USER GUIDE

# Sensi+

## GLA533-NG Gas Analyzer

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CHAPTER 1

# Connecting to Sensi+

Sensi+ is designed to be operational from the moment it comes online. Upon installation, the instrument is fully configured to work in a vast majority of gas analysis scenarios. However, situations might happen where you need to perform additional configurations and actions (adding users, extracting data, acknowledging system events, etc.). These configurations and actions are explained in this document.

**NOTICE**

All information related to the **physical** installation, connection, and troubleshooting of the Sensi+ gas analyzer can be found in the Sensi+ Installation and Commissioning Guide.

Also, operators of this instrument should familiarize themselves with the content of the Sensi+ Product Safety Guide.

To perform these additional operations, you first need to connect to the instrument via either a wired (Ethernet) or wireless (Wi-Fi) connection.

You will find these connections procedures in this chapter.

**NOTICE—CYBERSECURITY**

This product is designed to be connected to, and communicate information and data via a network interface. It is the user's sole responsibility to provide, and continuously ensure, a secure connection between the product and the user's network or any other network (as the case may be).

Users shall establish and maintain any and all appropriate measures (such as, but not limited to, the installation of firewalls, the application of authentication measures, the encryption of data, the installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized accesses, interferences, intrusions, leakages and/or theft of data or information.

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# Connecting to the Analyzer

The first step is to establish a link (wired or wireless) between your computer and Sensi+. This link can be established locally (via Ethernet or Wi-Fi) or remotely.

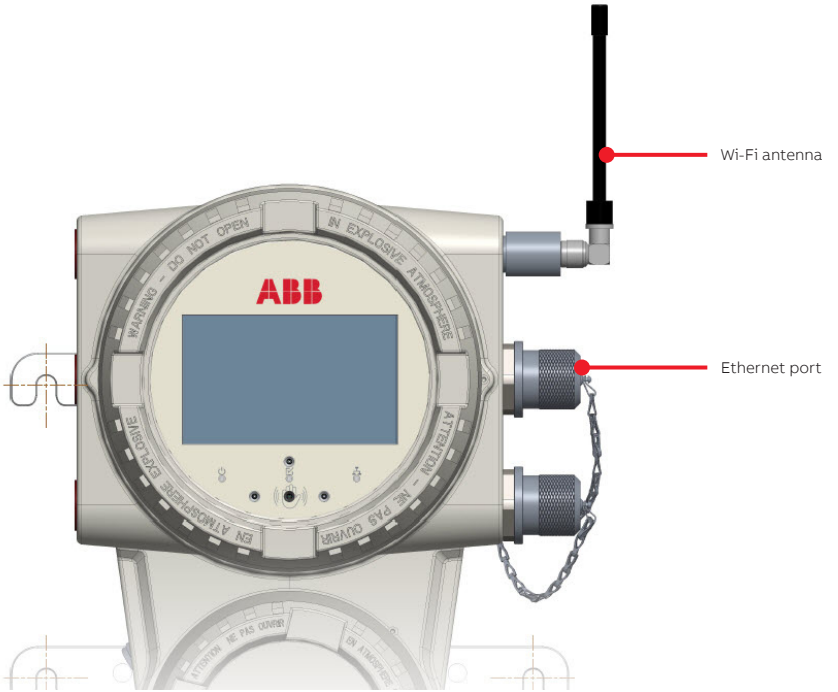
The following sections explain each method.

## Connecting Locally

There are two methods for connecting locally:

- Via the external Ethernet port
- Via Wi-Fi (optional)

**Figure 1** Connections



### Via the External Ethernet Port

To connect to the analyzer via the external Ethernet port:

1 Configure your laptop with the following fixed IP address:
   – Fixed IP Address: `10.0.0.x` (replace the *x* with any number except 0 or 1)
   – Subnet Mask: `255.255.255.0`

**DANGER**

Before performing the next step, make sure that the area is properly derated.

2 Connect an Ethernet cable (Cat 5 type, minimum) between your computer and the Sensi+ external Ethernet port.

3 Launch your Web browser and point it to the following address: `https://10.0.0.1`
   The Sensi+ web remote interface appears.

**NOTE:** You may need to confirm that you trust the site you are trying to access (REMOTE HMI) as the Security Certificate cannot be validated with your device.

### Via Wi-Fi (Optional)

To connect to the analyzer via Wi-Fi (available if an antenna is present):

1 Make sure that Wi-Fi on your computer is active. By default, the analyzer Wi-Fi connection is enabled.

2 On your computer, in the list of available Wi-Fi connections, select the analyzer (e.g., **GLA533-xxxxxxxxx**).

3 When you are asked to provide the Wi-Fi security password, enter `Sens1plusWF!`
   The Sensi+ web remote interface appears.

**NOTE:** The Wi-Fi password might have been modified upon commissioning of the analyzer. Make sure that you have the proper access information before trying to connect.

## Connecting Remotely

Technically, once your computer is connected to the network shared with your analyzer, you are connected to your analyzer and you just need to log in as explained in the next section.

# Logging Into the Analyzer

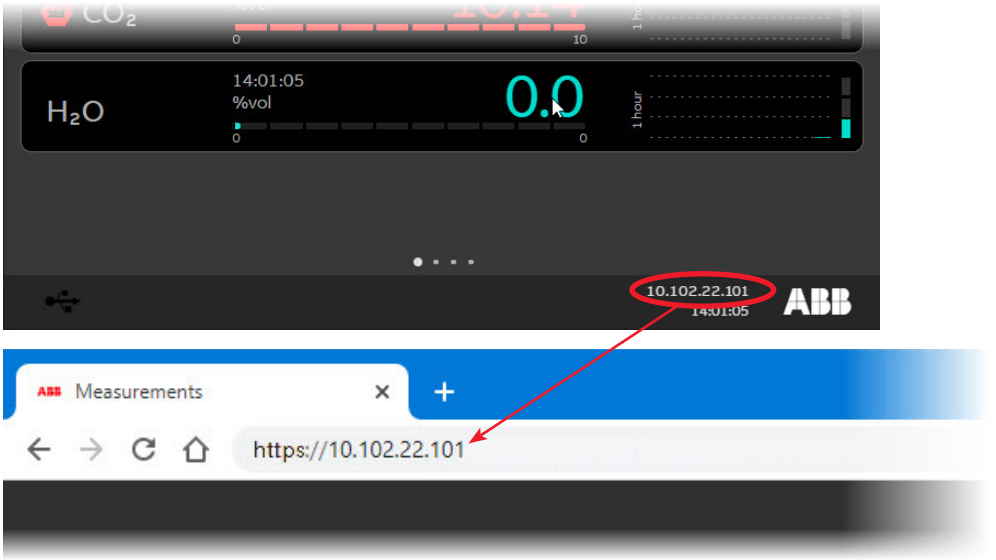
Once you are connected to the analyzer, you need log into it via its Web remote interface. The remote interface is accessible through most mainstream Web browsers. Sensi+ supports the latest versions of Chrome, Firefox, Edge, and Safari. **Chrome is strongly suggested.**

To log into the analyzer:

**1** Point your Web browser to the correct address:

- If you are connected locally, through the external Ethernet port, enter the IP address `https://10.0.0.1`
- If you are connected remotely via a network, enter the fixed IP address set during commissioning of the analyzer (refer to the Installation and Commissioning Guide for more information), or enter the IP address assigned by the DHCP server[1] (as displayed on the Sensi+ screen [see Figure 2]).[2]

**Figure 2** Analyzer Address in the Web Browser




When your browser connects to the address entered, the Sensi+ application appears in the current browser tab.

1 The address assigned by a DHCP server can be found on the Sensi+ analyzer screen or by scanning the network.

2 It is suggested to bookmark this address for future references.

**Figure 3** Sensi+ Gas Analyzer Application (administrator access rights)


**NOTE:** The interface that you see in Figure 3 might differ slightly, depending on your access rights.

2 Click the Login/Logout icon (see Figure 3).

3 In the dialog box that appears, enter your username and password.

**NOTE:** The default username and password should have been modified during analyzer commissioning. Refer to the Installation and Commissioning Guide for more information.

4 Click **Login**. The interface automatically adapts to your access rights (for more information on access rights, see Table 2 on page 31.)

**NOTICE**

Refreshing you Web page automatically logs you out.

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CHAPTER 2

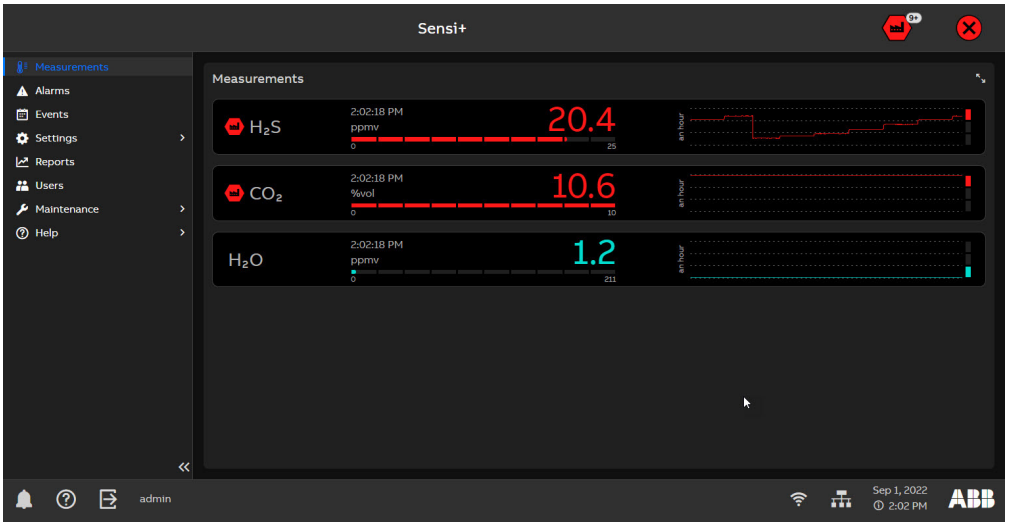
# Introducing the Sensi+ Gas Analyzer Software

The Sensi+ gas analyzer application allows you to configure the analyzer, manage its data and user accesses, generate reports, and perform basic maintenance tasks.

When your browser connects to the address entered, the Sensi+ application screen appears in the main window.

**NOTE:** The interface that you see in Figure 4 below may be slightly different from the one that you see on your screen, depending on the user's access rights to the system. For more information, see "Configuring User Profiles" on page 30.

**Figure 4** Sensi+ Gas Analyzer Application Screen (logged in as an administrator)



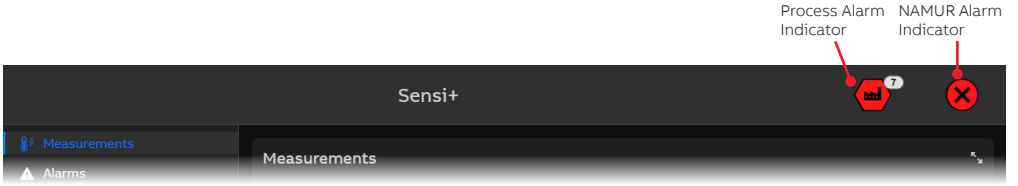
# Graphical User Interface

The following pages provide an overview of the main areas of the Sensi+ application graphical user interface (GUI).

## Top Bar

The application top bar displays two icons illustrating Process and NAMUR alarm categories. A number above one of these icons indicates the number of current alarms for the alarm category (seven process alarms in Figure 5 below). For more information on alarms, see “Managing Alarms” on page 35.

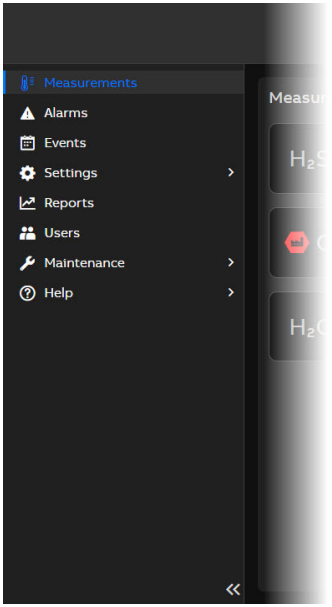
**Figure 5** Sensi+ Application Top Bar




## Sidebar

The application sidebar provides access to most of the Sensi+ gas analyzer operational functions and options.

