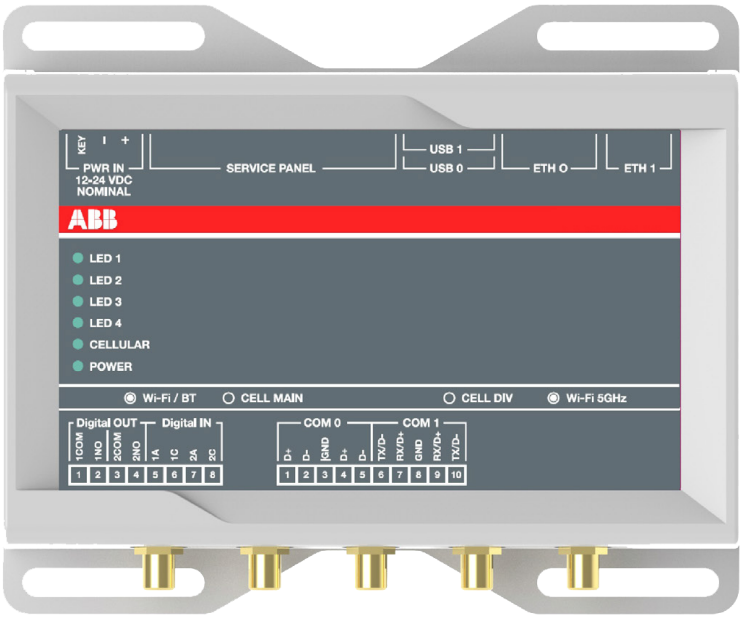
ABB SOLAR INVERTERS

VSN900 gateway

Commissioning manual



VSN900 gateway

Commissioning manual

3AXD50000523016 Rev A
EN
EFFECTIVE: 2020-01-28

Table of contents

1

Introduction to this manual

Contents of this chapter

This chapter provides information about the manual such as applicability, target audience and contents. It also lists the related documents.

Applicability

This manual is applicable to VSN900 gateway, version 0.00 or later.

Compatibility

The VSN900 gateway is compatible with the following solar inverters equipped with an Ethernet interface (optional):

- PVS800-57B central inverters
- PVS980 central inverters
- PVS980-58BC bidirectional converters.

Safety instructions

If you need to do connections or installation work in the inverter cabinets, read and obey the complete safety instructions in the inverter's hardware manual. You must be a qualified electrician to do installation, start-up and service work.

Read and obey the safety instructions of the gateway. See *ReliaGATE 10-12-3x IoT Edge Gateway TI AM335x LTE Cat 1 User's manual*, (REGATE-10-12-3x_Man_ENG_2-0).

Target audience

This manual is intended for people who start up the VSN900 gateway.

Before you start

It is assumed that the inverters are installed and ready to operate before starting the commissioning of the gateway.

Related documents

Document	Code (English)
User manuals	
ReliaGATE 10-12-3x IoT Edge Gateway TI AM335x, LTE Cat 1 User's manual	REGATE-10-12-3x_Man_ENG_2-0
Inverter hardware manuals and guides	
PVS800-IS inverter station hardware manual	3AXD50000009549
PVS800-57B hardware manual	3AXD50000048300
PVS980 central inverters hardware manual	3AXD50000026013
Inverter firmware manuals and guides	
PVS800-57B central inverters firmware manual	3AXD50000048332
PVS980 central inverters firmware manual	3AXD50000026271
PVS980-58BC Bidirectional converters firmware manual	3AXD50000205530
Fieldbus adapter module manuals and guides	
FENA-01/-11/-21 Ethernet adapter module user's manual	3AUA0000093568
Others	
Cybersecurity for ABB drives Technical guide	3AXD10000492137

Terms and abbreviations

Term	Description
Aurora Vision®	A cloud based application for remote monitoring and asset management of solar power plants integrated with ABB solar inverters.
DHCP	Dynamic Host Control Protocol. A protocol for automating the configuration of IP devices. DHCP can be used to automatically assign IP addresses and related network information.
FENA	Optional Ethernet adapter module
Gateway	A networking hardware that connects two discrete networks for data exchange.
MAC address	Media Access Control address
NTP server	Network Time Protocol. A protocol for synchronizing the clock time of a computer connected to a network.
ReliaGATE 10-12	Eurotech's IoT edge gateway. This hardware is used for developing the VSN900 gateway.
Solar inverter	Converts direct current and voltage from a solar array to alternating current and voltage to the grid.
TCP	Transmission Control Protocol
VSN900	ABB gateway used for remote data acquisition of central solar inverters.

Disclaimers

Generic disclaimer

The manufacturer shall have no obligation hereunder with respect to any product which (i) has been improperly repaired or altered; (ii) has been subjected to misuse, negligence or accident; (iii) has been used in a manner contrary to the Manufacturer"s instructions; or (iv) has failed as a result of ordinary wear and tear. All material in this manual is subject to change without a further notice. The manual is intended as non-contractual document.

Cybersecurity disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is Customer's sole responsibility to provide and continuously ensure a secure connection between the product and Customer network or any other network (as the case may be). Customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

2

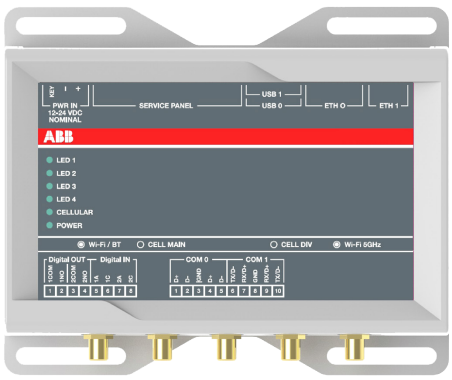
Hardware description

Contents of this chapter

This chapter provides an overview about the product. It also includes information about the network connectivity and connectors.

Product overview

The VSN900 gateway is used for remote data acquisition of central solar inverters. The hardware is developed based on ReliaGATE 10-12 gateway. The gateway enables collecting and analyzing energy generation data from all connected solar inverters and devices connected to the same monitoring network. System performance and energy information are logged into a database on the Aurora Vision® Plant Management Platform where it can be retrieved and used for analysis via a web-browser.



