

Example

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	
1	Time stamp	L1O1S1 - Sensor 1	L1O1S2 - Sensor 2	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1	L1O1
2	31/07/2018 00:15	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
3	31/07/2018 00:30	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
4	31/07/2018 00:45	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
5	31/07/2018 01:00	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
6	31/07/2018 01:15	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
7	31/07/2018 01:30	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
8	31/07/2018 01:45	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	
9	31/07/2018 02:00	23	24.5	0	100	0	60	0	0	0	19.5	23	2	2	12	0	60	5	1800	60	

Report Frequency. Used to define when the selected reports are sent.

Tip!

Do not set greater than Daily.

ZIP file. Used to control the compression requirements of the .csv (Comma Separated Variable) report. If Off, the report will be sent as a .csv file. If On, the .csv reports will be sent in a single compressed .zip file.

- ◆ **Billing/Half Hourly Log.** Generates a single report file per Datapoint, with the filename derived from <MAC - Auto included>_<Site name>_<SIP name>_<Datapoint label>_<Report period> (milliseconds since last report). The content includes 30 minute TimeStamp (Col:A), DataValue (Col:B) as logged in the internal MySQL database, and MeterID (Datapoint Label, Col:C).

Example

	A	B	C
1	TimeStamp	DataValue	MeterID
2	17/04/2023 13:00	3005	E016B0-Synapsys_Office_HM_kWh_11600501
3	17/04/2023 13:30	3005	E016B0-Synapsys_Office_HM_kWh_11600501
4	17/04/2023 14:00	3005	E016B0-Synapsys_Office_HM_kWh_11600501
5	17/04/2023 14:30	3005	E016B0-Synapsys_Office_HM_kWh_11600501
6	17/04/2023 15:00	3005	E016B0-Synapsys_Office_HM_kWh_11600501
7	17/04/2023 15:30	3005	E016B0-Synapsys_Office_HM_kWh_11600501
8	17/04/2023 16:00	3005	E016B0-Synapsys_Office_HM_kWh_11600501
9	17/04/2023 16:30	3005	E016B0-Synapsys_Office_HM_kWh_11600501
10	17/04/2023 17:00	3005	E016B0-Synapsys_Office_HM_kWh_11600501

Date separator. Used to define how the date and time Timestamp is shown in the report. If -, the date and time Timestamp will be shown as 01-01-2000 00:00. If /, the date and time Timestamp will be shown as 01/01/2000 00:00.

Data Period. Used to define the time frame of data included in the report.

Tip!

Ensure the end timestamp is before the Send at time.

Send at. Used to define the time (on the hour) the report will be sent.

- ◆ **Single File Vertical.** Generates a single report file for max 50 Datapoints with the filename derived from <Site name>_<SIP name>_<Recipient>_<Report date>. The content includes Time stamp (Col:A, repeated for each Datapoint label), Value (Col:B) as logged in the internal MySQL database, and Point name (Datapoint Label, Col:C).

Example

	A	B	C
1	Time stamp	Value	Point name
2	31/07/2018 00:10	23	L1O1S1 - Sensor 1
3	31/07/2018 00:25	23	L1O1S1 - Sensor 1
4	31/07/2018 00:30	23	L1O1S1 - Sensor 1
5	31/07/2018 00:35	23	L1O1S1 - Sensor 1
6	31/07/2018 00:40	23	L1O1S1 - Sensor 1
9	31/07/2018 23:25	23	L1O1S1 - Sensor 1
10	31/07/2018 23:40	23	L1O1S1 - Sensor 1
11	31/07/2018 23:55	23	L1O1S1 - Sensor 1
12	31/07/2018 00:10	24.5	L1O1S2 - Sensor 2
13	31/07/2018 00:25	24.5	L1O1S2 - Sensor 2
14	31/07/2018 00:40	24.5	L1O1S2 - Sensor 2

Caution Limit Single File Vertical reports to 50 Datapoints max when reporting to Synapsys Solutions EBIS platform.

Tip! Add Recipients to accommodate each range of 50 Datapoints and ensure the Global Settings>Site name include the last 6 digits of the MAC address.

Report Frequency. Used to define when the selected reports are sent.

Tip! Do not set greater than Daily.

ZIP file. Used to control the compression requirements of the .csv (Comma Separated Variable) report. If Off, the report will be sent as a .csv file. If On, the .csv reports will be sent in a single compressed .zip file.

Synchronised timestamps Used to define the timestamp in the report. If Off, the report will show the real time the value was logged in the database, e.g. 00:01, 00:17, ..., 23:33, 23:41. If On, the report will show the timestamp synchronised to the defined Plot period, e.g. Manage drivers>Data Acquisition>Plot period shows 15 minutes, the timestamp would show 00:00, 00:15, ..., 23:30, 23:45.

- ◆ **Single File Grouped.** Generates a single report file for all Datapoints with the filename derived from <Site name>_<SIP name>_<Recipient>_<Report date>. The content includes Site name (Col:A), SIP name (Col:B), Group name (Col:C), Time stamp (Col:D), Value (Col:E to Col:last configured datatype) according to the configured group Datatypes.

Example

	A	B	C	D	E	F	G	H	I
1	Site name	SIP name	Group	Time stamp	Energy kWh	Gas m3	Gas kWh	Water m3	Power kW
2	Synapsys	SIP+	Group 1	31/07/2018 00:15	23	24.5	0	100	0
3	Synapsys	SIP+	Group 1	31/07/2018 00:30	23	24.5	0	100	0
4	Synapsys	SIP+	Group 1	31/07/2018 00:45	23	24.5	0	100	0
5	Synapsys	SIP+	Group 1	31/07/2018 01:00	23	24.5	0	100	0
6	Synapsys	SIP+	Group 1	31/07/2018 01:15	23	24.5	0	100	0
7	Synapsys	SIP+	Group 1	31/07/2018 01:30	23	24.5	0	100	0
8	Synapsys	SIP+	Group 1	31/07/2018 01:45	23	24.5	0	100	0
9	Synapsys	SIP+	Group 1	31/07/2018 02:00	23	24.5	0	100	0

Tip!

Suitable when logging the same parameters/units from several devices.

Report Frequency. Used to define when the selected reports are sent.

Tip!

Do not set greater than Daily.

ZIP file. Used to control the compression requirements of the .csv (Comma Separated Variable) report. If Off, the report will be sent as a .csv file. If On, the .csv reports will be sent in a single compressed .zip file.

- ◆ **Network Health.** A single file showing the overall reliability of Trend modules being polled via the Trend Client driver with less than configured % success rate is listed.

Example

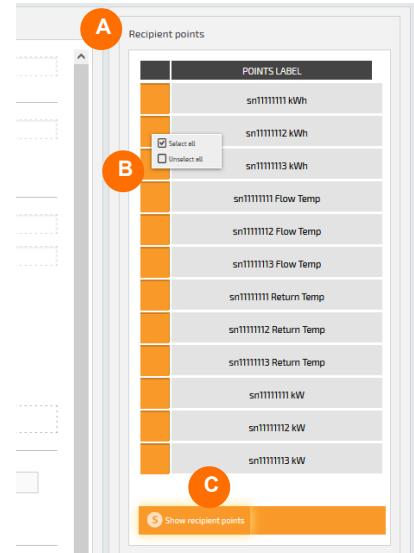
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	A
1	Synapsys	SIP+		Health report	#####																								
2																													
3	Overall success ratio	50%		Hour	00 to 01	01 to 02	02 to 03	03 to 04	04 to 05	05 to 06	06 to 07	07 to 08	08 to 09	09 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	21 to 22	22 to 23	23 to 24	
4	Successful requests	206926		Hourly success ratio	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	98%	99%	99%	99%	99%	37%	8%	8%	9%	9%	9%	9%	
5	Total requests	406625																											
6																													
7																													
8	Points with success under	100%																											
9	L2101151 - Sensor 1	50%																											
10	L2101152 - Sensor 2	50%																											
11	L2101153 - Sensor 3	50%																											
12	L2101154 - Sensor 4	50%																											
13	L2101155 - Sensor 5	50%																											
14	L2101156 - Sensor 6	38%																											
15	L2101157 - Sensor 7	38%																											

5. In 'Recipient settings' (A), edit as necessary.
 - i. Select the required Recipient from the list.
 - ii. Select each Datapoint (B), as necessary.
Use the context menu to 'Select all' or 'Unselect all' if necessary.

Tip!

Keyboard shortcuts can make this easier.

Use the 'Show recipient points' (C) button to filter the list of Datapoints assigned to the selected Recipient.



DATA ACQUISITION DATABASE QUERIES

The SIP+ Data-IF uses a MySQL database to store data that is recorded directly from the defined source. This data is stored in 'Read only' database objects ('Data' and 'DataPoints' tables). Each 'table' is a collection of related data entries.

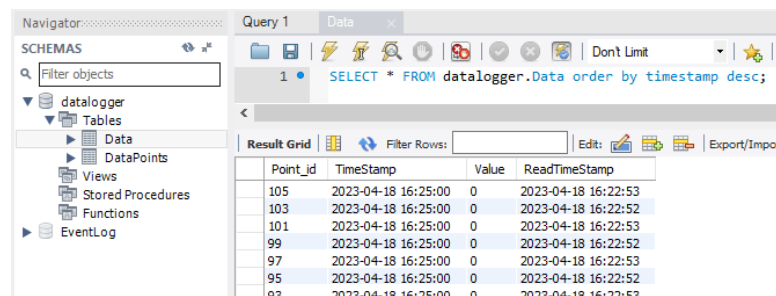
Note Databases are useful when storing information and allows quick and easy interrogation of the data using MySQL queries.

Tip! To perform read only MySQL queries, use Username 'Datalogger', and password 'Datalogger'. A schema is available on request.

The amount of historic data retained in the Data Acquisition driver database is calculated as, number of datapoints & the logging interval (max 162 days), e.g.,

$$10 \text{ Datapoints} \times 15 \text{ minute intervals} = 180 \text{ days reduced to max 162 days.}$$

Example



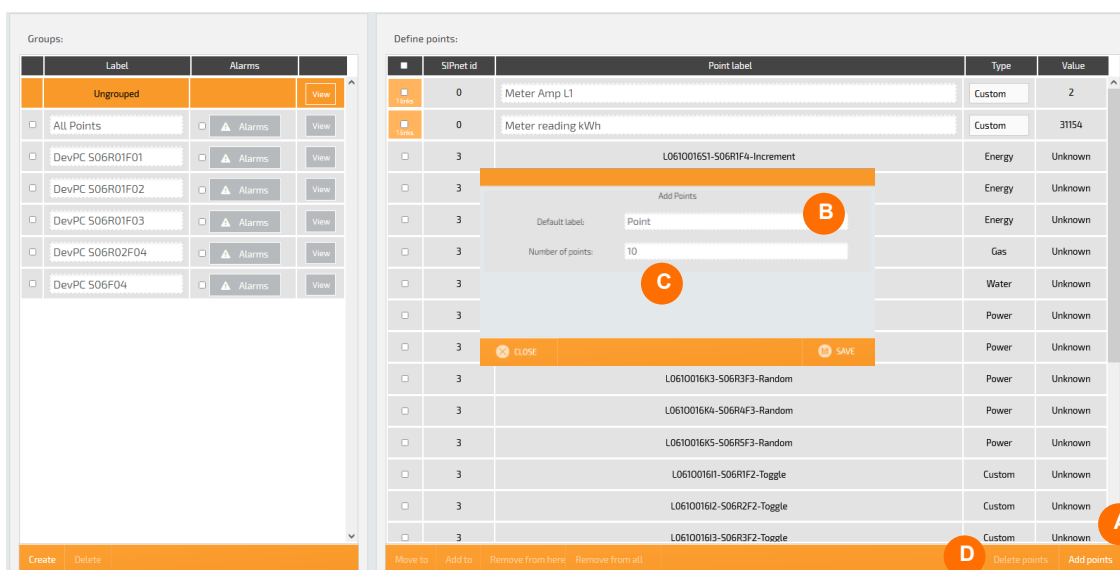
2.5.4 Define EMT Driver Points

This page is used to define the required EMT driver Datapoint labels (max 250 Datapoints) and assign to required groups for displaying on the EMT driver Dashboard and selected reporting.

Tip! Before starting, make a note of total number of points required for reporting.

1. If the driver is EMT, press 'Add points' (A). This displays the 'Default label' and 'Number of points' options.

Default label (B). Used to prefix the automatically generated EMT Datapoints labels e.g., 'Point' to give a default Datapoint label of 'Point nn'.



Tip! Amend the 'Label prefix' for each new range of EMT Datapoints labels to provide a specific identification.

Label the EMT Datapoints in the same order as the defined parameters from the data source protocol drivers were configured.

Number of points (C). Used to define the required number of EMT Datapoints (max 250) which will be available for display on the dashboard, reporting or via a MySQL query.

Tip! Press 'Copy/paste data' button to display a dialog. Use 'Copy to clipboard' to add page details to the computer clipboard or click the right-hand mouse button in the white square and select 'Paste' from the context menu to add copied information to the page. Copied information can be edited using .CSV editing software, e.g., Microsoft Excel. A configuration spreadsheet is available from Synapsys Solutions Technical Support.

Caution Using 'Copy/Paste' will break all existing links. Ensure all links are re-established after pasting the spreadsheet configuration.

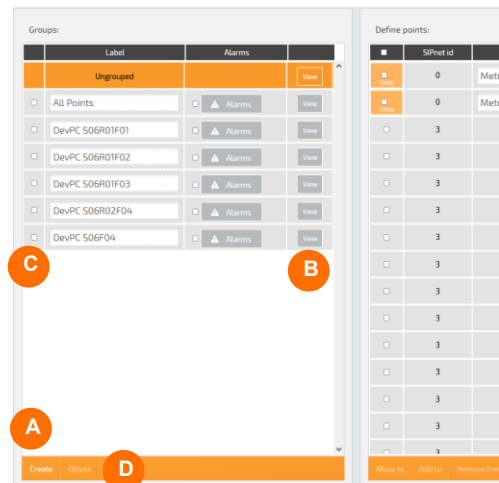
2. Add a 'Group' (A). Used to define a Group for 1 (one or more) EMT Datapoints.

View (B). Used to show the EMT Datapoints assigned to the selected Group.

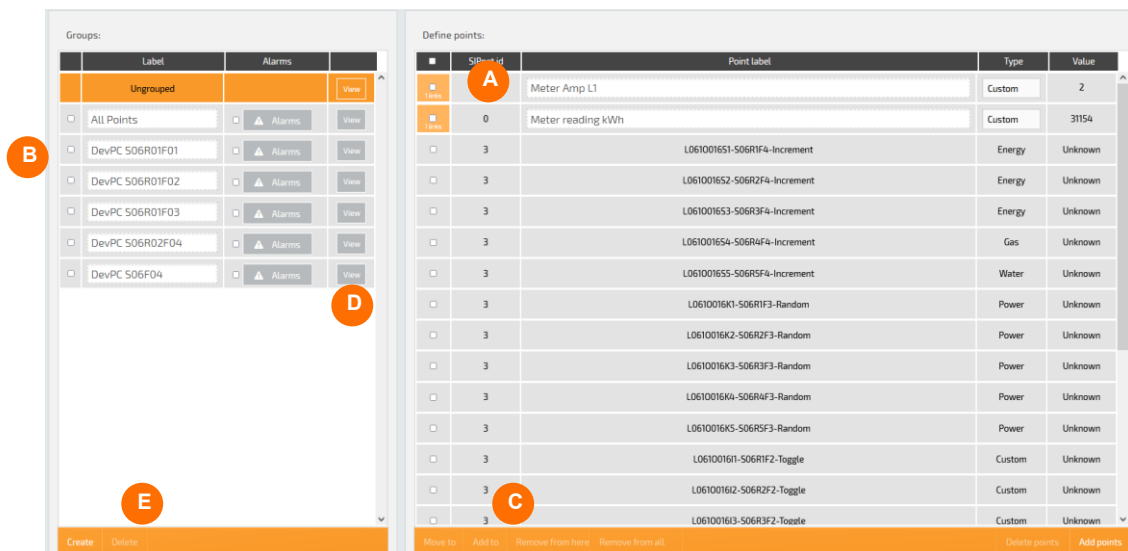
If necessary, use the tick box (C) to select a Group that is not required, and press Delete (D).

Tip!

To ensure a clear report filename, use a unique, meaningful name for the Datapoint and Group labels.



3. In 'Define points', assign the Datapoint(s) to the required Groups.



- i. Use the tick box to select Datapoints (A), then use the tick box to select a Group (B) for the selected Datapoints and press the 'Move to' (C) button.

Tip!

Use 'Remove from here' to remove the selected Datapoint from the selected Group but leave it in the other Groups. Use 'Remove from all' to move the selected Datapoint to 'Ungrouped'.

- ii. Press View (D) to confirm the Datapoints have been moved to the selected Group.

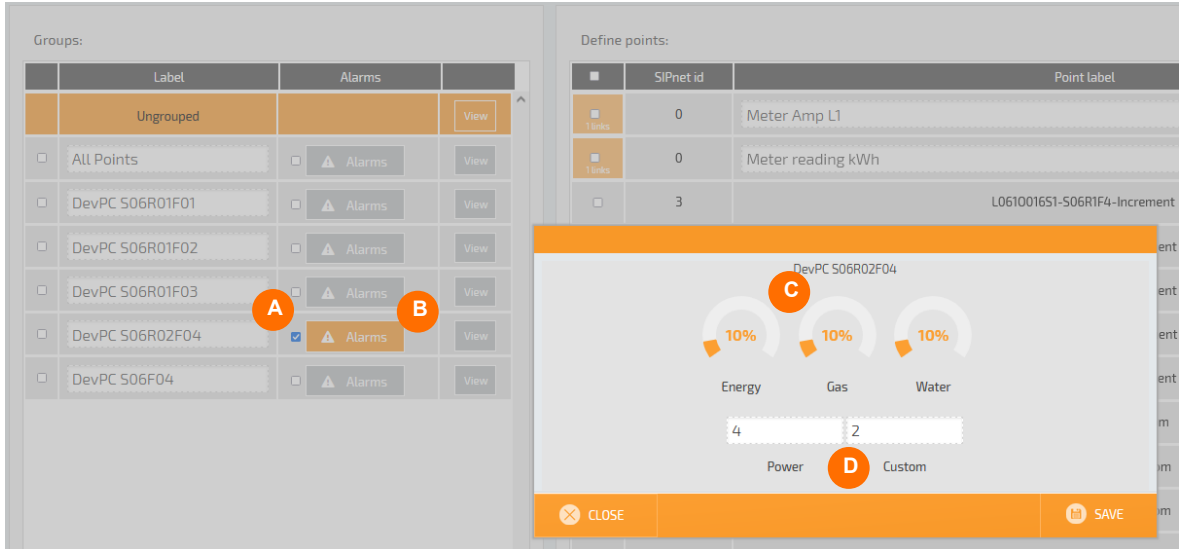
Tip!

Use the tick box (B) to select a Group that is not required, and press Delete (E).

Caution

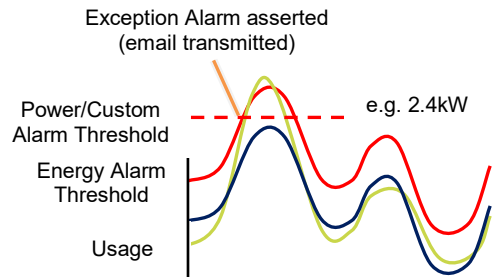
This will also delete the Group from the EMT User account.

4. In 'Define points', assign an Alarm Threshold for each Datatype in the Group.



- i. Use the tick box to enable the Alarm function for a Group (A) and activate the Alarm button (B).
- ii. Set Energy, Gas, and/or Water Alarm level (C). Use the gauge slider to set the threshold to an approximate value or enter the value to define a specific Alarm threshold value for Energy, Gas, and/or Water.

Use the text field below the gauge, to set the Power, and/or Custom Alarm threshold value (D).



Note

The Power and Custom threshold determines an absolute limit (i.e., an alarm is asserted when the value is exceeded) and is only available if the 'Power' or 'Custom' data type is defined in the 'Datapoints' page.

EMT DRIVER DATABASE QUERIES

The SIP+ EMT/EMT-IF products use a MySQL database to store data that is recorded directly from the defined data source. This data is stored in 'Read only' database objects ('DataPoint' and 'DataPointTemp', and 'GroupData' and 'GroupDataTemp' tables). Each 'table' is a collection of related data entries.

Note Databases are useful when storing information categorically and allows quick and easy interrogation of the data using MySQL queries.

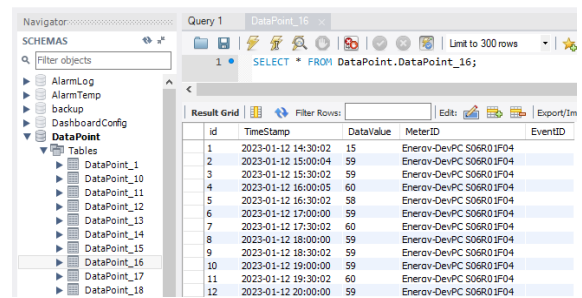
Tip! To perform read only MySQL queries, use Username 'Datalogger', and password 'Datalogger'. A schema is available on request.

The EMT driver DataPoint and DataPoinTemp tables retains 2 years of usage data, 3 months of Power/Custom values, and 3 months of meter reading values. These values can be accessed by using an appropriate MySQL query.

- DataPoint table

Each 'Datapoint' added to the 'Data point list' (Datapoint page) is stored in a separate 'DataPoint_<n>' table. The actual value is included in the 'Device_n' table. These tables are updated every 3 hours with the data recorded in the 'DataPointTemp' table.

Example



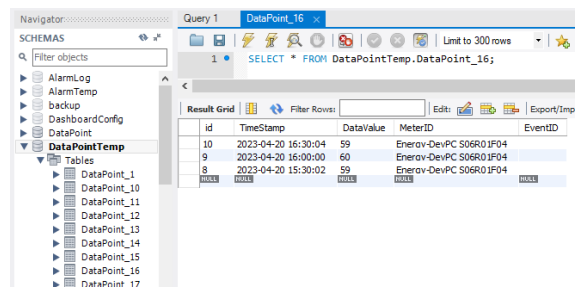
The screenshot shows a MySQL query result for 'DataPoint_16'. The query is 'SELECT * FROM DataPoint.DataPoint_16;'. The result grid shows 12 rows of data with columns: id, TimeStamp, DataValue, MeterID, and EventID.

id	TimeStamp	DataValue	MeterID	EventID
1	2023-01-12 14:30:02	15	Enerov-DevPC S06R0 IF04	
2	2023-01-12 15:00:04	59	Enerov-DevPC S06R0 IF04	
3	2023-01-12 15:30:02	59	Enerov-DevPC S06R0 IF04	
4	2023-01-12 16:00:05	60	Enerov-DevPC S06R0 IF04	
5	2023-01-12 16:30:02	58	Enerov-DevPC S06R0 IF04	
6	2023-01-12 17:00:00	59	Enerov-DevPC S06R0 IF04	
7	2023-01-12 17:30:02	60	Enerov-DevPC S06R0 IF04	
8	2023-01-12 18:00:00	59	Enerov-DevPC S06R0 IF04	
9	2023-01-12 18:30:02	59	Enerov-DevPC S06R0 IF04	
10	2023-01-12 19:00:00	59	Enerov-DevPC S06R0 IF04	
11	2023-01-12 19:30:02	60	Enerov-DevPC S06R0 IF04	
12	2023-01-12 20:00:00	59	Enerov-DevPC S06R0 IF04	

- DataPointTemp table

Each 'Datapoint' added to the 'Data point list' (Datapoint page) is stored in a separate 'DataPointTemp_<n>' table. The actual value is included in the 'Device_n' table. These tables show the recent data stored in RAM memory and is transferred to the storage device every 3 hours.

Example



The screenshot shows a MySQL query result for 'DataPointTemp_16'. The query is 'SELECT * FROM DataPointTemp.DataPointTemp_16;'. The result grid shows 3 rows of data with columns: id, TimeStamp, DataValue, MeterID, and EventID.

id	TimeStamp	DataValue	MeterID	EventID
10	2023-04-20 16:30:04	59	Enerov-DevPC S06R0 IF04	
9	2023-04-20 16:00:00	60	Enerov-DevPC S06R0 IF04	
8	2023-04-20 15:30:02	59	Enerov-DevPC S06R0 IF04	

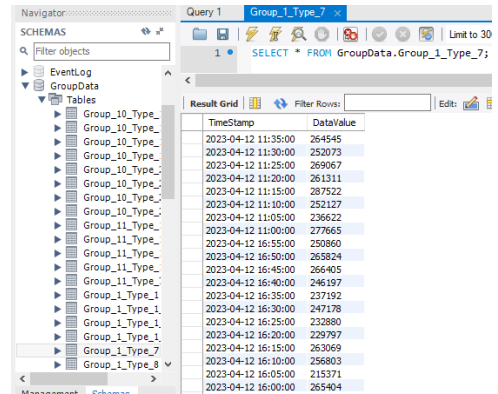
Tip! Data recorded at 'Datapoint' Index <n> is stored in the 'DataPointTemp_<n>' or 'DataPoint_<n>' table, where <n> is the data point number (i.e., 'DataPointTemp_1', 'DataPointTemp_2', etc... or 'DataPoint_1', 'DataPoint_2', etc...).

- GroupData table

Each 'GroupData' table shows the combined total of the corresponding datatype values in that group. These tables are updated every 3 hours with the data recorded in the 'GroupDataTemp' table.

A corresponding 'Profile_<n>' table (not applicable to 'Power' datatype) is used to create the graph Profile line from the values recorded for the previous week. The 'GroupProfile...' table is the calculated average for the datapoints in that group and is displayed as the blue line on the Line Graph widget.