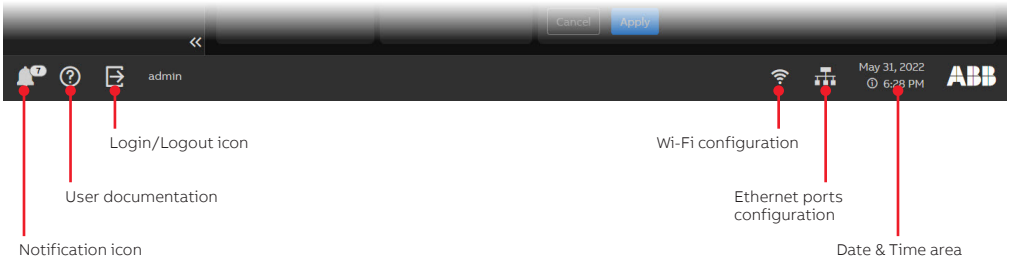
**Figure 6** Sensi+ Sidebar (logged in as administrator)



## Bottom Bar

The application bottom bar provides access to notifications, user documentation, login/logout functions, as well as shortcuts to Wi-Fi, Ethernet ports and date and time configurations.

**Figure 7** Sensi+ Application Bottom Bar (logged in as an administrator)

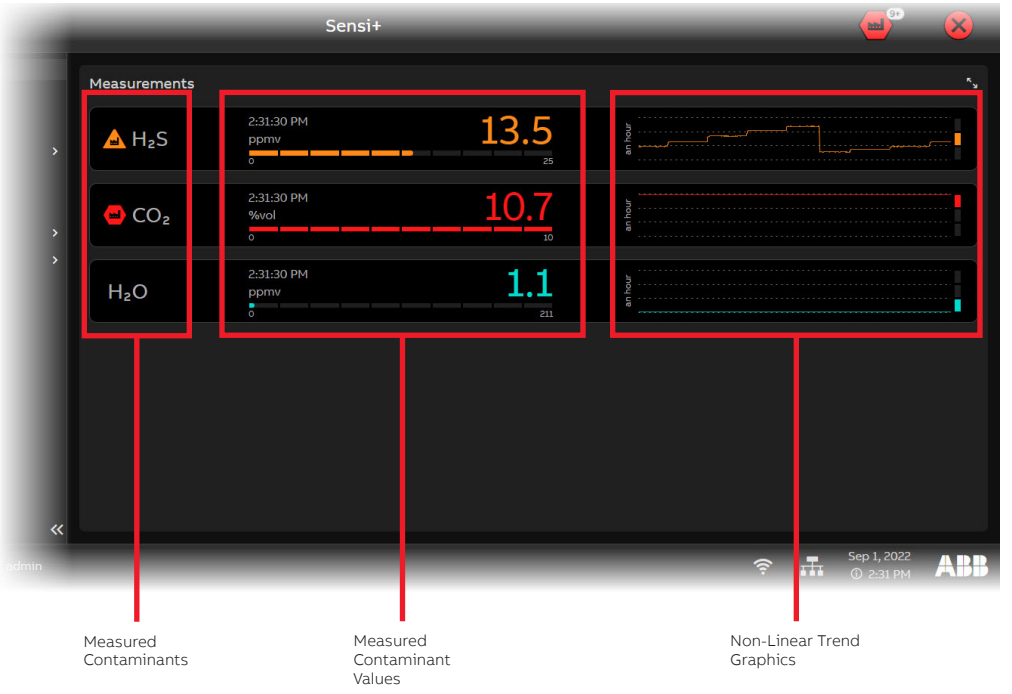



## Main Panel

The main panel indicates the contaminants measured, the measurements themselves, each contaminant linear trend (see “Configuring Gas Parameters” on page 17), as well as the presence of process and NAMUR alarms (see “Introducing NAMUR and Process Alarm Conventions” on page 35).

**NOTE:** The x axis on the non-linear trend graphics represents a time span of up to one hour linearily distributed (see also Figure 83 on page A81 for more details).

**Figure 8** Sensi+ Application Main Panel



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CHAPTER 3

# Configuring Sensi+

The Sensi+ gas analyzer is designed to be a plug-and-play instrument. Its default configuration aims at covering most use cases. However, there are situations where you might need to modify this default configuration. This chapter explains how to modify this configuration, once you established a link with the gas analyzer (see “Connecting to the Analyzer” on page 2).

## Changing Default Administrator Password

**NOTICE**

For cybersecurity reasons, it is considered a best practice to change passwords after initial analyzer installation, and regularly thereafter. Not doing so could expose your entire network to cyberattacks.

With Sensi+, parameters, functions and interface items are made available depending on the username used to access the system.

Upon connecting with the system for the first time, you are presented with the basic Operator remote software interface.

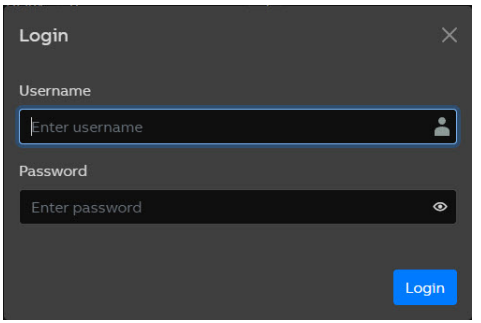
To change the default administrator password:

1. Click the Login/Logout icon in the bottom bar (see Figure 7 on page 9).
2. In the **Login** dialog box that appears (see Figure 9 on page 11), enter the default administrator username and password and click **Login** at the bottom right of the dialog box.

   If the original username and password were not changed as required during commissioning of the analyzer, the default administrator username and password are still:

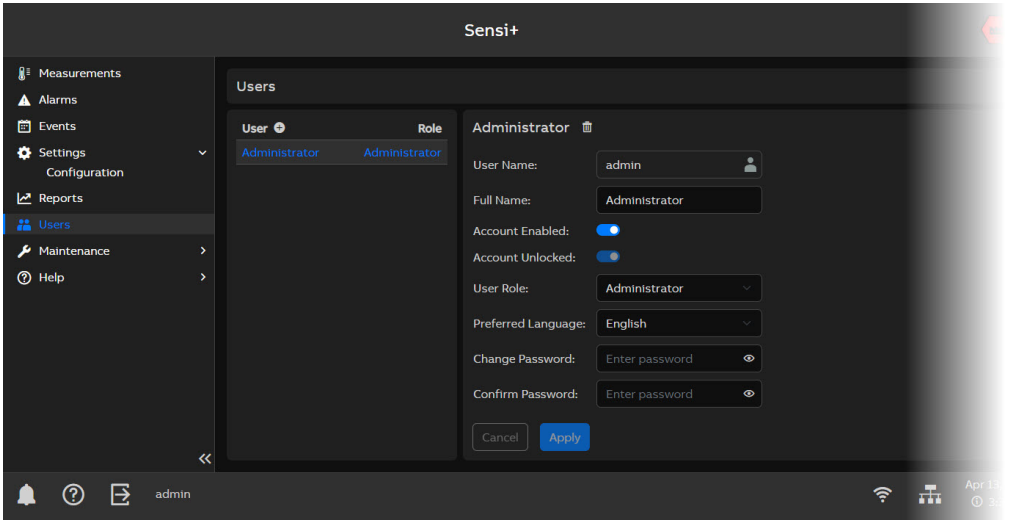
   – Username `admin`
   – Password `Sens1plus!`

**Figure 9** Entering the default Username and Password



3 Once logged in as an administrator, click **Users** in the Sensi+ application sidebar (see “Sidebar” on page 8). The **Users** panel appears to the right.

**Figure 10** Users Panel




4 On the **Users** panel, in the **User** list below, click the user named **Administrator**.
Its information is displayed in the panel to the right.

5 If necessary, in the **Administrator** panel, change the **Full name** for something more meaningful.

**NOTE:** The user name entered when creating a new user **cannot** be changed.

6 In the **Change Password** text field, enter a new password (to make sure that the password is correct, you can reveal it by clicking the eye icon to the right of the text field).

7 In the **Confirm Password** text field, enter the same password as the one entered in the **Change password** text field.
The **Confirm Password** text field is highlighted in red until both passwords match perfectly.

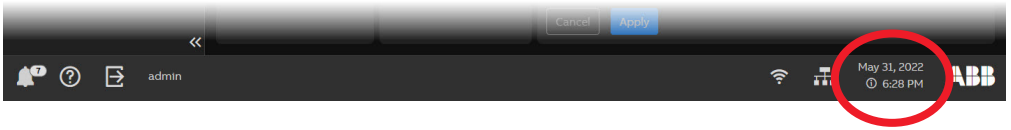
8 Click **Apply** at the bottom of the User panel.
The administrator password is now changed.

# Changing Analyzer Date and Time

Analyzer date and time should have been set to the analyzer's physical location date and time at commissioning. Normally, date and time do not need to be changed unless 1) the electronics containing the clock chip have been changed, or 2) the clock has drifted over a long period of time (~5 years).

When launching the analyzer remote interface, the analyzer's location date and time should appear in the bottom bar right corner, next to the ABB logo.

**Figure 11** Sensi+ Application Bottom Bar



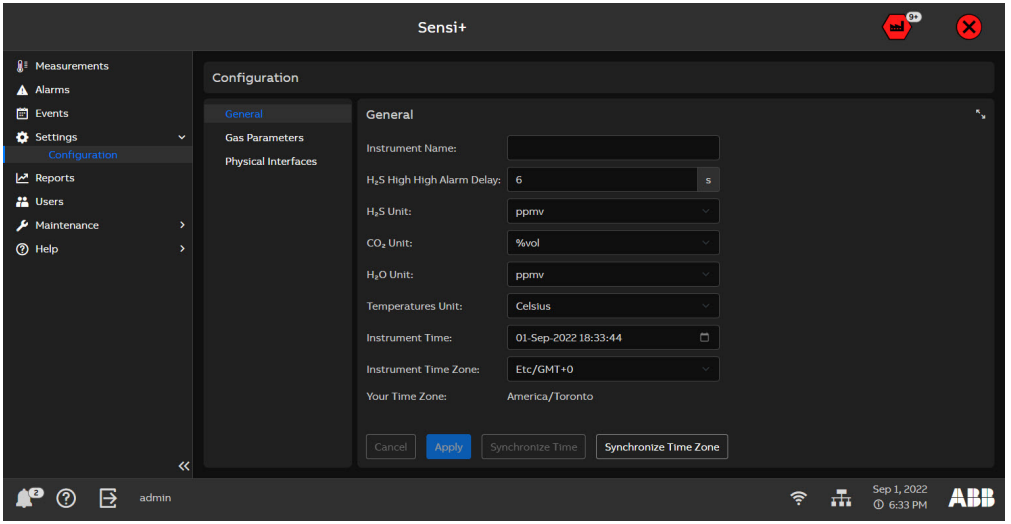

If the connecting computer time zone does not match the analyzer's time zone, a circled ¡ appears next to the clock, as shown in Figure 11.

**NOTE:** Time zones can differ with no ill effect on data collection.

To synchronize the gas analyzer time zone with the user's computer time zone:

1. In the Sensi+ application sidebar, select **Settings** > **Configuration** > **General**.
2. At the bottom of the **General** panel, click **Synchronize Time Zone**. The analyzer time synchronizes with the connected PC time zone (date and time).