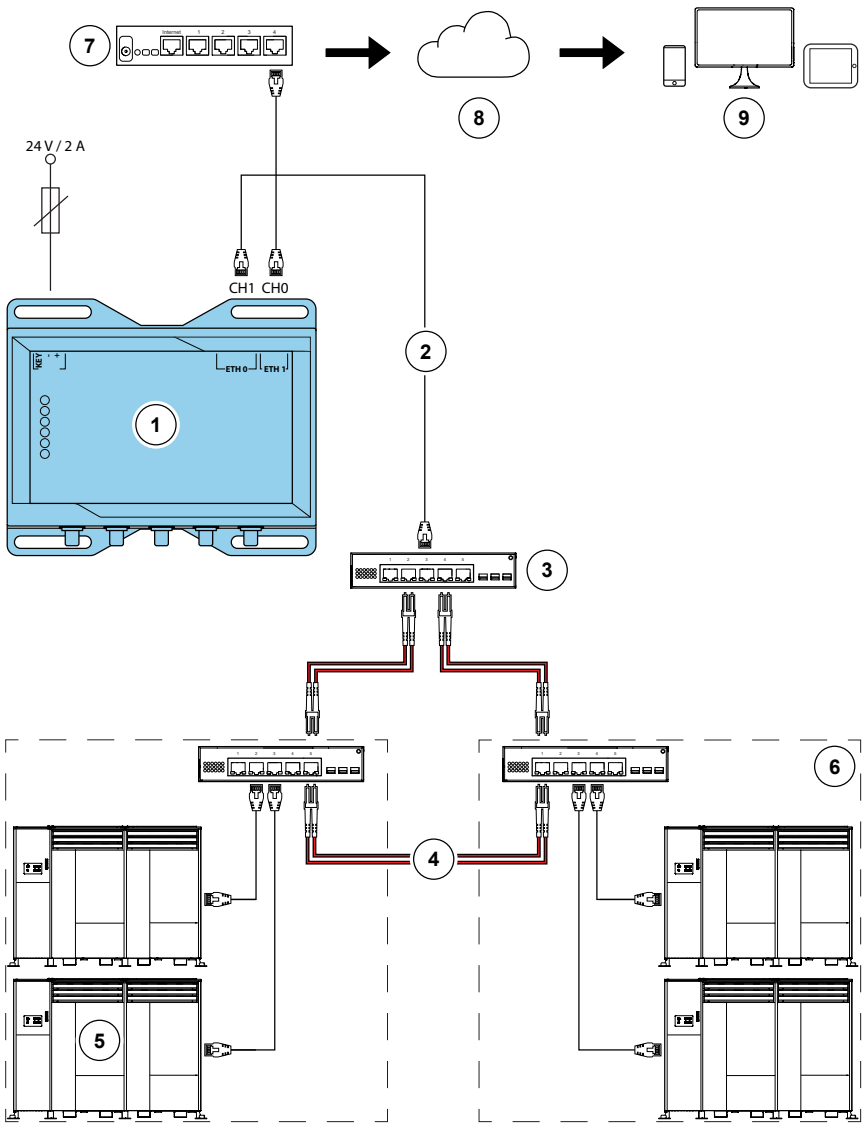
Features

The gateway with Aurora Vision® solution can perform the following tasks:

- monitor solar inverters (energy report)
- read inverter parameter values
- read status information and actual values from the inverter.

Network overview

The network diagram below shows the connectivity between the gateway, solar inverters and Aurora Vision® Plant Management Platform.

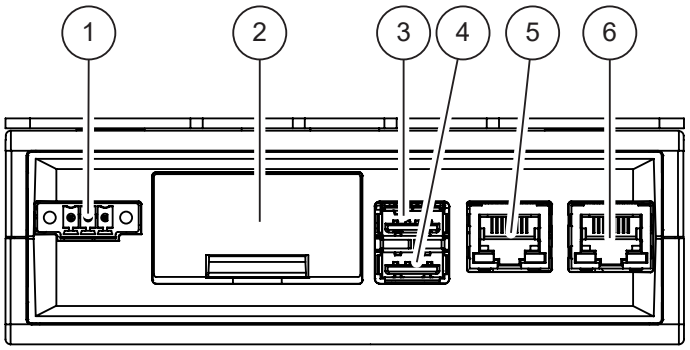


1	VSN900 gateway
2	Ethernet connection
3	Ethernet switch with fiber optic ports
4	Fiber optic ring
5	Solar central inverter (equipped with FENA Ethernet adapter module)
6	Solar megawatt station
7	Ethernet switch
8	Aurora vision®
9	User's device

Connectors

This section shows the connectors and LEDs of the gateway that are used to connect the solar inverters for remote data acquisition. For complete information of the connectors and LEDs, see *ReliaGATE 10-12-3x IoT Edge Gateway TI AM335x LTE Cat 1 User's manual*, (REGATE-10-12-3x_Man_ENG_2-0).