Example



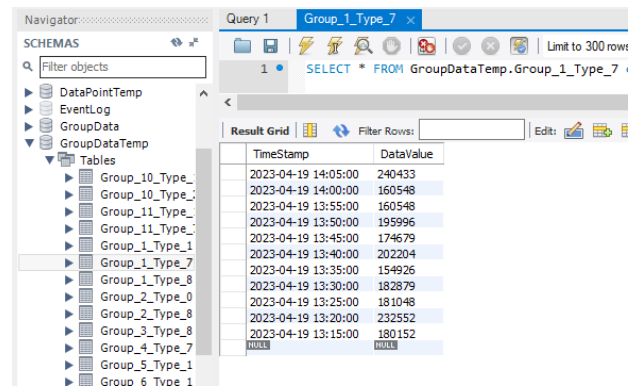
Timestamp	DataValue
2023-04-12 11:35:00	264545
2023-04-12 11:30:00	252073
2023-04-12 11:25:00	269067
2023-04-12 11:20:00	261311
2023-04-12 11:15:00	287522
2023-04-12 11:10:00	252127
2023-04-12 11:05:00	236622
2023-04-12 11:00:00	277665
2023-04-12 10:55:00	250860
2023-04-12 10:50:00	265824
2023-04-12 10:45:00	266405
2023-04-12 10:40:00	246197
2023-04-12 10:35:00	237192
2023-04-12 10:30:00	247178
2023-04-12 10:25:00	232880
2023-04-12 10:20:00	229797
2023-04-12 10:15:00	263969
2023-04-12 10:10:00	256803
2023-04-12 10:05:00	215371
2023-04-12 10:00:00	265404

- GroupDataTemp table

Each 'GroupDataTemp' table shows the combined total of the corresponding datatype values in that group. These tables show the recent data stored in RAM memory and is transferred to the storage device every 3 hours.

A corresponding 'Profile_<n>' table (not applicable to 'Power' datatype) is used to create the graph Profile line from the values recorded for the previous week. The 'GroupProfile...' table is the calculated average for the datapoints in that group and is displayed as the blue line on the Line Graph widget.

Example



Timestamp	DataValue
2023-04-19 14:05:00	240433
2023-04-19 14:00:00	160548
2023-04-19 13:55:00	160548
2023-04-19 13:50:00	195996
2023-04-19 13:45:00	174679
2023-04-19 13:40:00	202204
2023-04-19 13:35:00	154926
2023-04-19 13:30:00	182879
2023-04-19 13:25:00	181048
2023-04-19 13:20:00	232552
2023-04-19 13:15:00	180152
NULL	NULL

DASHBOARD CONFIGURATION

This section explains the additional configuration options available when Vision licence is included. Vision provides support for networking multiple SIP+ EMT and SIP+ EMT-IF products and displaying all data widgets on a specified public display system.

This includes the following options on the internal web-based pages.

- **Configuration.** Used to define network time protocol provider, news feed provider, local weather station location and the CO₂ calculation, as previously described.
- **Dashboard.** Used to display the values recorded by each configured groups on a Public Display.

Tip! The Dashboard configuration applies to both 'Local' (Dashboards that only appear after login) and 'Public' (Dashboards that appear on a public display). The Vision firmware is compatible with Energy/billing software on PC/Monitor, Network Screen (MUST have built-in drivers), IPTV (Internet Protocol TV system), Smart TV (e.g., Samsung Series 6) and Smart Phones/Tablets.

Caution Updates to the web browser in a Smart TV can cause the failure to display Dashboard information. We suggest using a PC to provide a reliable interface to the Public Display system.

The configurable 'Public' Display Dashboards include the following widgets.

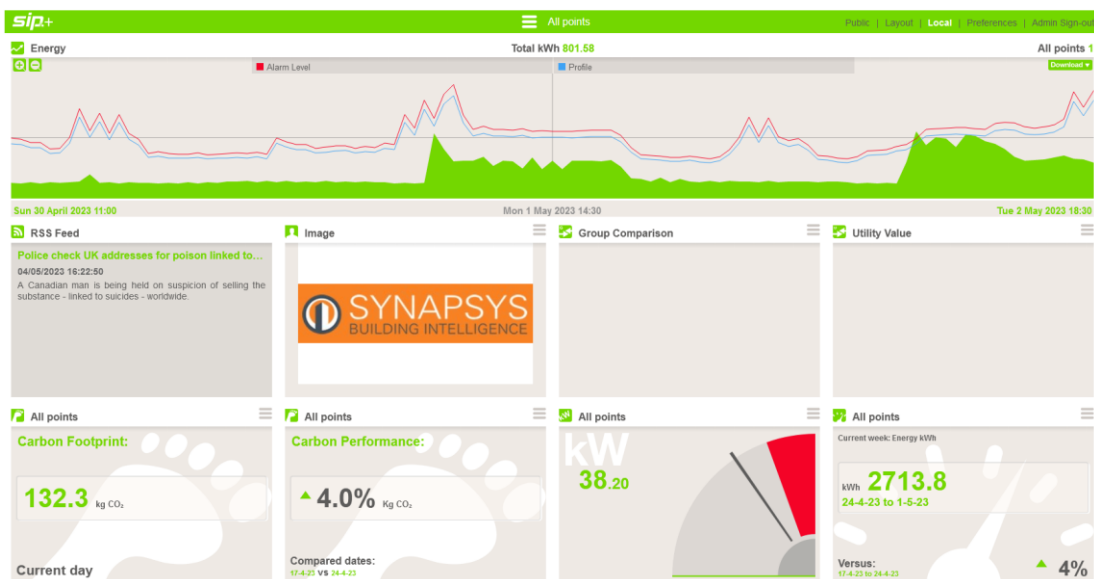
- Energy
- Power
- Comparison
- Financial
- Utility
- Carbon
- Media, Environmental and Logo

The configurable 'Local' Display Dashboards include the following widgets.

- Energy
- Power
- Performance

The SIP+ Vision licence ‘**Dashboard**’ comprises the Landing page and configured graph pages. Before ‘Login’ each page is automatically displayed, showing the recorded values, with the calculated performance and carbon footprint data.

The SIP+ EMT and SIP+ EMT-IF Vision Dashboard is used to display User selectable widgets according to the applied Licence and relevant data viewing levels, ‘**Local**’ (Dashboards that only appear after login) and ‘**Public**’ (Vision licence - Dashboards that appear on a public display). The default product licence offers Energy, Power, and Performance widgets, but this selection of widgets is enhanced when the Vision licence is included.

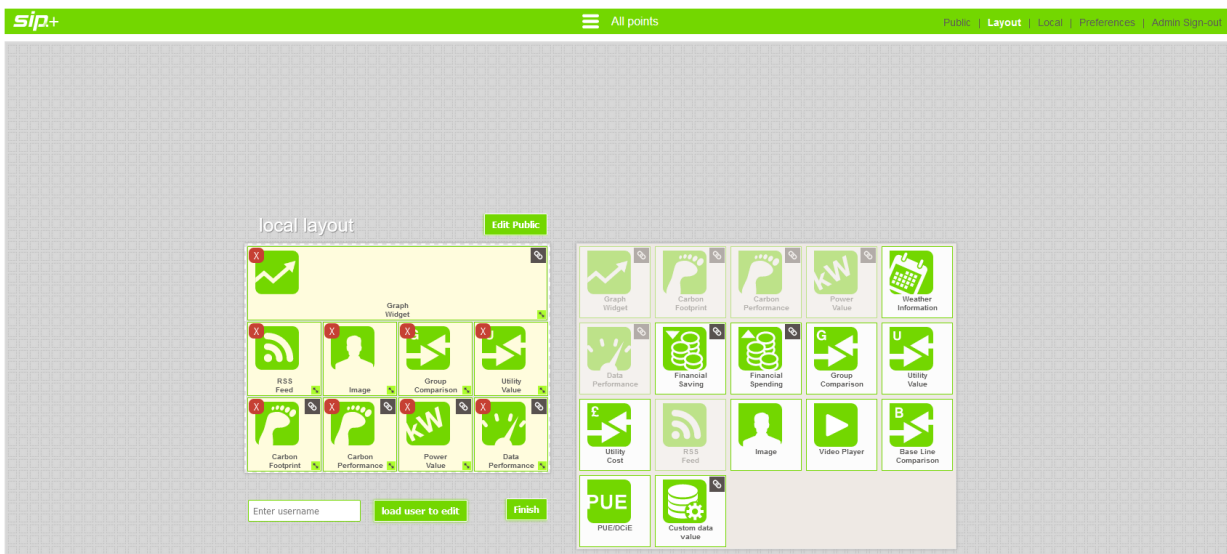


Note Typically, the Vision Dashboard is provided as a hardware option. However, this licence may be added to any product according to the amount of data required for the specific site (please consult with the account manager/sales), and will provide additional features, i.e., CO₂ Factors, Weather, NTP, and News Feed.

Tip! The SIP+ EMT and SIP+ EMT-IF Vision Dashboard is compatible with Energy/billing software on PC/Monitor, Network Screen (MUST have built-in drivers), IPTV (Internet Protocol TV system), Smart TV (e.g., Samsung Series 6) and Smart Phones/Tablets.

The Dashboard configuration page is structured as a 4 (four) x 3 (three) grid. Required widgets can be moved to the Dashboard configuration grid and used to display related information, e.g., the Graph widget displays the recorded Energy (electric and gas) usage at 30 minute intervals, and the Daily information widget displays Weather information related to the defined configuration and derived from the Internet.

Note Press the ‘Local’ or ‘Public’ option beside the ‘Preferences’ option to display a preview of the dashboard configuration.




CONFIGURING THE DASHBOARD

The Vision Dashboard supports 2 (two) data viewing levels, '**Local**' (Dashboards that only appear after login) and '**Public**' (SIP+ EMT (or SIPe) Vision licence - Dashboards that appear on a public display). This allows the authorised 'User' to configure a Dashboard layout that differs from the Dashboard configuration displayed on a Public Display, i.e., in a Reception, or Lobby area.

The principles for configuring the '**Local**' and '**Public**' Dashboards are very similar.

Tip! Ensure the necessary '**DataPoints**' have been assigned to the appropriate '**Groups**' before configuring the Dashboard.

1. Press  (right side of the header banner) to show the '**Login**' dialog.
2. Login using '**Administrator**' access (default Username and Password) and press 'Log in' to confirm.

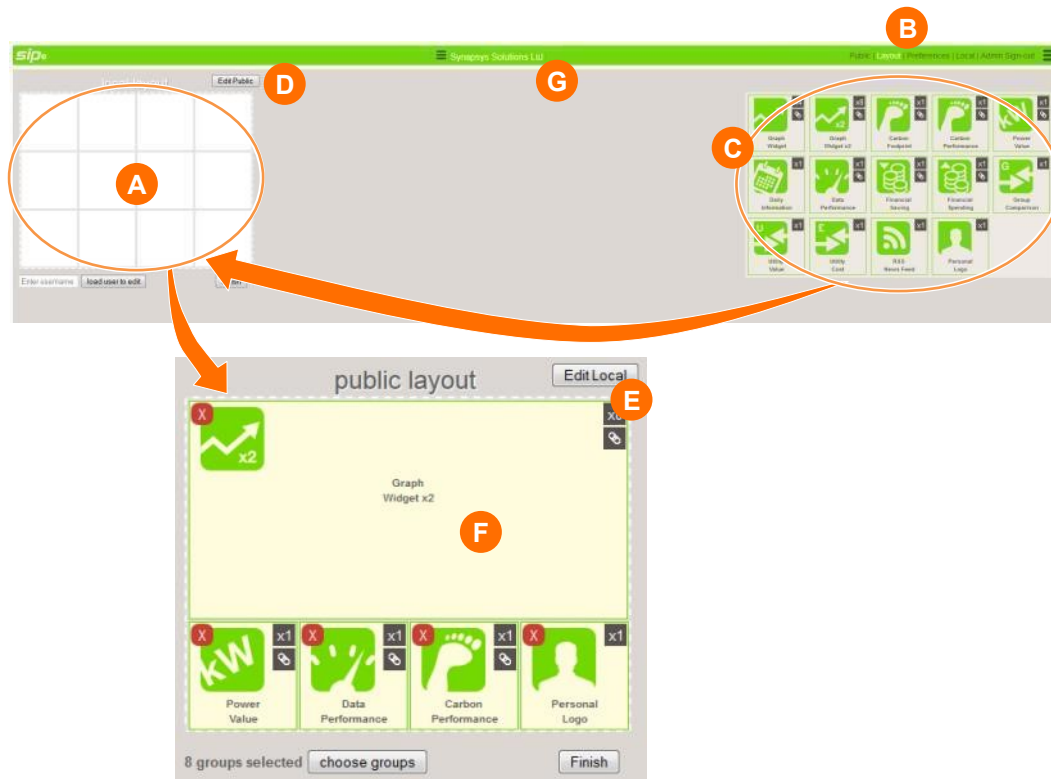
This will show a page of undefined widget locations on a default layout Dashboard page, e.g., prior to any '**Local**' and/or '**Public**' Dashboard configuration.



3. Press **'Layout'** (B) to display the **'Local'** Dashboard configuration page, including the Dashboard grid cells and all available widgets (C).

The grid indicates the position of any widget that requires a single cell in the grid.

All widgets that require a single cell in the grid are indicated by the 'x1' (cell) in the top right-hand corner. The 2 (two) Graph widgets require 4 (cells) or 8 (cells) in the grid as indicated by the 'x4' and 'x8' respectively.



4. Press the **'Edit Public'** button (D) to display the 4 (four) x 3 (three) grid cells that will show the Public display dashboard widgets.
2. Select the require widget and move to the necessary position on the grid (F).

Tip!

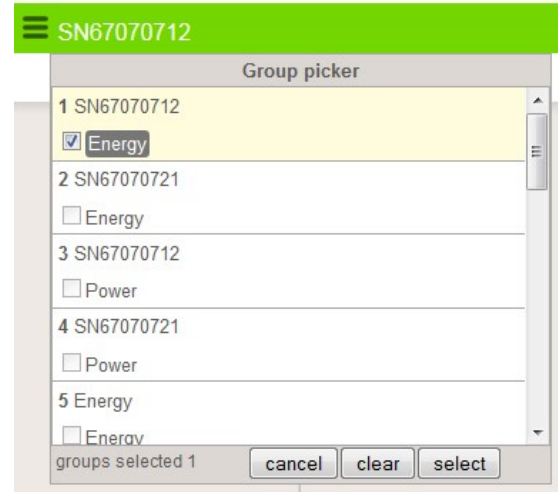
Press **'X'** to remove the widget from the dashboard configuration. The **'B'** icon indicates the widget is conditional to the Group graph, and shows additional configuration is required.

5. Select the **'Groups'** to appear on the Public Display.
 - i. Press **'choose groups'** to show the list of configured **'Groups'** (Group picker) from the 3 (three) lines in the centre of the header bar (G).
 - ii. Set the required **'Groups'** to .
 - iii. Press **'Select'** to confirm.

Note Use **'Cancel'** to ignore current changes and **'Clear'** to remove all **'Groups'** currently displayed on the Public Display.

6. Press **'Finish'** to confirm changes.

Tip! The **'Local'** dashboard can be configured in the same manner as the **'Public'** but will display all configured **'Groups'**.



CHANGING WIDGET DEFAULTS

Following the dashboard configuration, some widgets may require specific changes in order to display necessary information, i.e. the week to week comparison time period displayed in the **'Current Performance'** widget or the image displayed in the **'Personal logo'** widget.

1. Login to the Dashboard configuration pages and press **'Public'** or **'Local'** (as necessary) to display the appropriate dashboard configuration.
2. Edit the required widget(s) as necessary.

Change the Line graph widget(s) settings

This widget shows 30 minute energy usage records over the selected time period.


- i. Press the date area across the x-axis of the energy Line graph to show the time period options.
- ii. Select the required time period for the energy Line graph.

The **'Public'** (A) dashboard configuration includes only **'last 7 days'** and **'last 30 days'**.

The **'Local'** (B) dashboard configuration includes **'Start date'** and **'End date'** (press **'Get data'** to populate graph), or **'Quick date'** time periods (**'Current day'**, **'last 7 days'**, **'1st of the month'** and **'last 30 days'**) to determine the time period.



- iii. Press the date area again to hide the energy Line graph period.

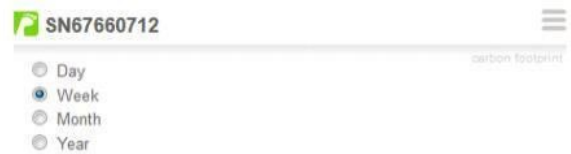
Tip! Use the  buttons to display pre-determined time periods of the currently displayed graph. Use the **'Alarm level'** (C) and **'Profile'** (D) to show/hide these limits on the graph.

Note Energy usage data is recorded and calculated at 30 minute intervals. This means that it may take 1.5 hours before a graph will appear on the Line graph on the Dashboard.

Change the Carbon footprint settings

This widget shows the calculated total of greenhouse gas emissions (kg CO₂) relating to the energy usage recorded by the meter over the selected time period.

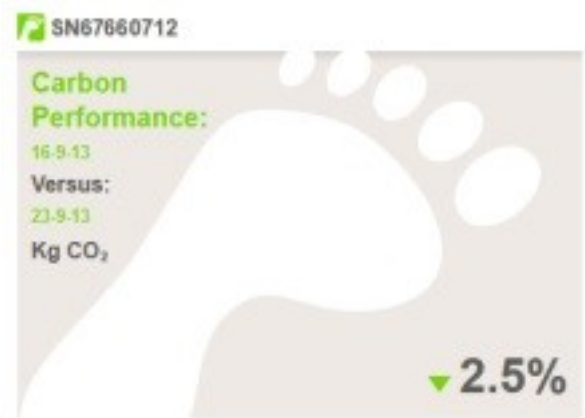
- i. Press '☰' (right side of the header banner) to show the available parameters.
- ii. Select the required Carbon footprint display period as necessary, i.e. nn.n kg CO₂ for the Week or Month.
- iii. Press '☰' to hide the parameters.



Change the Carbon performance settings (Vision Licence needed)

This widget shows the calculated Carbon performance of the 'Group' over the selected time period. The Carbon performance is illustrated by displaying the amount of Carbon produced as a percentage (%) for the latest defined time period compared to the previous period.

- i. Press '☰' (right side of the header banner) to show the available parameters.
- ii. Select the required Carbon performance period as necessary, i.e. nn.n kg CO₂ for the Day, Week or Month.
- iii. Press '☰' to hide the parameters.



Change the Power (kW) value settings (Vision Licence needed)

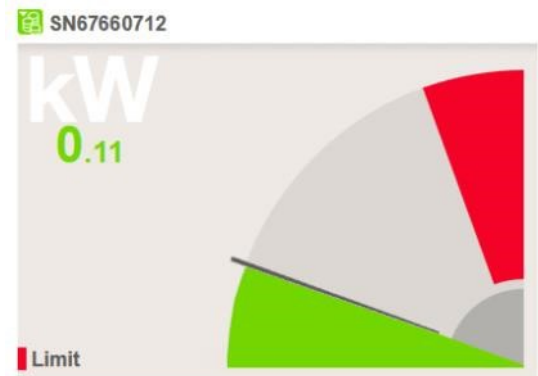
This widget shows the latest recorded Power (kW) value of the 'Group' via the preferred value display scenario. The Power value is illustrated by displaying the current kW value using the selected widget configuration.

- i. Press '☰' (right side of the header banner) to show the available parameters.
- ii. Select the preferred value display scenario, i.e., 'Dial' or 'Number', as necessary.

The 'Dial' shows the Power value as a pointer.

The 'Number' option shows the numeric value.

- iii. Press '☰' to hide the parameters.



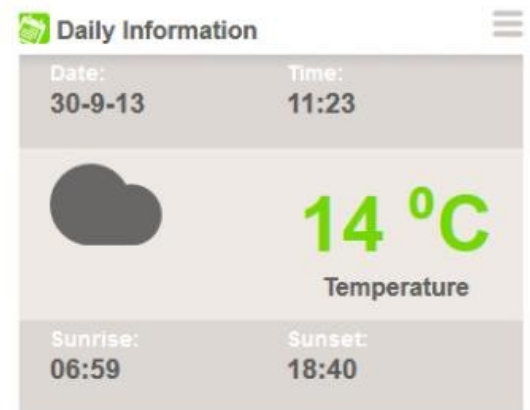
Change the Daily information settings (Vision Licence needed)

This widget shows information derived from the defined weather data provider specified on the 'Weather' page of the 'Configuration' dialog and calculated via the configured global position.

Tip! This widget requires internet connectivity and is only available if the SIPE Vision licence is included.

This widget shows current

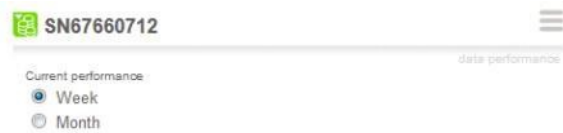
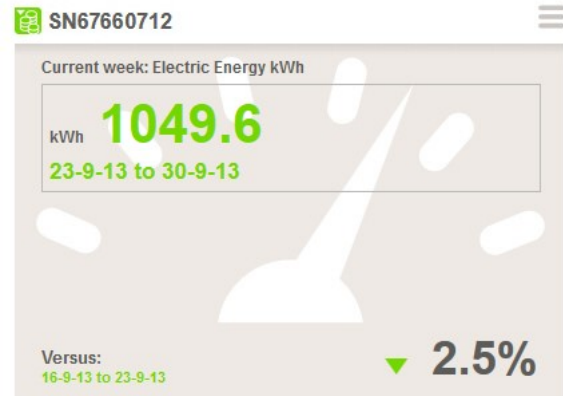
- ◆ date and time
- ◆ calculated sunrise and sunset
- ◆ temperature and weather conditions
- ◆ wind direction and speed
- ◆ precipitation status and humidity



Change the Data performance settings (Vision Licence needed)

This widget shows the calculated energy performance of the 'Group' over the selected time period. The Data performance is illustrated by displaying the amount of energy used during this current period and as a percentage (%) compared to the previous period.

- i. Press '☰' (right side of the header banner) to show the available parameters.
- ii. Select the required performance comparison period as necessary, i.e., Week or Month.
- iii. Press '☰' to hide the parameters.



Change the Financial Saving settings (Vision Licence needed)

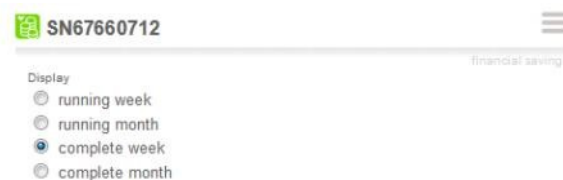
This widget shows the calculated financial saving of the 'Group' over the selected time period. The financial saving is illustrated by displaying an energy cost saving for the latest defined time period compared to the previous period.

- i. Press '☰' (right side of the header banner) to show the available parameters.
- ii. Select the required financial saving period as necessary.

The 'Running week' and 'Running month' show the calculated financial saving for the subsequent concurrent days, e.g., the previous 7 (seven) or 31 days.

The 'Complete week' and 'Complete month' show the calculated financial saving for the previous calendar week or month, e.g., Sunday to Saturday, or 1st of the month to last day of the month.

- iii. Press '☰' to hide the parameters.



Change the Financial Spending settings (Vision Licence needed)

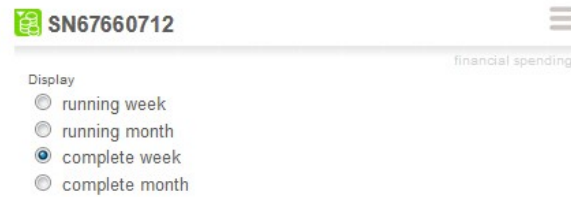
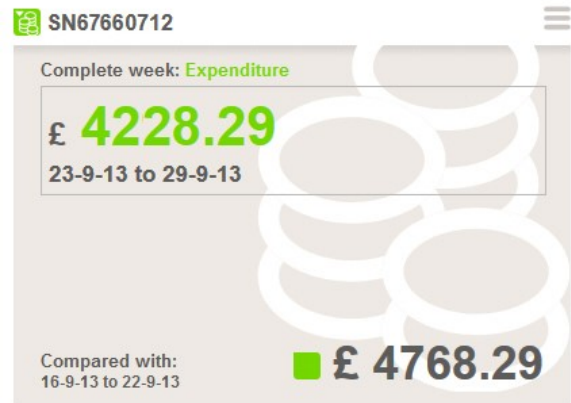
This widget shows the calculated expenditure of the **'Group'** for the current time period. The calculated financial spending is illustrated by displaying the cost of used energy for the latest defined time period compared to the previous period.

- i. Press '☰' (right side of the header banner) to show the available parameters.
- ii. Select the required financial spending period as necessary.

The **'Running week'** and **'Running month'** show the calculated financial spending for the subsequent concurrent days, e.g., the previous 7 (seven) or 31 days.

The **'Complete week'** and **'Complete month'** show the calculated financial spending for the previous calendar week or month, e.g., Sunday to Saturday, or 1st of the month to last day of the month.

- iii. Press '☰' to hide the parameters.



Change the Group Comparison settings (Vision Licence needed)

This widget shows the comparison of energy used in selected '**Group(s)**' over the defined time period. The Group comparison is illustrated by displaying the energy used in selected groups related to usage, expenditure, and percentages (%).

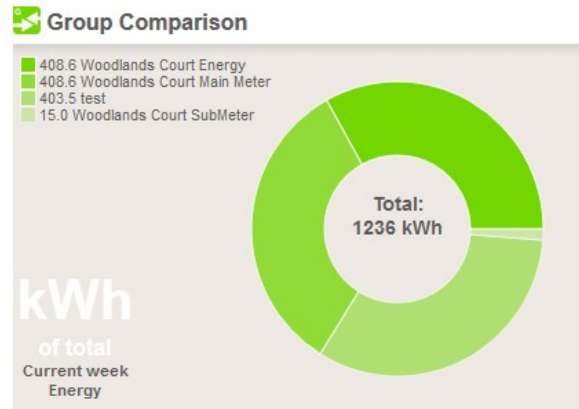
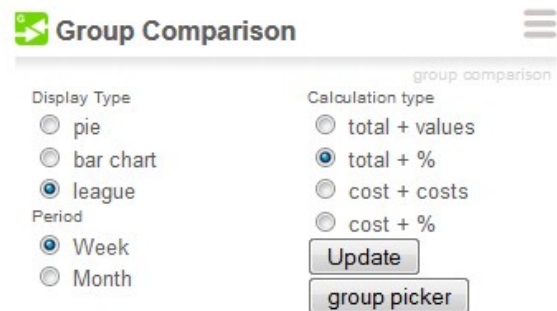
- i. Press '☰' (right side of the header banner) to show the available parameters.
- ii. Select the required 'Display Type', 'Period', and 'Calculation type'.