**Figure 12** Setting Proper Date and Time Zone




**NOTE:** You can also click the circled ¡ to synchonize date and time.

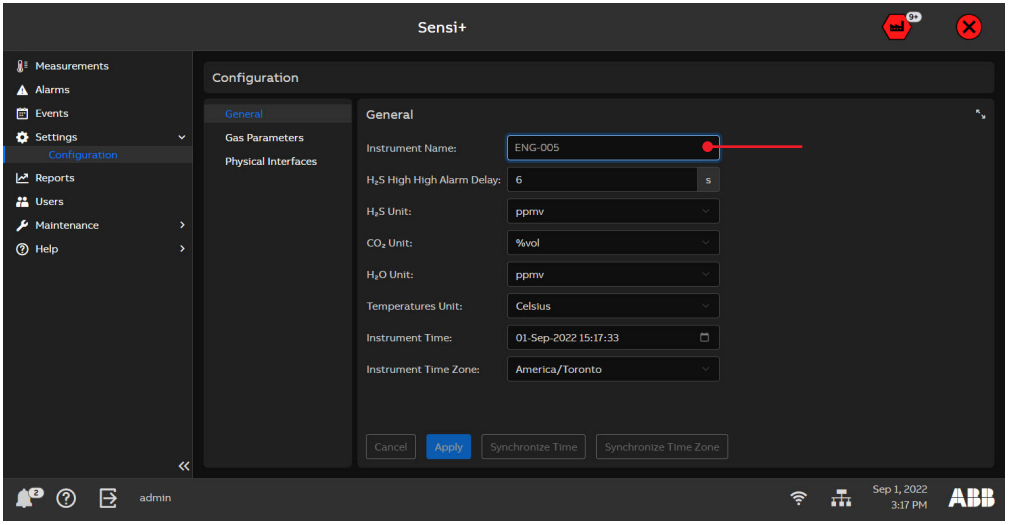
# Naming Your Analyzer

If your Sensi+ is part of a fleet of instruments managed through a network, it is a good idea to assign each instrument on the network a meaningful and easily recognizable name.

To assign a name to your Sensi+:

**1** In the Sensi+ application sidebar, select **Settings** > **Configuration** > **General**.

**Figure 13** Configuring Sensi+ general parameters




**2** In the **Instrument Name** text field, assign a name to the analyzer.

**3** Click **Apply**. The name will appear on the local graphical user interface (GUI) (see Figure 82 on page A80).

# Configuring Gas Measurement Units

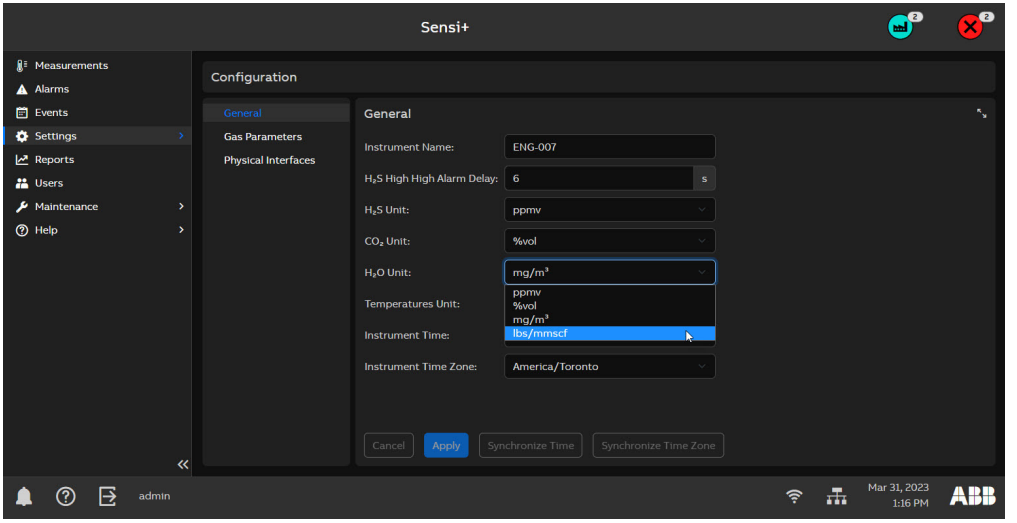
Each gas measurement made by Sensi+ ($H_2S$, $CO_2$, and $H_2O$) can be displayed with one of the following measurement units: ppmv, %vol, mg/m³ or lbs/mmscf.

To configure each gas's measurement unit:

1 In the Sensi+ application sidebar, select **Settings** > **Configuration** > **General** (see Figure 14).

2 For each gas measured, select the measurement unit from a drop-down menu.

**Figure 14** Selecting a measurement unit




3 Once the appropriate measurement units are selected, click **Apply**.

The selected measurement units will be used where appropriate throughout the application.

# Configuring the Temperature Unit

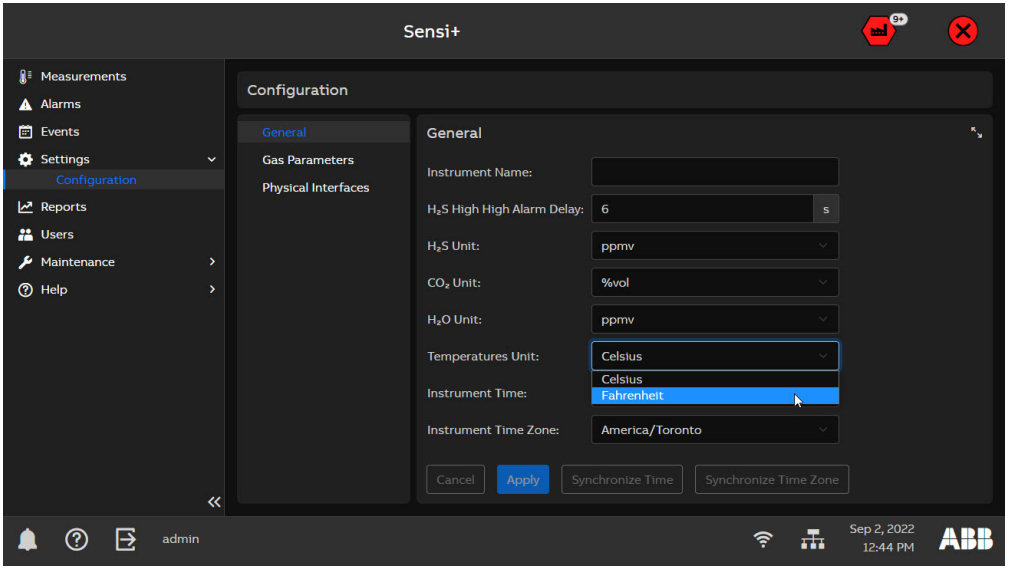
The Sensi+ default temperature unit is the Celsius (°C), but you can change it to the Fahrenheit (°F) if necessary.

To do so:

1 In the Sensi+ application sidebar, select **Settings** > **Configuration** > **General**.

2 In the **Temperature Unit** drop-down menu, select **Fahrenheit**.

**Figure 15** Configuring Sensi+ temperature units



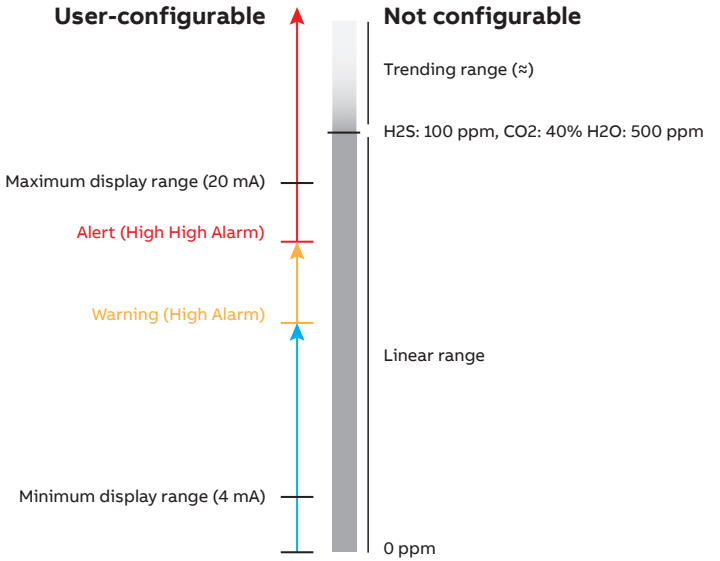

3 Click **Apply**. Temperature units will now be Fahrenheit (°F) throughout the application.

# Configuring Gas Parameters

Gas measurement range and threshold values are factory-set to simplify commissioning. However, these values can be modified if the initial configuration does not correspond to your current situation. The following pages explain how to perform these modifications.

Below is a visual representation of the various components of the gas parameters:

**Figure 16** Illustration of The Various Components of Gas Process Parameters




**NOTICE**

When modifying display range and alarm threshold values, they must follow this logical relation:

- **Min Display Range** < **High Alarm Threshold**
- **High Alarm Threshold** ≤ **High High Alarm Threshold**
- **High High Alarm Threshold** < **Max Display Range**

The display range thresholds (maximum and minimum) can be modified as explained in “Configuring the Display Range” on page 18).

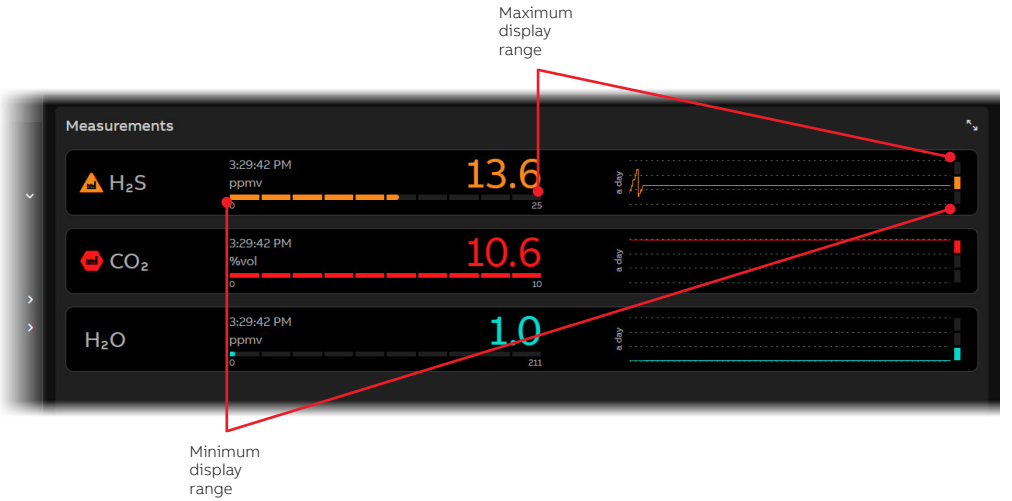
The alarm thresholds (High and High High) can be modified as explained in “Configuring Alarm Thresholds” on page 20).

The **linear range** of measurements is where minimal detectable changes, accuracy and repeatability are guaranteed as per the instrument specifications (“Measurement Specifications” on page E109). The **trending range** starts as defined in the instrument specifications. It cannot be modified and is not user-configurable. Values in this range are measured but they are not as accurate as those in the linear range. As such, they are preceded by the symbol ≈. Values turn gray with a diagonal stroke when they become absolutely invalid (NAMUR alarm error, or not in instrument measurement range).

## Configuring the Display Range

Display range values help visualize the recorded data shown in the **Measurements** panel. The values displayed are in direct linear relation with the 4–20 mA values defined during commissioning of the analyzer. Refer to the Sensi+ Installation and Commissioning Guide for more information.