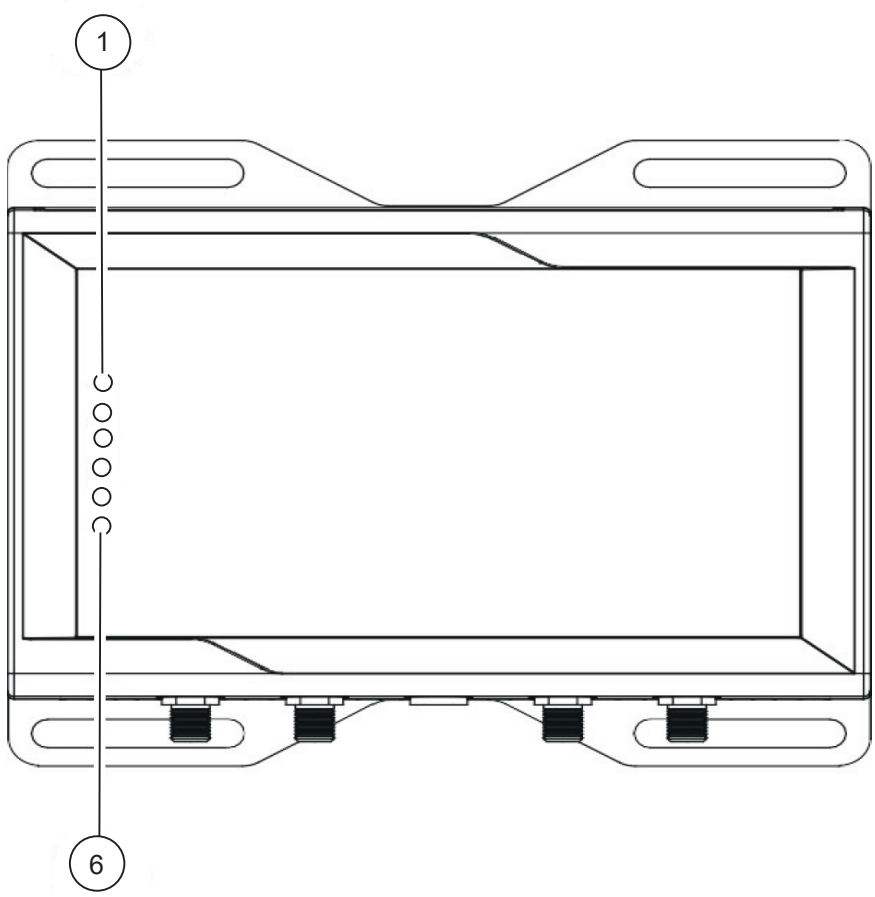
Upper side connectors



1	Power IN connector	External power supply: 24 V / 2 A. Use external fuse
2	Service panel	Hardware reset button, etc.
3	USB 0 connector	Not used
4	USB 1 connector	
5	Ethernet ETH 0 connector	CH0: Connection to solar inverters
6	Ethernet ETH 1 connector	CH1: Connection to web

For more information, see *ReliaGATE 10-12-3x IoT Edge Gateway TI AM335x LTE Cat 1 User's manual*, (REGATE-10-12-3x_Man_ENG_2-0).

LED indicators



1	Green	ON	cloud connection is ok
		OFF	cloud connection is not ok after three attempts
2	Green	Blinking	inverter data collection is in progress
		OFF	inverter data is not collected
3	Amber	ON	error in firmware update
		Blinking	firmware update is in progress
4	Amber	ON	system error
		OFF	system functionality is ok
5	Green	ON	cellular modem is on
		Blinking	cellular modem is connected to cellular network
6	Blue	ON	power on
		OFF	power off

3

Installation

For the connections of the gateway, see *Network overview (page 13)* and *Connectors (page 14)*.

For more information on the installation of the gateway, see *ReliaGATE 10-12-3x IoT Edge Gateway TI AM335x LTE Cat 1 User's manual*, (REGATE-10-12-3x_Man_ENG_2-0).

4

Start-up

Contents of this chapter

This chapter describes how to commission the gateway to communicate with the Aurora Vision plant management and solar inverters.

Commissioning steps

To set up the gateway

Step	Instruction	For more information, see ...
1	Check that the gateway is unpacked and installed as specified.	*ReliaGATE 10-12-3x IoT Edge Gateway TI AM335x LTE Cat 1 User's manual*, (REGATE-10-12-3x_Man_ENG_2-0).
2	Make sure that the connections of the gateway are done.	*Network overview (page 13)* and *Connectors (page 14)*
3	Make sure the Ethernet adapter (FENA) module is configured for inverter communication.	*Configuring Ethernet adapter modules of the solar inverters (page 20)*
4	Check the Internet connections of the gateway.	*Connecting to Internet (page 21)*
5	Connect the gateway via Wi-Fi to the PC (or other device) that you use for the gateway setup.	*Setting up wireless connection for the gateway setup (page 21)*
6	Configure the gateway using ABB wizard.	*Configuring the gateway (page 22)*
7	Make sure you have: • User ID and password to log in to Aurora Vision® Plant Portfolio Manager • Administrator privileges to access the Administrator tool in Aurora Vision®.	*Setting up the Aurora Vision® Plant Management Platform (page 34)* or contact ABB support.

Step	Instruction	For more information, see ...
8	Perform Asset registration in the **Administration** page of Aurora Vision® Plant Portfolio Manager web interface. **Note:** You will need the product number of the gateway.	*Asset registration (page 31)*
9	Verify end-to-end data transfer using the Aurora Vision® Plant Portfolio Manager web portal.	*Verifying end-to-end data transfer (page 31)*

Configuring Ethernet adapter modules of the solar inverters

Configure the FENA Ethernet adapter module to enable communication with the inverter.

1. Install the FENA module. See instructions in *FENA Ethernet adapter module user's manual*.
2. Power on the inverter.
3. Set parameter *150.31 FBA B Enable = Enable*.
4. Configure adapter module parameters in parameter group *154 FBA B*. For example, set the node address and the communication profile, typically *Transparent 16-bit* profile. See the example configuration in the below screen. The configuration uses a private network with IP address: *192.168.1.5* and network mask: *255.255.255.0*). For more information, see *FENA Ethernet adapter module user's manual* (3AUA0000093568 [English]).

	154. FBA B settings					
1	FBA type	Ethernet	NoUnit			None
2	Protocol/Profile	MB/TCP T16	NoUnit			MB/TCP ABB C
3	Commrate	Auto	NoUnit			Auto
4	IP configuration	Static IP	NoUnit			Static IP
5	IP address 1	192	NoUnit	0	255	0
6	IP address 2	168	NoUnit	0	255	0
7	IP address 3	1	NoUnit	0	255	0
8	IP address 4	5	NoUnit	0	255	0
9	Subnet CIDR	24	NoUnit	0	32	0
10	GW address 1	0	NoUnit	0	255	0
11	GW address 2	0	NoUnit	0	255	0
12	GW address 3	0	NoUnit	0	255	0
13	GW address 4	0	NoUnit	0	255	0
14	Commrate Port 2	Auto	NoUnit			Auto
15	FBA Par15	0	NoUnit	0	65535	0
16	FBA Par16	0	NoUnit	0	65535	0
17	FBA Par17	0	NoUnit	0	65535	0
18	FBA Par18	0	NoUnit	0	65535	0
19	T16 scale	99	NoUnit	0	65535	0
20	Timeout time	20	NoUnit	0	65535	0
21	Timeout mode	Control RW	NoUnit			None
22	Word order	HiLo	NoUnit			LoHi
23	Address mode	Mode 1	NoUnit			Mode 0
24	FBA Par24	128	NoUnit	0	65535	0
25	FBA Par25	0	NoUnit	0	65535	0
26	Reserved	0	NoUnit	0	65535	0
27	FBA par refresh	Done	NoUnit			Done
28	Par table ver	0x0102	NoUnit	0x0000	0xffff	0x0000
29	Drive type code	621		0	65535	0
30	Mapping file ver	3		0	65535	0
31	D2FBA comm sta	Off-line	NoUnit			Idle
32	FBA comm SW ver	0xc803	NoUnit	0x0000	0xffff	0x0000
33	FBA appl SW ver	0x0311	NoUnit	0x0000	0xffff	0x0000