The 'Display Type' defines the data comparison option, i.e., pie, bar chart or league.

The 'Period' defines the time period being compared, i.e., Week or Month.

The 'Calculation type' defines the data being compared across selected groups, total + values, total + %, cost + costs or cost + %.

- iii. Press '**Update**' to ensure the calculated values and selected display scenario will be displayed correctly on the widget.
- iv. Select the '**Groups**' that must be compared. Press '**group picker**' to show the list of configured '**Groups**' (Group picker) from the 3 (three) lines in the centre of the header bar.
- v. Set the required '**Groups**' to '☑'.
- vi. Press '**Select**' to confirm.
- vii. Press '☰' to hide the parameters.

Group Comparison ☰

group comparison

Display Type

pie

bar chart

league

Period

Week

Month

Calculation type

total + values

total + %

cost + costs

cost + %

Change the Utility Value and Utility Cost settings (Vision Licence needed)

This widget shows the calculated value or cost comparison (as appropriate) of the grouped utilities, e.g., electric energy, gas energy or water, between selected '**Groups**'. The comparison is illustrated by the start of period value and the end of period value as a preferred value display scenario, and a total value or total % (percentage) for the defined time period.

- i. Press '☰' (right side of the header banner) to show the available parameters.
- ii. Select the required 'Display Type', 'Period', and 'Calculation type'.

The 'Display Type' defines the data comparison option, i.e., pie or bar chart.

The 'Period' defines the time period being compared, i.e., Week or Month.

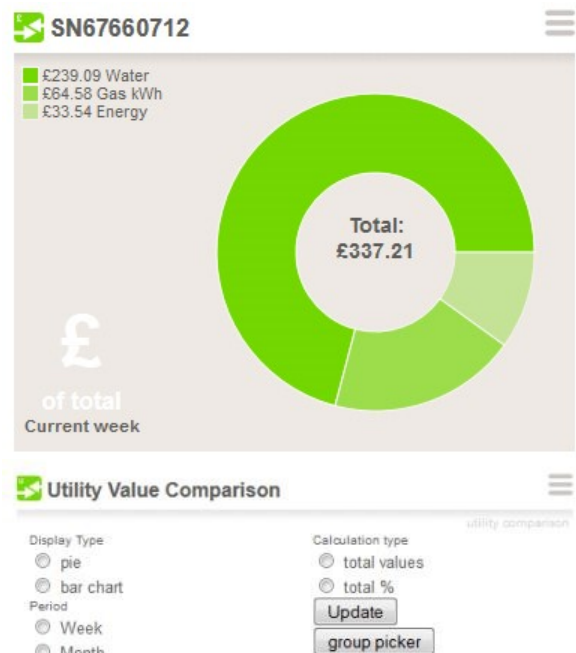
The 'Calculation type' defines the data being compared across selected groups, i.e., total values, or total %.

- iii. Press '**Update**' to ensure the calculated values and selected display scenario will be displayed correctly on the widget.
- iv. Select the '**Groups**' that must be compared. Press '**group picker**' to show the list of configured '**Groups**' (Group picker) from the 3 (three) lines in the centre of the header bar.
- v. Set the required '**Groups**' to .
- vi. Press '**Select**' to confirm.

Note

Use '**Cancel**' to ignore current changes and '**Clear**' to remove all '**Groups**' currently displayed on the Public Display.

- vii. Press '☰' to hide the parameters.



The RSS News Feed settings (Vision Licence needed)

This widget shows information from 1 (one) or more selected RSS (Rich Site Summary or Really Simple Syndication) documents defined on the 'News' page of the 'Configuration' dialog.

Tip! This widget may require internet connectivity and is only available if the SIP+ EMT (or SIPE) Vision licence is included.

Note The RSS News Feed is a standard XML file format.



Change the Personal Logo settings (Vision Licence needed)

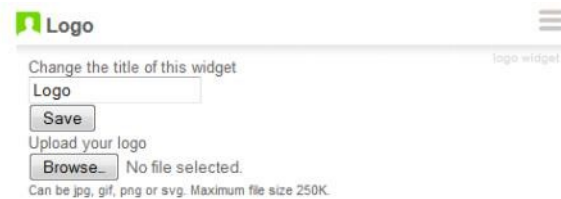
This widget shows the selected file, e.g., site photo, company logo, etc. with user defined widget label. Multiple Personal Logo widgets can be added to the Dashboard, but each separate widget can display a specified image.

- i. Press '☰' (right side of the header banner) to show the available parameters.
- ii. Press 'Browse' to open a Browser dialog. Locate, select, and confirm the required file.

Tip! This widget supports files up to 250kb maximum.

- iii. Select the 'Change the title of this widget', edit the widget label and press 'Save' to confirm changes, as necessary. This is the text that appears beside the widget icon.

- iv. Press '☰' to hide the parameters.



Change the Video Player settings (Vision Licence needed)

This widget shows a video file stream, i.e., YouTube or a video player from a uniquely define source, with user defined widget label. Multiple Video Player widgets can be added to the Dashboard, and each separate widget can display a uniquely defined video.

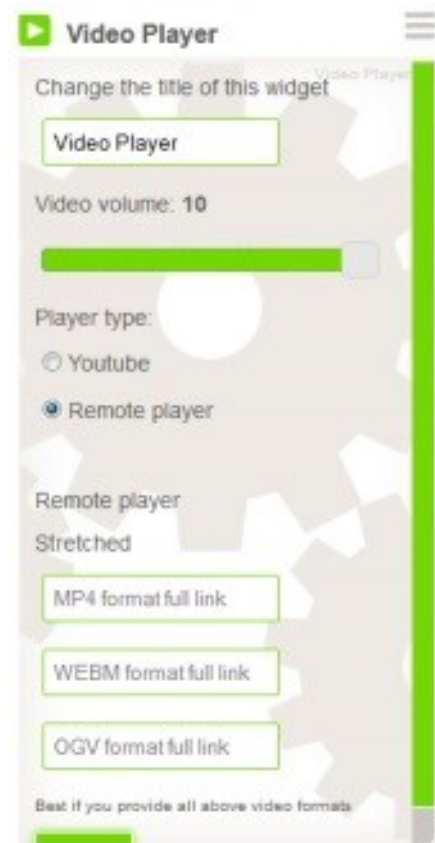
- i. Press '☰' (right side of the header banner) to show the available parameters.
- ii. Select the appropriate video player type, e.g., 'Youtube' or 'Remote player'.

If playing a 'Youtube' video, define the video using the video reference, e.g., <http://www.youtube.com/watch?v=dq8x-XeHLU>

If playing the 'Remote player' video, enter the file reference in the appropriate format field, e.g., 'MP4', 'WEBM' and 'OGV'.

Tip! Enter all file formats to provide the best video compatibility possible.

- ◆ If necessary, adjust the volume level of the video defined using the slider.
- iii. Select the 'Change the title of this widget', edit the widget label and press 'Save' to confirm changes, as necessary. This is the text that appears beside the widget icon.
- iv. Press 'Save' to confirm changes and '☰' to hide the parameters.



Change the Base Line Comparison settings (Vision Licence needed)

This widget shows the energy (e.g., electric energy, or gas energy) or Carbon savings targets for last period and this period according to the cumulative value or the value recorded for last month.



This widget shows a defined

- ◆ 'Target' value (this month's target)
- ◆ 'Current' value (this month's latest reading)
- ◆ 'Previous' value (last month's target value)

Tip!

A 'Current' value shown in red indicates a failure to meet the configured target and a value shown in green to indicate the configured target is on schedule.

i. Press '☰' (right side of the header banner) to show the available parameters.

ii. Select the required 'Values type', e.g., 'Energy' or 'Carbon'.

If 'Energy' is selected the 'Target', 'Current' and 'Previous' values relate to the kWh savings targets from the energy providing devices.

If 'Carbon' is selected the 'Target', 'Current' and 'Previous' values relate to the defined carbon savings targets.

iii. Select the required 'Widget type', e.g. 'Last month' or 'Cumulative'.

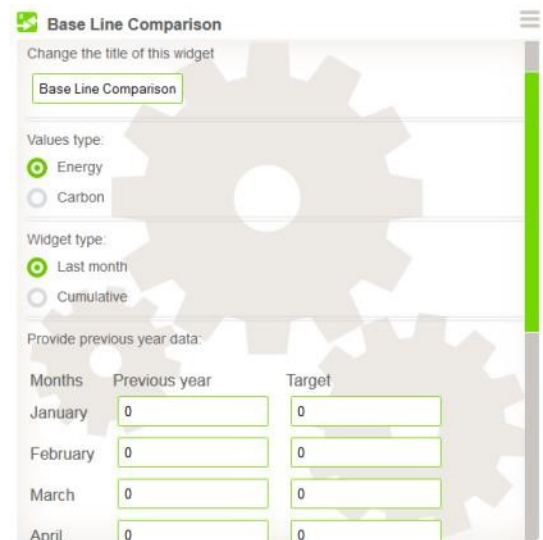
Select 'Last month' to compare the previous complete month with the same month the previous year.

Select 'Cumulative' to compare the current time period, e.g., January 2014 to now, to the same time period of the previous year, e.g. January 2013 to September 2013,

iv. Define the 'Previous year' and 'Target' values. The 'Previous year' values may be derived from previous utility statements. The 'Target' values may be a calculated value.

v. Select the 'Change the title of this widget', edit the widget label and press 'Save' to confirm changes, as necessary. This is the text that appears beside the widget icon.

vi. Press 'Save' to confirm changes and '☰' to hide the parameters.



Base Line Comparison

Change the title of this widget

Base Line Comparison

Values type:

Energy

Carbon

Widget type:

Last month

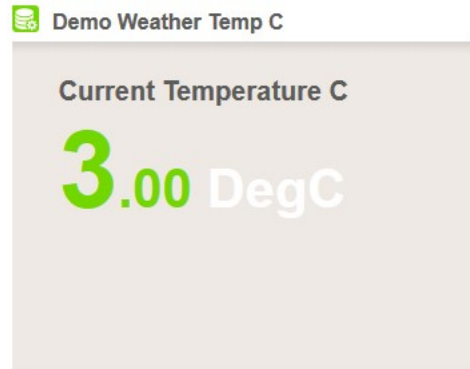
Cumulative

Provide previous year data:

Months	Previous year	Target
January	0	0
February	0	0
March	0	0
April	0	0

Change the Custom Data Value settings (Vision Licence needed)

This widget shows the current values of the configured 'Custom' type, according to the units defined in the 'Preferences' and the Groups related to this configuration.



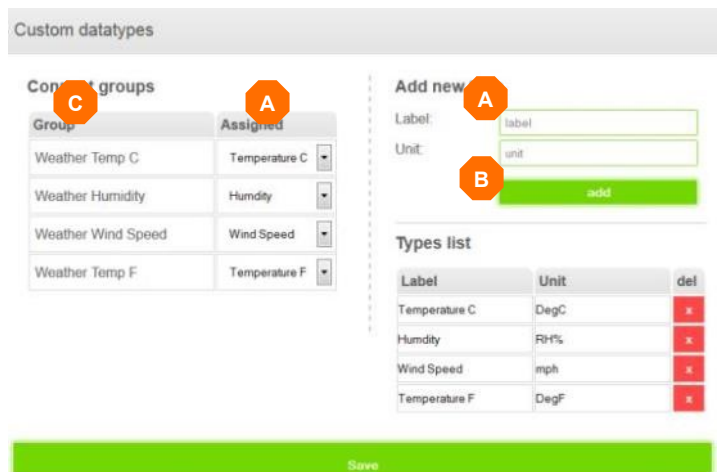
Remember A 'Custom' datatype **MUST** be defined using the 'Custom datatypes' parameters in the Dashboard 'Preferences' section.

- i. On the 'Dashboard>Preferences' page, create a new 'Custom' datatype.

Enter an appropriate 'Label' (A) for the new 'Custom' datatype in the 'Add new type' fields, e.g., 'Temperature C'.

Enter the appropriate value 'Unit' (B) in the 'Add new type' fields, e.g., 'DegC'.

Press 'add' to accept the new 'Custom datatype', and confirm it is shown in the 'Types list'.



Tip! If necessary, press 'x' to delete the corresponding 'Custom' datatype. Alternatively, edit an existing 'Label' and 'Unit' references in the 'Types list'. This may avoid having to delete existing 'Custom' datatypes.

- ii. Assign a new 'Custom datatype' to a Group listed in the 'Connect groups' section.


Find the required 'Group' name label (C - left side of 'Connect groups') from the full list of groups already configured on the 'Grouping' page and select the required new 'Custom datatype' (right side of 'Connect groups'), as necessary.

Tip! Data can only be downloaded manually from the 'Graph' widget using the 'Download' button.

- iii. Press 'Save' to confirm the changes.

CHANGING THE PREFERENCES

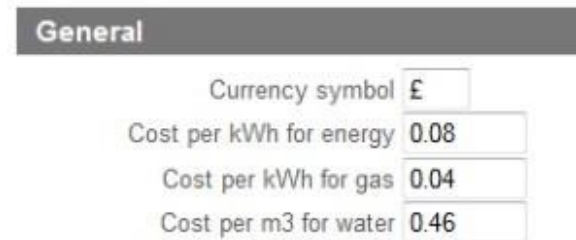
The Preferences are used to determine configuration of financial widget information for utility datatypes, control and appearance of the dashboards and local browser history (cache).

1. Press  (right side of the header banner) to show the **‘Login’** dialog.
2. Press **‘Preferences’** to display the Dashboard General, Local, Utility and Public parameters.

Change Dashboard General parameters

The General parameters determine the configuration of financial widget information for utility datatypes, including Currency relevant to the site location and supplier, and the cost according to the energy and water usage.

1. Change the **‘Currency’** type as necessary, e.g., £, \$, or €.
2. Select the appropriate **‘Cost per...’** parameter, edit accordingly and press **‘Apply’** to confirm changes. This information is used in conjunction with the Financial Spending and Financial Saving widgets.



General	
Currency symbol	£
Cost per kWh for energy	0.08
Cost per kWh for gas	0.04
Cost per m3 for water	0.46

3. Press **‘Public’** or **‘Local’** to preview the configuration.

Change Dashboard Utility parameters

The Utility parameter is used to ensure the latest data is applied to the dashboard widget, e.g., group values.

1. Press the **‘Clear local cache’**, as necessary.
2. Press **‘Public’** or **‘Local’** to preview the configuration.





Utility	
Clear local cache	<input type="button" value="Clear cache"/>

Change Dashboard Local parameters

The Local parameter is used to determine the speed at which the zoom feature is applied.

1. Select the '**Graph zoom speed**', as necessary and press '**Apply**' to confirm changes.

Slow, medium, and fast determines how quickly the selected portion of the graph loads when the zoom in (' ') button is pressed.

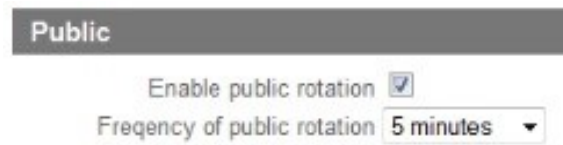


2. Press '**Public**' or '**Local**' to preview the configuration.

Change Dashboard Public parameters

The Public parameters are used to control the display of the dashboard and group pages.

1. Press the '**Enable public rotation**', as necessary. This is used to allow the dashboard to appear according to the orientation of the public display, e.g., portrait or landscape ('' typical monitor orientation).

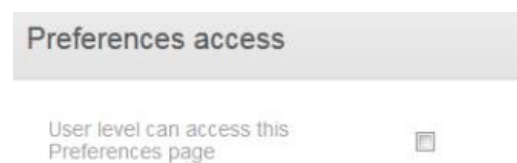


2. Select the '**Frequency of public rotation**', as necessary. This is a time period that determines when the next group page will appear.
3. Press '**Public**' or '**Local**' to preview the configuration.

Change Dashboard Preferences access parameters

The Preferences access parameter is used to control the '**User**' profile access to these configuration parameters.

1. Enable/disable the '**User level can access this Preferences page**', as necessary. When '' all '**User**' access profiles can edit these '**Preferences**' parameters. When '' all '**User**' access profiles are not permitted to edit these '**Preferences**' parameters.



2. Press '**Apply**' to confirm the changes.

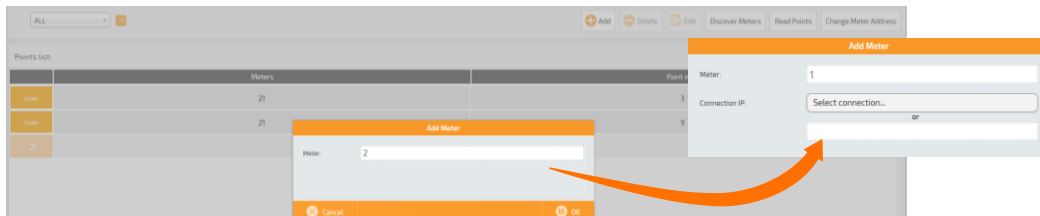
2.5.5 Define MBus Serial, or TCP/IP Master Driver Points

This page is used to discover MBus meters available on the compatible MBus network and define the parameters to be linked for reporting.


Tip! Third party MBus Level Converters can be connected via RS232, RS485, or Ethernet.

1. Press **'Add'** to display a page required to specify the required slave address.
2. Enter the MBus Primary address or Secondary Address (meter Serial/Fabrication number) according to the option defined in the **'Manage Drivers'** page.

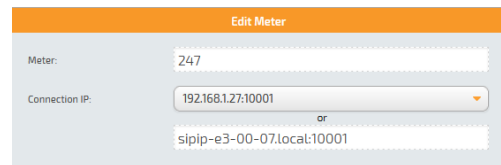
Tip! Ensure the filter option is set appropriately. **'All'** will show every MBus address connected to the MBus Level Converter defined in the **'Manage Drivers'** page.



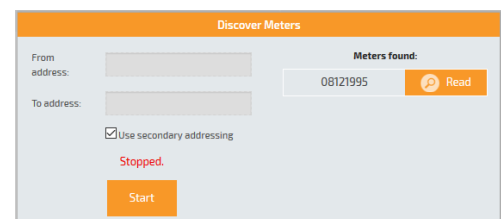
Press  to delete the existing slave address and any configured registers.

Press  to show page used to change the existing slave address.

Tip! Specify **<hostname>:10001** to connect to a device with DHCP/NetBios enabled or **<hostname>.local:10001** for a device with mDNS enabled.



3. Press **'Discover Meters'** to show a page used to detect all Primary or Secondary addresses according to the selected option on this page.
 - i. Press **'Start'** to poll the MBus network via the defined Level Converter and list each meter as it is detected.



Press **'Stop'** to cancel the polling of the MBus network.

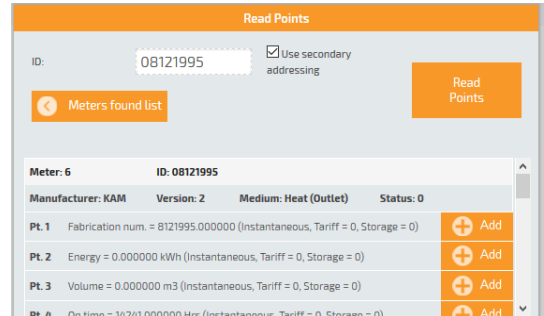
Tip! This is only for determining what meters are connected to the MBus driver defined in the **'Manage drivers'** page.

- ii. Press **'Read'** to show a page used to list all points available from the specified Primary or Secondary address according to the selected option on this page.

Tip! Individual MBus meter points can be added directly from this dialog.

4. Press **'Close'** on completion.
5. Press **'Read points'** to show a page used to list all points available from the specified Primary or Secondary address according to the selected option on this page.

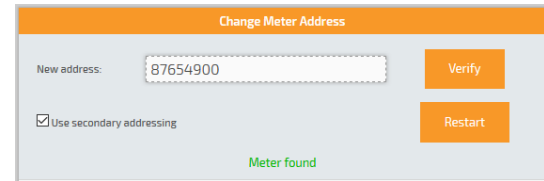
- i. Define the Primary or Secondary address according to the selected option on this page in the Address/Id field.
- ii. Press **'Read points'** to show a page used to list all points available from the specified Primary or Secondary address.
- iii. Press **'Add'** to include the selected point to the specified Primary or Secondary address.



- iv. Press **'Close'** on completion.

- Press **'Change address'** to show a page used to change an existing Primary address according to the selected option on this page.

- i. Define the Primary or Secondary address according to the selected option on this page in the Address/Id field.
- ii. Press **'Verify'** to check the address/Id exist.
- iii. Define **'New address'** as necessary, and press **'Verify'** to ensure the new details are not already used in this MBus Driver connection.



- iv. Press **'Change'** to confirm new details, or **'Restart'** to define different details.
- v. Press **'Close'** on completion.

Tip! Alternatively, manually edit the row indicated by '>' if required MBus points are already known and/or 'Duplicate/move' if a similar point(s) already exist.

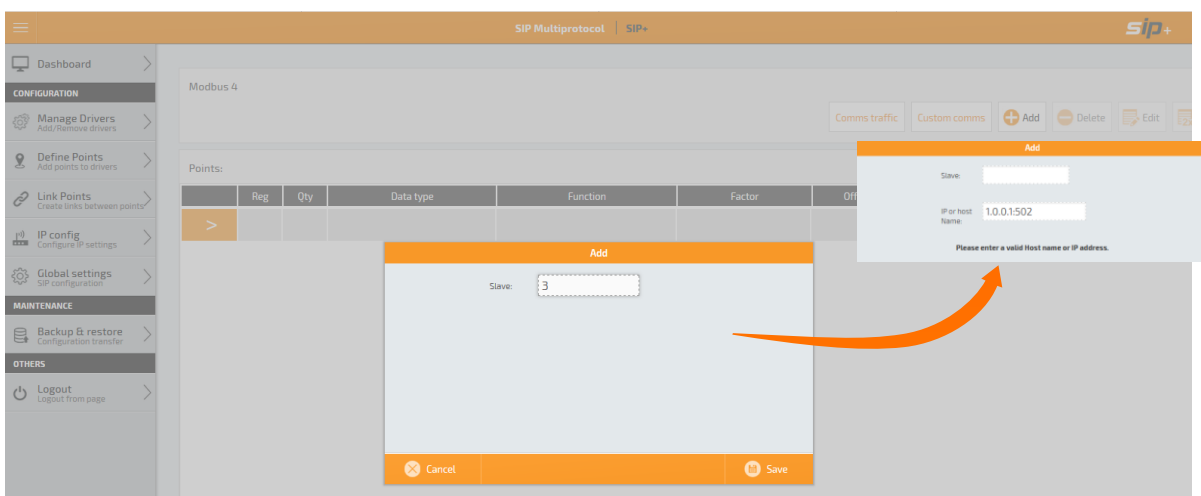
6. Press **'Save'** to confirm changes.

2.5.6 Define ModBus RS232, RS485 or TCP/IP Master Driver Points


This page is used to configure the ModBus slaves available on the compatible ModBus network and define the registers to be linked for reporting.


Tip! Add a slave and register before using the Custom request feature.

1. Press 'Add' to display a page required to specify the required slave address.
2. Enter the required slave address and press 'Save' to confirm. This will add a default configuration.



Note The 'Add' page may include sections specifically used to define the IP address related to the selected slave address.

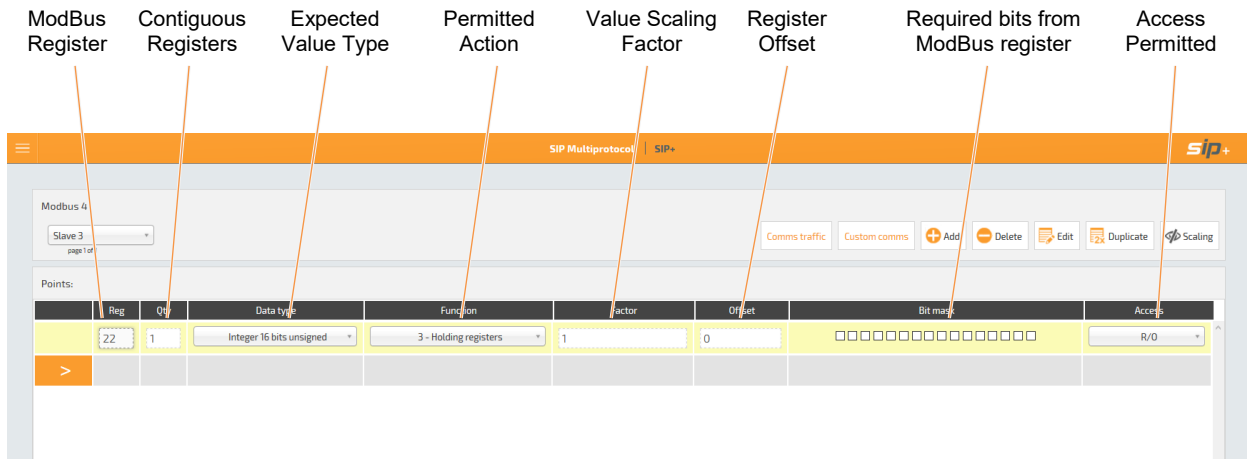
Press , to delete the existing slave address and any configured registers.

Press , to show page used to change the existing slave address.

Tip! Specify `<hostname>:502` to connect to a device with DHCP/NetBios enabled or `<hostname>.local:502` for a device with mDNS enabled.



3. Configure the required ModBus register details for the connected device.
4. Press '>' to insert a pre-defined row. Edit as necessary.



Note The ModBus 'Define points' page will include an IP address option when ModBus TCP/IP driver is selected.

Reg. Used to show the register number corresponding to the ModBus parameter defined in the manufacturers' documentation.