**Figure 17** Display Range in Measurements Panel



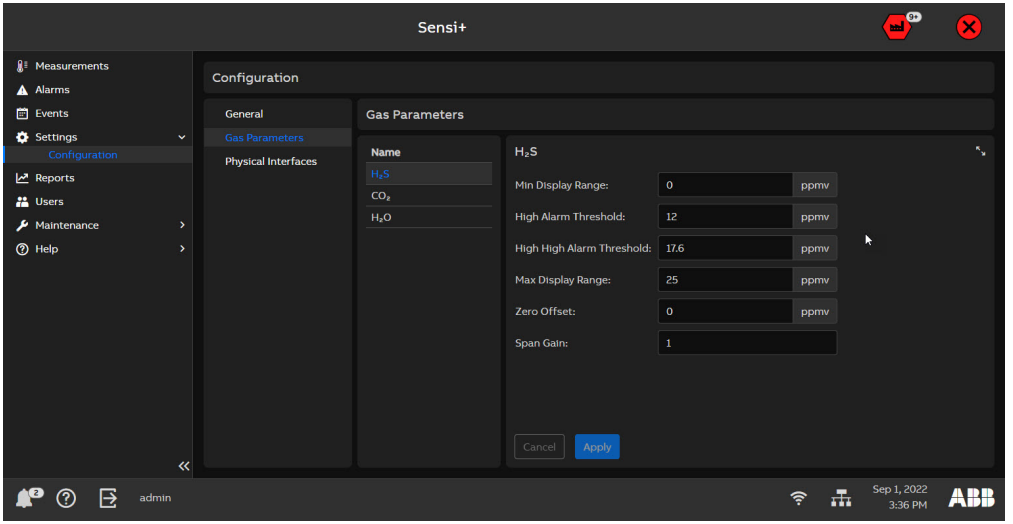

**NOTE:** Sensi+ keeps displaying measured values even if they go above the defined maximum display range or below the defined minimum display range. For example, in Figure 17 above, the maximum display range for $CO_2$ is 10%, but a value of 10,6% is displayed nevertheless.

To set the value display range:

1 From the Sensi+ application sidebar, click **Settings** > **Configuration** > **Gas Parameters**.

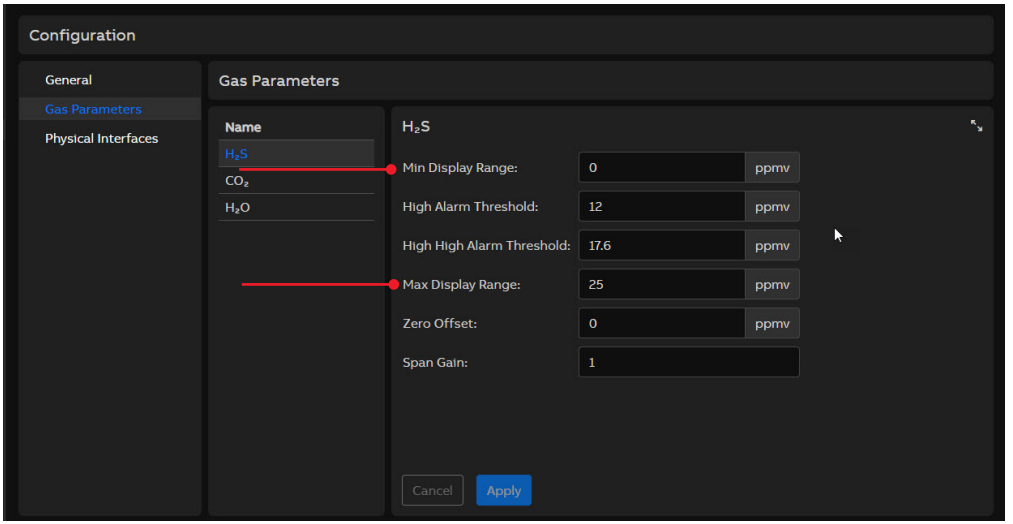
2 Under the **Name** column, select the gas whose display range you want to set (see Figure 18).

**Figure 18** Setting $H_2S$ gas parameters




**3** Enter the appropriate values in the **Min Display Range** and **Max Display Range** text fields (see below).

**Figure 19** Setting the display range




**NOTE:** Units of measurement can be changed as necessary (see “Configuring Gas Measurement Units” on page 15). Units of measurements are for each gas.

**4** Click **Apply** at the bottom of the panel. The display range is set. You can repeat this procedure for the remaining gases.

**NOTE:** The **Min Display Range** value cannot be below 0 and the **Max Display Range** value cannot be above the maximum trending range (see “Measurement Specifications” on page E109).

## Configuring Alarm Thresholds

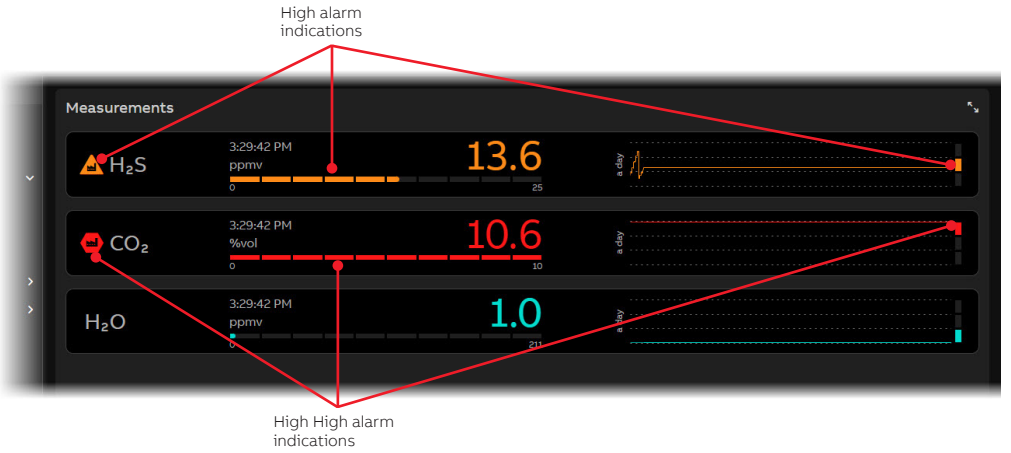
Alarm thresholds help highlight potentially problematic levels of a contaminant in the gas. These thresholds are displayed on the **Measurements** panel.

The **High Alarm** threshold is a warning that indicates that attention should be given to a rising level of contaminant. It is indicated by the amber color in the **Measurements** panel (see $H_2S$ in Figure 20)[1].

The **High High Alarm** threshold is the actual alarm level where contamination requires actions to be taken. When a High High alarm is registered for any of the measured contaminants, the associated digital output (DO) is triggered and values start appearing in red in the **Measurements** panel (see $CO_2$ gas in Figure 20). The trigger is often associated with closing the block valve to the pipeline, but it can be any action deemed necessary at the time of installation.

For more information on DOs, see “Configuring Output Connectors” on page 26. For more information on alarm colors and meanings, see Figure 16 on page 17 and “Introducing NAMUR and Process Alarm Conventions” on page 35.

**Figure 20** High and High High Alarm Thresholds



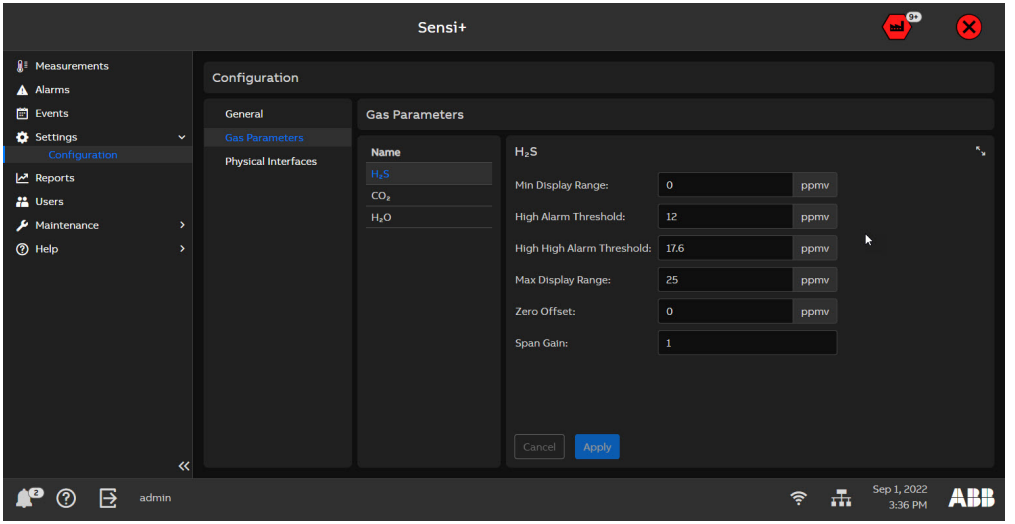

To set the alarm thresholds:

1 From the Sensi+ application sidebar, click **Settings** > **Configuration** > **Gas Parameters**.

2 Under the **Name** column, select the gas whose alarm thresholds you want to set.

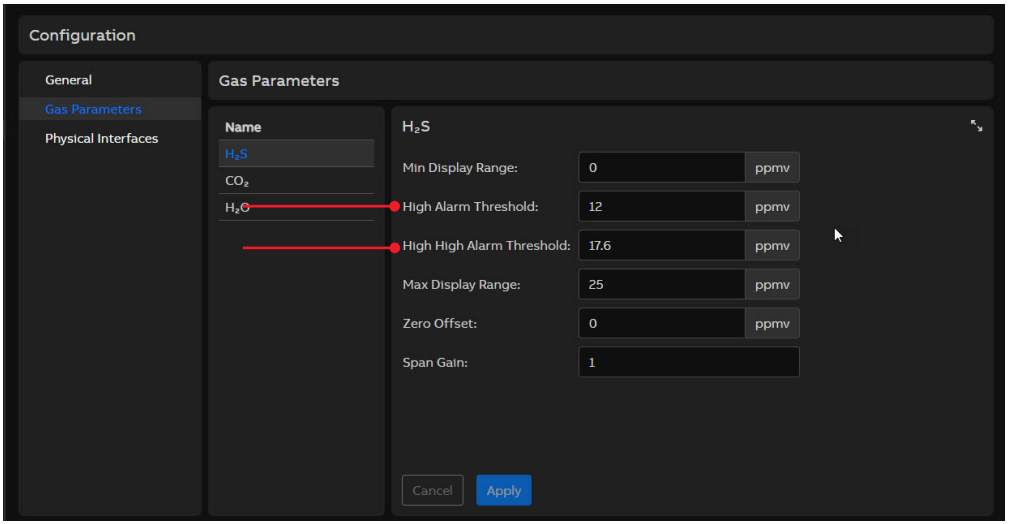
1 A delay can be set before the $H_2S$ contaminant High High alarm is raised. For more information, see “Changing the $H_2S$ High High Alarm Delay” on page 22. There is no delay for the other contaminants.

**Figure 21** Setting $H_2S$ alarm thresholds




**3** Enter the appropriate values in the **High Alarm Threshold** and **High High Alarm Threshold** text fields.

**Figure 22** Setting alarm thresholds




**NOTE:** The unit of measurement used can be changed as necessary (see “Configuring Gas Measurement Units” on page 15). Units of measurements are for each gas.

**4** Click **Apply** at the bottom of the panel.

Alarm thresholds are set. You can repeat this procedure for the remaining gases.

## Modifying Zero Offsets and Span Gains

Zero offset and span gain values should **ONLY** be modified by trained and qualified service personnel. A reminder of the basics of modifying these values is provided in “Calculating Zero Offsets and Span Gains” on page D107

**NOTE:** Entering improper values could render analyzer measurements inaccurate and affect the efficiency of the entire system at generating meaningful warnings and alarms.

## Changing the $H_2S$ High High Alarm Delay

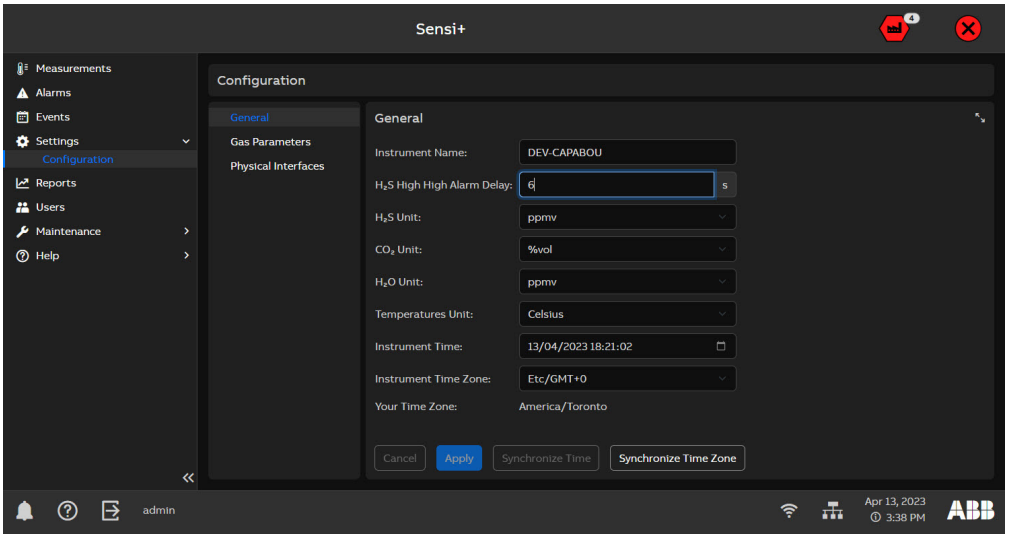
The $H_2S$ high high alarm delay is the delay between the moment the $H_2S$ high high threshold is reached and the moment it is reported (see “Configuring Alarm Thresholds” on page 20). This value should **ONLY** be modified by trained and qualified service personnel.