5. Validate the settings with parameter *154.27 FBA B par refresh = Configure*.

Connecting to Internet

Note: The gateway uses Ethernet connection, for which you need an IP address (DHCP or static). The gateway is by default set to DHCP and tries to acquire the IP address from the DHCP server on your local area network. For setting a static IP, see *Setting a Static IP address*.

1. Connect the gateway to the Internet through a local area network. Use the standard Ethernet cable and connect to the **Eth0** port of the gateway.

   Note: ABB does not provide Internet service or the cables required to connect the gateway to the Internet.
2. Check that Ethernet port LED indicator status is Green. If no activity is seen on the LED, check all the connections.

Setting up wireless connection for the gateway setup

Note: ABB recommends to use Chrome v.55 or later or Firefox v.50 or later.

1. Once powered, the gateway automatically creates a wireless network (approximately 60 seconds).
2. Enable wireless connection on the device used for setting up the gateway (eg. tablet, smartphone or PC) and connect it to the Wi-Fi access point created by the gateway.
   - Set the name of the wireless network for establishing connection. Eg: ABB-XX-XX-XX-XX-XX-XX, where “X” = hexadecimal digit of the wireless MAC address. You can find the MAC address on the “Communication Identification Label” placed on the side of the gateway. See also the sample screen from a tablet with Android operating system.

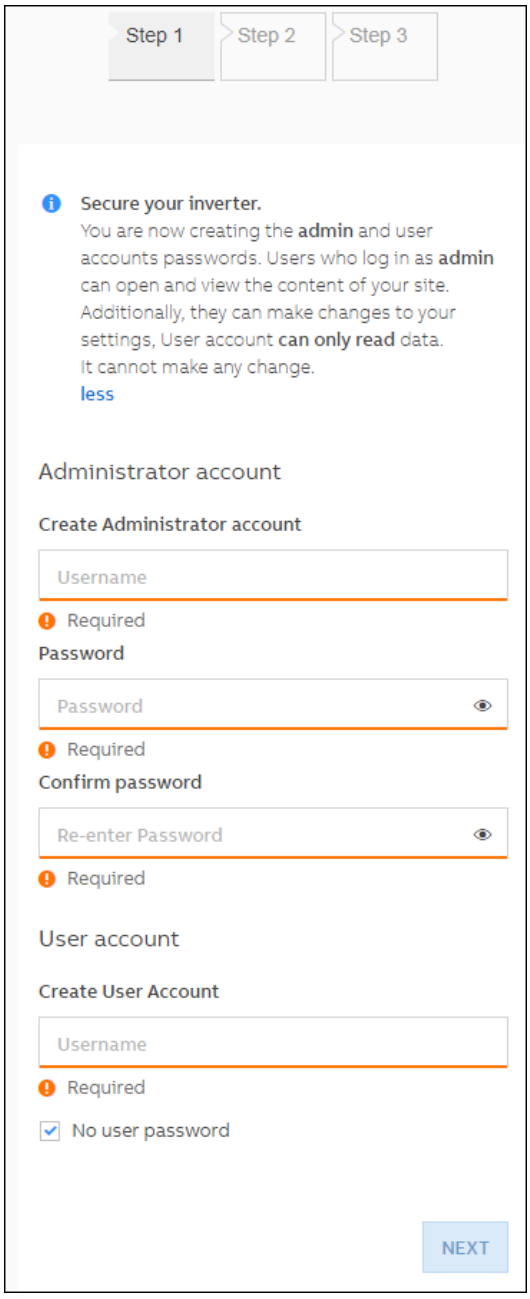
3. Enter the product key (printed on the gateway) as access point password. Consider dash "-" also as a character in the password field.

   Note: You can also recover the product key from Aurora Vision® cloud or contact ABB support.
4. Open the browser and enter the preset IP address 192.168.117.1 to access the gateway configuration interface.

Configuring the gateway

After you have formed the connection for the gateway setup, proceed as follows:

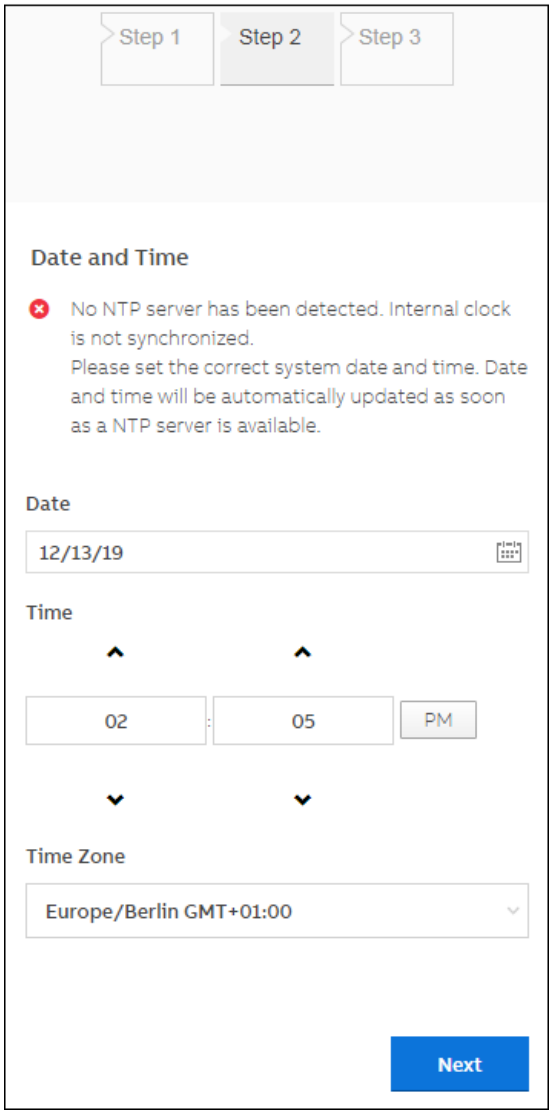
1. At the first power on, the wizard prompts to configure the basic settings of the gateway.
   Step 1: Enter username and password to create Administrator account and User account.
   Click **Next**.