Note The 'Comms traffic' and 'Custom comms' pages (see [Using the ModBus Diagnostic pages](#)) are used to validate the outgoing and incoming messages to/from the specified slave address and verify the response to a specific request.

Qty. Used to define the number of sequential ModBus register are required, i.e., configure registers (00)21 to (00)25 inclusive, 'Qty' equals 5.

Tip! Use the Tab key on the keyboard to move to the next numerical field.

Data type. Used to define the type of value expected from the corresponding register.

Remember ModBus communications are transmitted as multiples of 16-bit messages. Therefore, 32-bit values span two sequential ModBus registers, and 64-bit values span four sequential registers.

DATA TYPE	FUNCTION	DESCRIPTION
Integer 16-bits unsigned	03,04	A value in the range 0 to 65535 is expected
Integer 16-bits signed	03,04	A value in the range -32768 to 32767 is expected
Integer 32-bits unsigned	03,04	A value in the range 0 to 4,294,967,295 is expected
Integer 32-bits signed	03,04	A value in the range -2,147,483,648 to 2,147,483,647 is expected
Int 32-bits unsigned reversed	03,04	A 32-bit (2 x 16-bit) value that transmits the LEAST significant byte first. A value in the range 0 to 4,294,967,295 is expected
Int 32-bit signed reversed	03,04	A 32-bit (2 x 16-bit) value that transmits the LEAST significant byte first. A value in the range -2,147,483,648 to 2,147,483,647 is expected
Float IEEE	03,04	A 32-bit (2 x 16-bit) IEEE compatible value with an accuracy of up to seven digits that transmits the MOST significant byte first is expected, i.e., 4375 E666 = 245.9
Float IEEE reversed	03,04	A 32-bit (2 x 16-bit) IEEE compatible value with an accuracy of up to seven digits that transmits the LEAST significant byte first is expected, i.e., 7543 66E6 = 245.9
Digital (Register)	03,04	A Not 0 (not zero) or 0 (zero) binary value is expected, i.e., 00000000 00000000 is 0 (all other values equal 1 (Not 0))
Digital (Coil/Input)	01	A Boolean value of 1 or 0 (zero) is expected
Digital (Binary 16-bit)	02,03,04	A 16-bit binary value is expected, i.e., 00010010 01111100 = 127
Float IEEE Intel	03,04	A 32-bit (2 x 16-bit) IEEE compatible value with an accuracy of about seven digits that transmits the LEAST significant byte first is expected, i.e., 66E6 7543 = 245.9
BCD 16-bits unsigned	03,04	A 16-bit (4 x 4-bit per digit, where 8, 4, 2 and 1 are assigned per bit respectively) binary value representing a decimal is expected, i.e., 0000 0001 0010 0111 = 127
Integer 64 bits unsigned	03,04	A 64-bit (4 x 16-bit) value that transmits the LEAST significant byte. A value in the range 0 to 9,223,372,036,854,775,807 is expected.
Integer 64 bits signed	03,04	A 64-bit (4 x 16-bit) value that transmits the LEAST significant byte first. A value in the range -4,611,686,018,427,387,904 to 4,611,686,018,427,387,903 is expected.

...continued

DATA TYPE	FUNCTION	DESCRIPTION																																					
...continued																																							
Double 64 Bits	03,04	A 64-bit (4 x 16-bit) IEEE compatible value with an accuracy of up to 19 digits that transmits the MOST significant byte first is expected, byte order 0-7.																																					
Double 64 Bits Reversed	03,04	A 64-bit (4 x 16-bit) IEEE compatible value with an accuracy of up to seven digits that transmits the LEAST significant byte first is expected, byte order 7-0.																																					
Binary to Analog	03,04	An analog value derived from enabled bits is expected, i.e., enabled bits are 00010010 01111100 = 1183, because the 2 (right most bits are ignored).																																					
Special type 1 (signed long integer)	03,04	A 64-bit (4 x 16-bit) positive or negative long Integer value for power factor values is expected, generally from a Schneider Electric PM800 meter. This transmits the MOST significant bit (sign bit) first and then the absolute value (remaining bits), i.e., 0110 = +6, and 1110 = -6.																																					
Special type 2 (unsigned long integer)	03,04	A 64-bit (4 x 16-bit) long Integer value is expected, generally from a Schneider Electric PM800 meter. This transmits the MOST significant bit first and then the absolute value (remaining bits).																																					
Special type 3	03,04	A power of 10 value for specific raw values is expected, i.e., <div style="display: flex; align-items: center; margin-top: 10px;"> <div style="margin-right: 10px;">Value</div> <table style="border-collapse: collapse;"> <tr> <td style="padding: 0 10px;">0.0001</td> <td style="padding: 0 10px;">0.001</td> <td style="padding: 0 10px;">0.01</td> <td style="padding: 0 10px;">0.1</td> <td style="padding: 0 10px;">1</td> <td style="padding: 0 10px;">10</td> <td style="padding: 0 10px;">100</td> <td style="padding: 0 10px;">1000</td> <td style="padding: 0 10px;">10000</td> </tr> <tr> <td colspan="9" style="text-align: center;"> ----- ----- ----- ----- ----- ----- ----- ----- ----- </td> </tr> <tr> <td style="padding: 0 10px;">Raw</td> <td style="padding: 0 10px;">-4</td> <td style="padding: 0 10px;">-3</td> <td style="padding: 0 10px;">-2</td> <td style="padding: 0 10px;">-1</td> <td style="padding: 0 10px;">0</td> <td style="padding: 0 10px;">1</td> <td style="padding: 0 10px;">2</td> <td style="padding: 0 10px;">3</td> <td style="padding: 0 10px;">4</td> </tr> <tr> <td colspan="9" style="text-align: center;">Value</td> </tr> </table> </div>	0.0001	0.001	0.01	0.1	1	10	100	1000	10000	----- ----- ----- ----- ----- ----- ----- ----- -----									Raw	-4	-3	-2	-1	0	1	2	3	4	Value								
0.0001	0.001	0.01	0.1	1	10	100	1000	10000																															
----- ----- ----- ----- ----- ----- ----- ----- -----																																							
Raw	-4	-3	-2	-1	0	1	2	3	4																														
Value																																							
Special type 4 (unsigned long integer)	03,04	A data type specifically for a power value from IME Nemo meters that must be scaled to display it in the appropriate power measurement unit. It is displayed as complete power, or hundredths of power units, as determined by the Transformer ratio calculation (KTA x KTV).																																					

Example A value of 900var is displayed as 9000 if the Transformer ratio calculation KTA (Current transformer ratio) x KTV (Voltage transformer ratio) is less than 6000 but is displayed as 900 if the Transformer ratio calculation KTA x KTV is equal or more than 6000.

...continued

DATA TYPE

FUNCTION DESCRIPTION

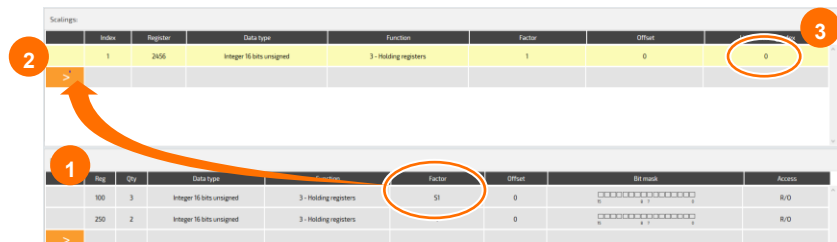
...continued

Special type 5
(Byte)

03,04

A data type specifically from an **IME Nemo** meter representing a sign. It appends a '+' to a value if the register provides a 0x00 value but appends a '-' if a 0x01 value is provided. This can only append a sign to a power measurement unit read by the Special type 4 data type.

Example



Index	Register	Data type	Function	Factor	Offset
1	2008	Integer 16 bits unsigned	3 - Holding registers	1	0

Reg	Qty	Data Type	Function	Factor	Offset	Bit mask	Access
100	3	Integer 16 bits unsigned	3 - Holding registers	SI	0	00000000 00000000	R/O
250	2	Integer 16 bits unsigned	3 - Holding registers		0	00000000 00000000	R/O

1. Register is read and the value is scaled, and then passed to the defined scaling index.
2. Sign appended to scaled value.
3. Value passed to another scaling index to perform further scaling as required.

Special type 6
(unsigned long integer)

03,04

A data type specifically for an energy value from an **IME Nemo** meter that must be scaled using a specific register to display the appropriate energy measurement unit. The value is displayed according to the transformer ratio, e.g.,

Energy Unit	1 Tenth of kvar or Wh	1 kvar or Wh	Tens of kvar or Wh	Hundreds of kvar or Wh	Thousands of kvar or
Raw Value	≤ 1 KTA x KTV < 10	≤ 10 KTA x KTV < 100	≤ 100 KTA x KTV < 1000	≤ 1000 KTA x KTV < 10000	≤ 10000 KTA x KTV < 100000

Tip! Typically, Special type 4, 5 and 6 are used in the dynamic scaling table.

Special type 7, and 8
(Modified unsigned long integer)

03, 04

A data type specifically for an energy value from an **Owen Brothers** 1 Phase and 3 Phase meters respectively.

Special type 9
(Modified unsigned long integer)

03, 04

A data type specifically for a CT ratio value from an **Owen Brothers** 3 Phase meter.

Special type 10

03, 04

A data type specifically for use with the **Branch Power Monitoring system** supplied by Synapsys Solutions

Special type 11

03, 04

A data type specifically for an Unsigned 32bit '**Modulus 10000**' Format as used by **Schneider Electric ION 7300** series meters

Special type 12

03, 04

A data type specifically for an Signed 32bit '**Modulus 10000**' Format as used by **Schneider Electric ION 7300** series meters

...continued

DATA TYPE	FUNCTION DESCRIPTION	
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...continued

Comms Failure	N/A	A data type specifically indicating a communications status of a device. If selected, any ModBus register configuration is ignored, but restricts 'Qty' to 1, and 'Access' to R/O.
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Tip! Link the Comms failure to a Trend 'Digital Input' module type to provide a communications failure indication (☑/☐), or a 'Sensor' module type to provide an accumulated total (max. 255) of failed responses from the device.

Function. Used to define the type of action the slave must perform. Each function (type of action) is identified by a group of specific memory addresses, i.e., coils, inputs, input registers, and holding registers. Each message (communication packet) includes a function code in the range of 1 to 55 Hex (1 to 255 decimal), but a function code in the range of 80 to 55 Hex (128 to 255 decimal) are reserved for exception responses.

FUNCTION (CODE)	DECIMAL ADDRESS	DESCRIPTION
-----------------	-----------------	-------------

Coils (01)	1 - 10000	Shows a single-bit Boolean (True/False, On/Off, or 1/0) ModBus register value. Generally, Read from and Write to (R/W) by an application program and associated with a 'Switch'.
Inputs (02)	10001 - 20000	Shows a single-bit Boolean (True/False, On/Off, or 1/0) ModBus register value. Generally, Read from (R/O) by an I/O system and associated with a 'Digital Input'.
Holding registers (03)	40001 - 50000	Shows 16-bit word Integer ModBus register value. Generally, Read from and Write to (R/W) by an application program and associated with a 'Knob'.
Input registers (04)	30001 - 40000	Shows 16-bit word Integer ModBus register value. Generally, Read from (R/O) by an I/O system and associated with a 'Sensor'.

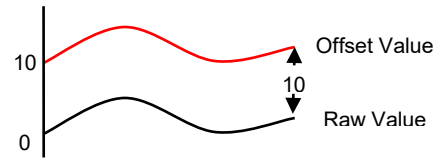
Note JBus protocol lists registers numerically and does not group them into 'Functions'.

Factor. Used to define a value (-0.000001 and 999999) that calculates the correct engineering data value before it is inspected by the BMS. This is used to correctly read any raw value with a scale factor other than 0, multiply the register value read by the appropriate factor of 10.

Example A recorded value of 100mA must be scaled using a Factor of 0.001 to produce an engineering value of 10A, or a recorded value of 100A that is scaled using a factor of 0.1 to produce an engineering value of 10A.

Note The 'Factor' value can be used in conjunction with the 'Scaling' table if S<Dynamic Scaling table Index>*<Factor> is configured (see [CONFIGURE THE DYNAMIC SCALING](#)). This allows the value from a ModBus register to be scaled in conjunction with a second register.

Offset Used to compensate for the differences (-999999 to 999999) the recorded value and the expected or required value.



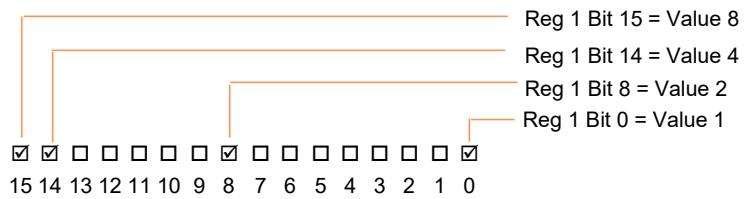
Bit mask Used to define only the requirement of only specified (☑) bits in a 16Bit message. This is specifically used for Digital Binary 16Bit and Binary to Analog Data types.

Note Information about specific bitfield signals should be described in the documentation supplied with the device.

Example Digital Binary 16Bit

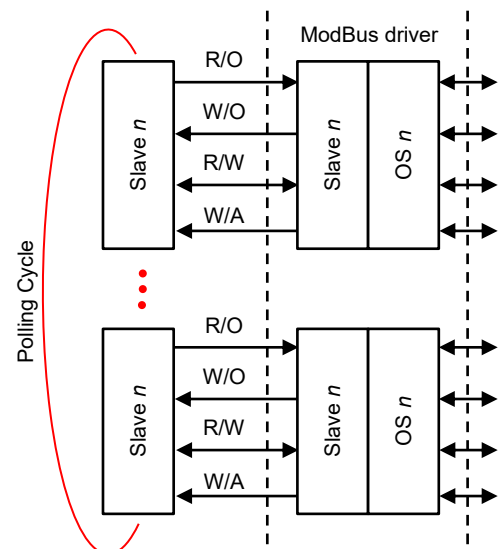


Example Binary to Analog



Access. Used to define the access privilege for the type of operation (Function) applied to the selected register, i.e., read-only (R/O) for an input register mapped to a Sensor, read-only (R/O) for an input mapped to a Digital Input, read-write (R/W) or write-only (W/O) for a coil mapped to Switch or a holding register mapped to a Knob.

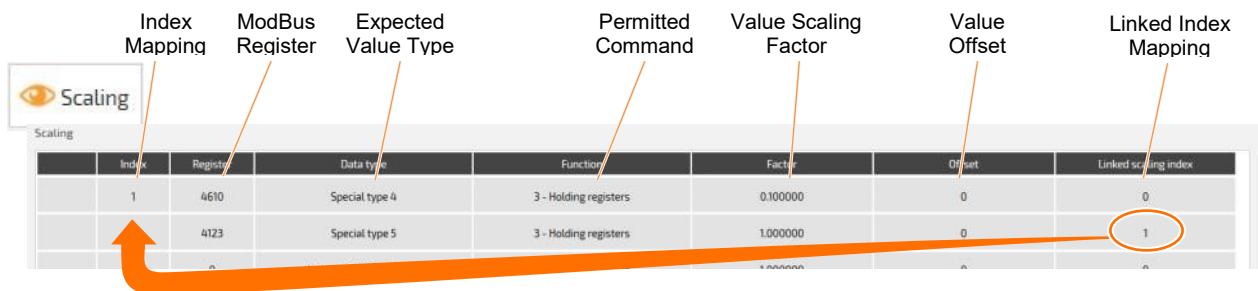
Note R/O, R/W and W/O operations are performed when a value has changed. The 'write-always' (W/A) access type provides a write command every cycle. This can be used to continually write the same value to the register, e.g., perform a heartbeat function.



CONFIGURE THE DYNAMIC SCALING

The Dynamic Scaling table is used to link a ModBus register that is reliant on another register to produce the correct recorded value. Each '**Index**' record supports a link from a register configured in the ModBus table.

Note Any '**Factor**' and '**Offset**' configuration in the ModBus table is applied before any configuration in the Dynamic Scaling table.



Index	Register	Data type	Function	Factor	Offset	Linked scaling index
1	4610	Special type 4	3 - Holding registers	0.100000	0	0
	4123	Special type 5	3 - Holding registers	1.000000	0	1

To configure the dynamic scaling

1. Press '**Scaling**' to show the dynamic scaling table used to associate a register from the Dynamic Scaling table with a register in the ModBus table on the '**Map points**' page.
2. Press '>' to insert a pre-configured index row. These must be configured according to the scaling required for the specific ModBus register. A maximum of 49 scaling indexes can be inserted.

Tip! To remove Dynamic Scaling registers, simply right click a row and select the, '**Delete point**' option. Multiple rows can be selected using '**Select all**' or '**Unselect all**', or using standard Windows keyboard commands, i.e., shift and Ctrl, as necessary.

3. **Index.** Used to associate the register defined in the Dynamic Scaling table with the register specified in the '**Factor**' field (e.g., S1) of the ModBus table.
4. **Register.** Used to define the register required to scale an associated register configured in the ModBus table.

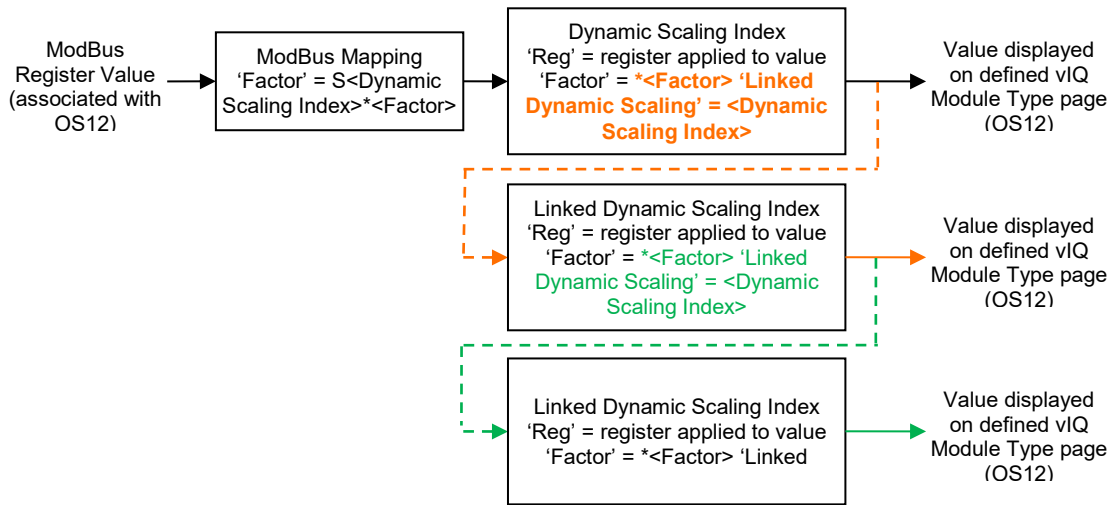
Note Typically, the first digit of a decimal address defines the ModBus function and must be configured in the corresponding '**Function**' field. Any preceding 0 (zeros) are automatically ignored.

Tip! Use the Tab key on the keyboard to move to the next numerical field.

Data type, Function, Factor, and Offset (see [Define ModBus RS232, RS485 or TCP/IP Master Driver Points](#)).

Linked scaling index. Used to define an additional register to be used to provide additional manipulation to the value.

Note **Scaling should be defined in the manufacturers' documentation, observed with some Northern Design meter.**



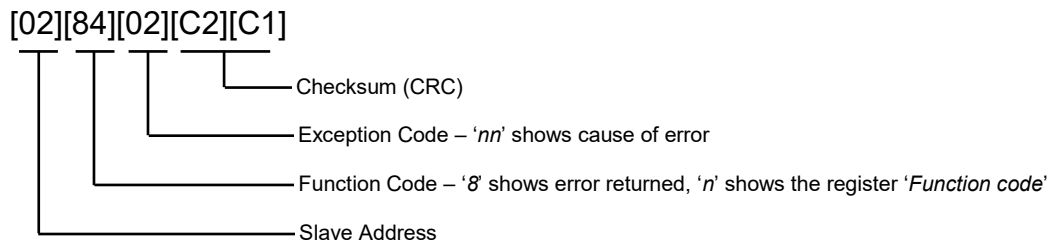
5. Press **'Save'** to save the changes. This ensures the Dynamic Scaling configuration is saved and will ensure the defined registers are scaled accordingly.

USING THE MODBUS DIAGNOSTIC PAGES

The pages that compose the '**Diagnostic**' page allow the user to verify the communication between the devices and this product. These pages are used to validate,

- the last 100 outgoing and incoming communications packets transmitted between unit and the devices at a defined interval.
- the last 100 responses from the devices at a defined interval.
- a response to a single custom request.
- a response to a single custom write command.

The ModBus RTU messages are transmitted continuously by the ModBus Master (this product) without inter-character hesitations and framed (separated) by idle (silent) periods. Each message includes the ModBus address of the device that will act on the command and checking information, ensuring that a command arrives undamaged. If a valid message is transmitted a valid response is returned to the ModBus Master, but if a damaged or invalid message is transmitted an exception message is returned, see [Validate the feedback messages](#).



This shows the exception messages structure.

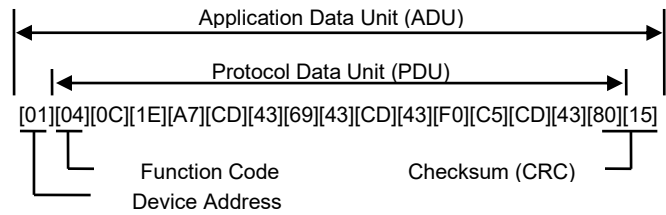
Use this information to determine the cause of the exception messages.

CODE	EXCEPTION NAME	DESCRIPTION
01	Illegal Function	The defined ' Function Code ' does not correspond to the function code for the defined register of the specified slave, e.g., register is a 'Coil' but 'Holding register' is selected.
02	Illegal Data Address	The ' Register ' and/or ' Qty ' are invalid, e.g., the register does not exist, or the number of contiguous registers exceeds the last data address. Example A slave with registers 0 to 99, does not allow 'Register' 96 and 'Qty' 5 because 96 + 5 = 100.
03	Illegal Data Value	The ' Data type ' does not correspond to the data type for the defined register of the specified slave, e.g., the register is an ' Integer 16 bit unsigned ' data type but an ' Integer 32 bit signed ' data type is selected.
04	Slave Device Failure	An unrecoverable error occurred while the server (or slave) was attempting to perform the requested action.
05	Acknowledge	Specialized use in conjunction with programming commands. The slave is processing the request, but the response will take a long time. This exception code prevents a timeout error from occurring in the master.
06	Slave Device Busy	Specialized use in conjunction with programming commands. The slave is processing a long duration program command.
07	Negative Acknowledge	The slave failed to perform the program request. Shown using function code 13 or 14 decimal. Diagnostic or error information from the slave may be required.
08	Memory Parity Error	Specialized use in conjunction with function codes 20 and 21 and reference type 6. A parity error (consistency check) in the memory has been detected. Retry the request, and ensure the slave is operational.
0A	Gateway Path Unavailable	Specialized use in conjunction with gateways. The gateway was unable to allocate an internal communication path from the input port to the output port for processing the request. Ensure the gateway is configured correctly and not overloaded.
0B	Gateway Target Device Failed to Respond	Specialized use in conjunction with gateways, A response was not obtained from the target device. Ensure the device is installed correctly.

VALIDATE THE COMMUNICATIONS PACKETS

The 'Last 100 comms packets' page shows the last 100 outgoing and incoming communication packets (Application Data Unit (ADU)) transmitted via the ModBus protocol. It can be used to ensure the correct response is received for each request. The list of communication packets collected by this product can be automatically refreshed according to the 'Auto-refresh' and 'Minimum interval' configuration.

Each communication packet is coded in hexadecimal values, represented with readable ASCII characters. Only the characters **0** to **9** and **A** to **F** are used for coding.



To validate the communication packets,

1. Select the 'Comms Traffic' option from the 'Diagnostics' section to show the 'Last 100 comms packets' page.
2. Inspect the displayed communication packets.

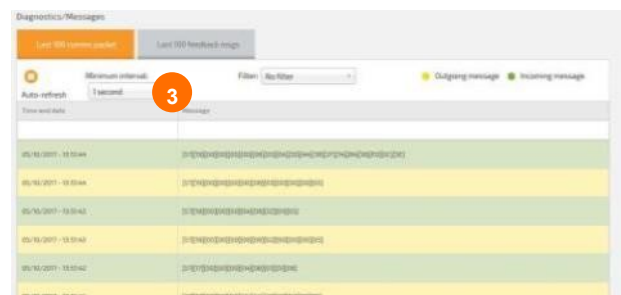
Outgoing messages show the requests and are coded yellow. If only outgoing messages are displayed, the device is not communicating or the ModBus register is configured incorrectly as defined by the feedback messages (see [Validate the feedback messages](#)).

Incoming messages show the responses from the selected slave and are coded green.

Tip! Use the Filter option to show only selected packet types, e.g., 'Outgoing messages' or 'Incoming messages'.

3. Adjust the 'Minimum interval'. This controls the refresh rate of the last 100 communications packets.

Auto-refresh. Used to control the automatic page updates. If 'On' the page updates showing each of the 100 requests and responses. The oldest communications packet is overwritten by the newest communications packet. If 'Off' the last 100 communications packet is not replaced by the newest communications packet.



Minimum interval. Used to define the rate at which this page will update.

VALIDATE THE FEEDBACK MESSAGES

The '**Last 100 feedback msgs**' page shows the condition of the response from each slave connected to this product. It can be used to ensure a response is received. The responses collected by this product can be automatically refreshed according to the '**Auto-refresh**' and '**Minimum interval**' configuration.

To validate the feedback messages,

1. Select the 'Comms Traffic' option from the 'Diagnostics' section to show the '**Last 100 feedback msgs**' page.
2. Inspect the feedback messages.
 - ◆ Valid responses from the device are coded green.
 - ◆ Warning responses, e.g., response failures, are coded yellow.
 - ◆ Error responses, e.g., responses containing incorrect register configuration, are coded red.