The default delay is six seconds. It ensures that at least three consecutive values are measured above the **Alarm High High** threshold before an alarm is raised.

To change this delay:

1 In the Sensi+ application sidebar, select **Settings** > **Configuration** > **General**.

**Figure 23** Configuring Sensi+ $H_2S$ High High alarm delay




2 In the **$H_2S$ High High Alarm Delay** field, modify the number of seconds as necessary.

3 Click **Apply**.

From now on, the set delay will start to count down after recording the first value above the High High threshold. If more values are measured above that threshold during the countdown, the analyzer will raise a High High Alarm and trigger the associated digital output (for more information, see “Configuring Alarm Thresholds” on page 20 and “Configuring Output Connectors” on page 26). The trigger is often associated with closing the block valve to the pipeline but it can be any action deemed necessary at the time of installation.

# Configuring Internal Connectors

In Sensi+ gas analyzers, internal connectors are preconfigured, and very few modifications can be performed. Modifications can be performed on the Ethernet ports, the Wi-Fi connection and the analog output state. These modifications are explained in the following pages.

**MODBUS PROTOCOL DISCLAIMER**

The Modbus® protocol is an unsecured protocol and, as such, the intended application of this system should be assessed to ensure that these protocols are suitable before implementation. To prevent any unauthorized accesses, always ensure that physical access to the analyzer and network are properly secured. For cybersecurity reasons, ABB decided not to password protect the Modbus communication protocol in Sensi+ series analyzers.

The Sensi+ (GLA533) analyzer requires access to the following TCP ports on the intranet:

- Modbus 502
- HTTPS Web Service 443

Details of the Modbus protocol are provided in “Modbus Table” on page C89.

## Modifying the Client Ethernet Port Configuration

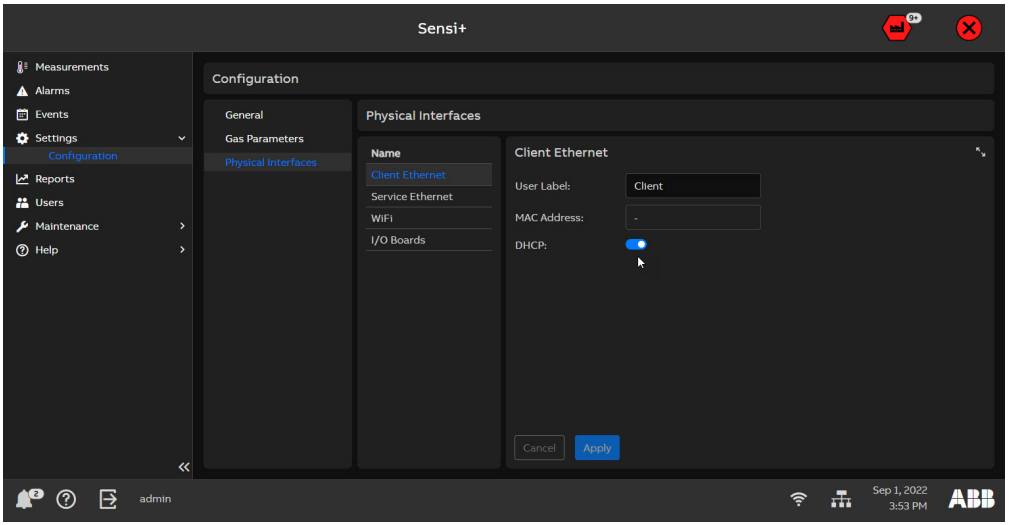
The Client Ethernet port, accessible during installation and commissioning (see the Sensi+ Installation and Commissioning Guide) is configured to be a DHCP client. As such, a DHCP host will automatically attribute an IP address to the analyzer upon connection to the network.

However, it is possible to configure the Client Ethernet port with a fixed IP address.

To modify the Client Ethernet port:

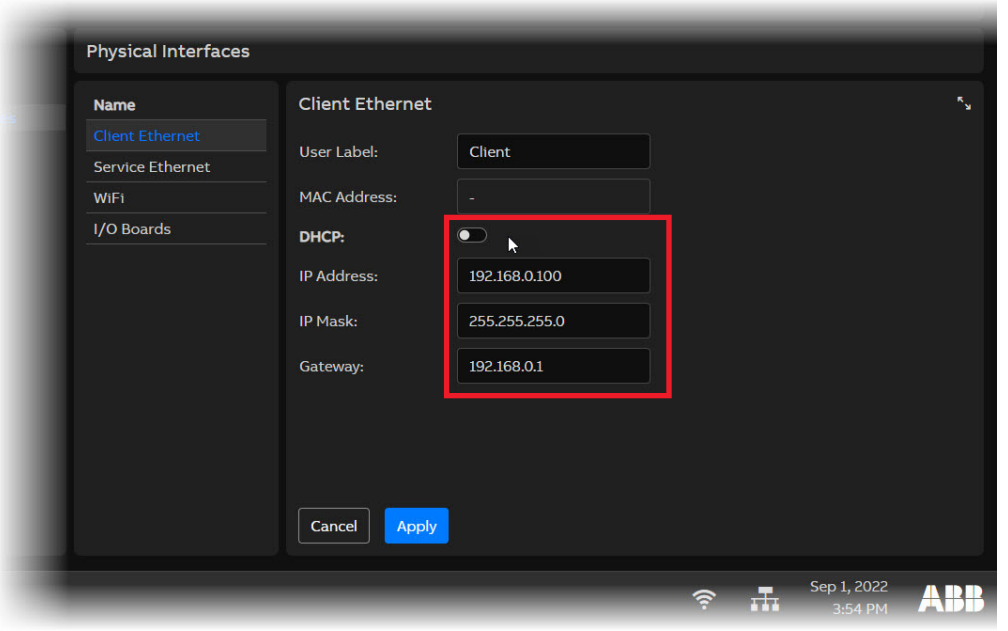
1 In the Sensi+ application sidebar, select **Settings** > **Configuration** > **Physical Interfaces** > **Client Ethernet**.

**Figure 24** Configuring Sensi+ Client Ethernet port



2 In the **Client Ethernet** panel, click the blue **DHCP** toggle button. This hides the analyzer from the DHCP host and provides specific network connection text fields, as shown in Figure 25.

**Figure 25** Configuring Sensi+ Client Ethernet port IP address




3 Enter the appropriate IP address information relevant to your network in the available fields (**IP Address, IP Mask, Gateway**)

4 Click **Apply**.

The Client Ethernet port becomes visible again on your network, based on the information that you just entered.

**NOTE:** If necessary, you can also modify the port user label by changing the text in the **User Label** text field.

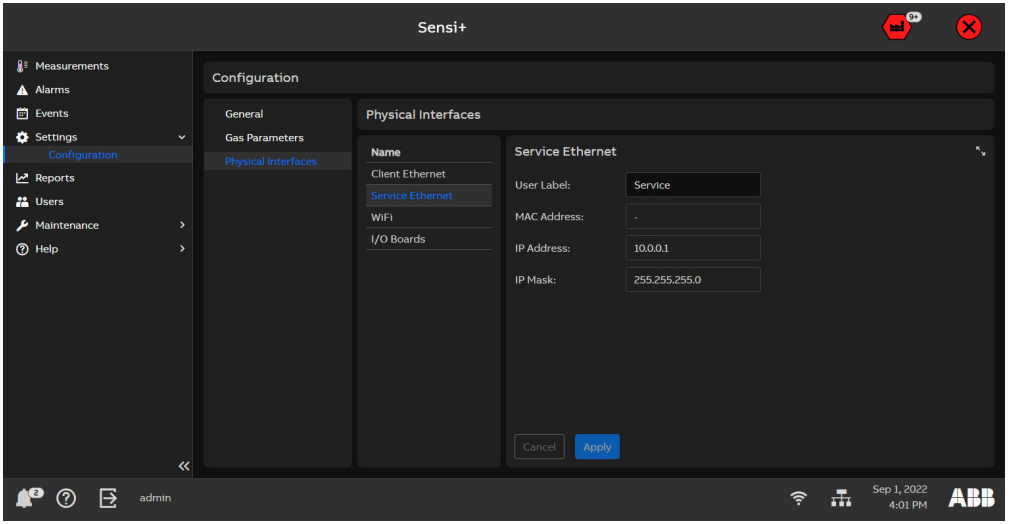
## Modifying the Service Ethernet Port Configuration

The Sensi+ Service Ethernet port is configured with a fixed IP address (**10.0.0.1**). This address cannot be modified. However, you can modify its user label.

To modify the Service Ethernet port user label:

1 In the Sensi+ application sidebar, select **Settings** > **Configuration** > **Physical Interfaces** > **Service Ethernet**.

**Figure 26** Configuring Sensi+ Service Ethernet Port user label




2 Change the text in the **User Label** text field.

3 Click **Apply**.

The Service Ethernet port user label is modified.

## Configuring Output Connectors

In Sensi+, parameters sent through the output connectors (analog and digital) cannot be modified. The proper connections inside the instrument should have been performed during commissioning (for more information, see Table 1 on page 27 and refer to the Sensi+ Installation and Commissioning Guide).

However, since Sensi+ analog connectors are compatible with active or passive modes, you can configure this parameter in the Web remote interface. **By default, analog connectors are set to passive mode.**

**NOTICE**

**DO NOT** change from passive to active mode without first consulting with the personnel who performed the initial installation. Doing so without proper authorization from qualified personnel could damage the analyzer.

To set analog connectors in active mode:

1. In the Sensi+ application sidebar, select **Settings** > **Configuration** > **Physical Interfaces** > **I/O Boards**.
2. Next to the **AOs State** drop-down menu, select **Active** (see Figure 27).
3. Click **Apply**.
4. Reboot Sensi+ (see “Rebooting the Analyzer” on page 65).