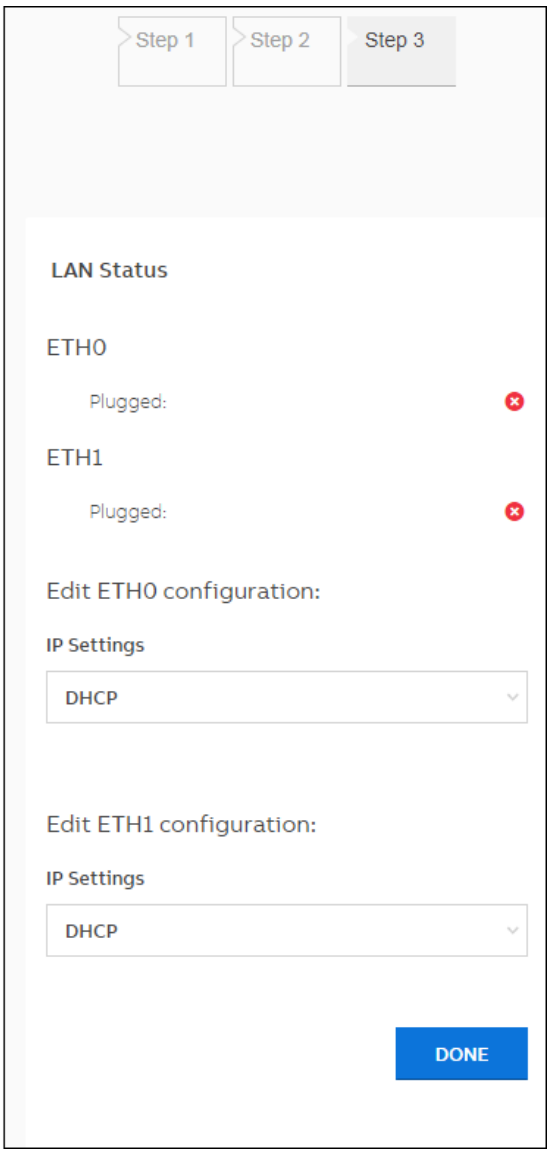
Note:

- User name and password are case sensitive. Make sure the password contains minimum eight characters.
- With Administrator account, you can read and change the gateway settings. With User account, you can only read data.

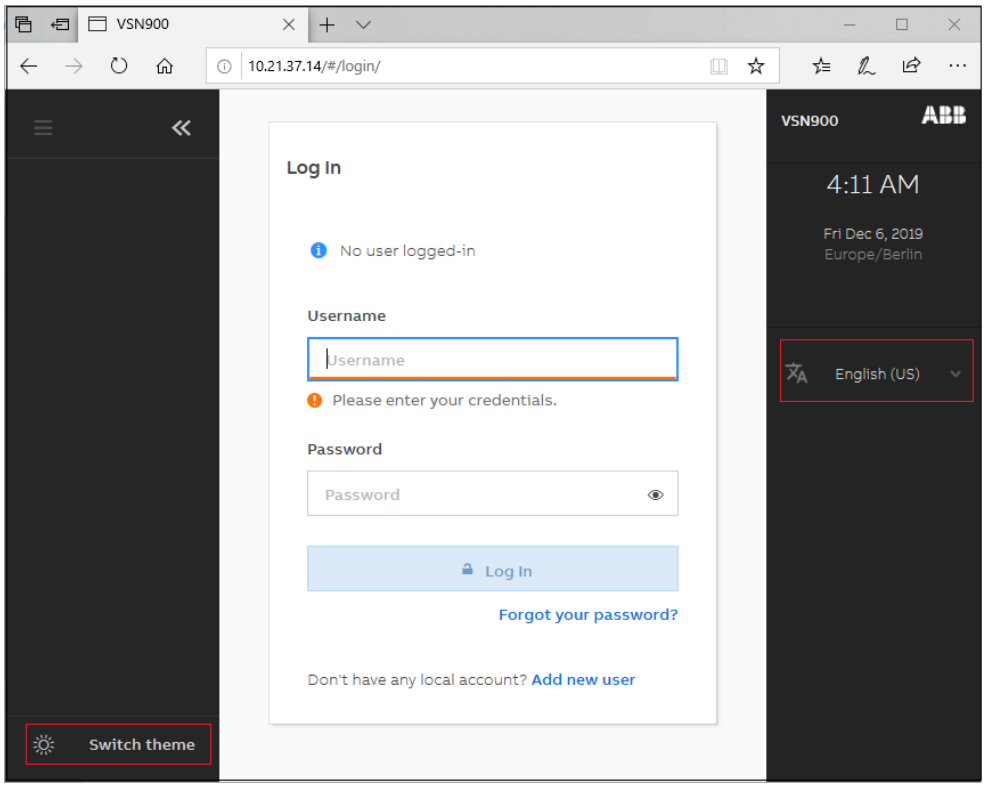
Step 2: Select date, time and time zone. Click **Next**.



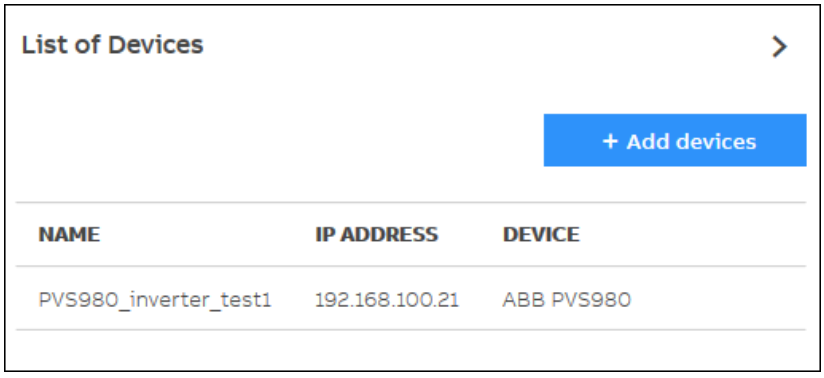
Step 3: Check the status of Ethernet links and if required, edit the configuration. Click **DONE**.