Note **Error responses include the Exception code indicating the error detected as defined by the ModBus protocol.**

- Adjust the '**Minimum interval**'. Used to define the rate at which this page will update.
- **Auto-refresh**. Used to control the automatic page updates. If '**On**' the page updates showing each of the 100 requests and responses. The oldest communications packet is overwritten by the newest communications packet. If '**Off**' the last 100 communications packet is not replaced by the newest communications packet.
- **Minimum interval**. Used to define the rate at which this page will update.

VALIDATE A CUSTOM REQUEST

The **'Custom request'** page shows the response to a specific read request from an identified ModBus register in a slave connected to this product. It can be used to verify the response to the specified request by comparing them to the values displayed in the slave. The response can be refreshed by pressing **'Custom request'**.

To validate a specific custom request,

1. Define the ModBus register parameters as specified in the manufacturers' documentation.
 - i. Enter the required **'Slave address'** (include IP address when using ModBus TCP/IP) and **'Register'**. Used to define the requested device and ModBus parameter.

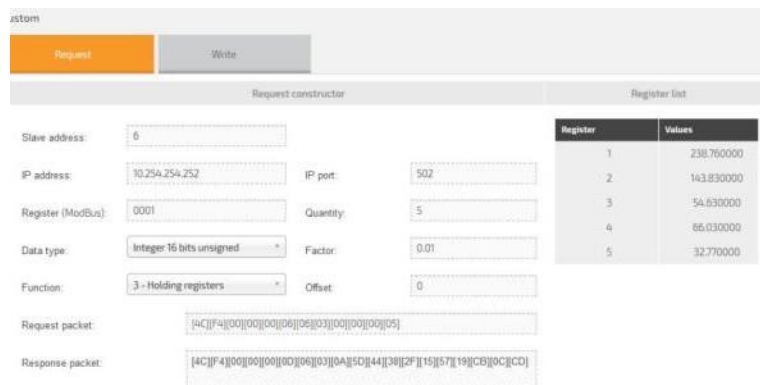
Note

The protocol type (see [Manage Drivers](#)) is shown after the **'Register'**.

- ii. Select the required **'Data type'** and **'Function'**. Used to define the type of number expected from the specified ModBus parameter and the action the slave must perform, respectively.
 - iii. Enter the required **'Number of values'**, **'Factor'** and **'Offset'** as necessary. Used to define the total number of contiguous registers requested, and a value used to provide the engineering data value from each of the registers and a value used to compensate for the difference between the recorded value and the expected or required value, respectively.
2. Press **'Custom request'** to send the configured request and populate the results fields, i.e. **'Register'** and **'Value'** columns.

Request packet. Used to show the outgoing communications packet representing the configured request in hexadecimal values with readable characters.

Response packet. Used to show the incoming communications packet from the specified slave displayed in hexadecimal values with readable characters (see [Validate the communications packets](#)).



Register	Values
1	238.760000
2	143.830000
3	54.630000
4	66.030000
5	32.770000

Tip!

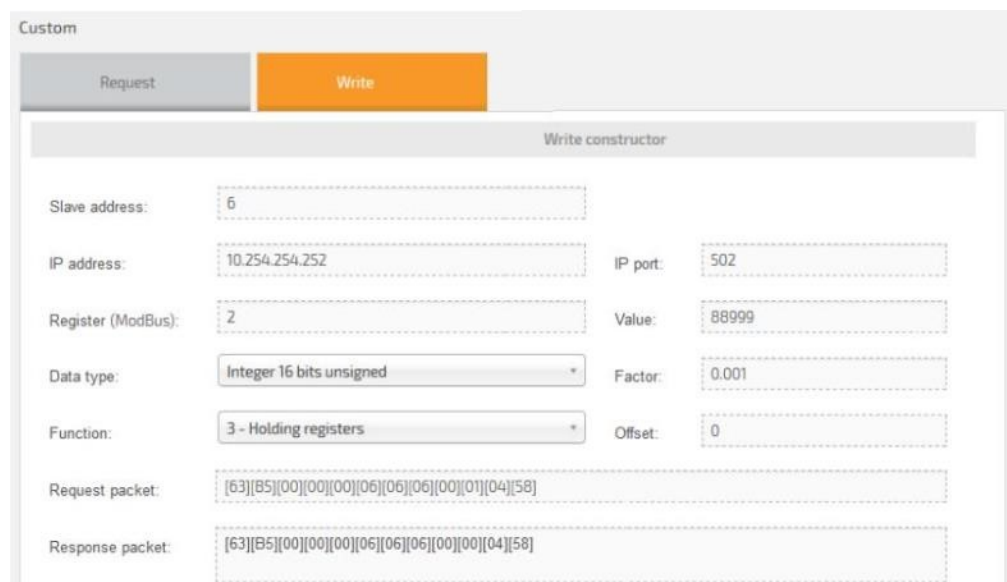
The **'Information area'** displays comments that may be useful when checking the Modbus configuration. It can be used to verify communications with ModBus devices on the network, e.g., Bad reply checksum can indicate the slave does not exist, a duplicate slave address, or the Comms settings are incorrect.

VALIDATE A CUSTOM WRITE

The 'Custom write' page shows the response to a specific write command from an identified ModBus register in a slave connected to this product. It can be used to verify the response to the specified write command by comparing by comparing them to the values displayed in the slave. The response can be refreshed by pressing 'Custom write'.

To validate a specific custom request,

1. Define the ModBus register parameters as specified in the manufacturers' documentation.
 - i. Enter the required 'Slave address' and 'Register', see [Validate a custom request](#).
 - ii. Select the required 'Data type' and 'Function', see [Validate a custom request](#).



- iii. Enter the required 'Factor' and 'Offset', see [Validate a custom request](#).
 - iv. Enter the required 'Value', i.e., the value to be written to the defined register at the specified slave address.
2. Press 'Custom request' to send the configured write command.

Request packet (yellow). Used to show the outgoing communications packet representing the configured request in hexadecimal values with readable ASCII characters.

Response packet (green). Used to show the incoming communications packet from the specified slave displayed in hexadecimal values with readable characters (see [Validate a custom request](#)).

Tip! The 'Information area' displays comments that may be useful when configuring a custom request register. It can be used to verify communications with ModBus devices on the network.

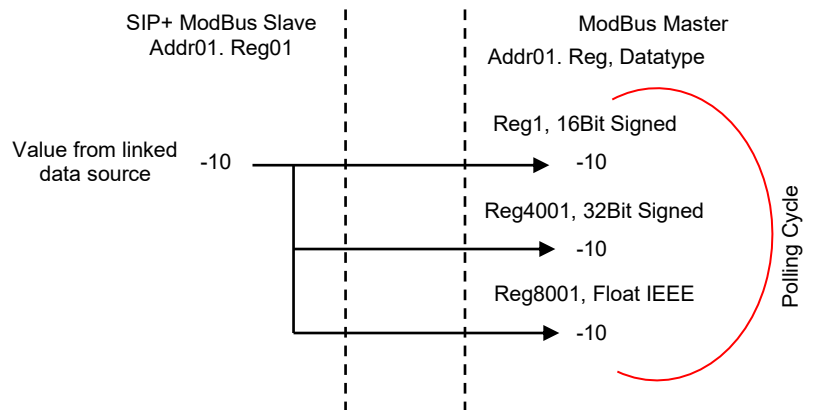
2.5.7 Define ModBus Slave Driver points

The ModBus Slave/Server Driver is used to provide values from the linked data source, e.g., MBus, BACnet (Client), Trend Client, to a third party ModBus Master, i.e., PLC, or SCADA system.

Tip! This driver supports addresses 1 to 247, with register Base 1 (ModBus).

The ModBus Slave makes each register value available as all datatypes at the same time.

Example



REGISTER RANGE IN MODBUS MASTER	REGISTER DATATYPE IN MODBUS MASTER	MAX REGISTERS PER ADDRESS
1-2000	16Bit Signed/Unsigned	1-2000 } Datatype Registers restart at 1 for each Function Code (1-Coils, 2-Inputs, 3-Holding Registers, and 4-Input Registers)
4001-6000	32Bit Signed/Unsigned	
8001-10000	32Bit Float IEEE	

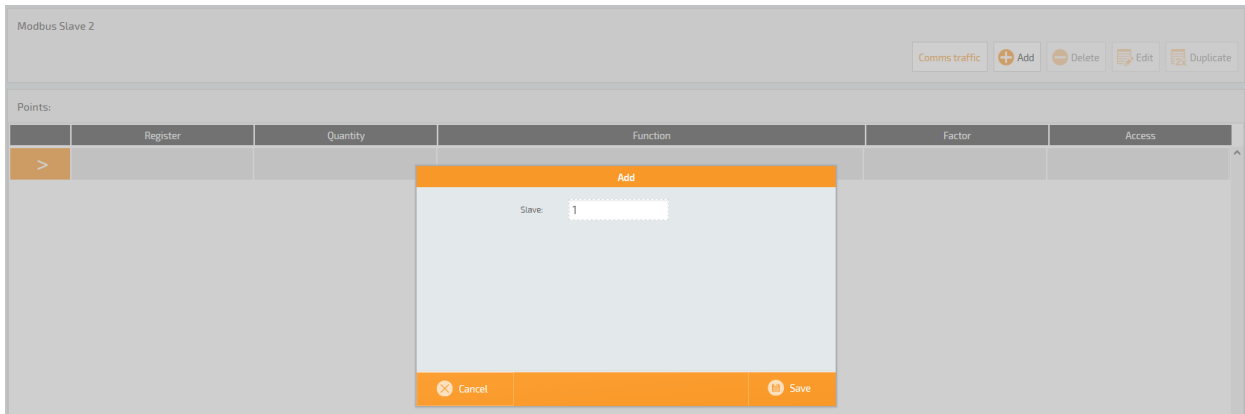
Example Values in each ModBus Slave Register/Base number automatically appear as follows.


REG/BASE	16BIT SIGNED/UNSIGNED	32BIT SIGNED/UNSIGNED	FLOAT32IEEE
1	1/2001	4001/6001	8001
2	2/2002	4003/6003	8003
3	3/2003	4005/6005	8005
to	to	to	to
1000	1000/3000	6000/8000	10000
to	to	N/A	N/A
2000	2000/4000	N/A	N/A


Caution Max 2000 16bit registers or 1000 32bit registers per slave.


To create ModBus Slaves/Server and registers

1. Press **'Add'** to display a page required to specify the required slave address.
2. Enter the required slave address and press **'Save'** to confirm. This will add a default configuration.



Press  to delete the existing slave address and any configured registers.

Press  to show page used to change the existing slave address.

Press  to show a page used to duplicate the selected slave address and registers to one or more slave addresses.

- i. Enter the required slave address.

Tip! A range of slave addresses can be defined, i.e., 2-10, 14, 25.

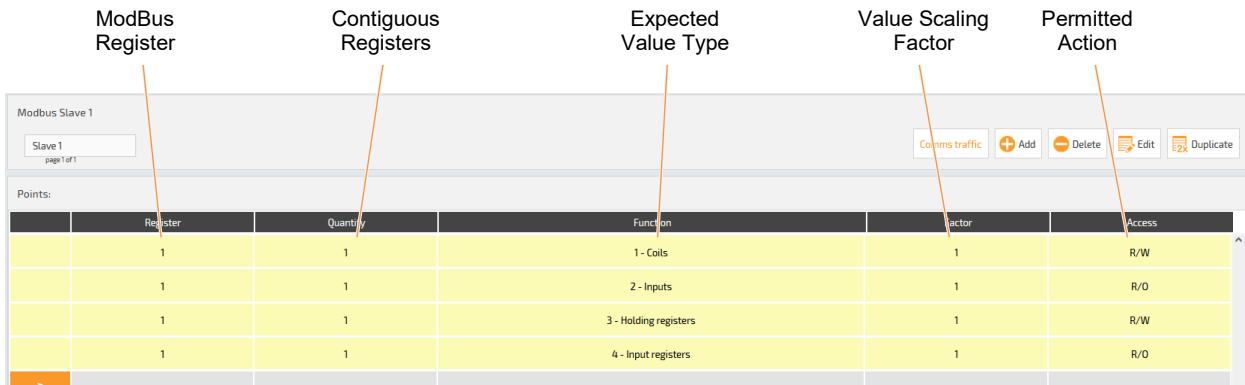
- ii. Press **'Add'** to list the slave addresses to be added to the Define Points page.



Tip! Use the **'☑'** to select slave addresses that can be removed from the list of requested slave addresses. Press **'Delete'** to remove selected slave addresses.

- iii. Press **'Save'** to confirm this list of new slave addresses.

3. Press '>' to insert a pre-defined row. Edit as necessary.



Register	Quantity	Function	Factor	Access
1	1	1 - Coils	1	R/W
1	1	2 - Inputs	1	R/O
1	1	3 - Holding registers	1	R/W
1	1	4 - Input registers	1	R/O

Reg. Used to define the ModBus Slave register that will show a value from the linked point. Edit as necessary

Note The 'Comms traffic' page (see Using the ModBus Diagnostic pages) is used to validate the outgoing and incoming messages to/from the ModBus Master and verify the response to a specific request.

Qty. Used to define a number of sequential ModBus register, i.e. register (00)21 and Qty 5 will give registers (00)21 to (00)25 inclusive.

Tip! To avoid confusion, ensure Qty is 1. Set the ModBus Master to poll continuous registers where appropriate.

Function. Used to define the type of value provided by the source point. Each function (type of action) is identified by a group of specific memory addresses, i.e. coils, inputs, holding registers, and input registers. Each message (communication packet) includes a function code in the range of 1 to 55 Hex (1 to 255 decimal), but a function code in the range of 80 to 55 Hex (128 to 255 decimal) are reserved for exception responses.

FUNCTION (CODE)	DEC ADDR.	DESCRIPTION
Coils (01)	1 - 10000	A single-bit Read/Write (R/W) Boolean (True/False, On/Off, or 1/0) ModBus register value, e.g. controlling a State.
Inputs (02)	10001 - 20000	A single-bit Read Only (R/O) Boolean (True/False, On/Off, or 1/0) ModBus register value, e.g., showing a State.
Holding registers (03)	40001 - 50000	A 16-bit word Read/Write (R/W) Integer/Float IEEE ModBus register value, e.g., controlling a condition.
Input registers (04)	30001 - 40000	A 16-bit word Read Only (R/O) Integer/Float IEEE ModBus register value, e.g., showing a condition.

Factor. Used to apply a scaling factor to a value from the linked point before the ModBus Master polls the register.

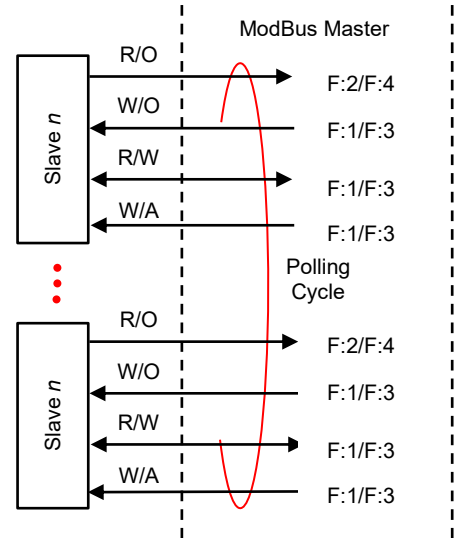
Tip! To avoid confusion, ensure Factor is 1.

Access. Used to define the type of operation applied to the selected register.

Note R/O, R/W and W/O operations are performed when a value has changed. The 'write-always' (W/A) access type provides a write command every cycle. This can be used to continually write the same value to the register, e.g., perform a heartbeat function.

Tip! To avoid confusion, ensure use R/W for Function 1 & Function 3, & R/O for Function 2 and Function 4.

4. Press **'Save'** to confirm changes.



2.5.8 Define MQTT Driver Points

The MQTT Driver uses a Publish and Subscribe method of transferring data related to a defined Topics. An MQTT Broker is required, but this can be part of the MQTT platform, i.e., Microsoft AWS, or Google IoT hub.

Data can be transferred as plain text or JSON topics, with the payload structure determined by the configuration on this page.

Caution MQTT points affect the available points limit.

To create MQTT points

1. Press '>' to insert a pre-defined row. Edit as necessary.

MQTT DEFINE POINTS							
	Topic		Property	COV	QOS	Retain	Access
	On/Off	Polling Topic					Interval
	▼	DevPC/S06F1R1		0	0	Off	R/W
	○ Polling	Polling Topic					interval
	▶	DevPC/S06F2R1		0	0	Off	R/O
	▶	DevPC/S06F3R1		0	0	Off	R/W
	▶	DevPC/S06F4R1		0	0	Off	R/O

Topic. Used to define the parameter being Published to the Broker and/or Subscribed from the Broker.

Example Unique Topic only.

Each Payload (plain text) shows the value according to the timestamp.

Value 07-06-2021 14:00:26.50426332 Timestamp
28800.000000

Each Payload (JSON Format) shows the value according to the timestamp.

07-06-2021 14:07:51.50871576
28814.000000

Example Unique Topic with multiple Property parameters.

Each Payload (plain text) shows the value according to the timestamp.

08-06-2021 14:58:44.53924574
{"S06F4R5":16428.0,"S06F4R5_ts":1623164324}

Each Payload (JSON Format) shows the value according to the timestamp.

08-06-2021 14:58:12.53892255
{"S06F4R5":31754.0,"S06F4R3_ts":1623164291}

Tip! A 'get' command in second MQTT Client can be used to see all values and Topics in a single payload.

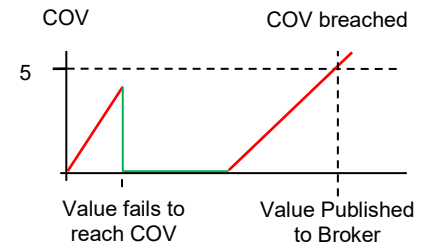
Property. Used in conjunction with the Topic. If all Topics are unique, every updated value will be an individual payload between this product and the Broker.

Tip! All changed values can be sent as an individual payload if the Property is the same for all Topics.

COV. Used to define when a value will be published to the Broker. If 0 (zero), every change will be published to the Broker, if not 0, the value MUST change by at least the specified amount before the payload is attempted.

Retain. Used to instruct the Broker to use the last value for a specified topic. When a new client subscribes to a topic, they receive the last message that is retained on that topic.

Access. Used to define what is allowed to occur at the parameter linked to this Topic, i.e., W/O published to Broker only, R/W Published to Broker and Subscribed from Broker, or R/O Subscribed from Broker only.



2. Select **Delete** from the available menu option to remove the selected Topic.

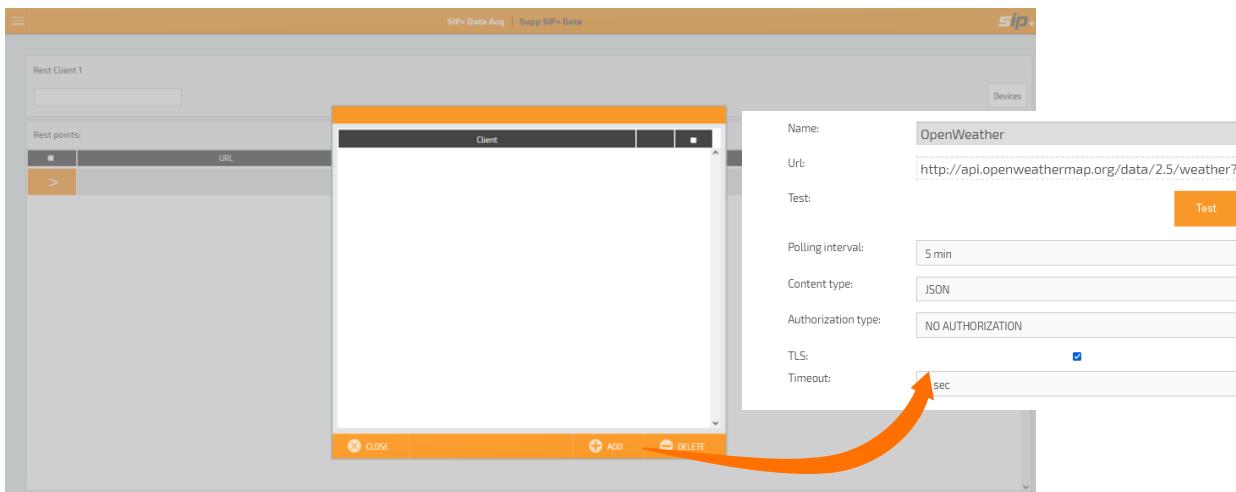
2.5.9 Define REST Client Driver Points

The REST Client Driver is primarily used over HTTP, making use of HTTP GET method operations to provide fast and reliable performance for getting value from a defined source, supporting both GET and POST commands.

When using the REST Client, the GET (e.g., read only) command is used to pull values from a source location, e.g., an online weather service. The POST (e.g., write only) command is used to write values to a REST server.

To create REST client points

1. Press **'Devices'** to display a page required to define the required REST Device.
2. Press **'Add'** to show default REST Client connectivity credentials.
3. Enter the required details and press **'Save'** to confirm. This will add a default configuration.

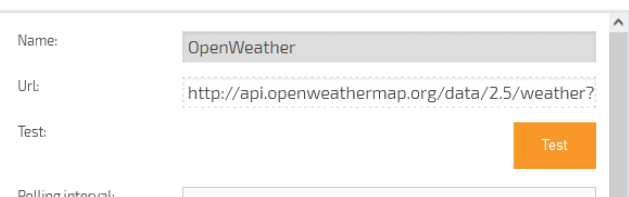


- i. Enter the required Device connectivity details.

Name. Used to provide a meaningful identification for this REST client connection.

URL (Uniform Resource Locator). Used to define the address of a given unique resource on the network.

Test. Used to confirm connectivity with the devices identified by the **URL**.



- ii. Configure the required Authorisation details.

Polling interval. Used to define the minimum period each device may be polled, i.e., each device will be polled every 5 minutes or more.

TEST

Polling interval: 5 min

Content type: JSON

POST instead of PUT:

Authorization type: NO AUTHORIZATION

Content type. Used to define the messaging type provided to the REST API. Select **JSON (JavaScript Object Notation)** or **Plain text**. **JSON** is an open standard file format and data interchange format that uses human-readable text to store and transmit data objects consisting of attribute–value pairs and arrays (or other serializable values). It is a common data format with diverse uses in electronic data interchange, including that of web applications with servers. **Plain text** indicates only characters of readable are used.

POST instead of PUT. Used to define which REST command will be used for the applicable REST API. If , PUT is used. If , POST is used.

TLS (Transport Layer Security). Used to manage the TLS encryption type. If , TLS encryption will be implemented when communicating with the device specified by the URL.

POST instead of PUT:

Authorization type: NO AUTHORIZATION

TLS:

Timeout: 5 sec

Timeout. Used to determine when the connection to the device specified by the URL has failed.

Authorisation type. Used to define the access rights/privileges required by the applicable REST API. Supports URL Hostname Prepend, HTTP Basic, OAuth2, UHOO and No Authorisation.

Tip!

The type of authorisation required should be available from the third party. UHOO is a specific air quality device.

If using URL HOSTNAME PREPEND, only a username and password (provided by the third party) will be required.

POST instead of PUT:

Authorization type: URL HOSTNAME PREPEND

TLS:

Timeout: 5 sec

Username: Admin

Password: aaaaaaaaaaaaaaaaaa

If using HTTP Basic, a username and password (provided by the third party) will be required and encoded but not encrypted.

POST instead of PUT:

Authorization type: HTTP BASIC

TLS:

Timeout: 5 sec

Username: Admin

Password: aaaaaaaaaaaaaaaaaa

If using OAuth2, a Grant type must be selected.

Client Credentials is used to obtain an access token outside of the context of a user. This is typically used by clients to access resources about themselves rather than to access a user's resources.

POST instead of PUT:

Authorization type: OAUTH2

TLS:

Timeout: 15 sec

Grant type: CLIENT CREDENTIALS

Write: Read:

Access token URL: eyJ0eXAI0iJKV1QilCjhbGciOiJIUzI1NiJ9.eyJhdWQiOiIiLCJ...

Client secret: kj sdfh489387n34 4u484 38u5n 3834095 u4544534

Client id: aaaaaaaaaaaaaaaaaa

Use the Read and write options to manage the access rights for this third party.

Note The Client Credentials Grant type should be provided by the third party. It requires,

Access (Bearer) Token, a string used to allow an application to access an API.

Client Secret, a string ensuring the request to get the access token is made only from the application, and not from an authorised site.

Client id, an identifier for the application, obtained when first registering for an application.

Example OAuth2, with Client Credentials Grant type.

```
POST /token HTTP/1.1
Host: authorization-server.com

grant_type=client_credentials
&client_id=xxxxxxxxxx
&client_secret=xxxxxxxxxx
```


Authorisation Code is used by confidential and public clients to exchange an authorization code for an access token. After the user returns to the client via the redirect URL, the application will get the authorization code from the URL and use it to request an access token.

Use the Read and write options to manage the access rights for this third party device.

Note

The Authorisation Code Grant type should be provided by the third party and requires.

Pin Code is the authorization code generated by the authorization server, typically lasting between 1 to 10 minutes depending on the OAuth service.

Redirect URI used to show the authorization server where to send the user back to after they approve the request.

Access (Bearer) Token is a string used to allow an application to access an API.

Client Secret is a string ensuring the request to get the access token is made only from the application, and not from an unauthorised site.

Client id is an identifier for the application, obtained when first registering for an application.

Example

OAuth2, with Authorisation Code Grant type.

```
POST /oauth/token HTTP/1.1
Host: authorization-server.com

grant_type=authorization_code
&code=xxxxxxxxxx
&redirect_uri=https://example-app.com/redirect
&code_verifier=Th7UHJdLswIYQxwSg29DbK1a_d9o41uNMTRmuH0PM8zyoMAQ
&client_id=xxxxxxxxxx
&client_secret=xxxxxxxxxx
```

Password is used to exchange a user's credentials for an access token.

Caution

This Grant type has been superseded for security reasons.