**Figure 27** Configuring Sensi+ active mode for analog outputs (AOs)

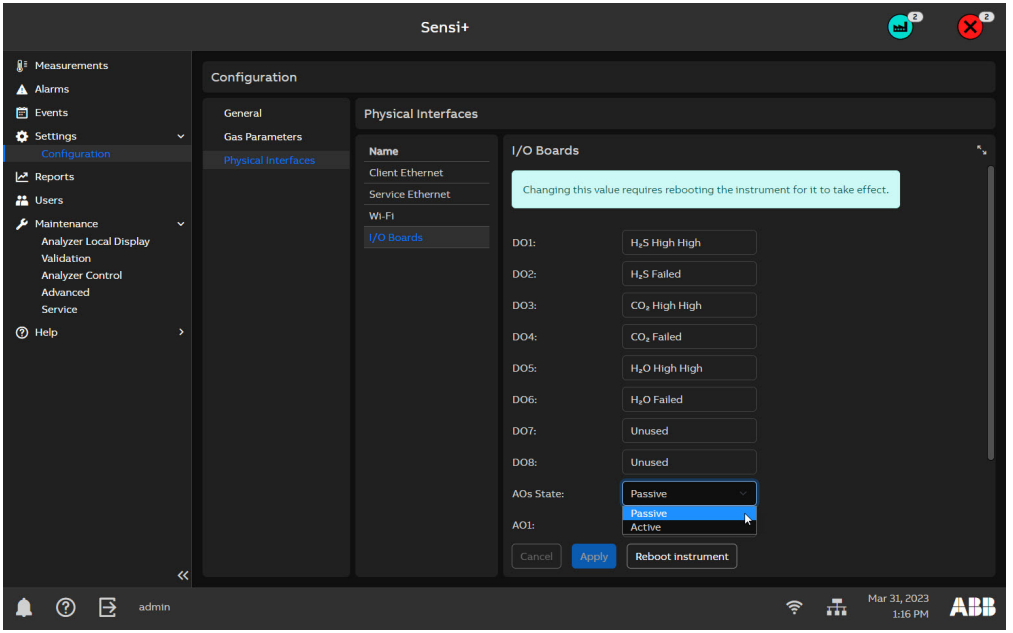


**Table 1** Output Connectors Factory Set States

| | Connector | State Description |
|---|---|---|
| Digital | D01 | $H_2S$ High High Alarm |
| | D02 | $H_2S$ Failed |
| | D03 | $CO_2$ High High Alarm |
| | D04 | $CO_2$ Failed |
| | D05 | $H_2O$ High High Alarm |
| | D06 | $H_2O$ Failed |
| | D07 | Reserved |
| | D08 | Reserved |
| Analog | A01 | $H_2S$ |
| | A02 | $CO_2$ |
| | A03 | $H_2O$ |
| | A04 | Reserved |

**NOTICE**

When Sensi+ stops being in a state to measure a specific gas within specifications, this gas' **Failed** digital output value will be set to its fail state (open; see "Digital Output Logic and Wiring" on page B87). This change of state can be caused by:

- Specific High NAMUR alarms
- Specific Function Check NAMUR alarms (e.g., warm-up sequence, validation mode,…)

While in this **Failed** state, the gas' High High alarms should be ignored as the measured concentrations and associated High High alarm digital outputs could be erroneous.

For more information on alarms, see "Introducing NAMUR and Process Alarm Conventions" on page 35.

# Configuring Wi-Fi Connections (optional)

On Sensi+, the Wi-Fi connection is optional. If your Sensi+ comes with this option, an antenna will be visible on the instrument housing. In such a situation, Wi-Fi connectivity is enabled by default, but few parameters can be modified. The analyzer's country of operation, IP address (**10.0.1.1**) and SSID (**GLA533-CPU_Serial_Number**) cannot be modified.

## Changing the Wi-Fi Password

By default, the Sensi+ password is **Sens1plusWF!**. It should have been changed upon commissioning of Sensi+.

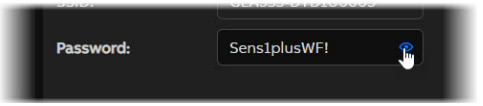
**NOTE:** If you forgot the Wi-Fi password, only users with administrator or maintenance privileges can recover that password from the analyzer Wi-Fi configuration parameters.

To change it again:

1. In the Sensi+ application sidebar, select **Settings** > **Configuration**.
2. In the **Configuration** panel displayed, select **Physical Interfaces** > **Wi-Fi** (see Figure 29 on page 29).
3. In the **Password** text field, enter a new password.

   To ensure that you enter the correct password, click the "eye" icon on the right-hand side of the text field to reveal the exact content of the password (see Figure 28).

**Figure 28** Revealing the current password




4. Click **Apply** at the bottom of the panel.

   The new password is now in effect, and will be valid on the **next** connection.

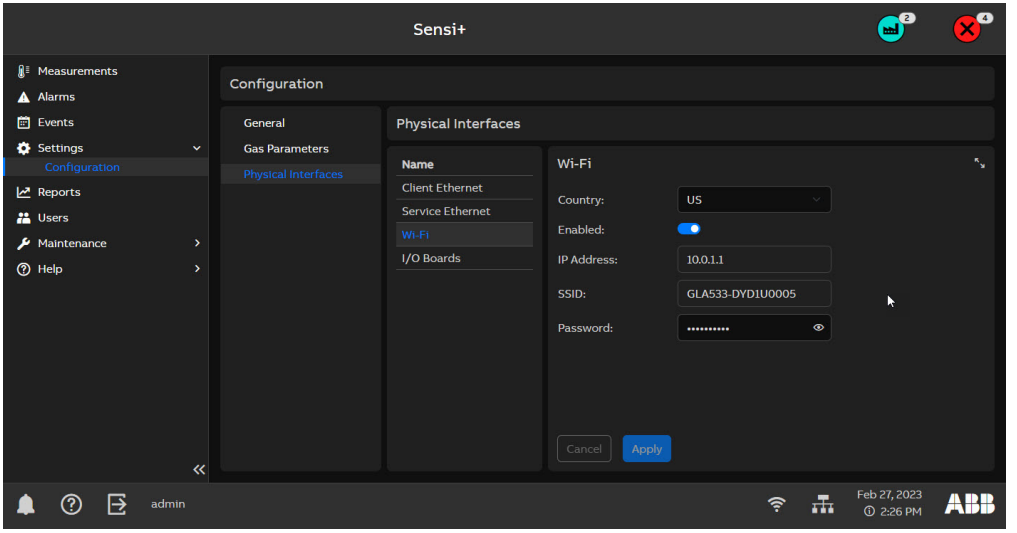
## Disabling/Enabling Wi-Fi connections

To disable (or re-enable) the Wi-Fi connection:

1 In the Sensi+ application sidebar, select **Settings** > **Configuration**.

2 In the **Configuration** panel displayed, select **Physical Interfaces** > **Wi-Fi**

**Figure 29** Configuring Sensi+ Wi-Fi connection




3 Click the toggle button next to **Enabled**. The toggle button turns black.

4 Click **Apply** at the bottom of the panel.

The Wi-Fi connection becomes inactive.

If you were currently connected via Wi-Fi, you lose the connection immediately.

# Configuring User Profiles

Different types of users have access to different types of functions in the Sensi+ Web remote interface.

**NOTICE**

Only users logged in as administrators can create, modify, or delete user profiles.

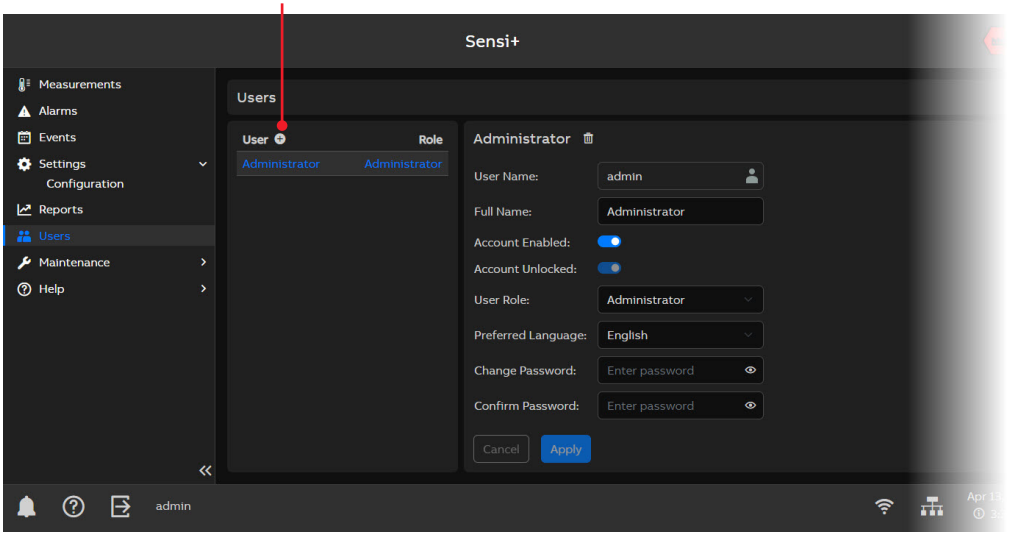
## Creating a User Profile

To create a user profile:

1 In the Sensi+ application sidebar, select **Users**.

2 In the **Users** panel, click the **+** sign next to the **User** list title. The **Create user** panel appears to the right.

**Figure 30** Creating a user profile




3 Enter the appropriate information in each field as detailed below:

- **User Name:** the name with which the system will recognize the user (between 3 and 30 characters). It is the name to enter when logging into the system. Once created, this user name cannot be changed. There cannot be two identical user names
- **Full name:** the real name of the user whose profile you are creating.
- **Account Enabled:** by default, a new user account is disabled. Only administrators can enable and disable user accounts (e.g., when an employee leaves). To enable an account, click the **Account Enabled** toggle button. The toggle button turns blue to indicate activation.
- **Account Unlocked:** by default, a new user account is unlocked. A user account can be locked by the system (e.g., after reaching the maximum number of failed password input). Only administrators can unlock user accounts. To unlock it, click the **Account Unlocked** toggle button. The toggle button turns blue to indicate activation.
- **User Role**: each role provides specific access rights to its user. Three roles exist in the gas analyzer: Operator, Maintenance and Administrator.

**Table 2** Access Rights for Each User Role

| | Operator | Maintenance | Administrator |
|---|---|---|---|
| **Measurements** panel | No restrictions | No restrictions | No restrictions |
| **Alarms** and **Events** panels | Export, Filter | Acknowledge, annotate, export, filter | Acknowledge, annotate, export, filter |
| **Configuration** panel | View | View and modify | View and modify |
| **Reports** panel | No restrictions | No restrictions | No restrictions |
| **Users** panel | Not visible | Not visible | View and modify |
| **Maintenance** panel | View analyzer local display | • View analyzer local display<br>• View and modify Validation panel<br>• View and modify Advanced panel<br>• View and modify Service panel | • View analyzer local display<br>• View and modify Validation panel<br>• View and modify Analyzer panel<br>• View and modify Advanced panel<br>• View and modify Service panel |
| **Help** panel | No restrictions | No restrictions | No restrictions |

- **Preferred Language:** only English is available.
- **Initial Password:** enter a password. When you enter a password, the **Confirm Password** field becomes highlighted in red.
  To ensure that you enter the correct password, click the “eye” icon on the right-hand side of the text field to reveal the exact content of the password (see Figure 28 on page 28).
- **Confirm Password** (highlighted in red once a password is entered in the field **Change Password**): reenter the same password as the one you entered in the **Change Password** field. When you reenter the password correctly, the red highlight disappears.
  To ensure that you enter the correct password, click the “eye” icon on the right-hand side of the text field to reveal the exact content of the password (see Figure 28 on page 28).

**PASSWORD MANAGEMENT RULES**

- Passwords must be between 3 and 12 (users) or 16 (administrators) characters long.
- Passwords can contain lowercase and uppercase letters, special characters and numbers.
- Administrator passwords must contain characters from at least two categories.
- Any user is locked out of the system after the 9$^{th}$ try at entering a password. Administrators are locked out for 15 minutes and users, 5 minutes.
- Administrators can unlock any other user and reset all other passwords.
- **If all passwords are forgotten (including the last administrator password), the analyzer will be completely locked and require a factory reset, thus erasing the complete content of all internal databases.**

**4** Click **Create**. The new user profile appears in the **User** list and this user can now enter the Web remote interface according to its role.