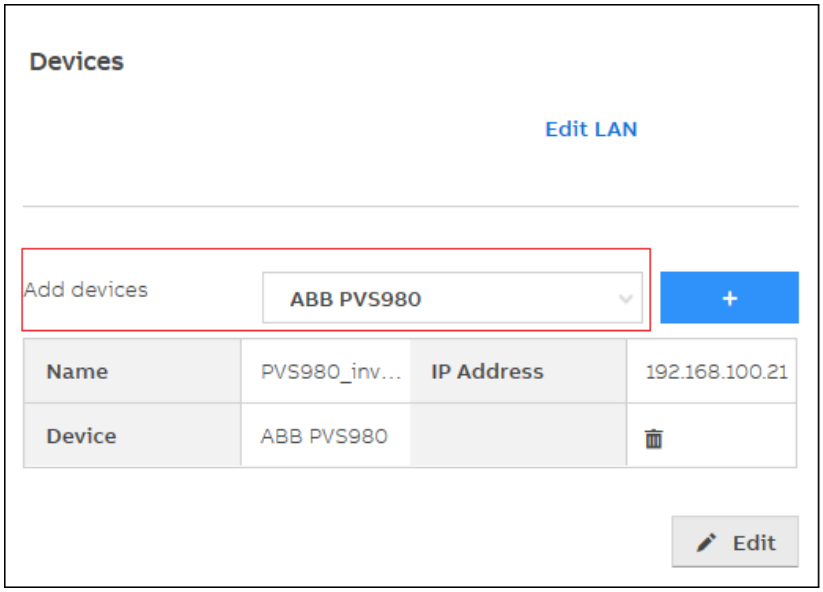
2. Now you can login to the gateway wizard. Select your desired language. You can also switch to a desired theme.



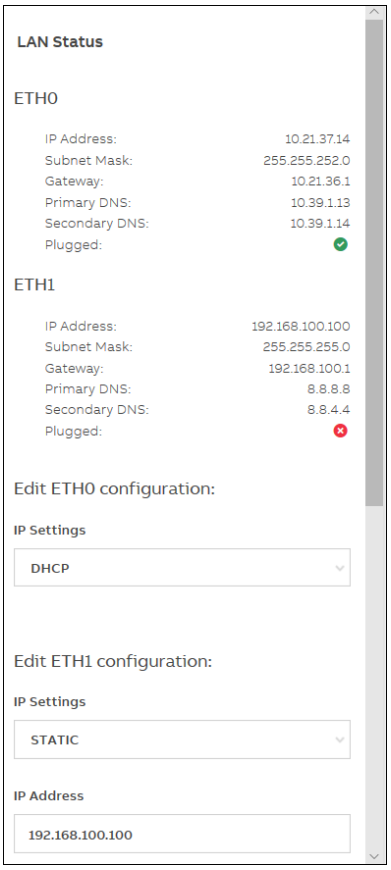
3. If the gateway is already connected to inverters, they are displayed in the List of Devices. Click **Add devices**, if you prefer to add more devices.
   At any point-of-time to view the list of devices, go to **Main** → **List of Devices**.

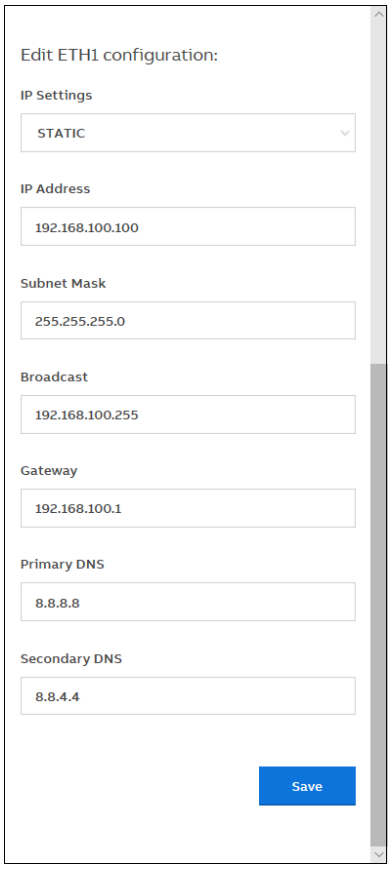


4. In the Add devices drop down list, select the required device and click **+**. You can also edit or delete the added devices from here. Click **Edit LAN**, to check the status of the Ethernet links connected to CH0 and CH1 connectors of the gateway.
   At any point-of-time to edit the added devices, go to **Connectivity** → **Devices**.



5. Edit the required ETH configuration and click **Save**.
   At any point-of-time to edit the ETH configuration, go to **Connectivity → LAN**.
   The screen below shows an example configuration.

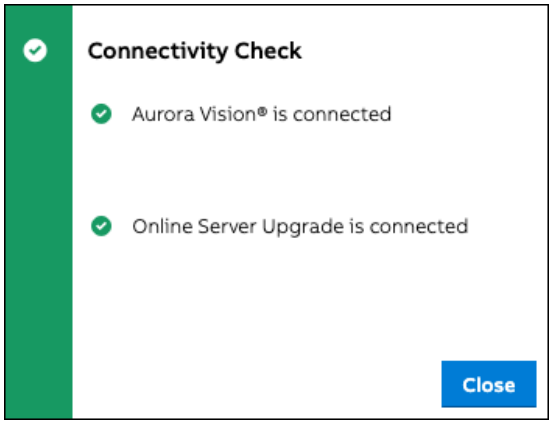




- ETH0 configuration refers to the Ethernet gateway port of external network, i.e. Internet. The preferred IP setting is DHCP.

- ETH1 configuration refers to the Ethernet gateway port of the inverter network. The preferred IP setting is STATIC.
- If IP setting is
  - STATIC - allows to assign a fixed IP address. When data for assigning the IP static address appears, complete all additional fields except the secondary DNS server.
  - DHCP - router automatically assigns a dynamic IP address whenever the network is connected.