Use the Read and write options to manage the access rights for this third party device.

PUS I instead of PU I:
 Authorization type: OAUTH2
 TLS:
 Timeout: 15 sec
 Grant type: PASSWORD
 Username:
 Password:
 Write: Read:
 Access token URL: eyJ0eXAI0iJKV1QILChbGciOjIJSUzi1NiJ9.eyJhdWQiOiIxI...
 Client secret: kjdfh489387n34 4u484 38u5n 3834095 u4544534...
 Client id: aaaaaaaaaaaaaaaaaa

Note

The Password Grant type should be provided by the third party and requires.

Username and password are the authorization code generated by the authorization server, typically lasting between 1 to 10 minutes depending on the OAuth service.

Access (Bearer) Token URL is a string used to allow an application to access an API.

Client Secret is a string ensuring the request to get the access token is made only from the application, and not from an unauthorised site.

Client id is an identifier for the application, obtained when first registering for an application.

Example

OAuth2, with Password Grant type.

```

POST /oauth/token HTTP/1.1
Host: authorization-server.com

grant_type=password
&username=user@example.com
&password=1234luggage
&client_id=xxxxxxxxxx
&client_secret=xxxxxxxxxx
  
```

Caution

Implicit is used by public clients that do not have a Client Secret.

This Grant type has been superseded by Authorisation Code for security reasons.

POST instead of PUT:

Authorization type:

TLS:

Timeout:

Grant type:

Access token:

Note

The Implicit Grant type should be provided by the third party and requires.

Access (Bearer) Token URL is a string used to allow an application to access an API.

No Authorisation is used by clients when there are no access restrictions implemented.

POST instead of PUT:

Authorization type:

TLS:

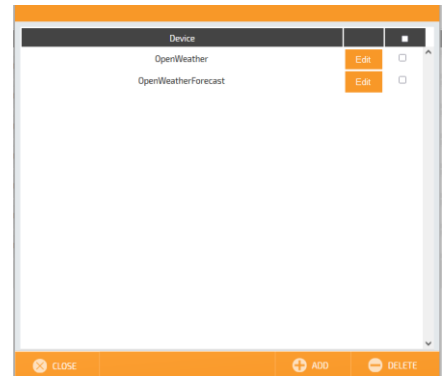
Timeout:

Save. Use this to confirm the REST Client connection details.

Edit. Use to show the corresponding REST Client connection details.

Tip!

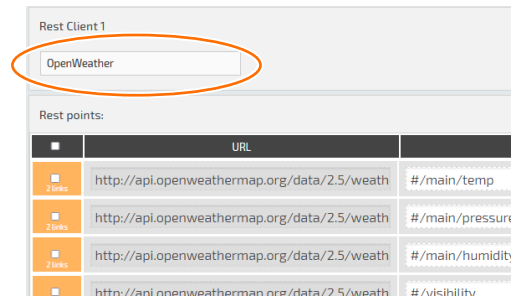
Select the tick box of the REST device that is not required, and press 'Delete' to remove the defined REST Client.



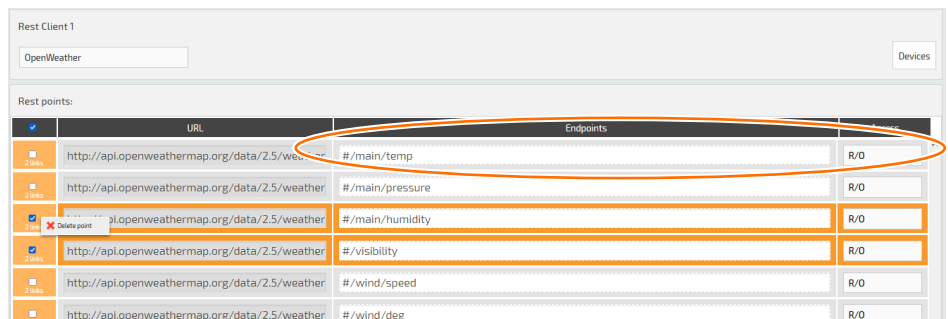
- Select the REST Client device from the list to show the REST Client Endpoints.

Caution

The Endpoints MUST be available from the REST Client.



- Press '>' to insert a pre-defined row. Edit as necessary.



Tip!

Use the '☑' to select a REST Endpoint that can be removed. Press 'Delete point' on the context menu to remove selected REST Endpoint.

2.5.10 Define REST Server Driver points

The REST Server Driver is the Synapsys Solutions REST API compatible software. It provides values to a REST client across an IP network using an OAuth 2.0 authentication.

To create REST Server points

1. Press **'Client Admin'** to display a page required to define an available connection to this device.
2. Define the connection details.
 - i. Press **'Add'** to display a page used to create a connection and define all the required connection credentials.



Client name. Human readable text identifying for connection by a third party. Edit as necessary. Max 3 REST Clients are permitted.

Permission. The permitted privileges for connection by a third party. Set **'Write'** and **'Read'** (*On*) to allow the connected third party to write and/or read the configured parameters. If (*Off*), third party is not allowed to write and/or read the configured parameters. Edit as necessary.

Client name:	BMS PC
Client id:	0smaOP3FeNE7K9L
Client Secret:	20gz1L3P0X3LFFLausxWOMp3iP4v9P05
Permission:	
Write: <input checked="" type="checkbox"/>	Read: <input checked="" type="checkbox"/>
Access token:	DZgNRuqTeHGEynYvN1jRGOKHs3QP9Iiv

you should Copy this code to be used in the future.

- ii. Press **'Save'** to confirm and show connection details required by third party connection.

Client id and **Client Secret.** A machine id code generated internally for connection by a third party, and the corresponding pass code for requesting an access 'Bearer' token.

Tip! **The Client id and Client Secret can be used as authentication for requesting the access 'Bearer' token by the third party connection, if required.**

- iii. Press **'Get token'** to provide an access 'Bearer' token. This is the 'Bearer' token required by the third party to read and write values to the REST points defined internally.

Caution **The third party must include the access 'Bearer' token in the Authorization header when making requests.**

- iv. Press **'Save'** to confirm connection details. Close the page.

Tip! **Use the** to select a connection that can be removed. Press **'Delete'** to remove selected connection.

3. Create REST server points. These are Endpoints can be used to the make the value from a linked point available to a third party connection.

URI. Identifies the REST point to the third party connection. Edit as necessary.

Access. Defines the type of operation permitted to this REST point, dependant on the point linked.



URI	Access
<input type="checkbox"/> /rest/ 501R01F3RoomTemp	R/O
<input type="checkbox"/> /rest/ point2	W/O

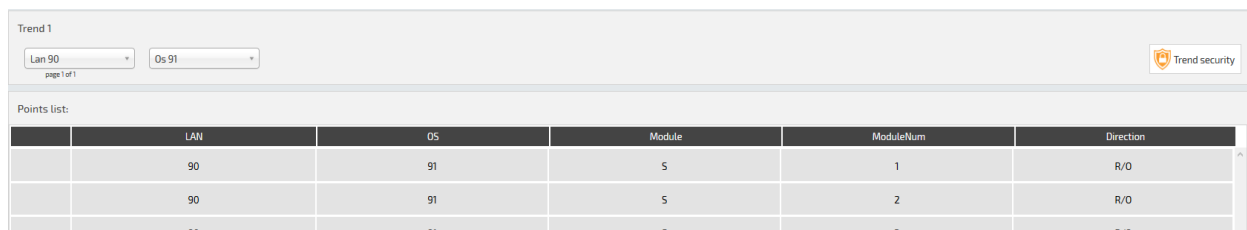
Tip! Use the '☒' to select a REST Endpoint that can be removed. Press 'Delete' to remove selected REST Endpoint.

2.5.11 Define Trend Driver Points

The Trend Driver provides read only and read/write access directly to defined Trend modules across a Trend BMS network.

1. Press '>' to insert a pre-defined row. Edit as necessary.

Tip! Ensure the filter options are set appropriately.



Trend 1

Lan 90 Os 91

page 1 of 1

Trend security

Points list:

LAN	OS	Module	ModuleNum	Direction
90	91	S	1	R/O
90	91	S	2	R/O
an	os	c	3	R/W

- **LAN (Local Area Network).** Used to define the Trend LAN of the Trend module being polled.
- **OS (out-station).** Used to define the Trend controller of the Trend module being polled.
- **Module (Sensor, Digital Input, Knob, and Switch).** Used to define the type of Trend Module in the Trend controller being polled.
- **ModuleNum (Module number).** Used to define the specific Trend Module, Sensor, Digital Input, Knob, and Switch, being polled.
- **Direction.** Used to define read only or read/write access to that module.

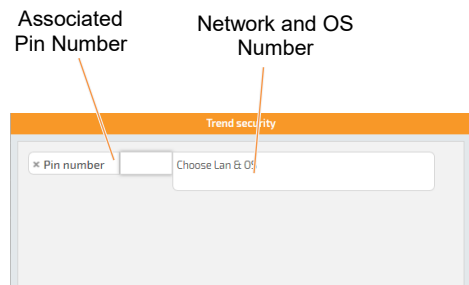
TREND MODULE	DESCRIPTION
Sensor	Indicates a Read from (R/O) analogue value is expected.
Digital Input	Indicates a Read from (R/O) single-bit Boolean (True/False, On/Off, or 1/0) state is expected.
Knob	Indicates a Read from and Write to (R/W) analogue value is expected.
Switch	Indicates a Read from and Write to (R/W) single-bit Boolean (True/False, On/Off, or 1/0) is expected

CONFIGURE THE MODULE AUTHORISATION

Occasionally authorisation may be used to control which users are permitted to change module parameters in a specific group of OSs. Groups of one or more OSs can be protected using a pin number. This pin number only allows changes to module parameters in the OS, after the correct pin number has been entered. When a valid pin number is entered, if requested in the BMS, it confirms the user is authorised to change a module parameter.

Tip! Check the IQ Controller User module 'Pin Number' and 'Pin Level', and/or the 'Users' page in the 'vIQ configuration'.

1. Press '**Trend Security**' to display the 'Module Authorisation' dialog. This shows groups of OS (OS number) and associated Pin number fields.
 - i. Configure the individual groups of OSs by defining the '**LAN**' number and the specific '**OS**' (OS identification number).



Caution Not compatible with IQ Controller Secure VCNC.

- ii. Enter the required pin number, 4 (four) digit value maximum, in the '**Pin number**' field associated with the individual group of meters. The Pin number should already be configured.
2. Press '**Save**' to confirm changes.

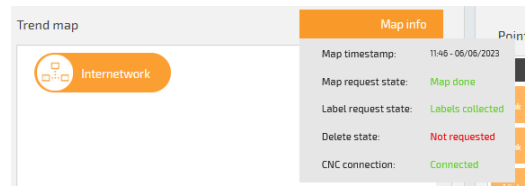
2.5.12 Define Trend Client Driver Points

This page is used to discover supported Trend controller modules types on the compatible IP network and define the parameters to be linked for interfacing and reporting.

1. Discover all devices connected to the Trend BMS in the compatible subnet range via the Trend connection defined in the Manage driver page.

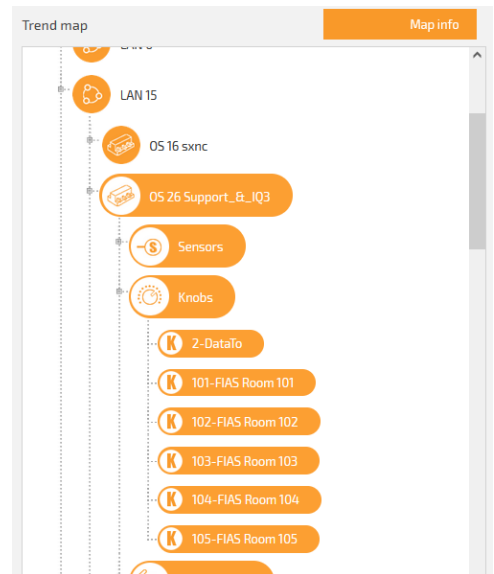
Tip! Press 'Map info' to ensure the connection to the Trend BMS has been made, before trying to discover Trend LANs/OSs/Modules.

- i. Select 'Internetwork' (highlight text orange) and press 'Get map' at the foot of the tree to discover all Trend LANs in the UDP Group and all OSs in each Trend LAN.



Tip! Be patient when discovering larger Trend sites.

- ii. Press the disc for a Trend LAN to expand and show the discovered Trend OSs.
- iii. Select an IQ controller, e.g., 'OS nn Aaaaaaa' (highlight text orange) and press 'Get labels' to discover the Modules and Module labels available in the selected IQ controller.



Tip! Select 'Internetwork' (highlight text orange) and use 'Delete' to remove the Trend map. This can be used to confirm connectivity with the centralised controller, and will not affect the configuration of this product.

Press 'Map info' to show the current state of the Trend Map.

- iv. Press the disc for an IQ controller to expand and show the available Trend modules, e.g., 'Sensors', 'Knobs', 'Digital Inputs', 'Switches', 'Timezones', and 'Drivers'.
- v. Press the disc for an Trend Module type to expand and show the selected Module type Module labels available in the selected IQ controller

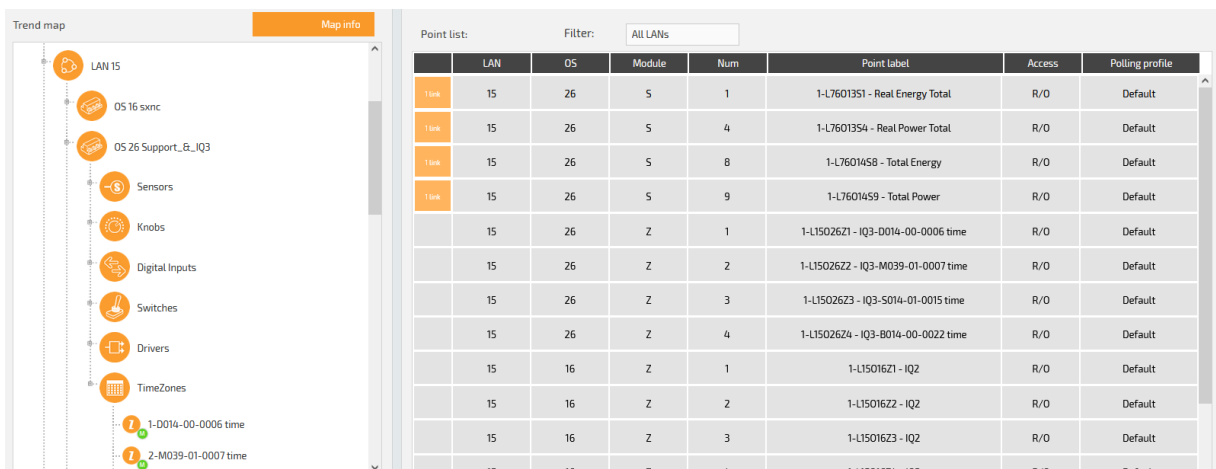
- vi. Select an IQ controller, e.g., 'OS nn Aaaaaaa' (highlight text orange) or an individual Module type/Number, e.g., 'Kn-Aaaaa', and drag to the table, as below. A message confirms the point is added to the configuration. Each column is automatically populated according to the Trend LAN, OS, Module Type, Module Number, and a Point label, and can be edited as required.

Tip! The 'Point label' column shows a unique label, automatically generated according to the first 4 (four) column names & values, e.g., <L15><O26><S><1> - <Real Energy Total>.

- vii. Use the 'Filter' options to reduce what is shown in the Points list. When a filter is applied, use the 'Edit' option to allow changes to a filtered range, and 'Duplicate' option to replicate the filtered list of Modules to configure additional Modules.

Remember Alternatively, manually edit the row indicated by '>' if required Trend Modules are already known and/or 'Duplicate/move' if a similar point(s) already exist.

Tip! Press 'Copy/paste data' button to display a dialog. Use 'Copy to clipboard' to add page details to the computer clipboard or click the right-hand mouse button in the white square and select 'Paste' from the context menu to add copied information to the page. Copied information can be edited using .CSV editing software, e.g., Microsoft Excel. A configuration spreadsheet is available from Synapsys Solutions Technical Support.



The screenshot shows the Synapsys configuration interface. On the left is the 'Trend map' showing a hierarchy of components: LAN 15, 05 16 sxnc, 05 26 Support_B_IQ3, Sensors, Knobs, Digital Inputs, Switches, Drivers, and TimeZones. On the right is the 'Point list' table, which is filtered to 'All LANs'. The table has columns for LAN, OS, Module, Num, Point label, Access, and Polling profile. The first four columns are highlighted in orange, indicating they are used for generating the unique Point label.

	LAN	OS	Module	Num	Point label	Access	Polling profile
lock	15	26	S	1	1-L7601351 - Real Energy Total	R/O	Default
lock	15	26	S	4	1-L7601354 - Real Power Total	R/O	Default
lock	15	26	S	8	1-L7601458 - Total Energy	R/O	Default
lock	15	26	S	9	1-L7601459 - Total Power	R/O	Default
	15	26	Z	1	1-L1502621 - IQ3-D014-00-0006 time	R/O	Default
	15	26	Z	2	1-L1502622 - IQ3-M039-01-0007 time	R/O	Default
	15	26	Z	3	1-L1502623 - IQ3-S014-01-0015 time	R/O	Default
	15	26	Z	4	1-L1502624 - IQ3-B014-00-0022 time	R/O	Default
	15	16	Z	1	1-L1501621 - IQ2	R/O	Default
	15	16	Z	2	1-L1501622 - IQ2	R/O	Default
	15	16	Z	3	1-L1501623 - IQ2	R/O	Default
	15	16	Z	4	1-L1501624 - IQ2	R/O	Default

Tip! Use the 'Map mismatch' button to indicate any configured Trend Modules that are NOT available in the current 'Trend map'.

Access. Used to show the Module can only be read, or can be read from and written to. Typically, Sensors and Inputs are R/O (Read Only) because they refer to a value/state that can only be read in the source device. Knobs and Switches are R/W (Read and Write) because they refer to a value/state that can be changed in the source device.

Polling profile. Used to define the polling rules, i.e., manage the polling cycle if IQ controllers fail to respond within the Polling.

Use the **'Polling profiles'** option to configure polling rules. The polling rules are included in the **'Data Acquisition'** **'Trend Network'** report format.

Profile name	Min polling interval	Max polling interval	Throttling threshold
Default		--	--
Profile 2	5 min	3 hr	<90% success

If using the **'Default'** profile, the Trend communications operates according to the Trend Client Comms settings (Manage drivers>Trend Client>Comms settings).

Min polling interval. Used to define the expected polling interval.

Max polling interval. Used to define the maximum polling interval permitted when specific IQ controllers fail to respond within the expected interval, and **'Throttling threshold'**.

Throttling threshold. Used to define when the **'Max polling interval'** will be applied.

Press **'>'** to add a **'Polling profile'**. Edit the **'Profile name'**, used to identify this polling rule as a **Polling profile** option. Edit the **'Min polling interval'**; and **'Max polling interval'** as necessary. Select the **'Throttling threshold'** as necessary.

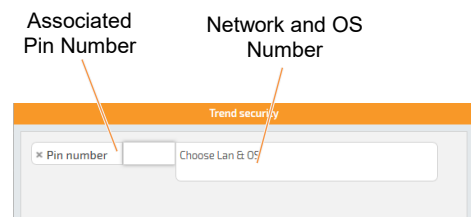
2. Press **'Save'** to confirm changes.

CONFIGURE THE MODULE AUTHORISATION

Authorisation may be used to control which users are permitted to change module parameters in a specific group of OSs. Groups of one or more OSs can be protected using a pin number. This pin number only allows changes to module parameters in the OS, after the correct pin number has been entered. When a valid pin number is entered, if requested in the BMS, it confirms the user is authorised to change a module parameter.

Tip! Check the IQ Controller User module **'Pin Number'** and **'Pin Level'**, and/or the **'Users'** page in the **'vIQ configuration'**.

1. Press **'Trend Security'** to display the **'Module Authorisation'** dialog. This shows groups of OS (OS number) and associated Pin number fields.
 - i. Configure the individual groups of OSs by defining the **'LAN'** number and the specific **'OS'** (OS identification number).



Caution Not compatible with IQ Controller Secure VCNC.

- iii. Enter the required pin number, 4 (four) digit value maximum, in the **'Pin number'** field associated with the individual group of meters. The Pin number should already be configured.
3. Press **'Save'** to confirm changes.

2.5.13 Define vIQ Driver Points

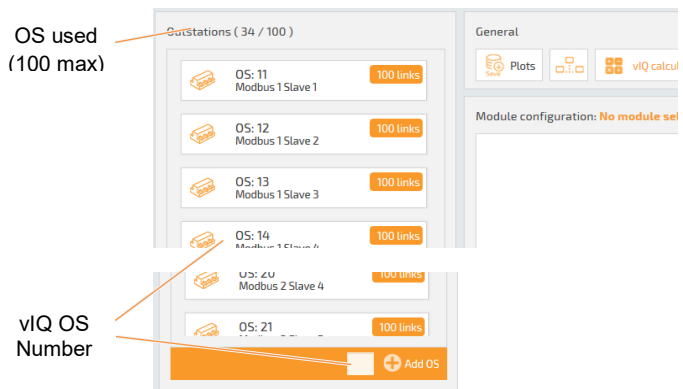
The vIQ Driver is the Synapsys Solutions Trend BMS compatible software. It provides a connection to the Trend Internetwork, the defined network details configured in the Manage Driver, Comms settings. This driver supports interfacing to a maximum 100 vIQ OS on a single Trend LAN. Each vIQ OS appear as an individual Trend controller.

Caution Use Trend IComms (DataFrom and DataTo Comms) to add values to a Trend IQ controller strategy.

To create an vIQ OS

1. Define the required vIQ OS number in the appropriate field.
2. Press 'Add OS' to include a default vIQ OS with the defined vIQ OS number in the list above.

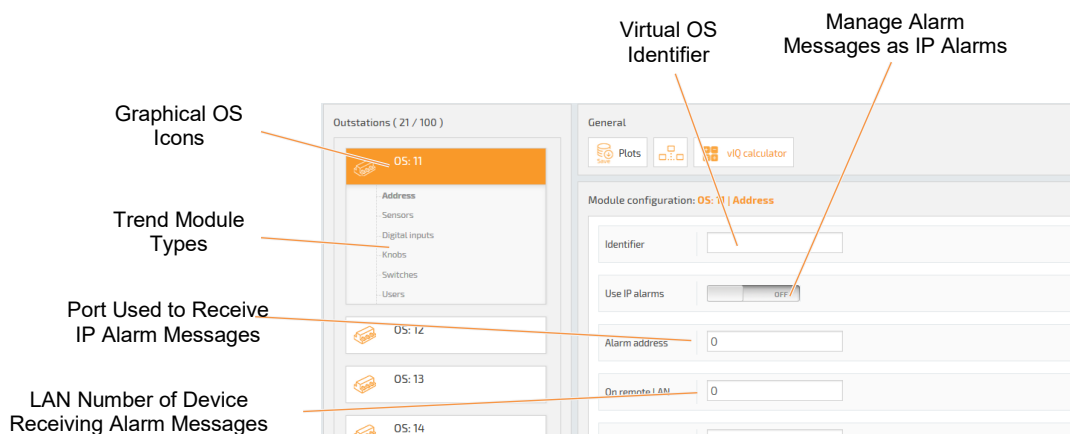
Tip! Number of existing Links per vIQ OS are shown.



CONFIGURE THE ADDRESS MODULE

The 'Address Module' page displays information relating to the module selected from the graphical list of OS icons already created using the OS network window.

The device receiving alarm messages can be identified using the 'Alarm Address' and 'On Remote LAN' fields, or the 'IP' and 'Port' fields if 'Use IP Alarms' is enabled.



Caution Identifier does not support '\ / (; , : ' invalid characters.

To configure the module details

1. Configure the **'Address Module'** details. This page provides parameters used to identify each individual OS and configure the alarm message transmission path.
 - i. Select the required OS from the list of graphical icons and press **'Address Module'** if the Address Module details are not displayed.
 - ii. Configure the alarm message transmission path.

Tip! The text above the Module type buttons identifies the selected out-station.

- ◆ If necessary, enter text in the **'Identifier'** field. This identifies the OS associated with the defined slave in this product and BeMS.

Use standard alarm message transmission (default **'Alarm address'** and **'On remote LAN'** values define a local connection).

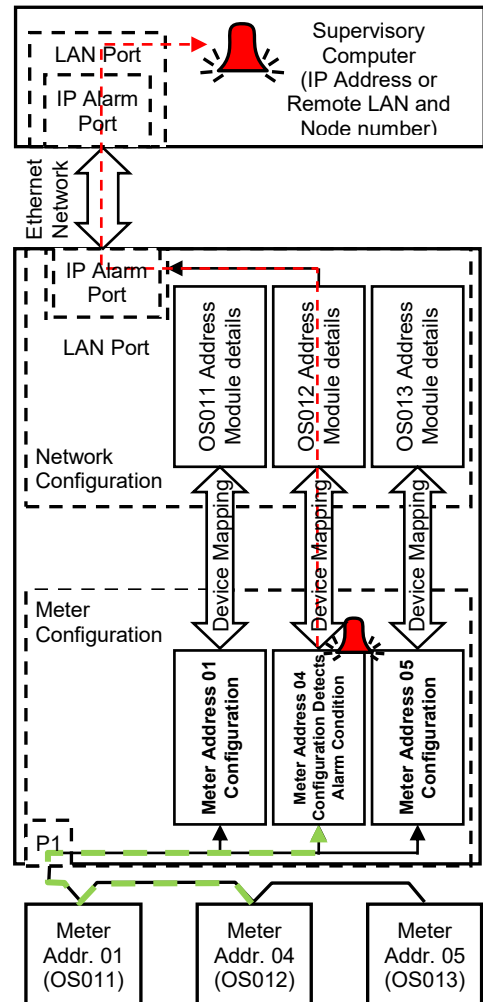
Enter the **'Alarm Address'** number. This identifies the device on the Ethernet network used to display alarms generated by the third party devices on the network. Enter the **'On Remote LAN'** number. This identifies the LAN that includes the device on the Ethernet network used to display asserted alarms.