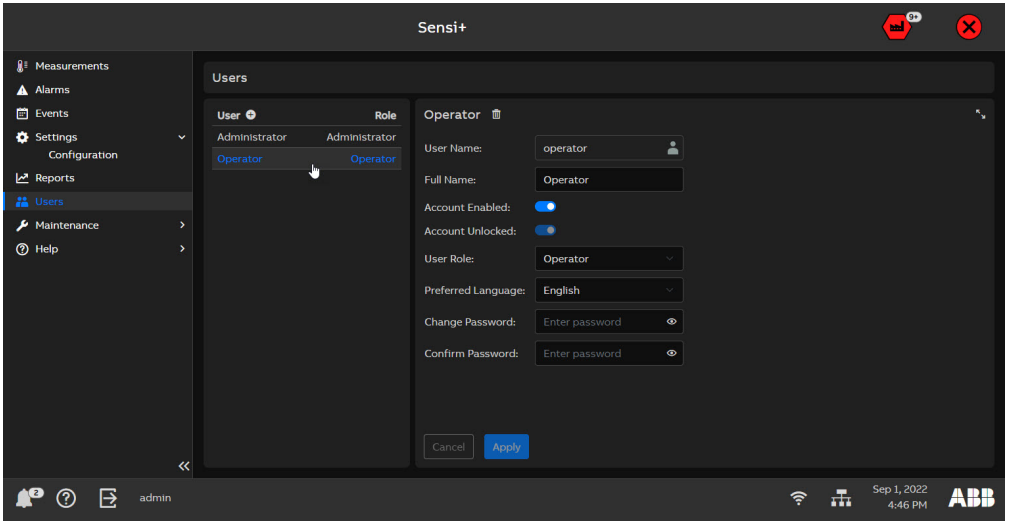
# Modifying a User Profile

To modify a user profile:

1 In the Sensi+ application sidebar, select **Users**.

2 In the **Users** panel displayed, select the user whose profile you want to modify.

**Figure 31** Editing a user profile




3 Modify the information as necessary.

**NOTE:** The user name **cannot** be modified.

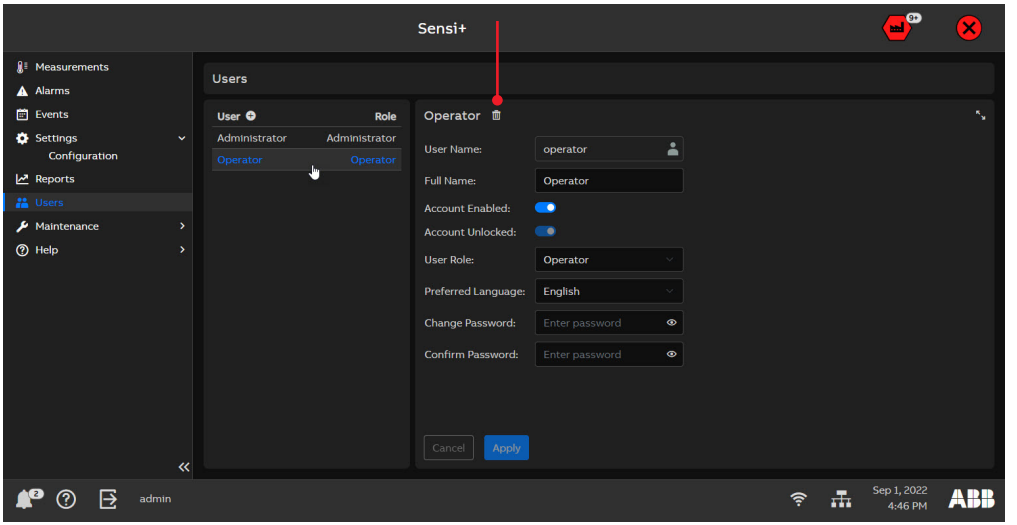
4 Click **Apply**. The modified information becomes active.

## Deleting a User Profile

To delete a user profile:

1. In the Sensi+ application sidebar, select **Users**.
2. In the **Users** panel displayed, select the user profile that you want to delete.
3. Click the trash can icon next to the user name at the top of the panel.
4. In the confirmation dialog box that appears, click **Delete user**. The user profile is deleted and the person using this profile will no longer have access to the associated functions.

**Figure 32** Deleting a user profile




**NOTICE**

It is not possible to delete the last user with an Administrator **role.**

However, it is possible to delete the **default** Administrator if another user with Administrator **role** is still available.

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CHAPTER 4

# Managing Alarms

Alarms can be raised when abnormal situations occur in a monitored process (process alarms) or the analyzer (NAMUR alarms). The following pages explain how to manage these alarms.

## Introducing NAMUR and Process Alarm Conventions

The analyzer can raise two alarm types: process and NAMUR. Process alarms indicate abnormal situations within the process (the monitored substances), whereas NAMUR alarms relate to abnormal situations within the analyzer itself.

**Table 3** Process Alarms

| Alarm | Icon | Meaning |
|---|---|---|
| High Alarm (red) |  | Indicates High High alarms.<br>Current measured value exceeds the specified alarm range. |
| Warning Alarm (amber) |  | Indicates High alarms.<br>Current measured value exceeds the specified warning range. |
| Information (cyan) |  | Notification<br>Only occurs on uncertain gas quality. |
| None (green) |  | No high alarm, warning or information related to the process. |

For additional information on configuring alarm thresholds, see “Configuring Alarm Thresholds” on page 20. See also Figure 16 on page 17 for a visual representation of these various thresholds and alarms.

**Table 4** NAMUR Alarms

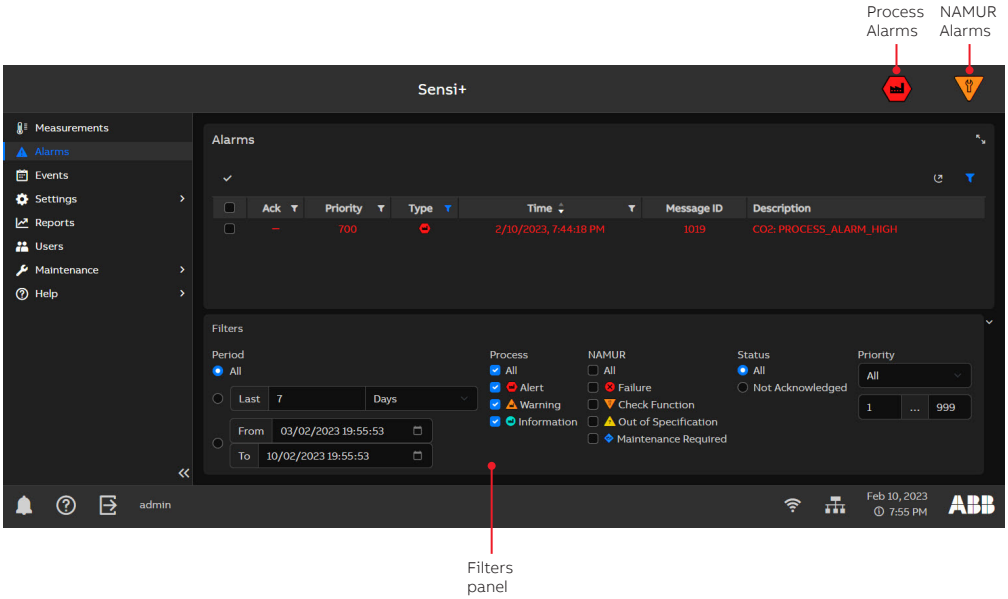
| Alarm | Icon | Meaning |
|---|---|---|
| Failure |  | HIGH SEVERITY<br>Analyzer has an invalid signal due to hardware malfunction (temperature/ pressure sensor, electronic board, pump, variable valve, pressure leak, processing error, etc.) |
| Out of specificaton |  | MEDIUM SEVERITY<br>Analyzer is operating beyond its setup, permissible range or specification (temperature or pressure range, etc.). |
| Check function |  | LOW SEVERITY<br>Analyzer has a **temporarily** invalid signal, e.g., during validation, stream or pump switching, test modes (test I/Os), temporary data processing overflow, etc. |
| Maintenance required |  | LOW SEVERITY<br>Analyzer has a valid signal, but function may drop or cease to function soon, such as for preventitive pump replacement notifications, preventitive laser strength or cell cleanliness notification. |
| Diagnosis active |  | NO ERROR<br>Analyzer is operating as expected |

# Displaying Alarms

General alarm notifications appear in the top right corner of the Sensi+ application (see Figure 33).

To display specific alarms (process or NAMUR), click the appropriate icon. The relevant **Alarms** table appears, and the **Filters** panel appears as well to confirm which alarms are displayed.

**Figure 33** Process Alarms and Filters panel




You can also click **Alarms** from the Sensi+ application sidebar. When displaying alarms this way, they are not automatically filtered by alarm type (process vs. NAMUR).

**NOTE:** Alarms are displayed **only** if they are still active and/or need to be acknowledged.

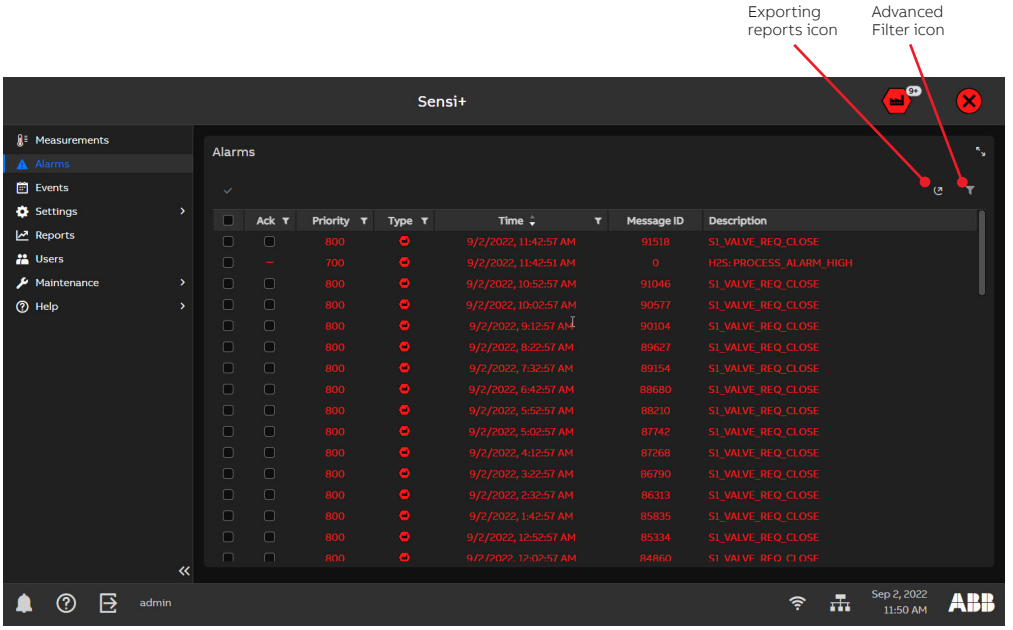
## Sorting Alarms

In the **Alarms** panel, you can sort alarms in chronological or reverse chronological order. By default, alarms are sorted in reverse chronological order (most recent first).

To sort alarms:

**1** From the Sensi+ application, click **Alarms** in the sidebar.

**Figure 34** Alarms Panel




**2** In the **Time** column, click ▼ to sort alarms starting with the latest, and ▲ to sort them starting from the earliest.

# Acknowledging Alarms

From the **Alarms** table, you can acknowledge individual alarms, more than one alarm or all alarms at once. The following pages explain these procedures.

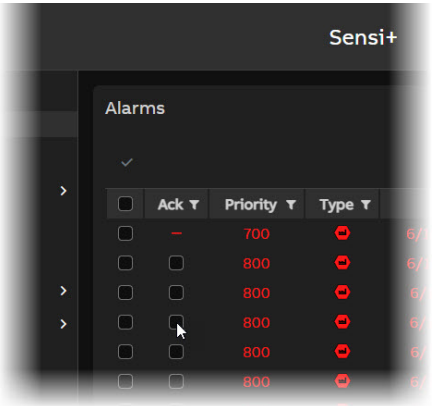
**NOTE:** Alarms displaying a dash in the **Ack** column cannot be acknowledged and removed from the **Alarms** table.

## Acknowledging One Alarm

To acknowledge just one alarm:

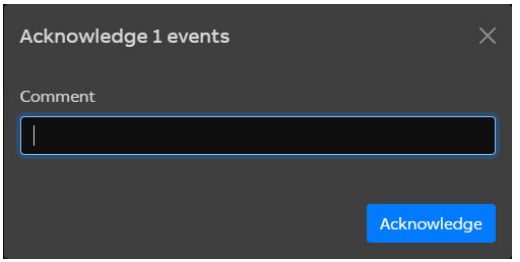
1 From the **Alarms** table, underneath the **Ack** column, check the box next to the alarm that you want to acknowledge (see Figure 35).

**Figure 35** Checking a box to acknowledge one alarm




2 As soon as you check the box in the **Ack** column, a **Comment** dialog box appears (see Figure 36) where you can enter a comment as to why you acknowledge the selected alarm.