6. If configuration is successful, the connectivity check status shows green. Click **Close**.
   If configuration is not successful, recheck the connections to the gateway and repeat the steps for *Configuring the gateway (page 22)*.
   At any point-of-time to check the connectivity status, go to **Service Tools** → **Connectivity Check**.

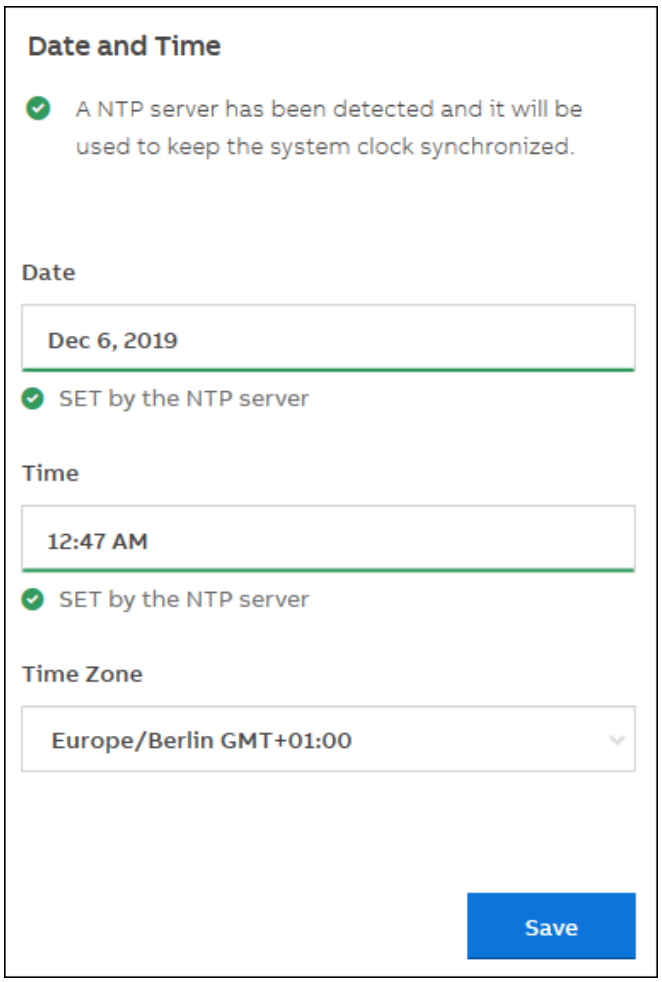


Additional configurations

Setting date and time zone

If gateway is connected to the Internet, the date and time fields are filled automatically through the NTP server. Otherwise, you may have to fill the fields manually using below steps:

1. Go to **Services Tools** → **Date and Time**.
2. Fill the required information and click **Save**.

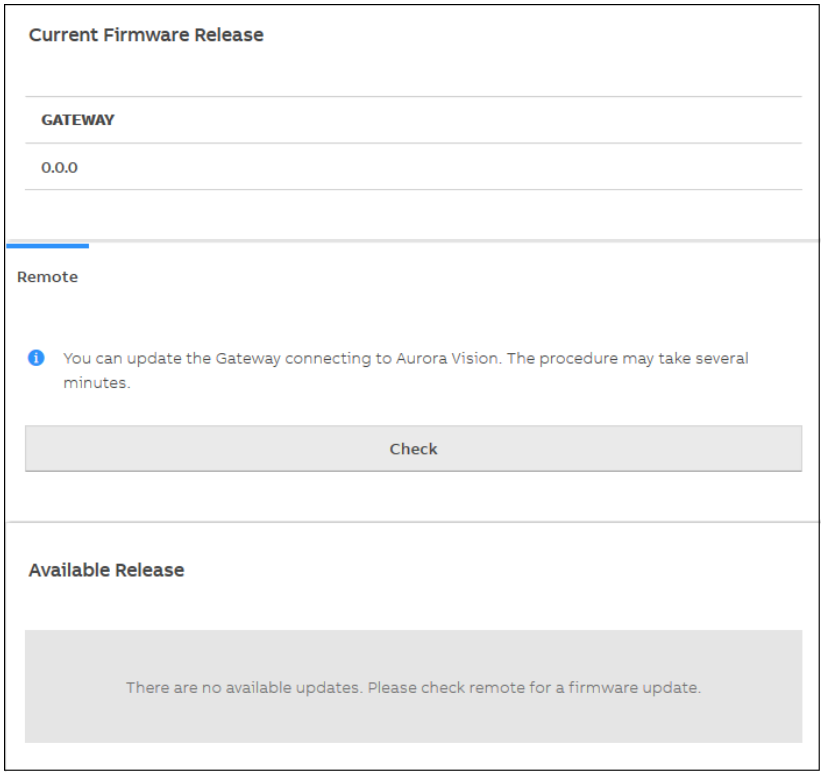


Updating firmware

To update the gateway firmware,

1. Go to **Services Tools** → **Firmware Update**.
2. In the Current Firmware Release screen,
   - **GATEWAY** - lists the current firmware on the gateway.
   - **Remote** - updates the gateway firmware remotely.

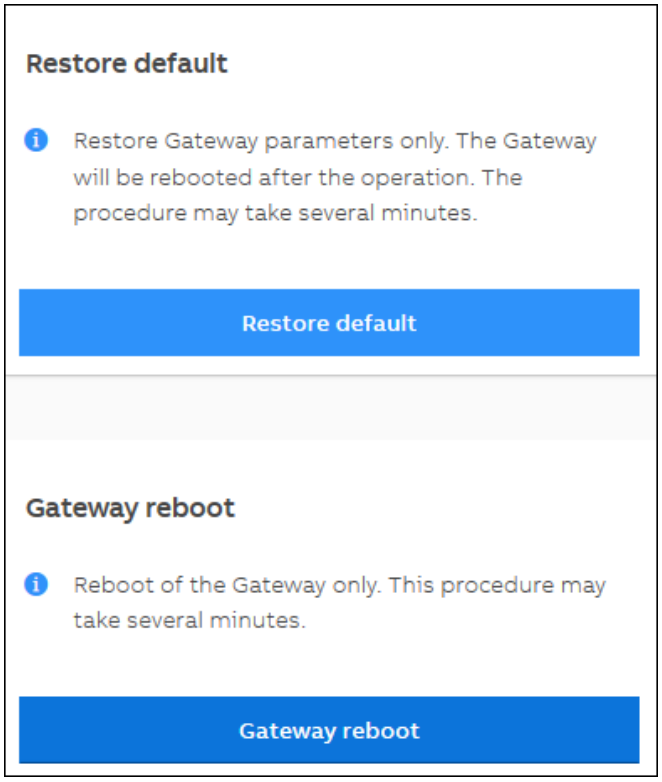
   Click **Check**, to check for available firmware releases.