Alternatively, use IP alarm message transmission (default **'Use IP alarms'**, **'IP address'** and **'Port'** values define a local connection).

Enable IP alarms (Internet Protocol), i.e., **'Use IP alarms'**. This allows the transmission of IP alarm signals, but not Trend alarms, to the BMS. Enter the **'IP address'**. This identifies the device on the BMS that will receive alarms messages. Enter the **'Port'** number. This identifies the internal port used to receive IP alarm messages.

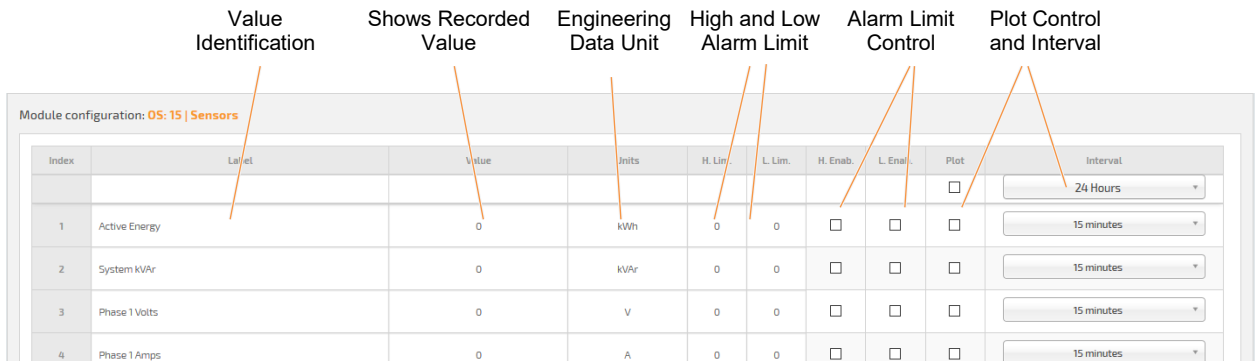
Note The IP address must be configured according to local company network policy.

2. Press **'Save'** to confirm changes.



CONFIGURE A SENSOR MODULE

The **'Sensors'** page displays read-only Integer values in the specified engineering units recorded by the corresponding third party device. The parameters on this page are also used to define and enable required alarm levels and determine the plot intervals.



Module configuration: 05:15 | Sensors

Index	Label	Value	Units	H. Lim.	L. Lim.	H. Enab.	L. Enab.	Plot	Interval
1	Active Energy	0	kWh	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	24 Hours
2	System KVAr	0	KVAr	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15 minutes
3	Phase 1 Volts	0	V	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15 minutes
4	Phase 1 Amps	0	A	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15 minutes

Callouts from the image:

- Value Identification (points to Label)
- Shows Recorded Value (points to Value)
- Engineering Data Unit (points to Units)
- High and Low Alarm Limit (points to H. Lim. and L. Lim.)
- Alarm Limit Control (points to H. Enab. and L. Enab.)
- Plot Control and Interval (points to Plot and Interval)

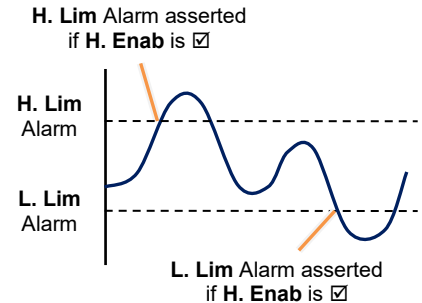
To configure a Sensor module

1. Press **'Sensors'** to display the Sensor module configuration page.
 - i. Enter text (40 characters max) used to identify the associated parameter in the **'Label'** field. This is used to identify the parameter in the BMS. It should be a concise description of the parameter.

Caution Identifier does not support '\ / ({ ; , : ' invalid characters.

- ii. Inspect the **'Value'** field. This displays the value recorded from the parameter defined in the **'Link points'** page.
- iii. Enter the appropriate engineering data value type in the **'Unit'** field. This appears in the BMS and is used to identify the engineering data value, i.e. A (amps) if scaling a value measuring a mA signal.

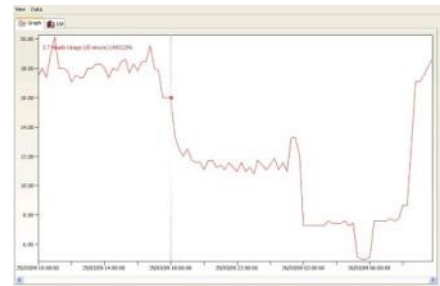
- ◆ If necessary, enter a value used to specify the high alarm limit in 'H. Lim.' and/or the low alarm limit in 'L. Lim.'. This is used to define the upper and/or lower limits of the value recorded from the parameter. If a limit is exceeded the corresponding alarm in the BeMS will only be asserted if 'H. Enab.' and/or 'L. Enab.' is enabled (☑).



Remember A configured low alarm limit value must be less than the defined high alarm limit.

- ◆ If necessary, enable (☑) the high alarm limit ('H. Enab.') and/or low alarm limit ('L. Enab.'). This control the high alarm and low alarm indication in the BeMS, when the value recorded from the parameter asserts an alarm state determined by the value defined in 'H. Lim.' and/or 'L. Lim.'. If this field is disabled (☐) an alarm state will not be indicated.
- ◆ If necessary, enable (☑) the plot function. This allows the Trend graph in the BeMS to plot 1000 value records from the parameter. If this field is disabled (☐) a Trend will not be generated.

Note A Trend is a graphical representation of a value from a defined point at regular time periods. The time is synchronised to the real-time clock in this product. The Trend Sensor module appears as the value in Plots page of Trend BMS.



Tip! Plot data logged in this product can be recorded by the Trend Supervisor (963) before it is overwritten using the RECORDAUTO_COMPACT action or RECORDAUTO_PRECISION action. This is automatically run when Buffer Ready Events (BBUF) are received from this product. Refer to Trend Controls documentation for details.

- ◆ If necessary, select the required plot interval, from 1 minute to 24 hours. This defines the period between each plot of the corresponding recorded value on the Trend graph in the BMS.

Tip! Press 'Copy/paste data' button to display a dialog. Use 'Copy to clipboard' to add page details to the computer clipboard or click the right-hand mouse button in the white square and select 'Paste' from the context menu to add copied information to the page. Copied information can be edited using .CSV editing software, e.g., Microsoft Excel. A configuration spreadsheet is available from Synapsys Solutions Technical Support.

2. Press 'Save' to confirm changes.

CONFIGURE A DIGITAL INPUT MODULE

The **'Digital Inputs'** page displays read-only Boolean values recorded by the parameter in the corresponding third party device. The parameters on this page are used to enable required alarms and inspect and control the status of a specific engineering data value from this product.

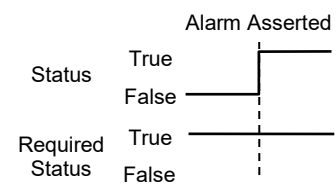
Module configuration: 05.15 Digital inputs Value		Shows Current Digital Value	Alarm Control	Shows Required Digital Value	
Index	Identification Label		Value	Alarm enable	Required status
1			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

To configure the Digital Input

1. Press **'Digital Inputs'** to display the Digital Input module configuration parameters.
 - i. Enter text (40 characters max) in the **'Label'** field. This is used to identify the parameter in the BMS. It should be a concise description of the parameter.

Caution **Identifier does not support '\ / ({ ; , : ' invalid characters.**

- ii. Inspect the **'Status'** field. This displays the current condition of the recorded Digital Input value.
 - ◆ If necessary, enable () the alarm detection state in **'Alarm enable'**. This controls the alarm indication when the recorded value asserts an alarm state, determined by the **'Required Status'**. If this field is disabled () an alarm state will not be indicated.
 - ◆ If necessary, define the required alarm indication state in the **'Required Status'** field. A healthy state is shown if **'Status'** is (1, True, Enabled, or On), and **'Required Status'** is (0 (zero), False, Disabled, or Off). An unhealthy state (alarm state asserted) is shown if the **'Status'** and the **'Required Status'** are the same.



Tip! Press **'Copy/paste data'** button to display a dialog. Use **'Copy to clipboard'** to add page details to the computer clipboard or click the right-hand mouse button in the white square and select **'Paste'** from the context menu to add copied information to the page. Copied information can be edited using .CSV editing software, e.g., Microsoft Excel. A configuration spreadsheet is available from Synapsys Solutions Technical Support.

2. Press **'Save'** to confirm changes.

CONFIGURE A KNOB MODULE

The '**Knobs**' page displays read and write Integer values in the specified engineering units recorded by the parameter in the corresponding third party device. The parameters on this page are used to configure the authorisation level required to inspect and/or control a specified Knob Module value within the defined limits.

Index	Value Identification	Shows Recorded Value	Engineering Data Unit	Upper and Lower Limit	Access Level
1		0		0	0
2		0		0	0
3		0		0	0
4		0		0	0
5		0		0	0

To configure a Knob module

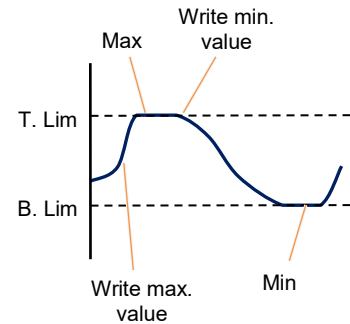
1. Press '**Knobs**' to display the Knob module configuration page.
 - i. Enter text used to identify the parameter in the '**Label**' field. This is used to identify the value in this product and the BMS. It should be a concise description value.

Caution Identifier does not support '\ / ({ ; , : ' invalid characters.

- ii. Inspect the '**Value**' field. This displays the value recorded from the parameter defined in the '**Link points**' page.

Note If an authorisation level has been configured, an appropriate pin number must be entered correctly before a write command to this module type can be confirmed.

- iii. Enter the appropriate engineering data value type in the **'Unit'** field. This appears in the BMS and is used to identify the engineering data value recorded, i.e. A (amps) if scaling a value measuring a mA signal.
- ◆ If necessary, enter a value used to specify the maximum value allowed in **'T. Lim.'** and/or minimum value allowed in the **'B. Lim.'**. This is used to define the maximum and/or minimum value that can be written to the parameter using the corresponding engineering units.
- iv. Enter the required **'Pin level'** number. This is the authorisation level used to prevent un-authorised access to the engineering data. A **'Pin level'** number should already have been configured via the **'Users'** page (see [Configure the User Pin Level Authorisation](#)).



Tip!

Press **'Copy/paste data'** button to display a dialog. Use **'Copy to clipboard'** to add page details to the computer clipboard or click the right-hand mouse button in the white square and select **'Paste'** from the context menu to add copied information to the page. Copied information can be edited using .CSV editing software, e.g., Microsoft Excel. A configuration spreadsheet is available from Synapsys Solutions Technical Support.

- 2. Press **'Save'** to confirm changes.

CONFIGURE A SWITCH MODULE

The **'Switches'** page displays read and write Boolean values that have been recorded by parameter in the corresponding third party device. The parameters on this page are used to inspect and/or control the status and authorisation level.



Index	Label	Status	Pin Level
3		<input type="checkbox"/>	0
4		<input type="checkbox"/>	0
5		<input type="checkbox"/>	0
6		<input type="checkbox"/>	0
7		<input type="checkbox"/>	0
		<input type="checkbox"/>	-

To configure the switch

1. Press **'Switches'**. This displays the Switch module configuration parameters.
 - i. Enter text used to identify the parameter in the **'Label'** field. This is used to identify the parameter in the controller. It should be a concise description of the parameter.

Caution Identifier does not support '\ / ({ ; , : ' invalid characters.

- ii. Inspect the **'Status'**. This shows the current condition of the corresponding parameter in the 'Switch' module, where is 1, True, Enabled or On.

Note If an authorisation level has been configured, an appropriate pin number must be entered correctly before a write command to this module type can be confirmed.

- iii. Enter the required **'Pin level'** number. This is the authorisation level used to prevent unauthorised access to the parameter. A Pin level number should already have been configured via the **'Users'** page (see [Configure the User Pin Level Authorisation](#)).

Tip! Press **'Copy/paste data'** button to display a dialog. Use **'Copy to clipboard'** to add page details to the computer clipboard or click the right-hand mouse button in the white square and select **'Paste'** from the context menu to add copied information to the page. Copied information can be edited using .CSV editing software, e.g., Microsoft Excel. A configuration spreadsheet is available from Synapsys Solutions Technical Support.

2. Press **'Save'** to confirm changes.

CONFIGURE THE USER PIN LEVEL AUTHORISATION

A maximum of six authorisation levels, Pin Levels and associated Pin Numbers, can be configured via the **'Users'** page which is displayed when **'Users'** is selected. Each **'Pin Level'** determines the minimum level of authorisation required to change module parameters. Any **'Pin Level'** of 94 or below only permits changes to the values on **'Knobs'** pages and status on the **'Switches'** pages. However, a **'Pin Level'** of 95 or above permits changes to all module parameters, and includes **'Labels'**, **'Units'** and changing the Pin Numbers that are assigned to a Pin Level less than current Pin Level.

Caution Values will not appear on the 'viQ pages' if a 'Pin number' is configured, but the 'Trend security' on protocol dependant web page is not.

Module configuration: 05: 15 | Users

Index	Pin number	Pin level
1		0
2		0
3		0

To configure the authorisation levels

1. Press **'Users'** to display the Pin Level configuration page. Each 'Pin Level' is associated with a 'Pin Number' that is used to confirm the current users' authorisation to change the edited parameter.

- i. Enter a **'Pin level'** number in the range 0 (zero) to 99. This number is an authorisation level relating to the **'Pin Number'**.


Tip! Always configure an administrative 'Pin Level' first (Pin Level 99).

- ii. Enter a maximum 4 (four) digit security number in the **'Pin Number'** field. This number is used to confirm the user is allowed to change a module parameter using 'Text comms'.


Note Text comms enables user-entered read and write requests to module parameters.

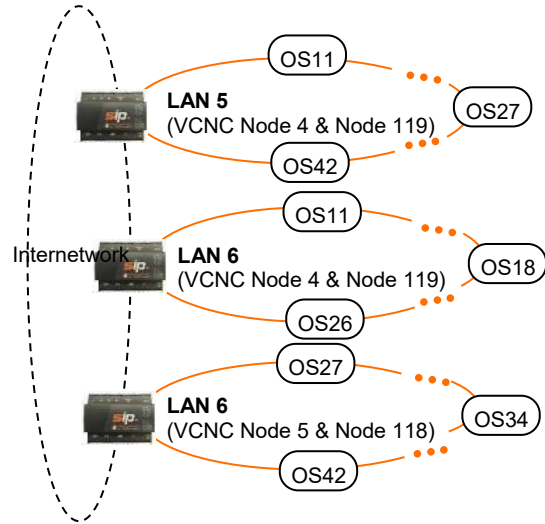
2. Press **'Save'** to confirm changes.

VERIFY TREND NETWORK STATUS

Network status. Use the  button to show status of the Trend system, LAN and Internetwork. It can be used to diagnose and indicate network problems.

Caution When combining multiple Trend compatible devices on the same Trend LAN, ensure both vIQ VCNCs Node 4 (Port 1000n) and Node 119 (Port 10000) and OSs are unique.

Tip! This  button is also available from the Trend Client driver when vIQ is the connection type.



PARAMETER	DESCRIPTION
System Uptime	The amount of time this product has been operating, i.e. since this product was last turned on or rebooted.
Lan OK Time	The amount of time the Lan has been successfully communicating on the Trend network, i.e., since the last build process was successful.
Lan Status	The current condition of the Lan corresponding to this product and the time remaining until a 'Timeout' will occur.
	Lan POWERUP The Lan build process is starting.
	Lan DEAF The comms with other Trend network devices are not applicable (only 1 (one) device in Lan) or not available (more than 1 (one) device in Lan, see ' <i>Lan BROKEN</i> ').
	Lan BROKEN A comms failure with other devices on the Lan. Typically, due to a timeout caused by Ethernet wiring or connection problem, an IP address that is sending but not receiving messages, duplicate OS numbers from identified IP address on the Lan or when a Lan is changed, i.e. identified IP address is added or removed.
	Lan BUILT The Lan build process is successful.
	Lan OK! Successful Lan comms are detected if product is not alone on local Lan or if it can communicate with other devices on the local Lan.

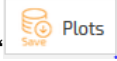
continued...

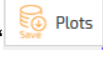
PARAMETER	DESCRIPTION
continued...	
Last Lan Message	The last message from describing the Lan status, see 'Lan Status'.
Internetwork OK Time	The amount of time the Internetwork has been successfully communicating, i.e., since the last Internetwork build process was successful.
Internetwork Status	The current condition of the Internetwork assigned to this product and the time remaining until a 'Timeout' will occur.
Internetwork POWERUP	The Internetwork build process is starting.
Internetwork DEAF	The comms with other Trend network devices are not applicable (only 1 (one) device in Internetwork) or not available (more than 1 (one) device in Internetwork, see ' <i>Internetwork BROKEN</i> ').
Internetwork BROKEN	An Internetwork comms failure. Typically, due to a timeout caused by an Ethernet wiring or connection problem, duplicate Lan numbers from an identified IP address on the Internetwork or when the Internetwork is changed, i.e., identified IP address is added or removed.
Internetwork BUILT	The Internetwork build process is successful.
Internetwork OK - Timeout in <i>nn</i>	Successful Internetwork communications and number of seconds until Timeout is detected, i.e., when ' <i>nn</i> ' shows '00'.
Last Internetwork Message	The last message from describing the Internetwork status, see 'Internetwork Status'.

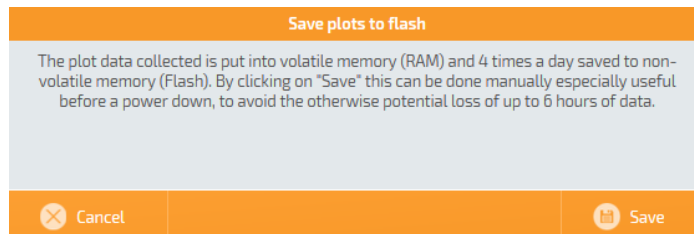
Tip! If necessary, use 'SIP Search' to ensure IP Addresses are unique. Use Trend 'ipTool' to ensure Lan numbers (and VCNC Node numbers where necessary) are unique.

- If necessary, correct any issues that may be indicated.

SAVE PLOTS TO FLASH

The  button is used to display a dialog that provides the functionality to save the current vIQ OS plot values. Saving these values ensures all selected plot data is included when a **'Backup'** is performed. The plot data will be automatically loaded when a **'Restore'** is performed.

1. Press  to display the **'Save plots to flash'** dialog.
2. Press **'Save'** to save the current plot data immediately. This can prevent the loss of data before using the 'Restore' function.

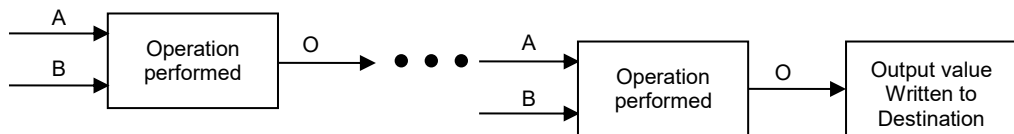


Note Plot data is saved to flash at regular 6 hours intervals, 00:00, 06:00, 12:00 and 18:00. Performing this operation does not affect this function.

Caution **Rebooting or removing the power from this product before all plot data is saved may corrupt plot data files or cause loss of essential energy data. It takes about 1.5 secs to save a plot data file, and approximately 20 mins to save the maximum 1024 plot data files.**

USE THE VIQ CALCULATOR

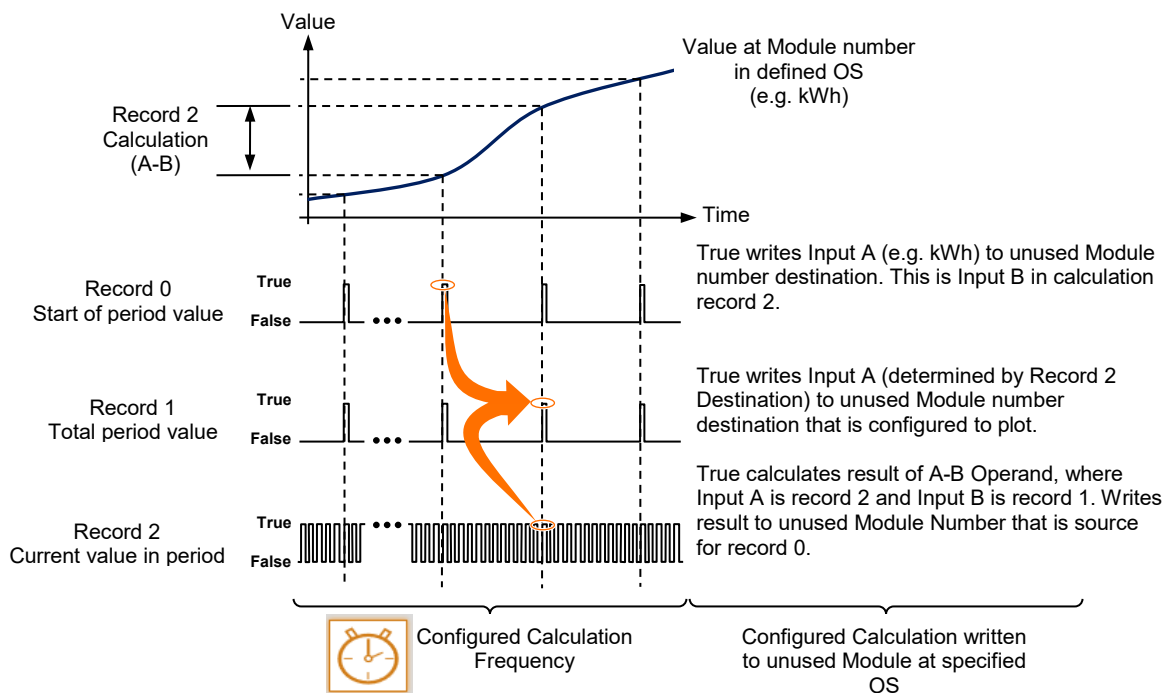
The vIQ Calculator page allows the user to influence an output value to a specified Module type by performing a sequence of up to 5 operations at specified intervals. Each operation is constructed using a combination of values sourced from a defined Module number at a specified OS or a user defined fixed value.



Note
A and B - Fixed Value or vIQ Module Value
O - Output (Result of A and B)

The final operation provides an output that should be written and stored at an unused Module number in the defined OS. This may be the partial result of a combination of multiple vIQ Calculations which produces a completed result at a scheduled frequency. This is useful when investigating energy usage.

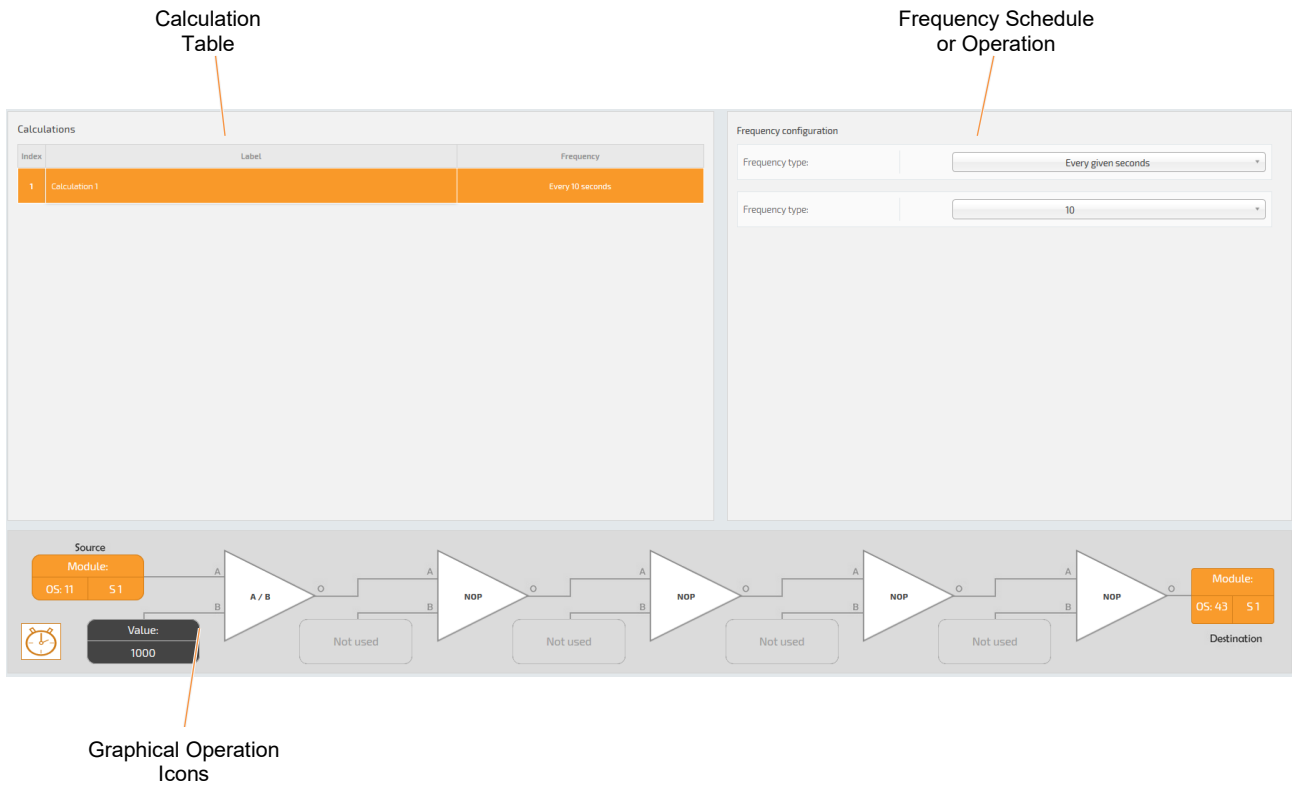
Example This example shows 2 vIQ Calculations that provide partial results for a third vIQ Calculation. Index 0 shows the total usage over the last configured calculation period and writes the value to an unused Module number at a defined out-station. Index 1 shows the starting usage from second unused Module number at a defined out-station. Index 2 calculates the total usage at configured intervals.



This page provides sections that,

- identify each calculation,
- show the sequence of operations combined for a selected calculation,
- configure the frequency of a selected calculation and each operation (e.g., A+B, A-B, etc.) in the calculation.

Note **The Calculator supports a maximum of 1000 calculations.**



The screenshot shows a software interface for configuring calculations. It is divided into three main sections:

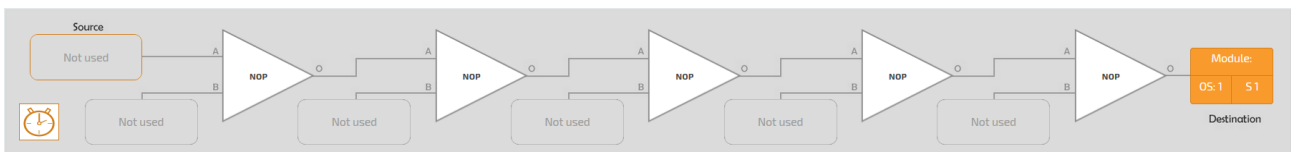
- Calculations Table:** A table with columns for Index, Label, and Frequency. It contains one entry: Index 1, Label 'Calculation 1', and Frequency 'Every 10 seconds'.
- Frequency configuration:** Two dropdown menus for 'Frequency type'. The first is set to 'Every given seconds' and the second is set to '10'.
- Graphical Operation Icons:** A flow diagram showing a sequence of operations. It starts with a 'Source' module (OS: 11, S1) and ends with a 'Destination' module (OS: 43, S1). The first operation is 'A / B', followed by three 'NOP' (No Operation) blocks. Below each operation icon is a 'Not used' label. A 'Value: 1000' field is shown with a clock icon, indicating the frequency of the calculation.

Annotations with orange lines point to the 'Calculations Table', 'Frequency Schedule or Operation', and 'Graphical Operation Icons'.

CREATE THE VIQ CALCULATION

Each vIQ Calculation is referenced using an '**Index**' number and is performed at intervals determined by the configured '**Frequency**' schedule. The '**Index**' number is identified by a '**Label**' that can be edited to clarify the purpose of the individual vIQ Calculation.

Remember **The Calculator supports a maximum of 1000 calculations.**



To create a vIQ Calculation table,

The vIQ Calculation table is used to assign an Index number to a specific calculation and provides a simple means of tracking the calculations. It will also show the total number of calculations configured in this product.

Tip! **Press 'Calculator' to refresh the page. This will ignore unsaved changes and restore the page to the last known configuration. Press 'Go back' to return to the 'vIQ' driver Define points page.**

1. Create a blank vIQ Calculation.

Press '**Add Calculation**' to add a blank vIQ Calculation using the next available Index number.

Index	Label	Frequency
1	Energy at Start of period	Every 10 seconds
2	Calculation 2	Never


Alternatively,

- ◆ drag calculations to list in a specific sequence.
- ◆ select 'Select all' or 'Unselect all' from the available menu option as necessary.
- ◆ select 'Delete' from the available menu option to remove the selected calculations.
- ◆ select 'Move to' to re-order the list of current calculations.
- ◆ press '**Wizard**' to create a specific number of calculations (see [Replicate an Existing vIQ Calculation](#)).

Note **All Index numbers will be automatically re-numbered.**


- If necessary, change the text in the '**Label**' field used to identify the calculation.

Tip! **Use a brief description to clearly indicate the purpose of the calculation.**

Note **The Frequency of a blank calculation is scheduled to 'Never', i.e. it will not run.**
Use the  in the graphical vIQ Calculation to display parameters that configure frequency schedule.

CONFIGURE THE VIQ CALCULATION

A vIQ Calculation can be used to perform a calculation using a value sourced from a defined Module number in a specified out-station or a user defined fixed value which produces an output value that can be written to a defined Module Type. Each vIQ Calculation Index corresponds to a configured sequence of 5 graphically represented operations displayed below the vIQ Calculation Index table.

Note Each vIQ Calculation can be scheduled using parameters that are displayed when the  is pressed.

Tip! An area below the graphical vIQ Calculation displays information that may be useful configuring a vIQ calculation.

To configure a vIQ Calculation

1. Select the required vIQ Calculation.

This displays a sequence of 5 operations. Each mathematical operation is pre-configured as a **'No Operation'**, i.e., the input value will remain unchanged.

2. Configure the Input values. Input values can be sourced from a defined Module number in a specified OS or can be a user defined fixed value.

Starting at the Source,

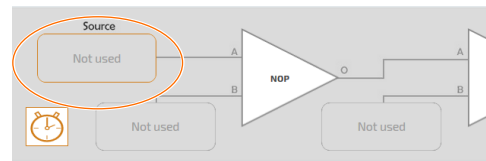
- i. Configure **Source** (Input A) value type.

Select the Source (Input A) operand configuration icon to display the parameters used to define the Source Input A value.

Define the origin of Input A value by selecting a **'Fixed value'** (user defined value) or **'Module'** (Module number in a specified out-station) **'Operand type'**.

If **'Fixed value'** is selected, enter the required value at the 'Fixed value' parameter.

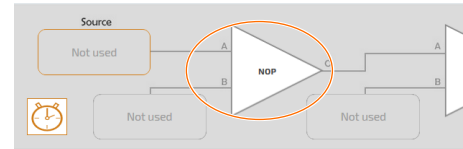
If **'Module'** is selected, define the required OS number at **'OS'**, define the number of the Module at **'Module number'** and select the corresponding type of Module at **'Module type'**.



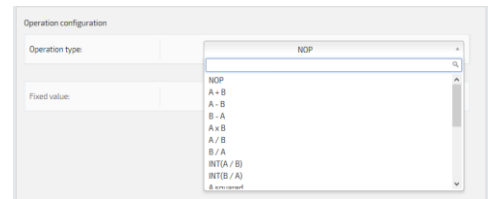

Tip! All this information should be available on the configuration web pages.

ii. Configure the mathematical operation.

Select the Input B operand configuration icon to display the parameters used to configure the mathematical operation.



Select the mathematical operation used to determine the output using the values derived from Input A and Input B at the 'Operation type'.



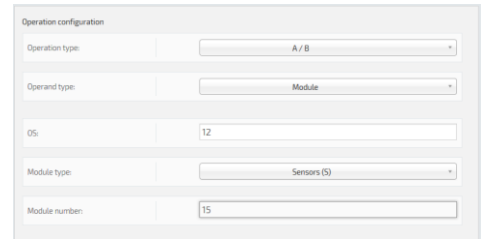
Note Input A is already defined from the Source or previous operation.

OPERATION TYPE	DESCRIPTION
NOP	Input value is unchanged, No Operation
A + B	Add A and B (e.g. 9 + 3 = 12)
A - B	Subtract B from A (e.g. 9 - 3 = 6)
B - A	Subtract A from B (e.g. 3 - 9 = -6)
A x B	Multiply A by B (e.g. 9 x 3 = 27)
A / B	Divide A by B (e.g. 9.3 ÷ 3 = 3.1)
B / A	Divide B by A (e.g. 3 ÷ 9 = .333)
INT(A / B)	Divide A by B (e.g. 9.3 ÷ 3 = 3), whole integers, no decimal places
INT(B / A)	Divide B by A (e.g. 3 ÷ 9 = 0), whole integers, no decimal places
A squared <A ² >	Multiply A by A (e.g. 9 x 9 = 81)
A cubed <A ³ >	Multiply A by A by A (e.g. 9 x 9 x 9 = 729)
A to the power of B <A ^B >	Multiply A by A using B to define the power ratio (e.g. if B = 5, sum 9 ⁵ = 9 x 9 x 9 x 9 x 9 = 59,049)
2 to the power of A <2 ^A >	Multiply 2 by 2 using A to define the power ratio (e.g. if A = 9, sum 2 ⁹ = 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 = 512)
10 to the power of A <10 ^A >	Multiply 10 by 10 using A to define the power ratio (e.g. if A = 9, sum 10 ⁹ = 10 x 10 x 10 x 10 x 10 x 10 x 10 x 10 x 10 = 1 000 000 000)
B to the power of A <B ^A >	Multiply B by B using A to define the power ratio (e.g. A = 9, sum 3 ⁹ = 3 x 3 x 3 x 3 x 3 x 3 x 3 x 3 x 3 = 19,683)
Square root of A	A = n ² (e.g. 9 = 3 x 3)
A % B	A% of B (e.g. 50% of 200 = 100)
Truncate A	Ignores decimal places (e.g. Truncate 9.333 = 9)
A Modulus B	Divide A by B and display the remaining value (e.g. if 10 ÷ 3 = 3 + remainder 1, then 10 Modulus 3 = 1)

Define the origin of Input B value by selecting a 'Fixed value' (user defined value) or '**Module**' (Module number in a specified out-station) '**Operand type**'.

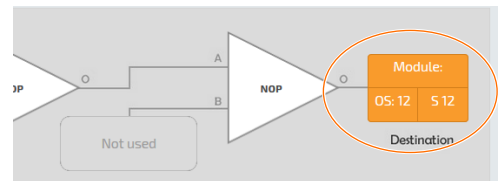
If '**Fixed value**' is selected, enter the required value at the 'Fixed value' parameter.

If '**Module**' is selected, define the required Out-station number at '**OS**', define the number of the Module at '**Module number**' and select the corresponding type of Module at '**Module type**'.



Tip! All this information should be available on the VIQ Driver 'Define Points' page.

- iii. Press '**OK**' to confirm changes.
 - ◆ If necessary, configure the remaining mathematical operations as required using the previous instructions.
3. Configure the destination OS and module type used to display the output value.
 - i. Select the **Destination OS/Module Type** configuration icon to display the parameters used to identify the OS and module type used to display the output value.
 - ii. Enter the required OS number at '**OS**', the number of the module at '**Module number**' and select the corresponding type of module at '**Module type**' (Sensor (S), Digital Input (I), Knob (K), or Switch (W)).
 - iii. Press '**OK**' to confirm changes.



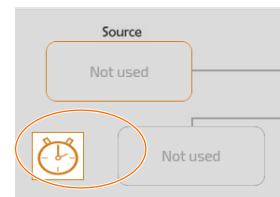
Tip! All this information should be available on the VIQ Driver 'Define Points' page.

CONFIGURE THE 'FREQUENCY' SCHEDULE

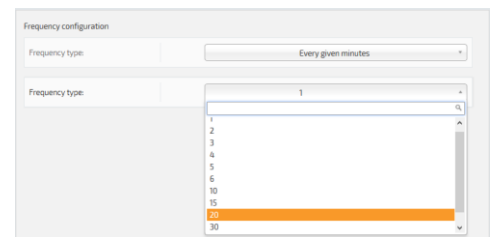
The '**Frequency**' schedule determines the time period between repeating the selected vIQ Calculation. A vIQ Calculation can be configured to occur at a pre-defined time period or at a user defined time period.

To configure the 'Frequency' schedule

1. Select the '**Frequency**' configuration icon to display parameters that configure calculation schedule. Calculations can be configured to occur at a pre-defined time period or a user defined time period.
 - i. Select a pre-defined or user defined time schedule in '**Calculation frequency**'.



A pre-defined schedule performs the calculation at specific occurrences, i.e. '**At first run**', '**At midday**', '**At midnight**', '**A new month**', '**A new year**' or '**Never**'. The calculation will not be performed if '**Never**' is selected.



A user defined schedule performs the calculation at regular periods, i.e. '**Every given seconds**', '**Every given minutes**', '**Every given hours**', or '**Every given days**' determined by the value configured in '**Parameter**', i.e. if '**Parameter**' is 10, and '**Calculation frequency**' is '**Every given hours**' the calculation will be performed at regular intervals of 10 hours.

- ii. Press '**OK**' to confirm changes.
2. Press '**Save**' to confirm changes.

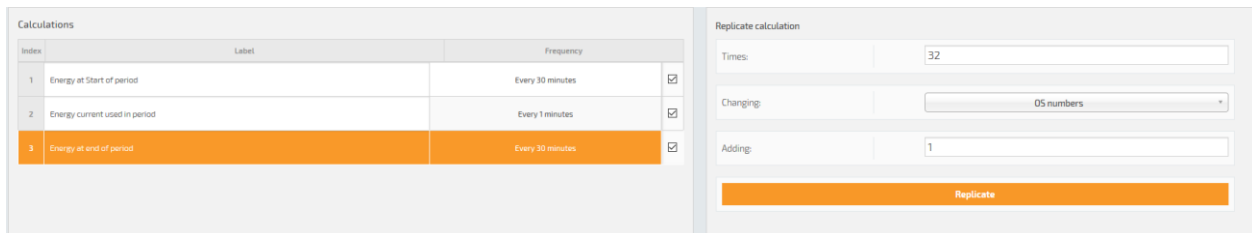
REPLICATE AN EXISTING VIQ CALCULATION

An existing vIQ Calculation will perform a sequence of mathematical operations that are also applicable or like the requirements of other vIQ Calculations. By replicating a selected a calculation, the corresponding sequence of mathematical operations can be automatically assigned to a defined out-station and module in each calculation record.

Example This shows the automatic configuration of out-station numbers when replicating an existing vIQ Calculation record. This can also apply to module numbers.

To replicate an existing vIQ Calculation

1. Replicate the selected vIQ Calculation record.
 - i. Press **'Wizard'** to display the parameters used to configure how the selected vIQ Calculation must be adjusted.
 - ii. Select the Calculations that are to be replicated.
 - iii. Enter the number of calculations to be added to the vIQ Calculation table in **'Replicate'**. The additional calculation records are automatically populated using the selected vIQ Calculation.



The screenshot shows a software interface with two main sections. On the left, a table titled 'Calculations' lists three items:

Index	Label	Frequency	
1	Energy at Start of period	Every 30 minutes	<input checked="" type="checkbox"/>
2	Energy current used in period	Every 1 minutes	<input checked="" type="checkbox"/>
3	Energy at end of period	Every 30 minutes	<input checked="" type="checkbox"/>

On the right, a 'Replicate calculation' panel contains the following fields:

- Times:** A text input field containing the value '32'.
- Changing:** A dropdown menu with 'OS numbers' selected.
- Adding:** A text input field containing the value '1'.
- Replicate:** A large orange button at the bottom of the panel.

Select **'OS numbers'** or **'Module numbers'** in **'Changing'**. This determines the numerical references that are adjusted when the vIQ Calculation corresponding to the selected calculation record is replicated, i.e., if **'OS numbers'** is selected, all numerical out-station references in each mathematical operation is offset by the value defined in **'Adding'**, or if **'Module numbers'** is selected, all numerical Module references in each vIQ Calculation are offset by the value defined in **'Adding'**.

Enter a value in **'Adding'**. This determines the offset for the numerical references defined in **'Changing'** when the selected calculation record is replicated, i.e., if this value is '2' and **'OS numbers'** is selected, all numerical out-station references in each vIQ Calculation are offset by the '2'.

Tip! Enter a minus (-) number in **'Adding'** to decrease the **'OS numbers'** or **'Module numbers'** defined in **'Changing'**.

- iv. Press **'Replicate'** to perform the request changes.
2. Press **'Save'** to confirm changes.

2.6 LINK POINTS

The 'Link points' page is used to associate defined points from 1 (one) protocol driver to a Data Acquisition driver.

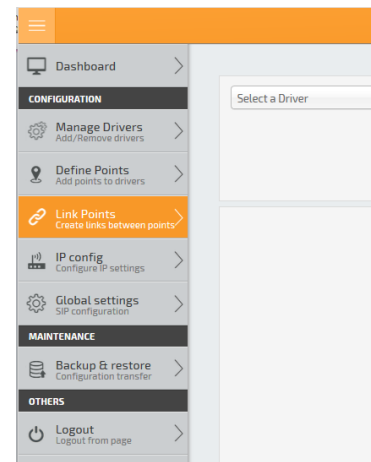
Caution Do NOT link multiple drivers together, e.g., ModBus Register to vIQ Sensor to REST Server point.

2.6.1 Use the Link defined points

All previously defined points are listed according to the driver type.

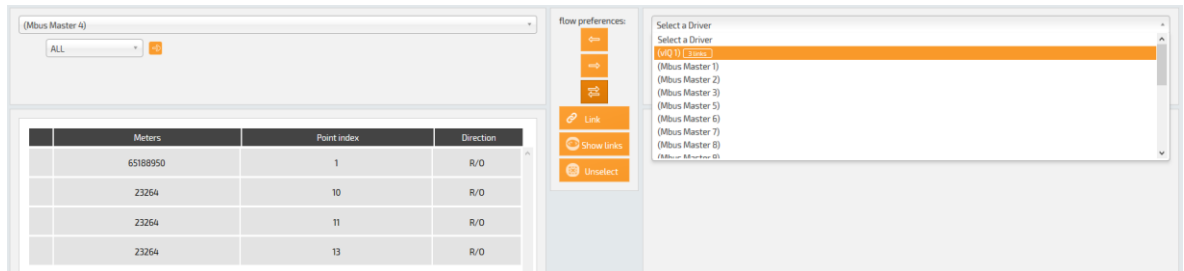
Any previously defined points can be linked to any other defined point in any other driver but MUST be linked using the appropriate 'Flow preference', i.e., a ModBus R/O register from Driver Instance 1 could be linked to vIQ OS 11 Sensor 1, and to the EMT Driver.

- Select 'Link points' and select the required driver to show the driver related configuration pages.



LINK POINTS BETWEEN DRIVERS

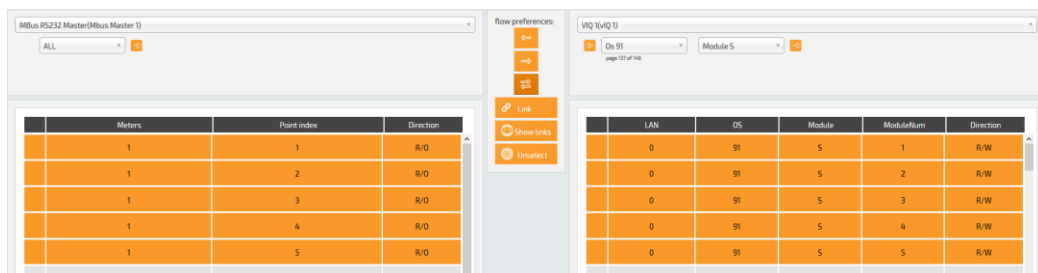
The 'Link points' page shows 2 (two) tables that allow the defined points from 1 (one) driver to be linked to the defined points in the other driver.



1. Select the required drivers.
 - i. Select the required driver on the left to show a list of the existing 'Define points' for the selected driver.
 - ii. Select the require driver on the right to show a list of the existing 'Define points' for the selected driver.

Tip! Use the available filters to ensure specific 'Defined points' are shown.

2. Select the required points from the drivers.
 - i. Select the required points on the left from the list of existing 'Define points' for the selected driver.
 - ii. Select the required points on the left from the list of existing 'Define points' for the selected driver.



Tip! The number of points selected is shown below the list of points.

Press '**Unselect**' to remove all currently selected '**Defined points**'.

- iii. Define the 'Flow preference' to determine the read only/write only flow of data between the 2 (two) lists of points.

Caution The 'Flow preference' **MUST** be selected according to the flow of data between the 2 (two) lists of Driver points.

- ◆ Press **'Link'** to show a page used to verify and confirm the link between the selected **'Defined points'**.

Ensure the points are correctly linked, and press **'Manage links'** to confirm the link.

	meter	index	Links	LAN	OS	Module	ModuleNum
<input type="checkbox"/>	1	1	↔	0	91	5	1
<input type="checkbox"/>	1	2	↔	0	91	5	2
<input type="checkbox"/>	1	3	↔	0	91	5	3
<input type="checkbox"/>	1	4	↔	0	91	5	4
<input type="checkbox"/>	1	5	↔	0	91	5	5
<input type="checkbox"/>	1	1	↔	0	11	5	1
<input type="checkbox"/>	1	2	↔	0	11	5	2

Tip! To remove the link between **'Defined points'** that are not necessary, enable the points that are not required and press **'Delete'**.

- ◆ Press **'Show Link'** to show a page displaying all existing link between the selected **'Defined points'**.

Ensure the points are correctly linked, and press **'Manage links'** to confirm the link.

	meter	index	Links	LAN	OS	Module	ModuleNum
<input type="checkbox"/>	1	1	↔	0	91	5	1
<input type="checkbox"/>	1	2	↔	0	91	5	2
<input type="checkbox"/>	1	3	↔	0	91	5	3
<input type="checkbox"/>	1	4	↔	0	91	5	4
<input type="checkbox"/>	1	5	↔	0	91	5	5

Tip! To remove the link between **'Defined points'** that are not necessary, enable the points that are not required and press **'Delete'**.

3. Press **'Save'** to confirm changes.

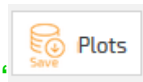
2.7 MANAGE CONFIGURATION TRANSFER

The main menu page provides access to the **'Backup and restore'** function.

2.7.1 Backup and restore unit configuration

The **'Back up'** function allows a copy of the configuration in this product to be protected in a secure environment that prevents un-authorised access and/or damage. It creates a back up of the configuration to a defined media/location which can be used to restore this product configuration to a previous state.

Tip!



Use **'Save Plots'** (**'Save Plots'** in the **'Define points>vIQ Driver'**) before performing a **'Back up'**. This ensures the latest plot values are saved and may prevent the loss of data before using the **'Restore'** function.

- A **'Back up file'** will restore the site configuration following a serious data loss, i.e., disaster recovery.
- An **'Update file'** (available from Technical Support or website) will update the product firmware to improves functionality.

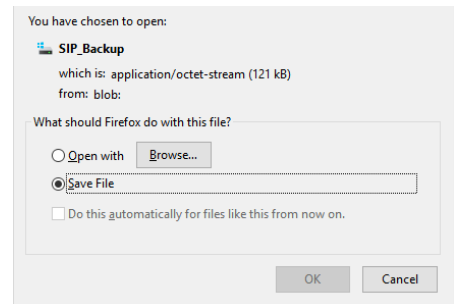
To create a back up file

- Press **'Backup'** to automatically collate the configuration data ready for creating a back up file. When completed a confirmation dialog appears.
- Select **'Save file'** and press **'OK'** to confirm the back up file must be downloaded and launch a browse dialog.
- Locate the required back up destination, i.e., a hard drive, writable CD or DVD, network location, or a removable drive and press **'Save'** to confirm the operation.



Tip!

Adjust the browser settings to allow the file to be saved to any destination required, e.g. use **'Always ask you where to save files'** in Firefox.



To restore a back up or update file

- Press **'Restore'** to show the dialog.
- Locate and select the required back up or update file.
- Confirm selection and wait for the hardware to apply the file and completely reboot.

3 ORDER CODE

Several slices (network expansion modules) can be attached to the right of the SIP+ Data-IF, SIP+ EMT, and/or SIP+ EMT-IF.

Caution **The number of slices must NOT exceed the 8A Din rail limit.**

It is not possible to convert a SIP+ Data-IF to a SIP+ EMT or SIP+ EMT-IF. Contact the account manager/tech support to ensure you order the appropriate product.

3.1 SIP+ DATA-IF

ORDER CODE	DESCRIPTION
SIP+/DATA-IF/500P	Up to stated total number of data source points from BACnet Client/MSTP, MBus, ModBus, MQTT, REST Client and/or Trend (client), Serial and/or Ethernet (TCP/IP) protocols for reporting purposes via email/FTP (secure FTP) to up to 20 recipients
SIP+/DATA-IF/1000P	
SIP+/DATA-IF/2000P	
SIP+/DATA-IF/4000P	
SIP+/DATA-IF/6000P	

3.2 SIP+ EMT/SIP+ EMT-IF

ORDER CODE	DESCRIPTION
SIP+/EMT/25P	Up to stated total number of data source points from BACnet Client/MSTP, MBus, ModBus, MQTT, REST Client and/or Trend (client), Serial and/or Ethernet (TCP/IP) protocols mapped directly to max 250 internal EM&T (Energy Monitoring and Targeting) points.
SIP+/EMT/50P	
SIP+/EMT/100P	
SIP+/EMT/250P	
SIP+/EMT-IF/100P	Up to stated total number of data source points from BACnet Client/MSTP, MBus, ModBus, MQTT, REST Client and/or Trend (client), Serial and/or Ethernet (TCP/IP) protocols mapped directly to max 250 internal EM&T (Energy Monitoring and Targeting), but also available to BeMS (Building energy Management System).
SIP+/EMT-IF/250P	
SIP+/EMT-IF/500P	
SIP+/EMT-IF/1000P	
SIP+/EMT-IF/1500P	
SIP+/EMT-IF/2000P	
SIP+/Vision FW	Firmware upgrade to add EM&T (Energy Monitoring and Targeting) Dashboard functionality to existing SIP+/EMT or SIP+/EMT-IF
SIP+/Vision HW	Dedicated hardware for EM&T (Energy Monitoring and Targeting) Dashboard

Tip! **Product licences can be updated simply by providing a PO for the cost different between the 2 (two) options, and the SIP+ Mac address.**

3.3 ACCESSORIES

ORDER CODE	DESCRIPTION
PSU/24VDC/nA	24V DC nA Power Supply
SYN+/MBUS/CONV/n	Extends the number of MBus networks available to the SIP+ via the DIN Rail connector, according to the constraints of the MBus Level Converter unit load limit
SYN+/SER/CONV	Extends the number of ModBus RS232 and RS485 networks available to the SIP+ via the DIN Rail connector, according to the constraints of the ModBus standard
SYN/IP/CONV	Converts ModBus RS232, or RS485 Serial communications messages to ModBus TCP/IP communications messages.
SYN/ESWn	Unmanaged Ethernet switch with 'n' x 10/100BaseT(X) ports

Caution **An appropriate PSU is required according to the number of SIP Slices installed on the DIN Rail.**

Tip! **Contact Synapsys Solutions for appropriate power supply unit, according to the protocol type and number of slices required.**