Reset to factory default

To restore the gateway parameters to factory default,

1. Go to **Services Tools** → **Reset Manufacturing**.
2. In the Restore default screen, click
   - **Restore default** - to restore only the gateway parameters.
   - **Gateway reboot** - to reboot only the gateway.



Asset registration

Asset registration assigns the MAC address of gateway to a specific plant in Aurora Vision®. The registration can be performed before or after the on-site installation is complete. When you register the gateway, all the assets (inverters and other devices) connected to the gateway are registered.

For more information, see Aurora Vision® documentation.

Verifying end-to-end data transfer

Make sure that data is reported and visible on the Aurora Vision® portal. After you have completed the gateway setup, wait for 15 minutes and log on to www.auroravision.net using a web browser on an Internet connected device.

1. In the Aurora Vision® portal, go to the **Plants** > Dashboard page of the plant.
2. Open the Device Status panel.
3. Verify that the energy readings and the status data agree with the actual inverter data.
4. Check that all the monitored devices are communicating as indicated at the last reported time.

5

Aurora Vision® plant management platform

Content of this chapter

This chapter describes the Aurora Vision® cloud platform shortly. For more information see *Aurora Manager LITE - Advanced configuration software Product Manual* (M000006DG).

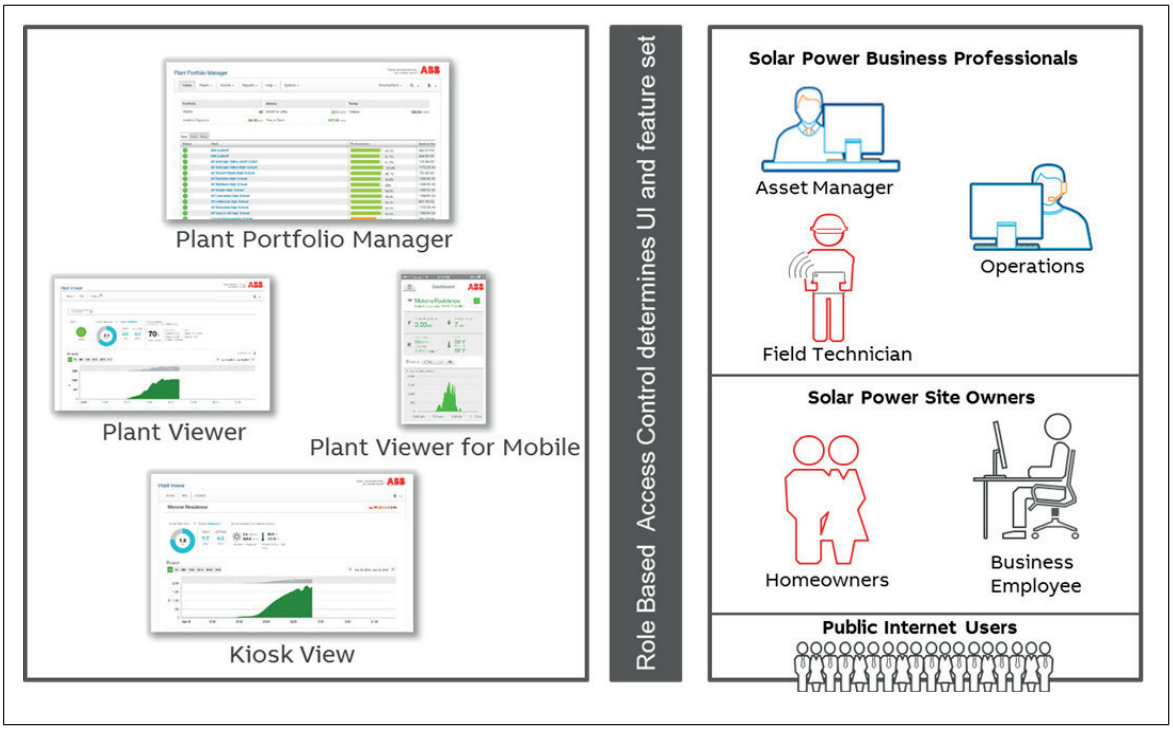
Overview of Aurora Vision® plant management platform

Aurora Vision® Plant Management Platform is a cloud based application enabling remote monitoring and asset management of solar power plants integrated with ABB solar inverters. The application allows solar power plant professionals and site owners to monitor the power plants. The application is available in three different types (listed in table below) which can be used together to match the technology and usage.

Application type	Description
Plant Portfolio Manager	• Web-based application. • used by solar power professionals • used to monitor and manage a portfolio of power plants using ABB solar inverters.
Plant Viewer	• Web-based serviced application • used by non-solar power professionals (such as homeowners or small business owners) • used to monitor solar power plants
Plant Viewer for Mobile	• mobile-based application • can be accessed through smart phones, tablets and iPod Touch with IOS and Android operating systems • used by non-solar power professionals • used for remotely monitoring of PV power plants

Role-based access control

The Aurora Vision® application features are determined based on the roles defined in the power plant.



Setting up the Aurora Vision® Plant Management Platform

For plant portfolio manager account (mainly for installers and plant administrators), contact ABB technical support.

For plant viewer and plant viewer for mobile (mainly for site owners), navigate to www.auroravision.net and click **Register with Plant Viewer**.

Further information

Product and service inquiries

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to www.abb.com/searchchannels.

Product training

For information on ABB product training, navigate to new.abb.com/service/training.

Providing feedback on ABB manuals

Your comments on our manuals are welcome. Navigate to new.abb.com/drives/manuals-feedback-form.

Document library on the Internet

You can find manuals and other product documents in PDF format on the Internet at www.abb.com/drives/documents.

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