**Figure 36** Commenting on alarm acknowledgment




3 Once the comment is entered, click **Acknowledge**.
The selected alarm is acknowledged, **but** it remains in the **Alarms** table if the condition that caused the alarm is still present. The alarm will disappear from the table once the condition that caused it has beed fixed.

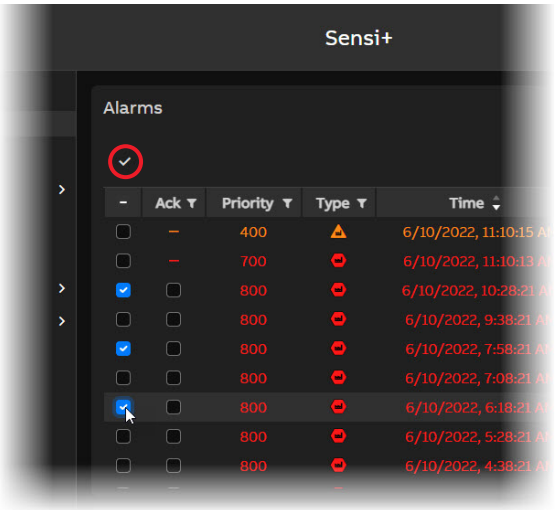
If you need to review the alarm once it has been acknowledged, go to the **Events** table (for more information on managing events, see “Managing Events” on page 49).

## Acknowledging More Than One Alarm

To acknowledge more than one alarm:

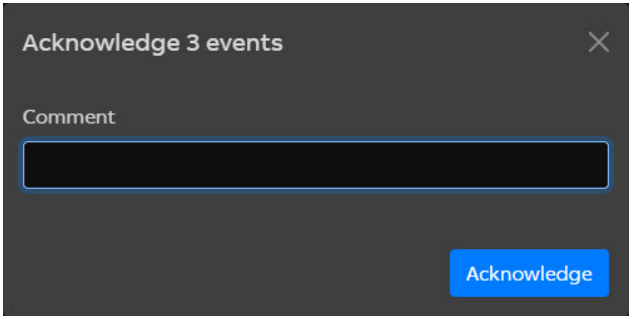
1 From the **Alarms** table, in the leftmost column (left of the **Ack** column), check the boxes next to the alarms that you want to acknowledge (see Figure 37).

**Figure 37** Checking More Than One Box Next to Alarms to Acknowledge




2 Click the checkmark at the top of the column (see Figure 37). As soon as you click the checkmark, a **Comment** dialog box appears (see Figure 38) where you can enter a comment as to why you acknowledge the selected alarms.

**Figure 38** Commenting on alarms acknowledgment




3 Once the comment is entered, click **Acknowledge**.
The selected alarms are acknowledged, **but** they remain in the **Alarms** table if the conditions that caused them are still present. The alarms will disappear from the table once the conditions that caused them have beed fixed.

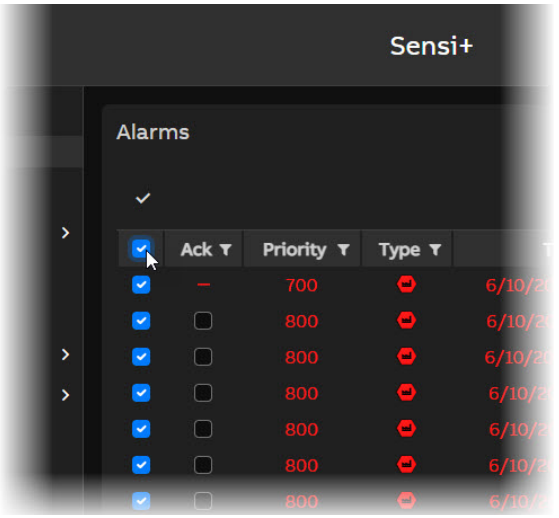
If you need to review alarms once they have been acknowledged, go to the **Events** table (for more information on managing events, see “Managing Events” on page 49).

## Acknowledging All Alarms at Once

To acknowledge all alarms at once:

1 From the **Alarms** table, in the leftmost column (left of the **Ack** column), check the box in the column title. This selects all current alarms (see Figure 39).

**Figure 39** Checking all boxes next to alarms to acknowledge




2 Click the checkmark at the top of the column (see Figure 37 on page 40). As soon as you click the checkmark, a **Comment** dialog box appears (see Figure 38) where you can enter a comment as to why you acknowledge the selected alarms.

3 Once the comment is entered, click **Acknowledge**.
The selected alarms are acknowledged, **but** they remain in the **Alarms** table if the conditions that caused them are still present. The alarms will disappear from the table once the conditions that caused them have beed fixed.

If you need to review alarms once they have been acknowledged, go to the **Events** table (for more information on managing events, see “Managing Events” on page 49).

# Filtering Alarms

In the **Alarms** panel, you can filter the content of the alarm table by status, priority, type and/or time period. You can filter the content from the general **Filters** panel or from a specific column in the **Alarms** table. The following pages explain these filtering options.

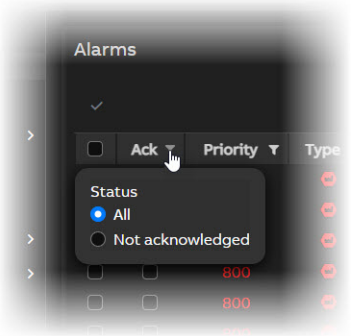
## Filtering by Alarm Status

The status of an alarm is either **Acknowledged** or **Not Acknowledged**. You can filter out all alarms that were acknowledged to keep only the alarms still needing acknowledgment.

To do so:

1 From the **Alarms** table, click the funnel icon next to the **Ack** column title. The **Status** filter is displayed.

**Figure 40** Status Filter




2 In the **Status** filter, select **Not acknowledged**, then click outside the filter. The filter disappears and only alarms to be acknowledged remain in the **Alarms** table.

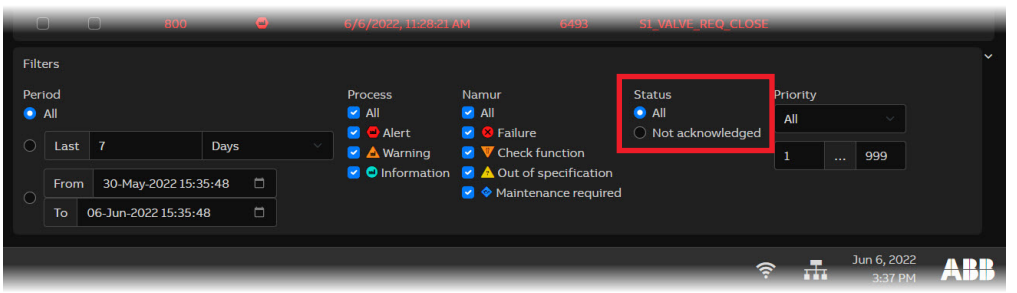
**NOTE:** When a filter is applied to a column, the funnel icon turns blue.

You can also filter by alarm status from the **Filters** panel.

To do so:

1 From the **Alarms** panel, click the Advanced Filter icon (see Figure 34 on page 38). The **Filters** panel appears below the **Alarms** panel.

**Figure 41** Filters Panel by Status



2 Under **Status**, select **Not acknowledged**. All acknowledged alarms are immediately removed from the **Alarms** table.

For more information on acknowledging alarms, see “Acknowledging Alarms” on page 39

3 Close the **Filters** panel by clicking the Advanced Filter icon (see Figure 34 on page 38).

## Filtering by Priority

In Sensi+, alarms are assigned a priority, and a level within that priority as shown in the table below.

**Table 5** Alarm Priorities

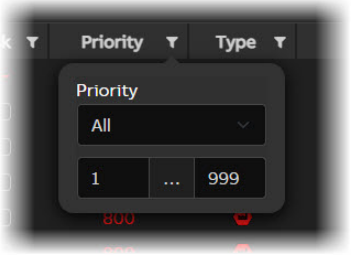
| Priority | Severity Level |
|---|---|
| Information | 0 to 99 |
| Notification | 100 to 399 |
| Warning | 400 to 699 |
| Alarm | 700 to 999 |

You can filter alarms by priority and/or by severity level.

To do so:

1 From the **Alarms** table, click the funnel icon next to the **Priority** column. The **Priority** filter is displayed.

**Figure 42** Priority Filter




2 In the **Priority** filter, select the required priority from the drop-down menu. All other priorities are removed from the current **Alarms** table.

3 If necessary, you can fine-tune the filter further by specifying a range of security levels in the text boxes located underneath. The modified range is immediately updated as you change the range of the severity level.

4 Click outside the filter. The filter disappears and only alarms with the specified priorities remain in the **Alarms** table.

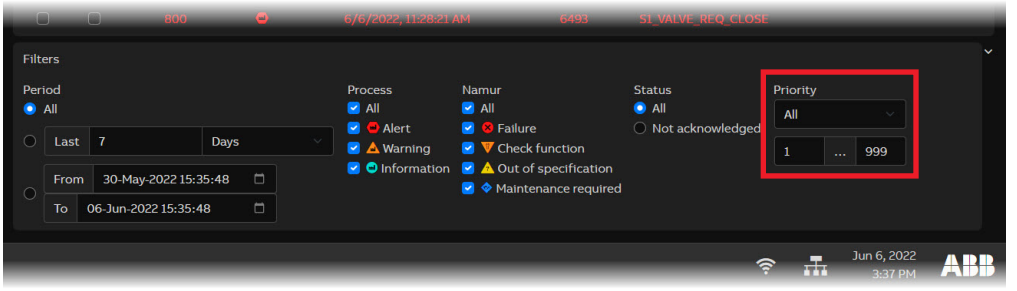
**NOTE:** When a filter is applied to a column, the funnel icon turns blue.

You can also filter by alarm priority from the **Filters** panel.

To do so:

1 From the **Alarms** panel, click the Advanced Filter icon (see Figure 34 on page 38). The **Filters** panel appears below the **Alarms** panel.

**Figure 43** Filters Panel by Priority




2 Under **Priority**, select the required priority from the drop-down menu. All other priorities are removed from the current **Alarms** table.

3 If necessary, you can fine-tune the filter further by specifying a range of security levels in the text boxes located underneath. The modified range is immediately updated as you change the range of the severity level.

4 Close the **Filters** panel by clicking the Advanced Filter icon (see Figure 34 on page 38).

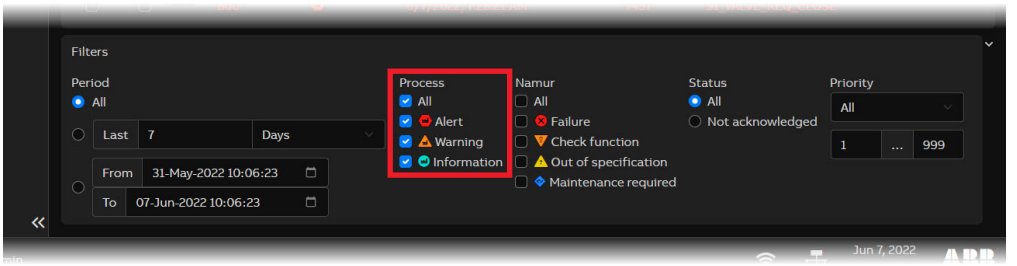
## Filtering by Alarm Type

The analyzer can raise two alarm types: process and NAMUR. Process alarms indicate abnormal situations within the process (the monitored substances), whereas NAMUR alarms relate to abnormal situations within the analyzer itself.

### Quick Filter

You can quickly filter and display alarms by type. For example, to quickly filter for all process alarms, click the Process alarms icon in the Sensi+ top bar (see “Sensi+ Application Top Bar” on page 8). The **Alarms** panel opens, as well as the **Filters** panel, which indicates that all process alarms are displayed.

**Figure 44** Filters Panel - Only Process Alarms




You can proceed in the same fashion to quickly filter by NAMUR alarms by clicking the NAMUR alarm icon in the Sensi+ top bar (see “Sensi+ Application Top Bar” on page 8). The **Alarms** panel opens, as well as the **Filters** panel, which indicates that all NAMUR alarms are displayed.

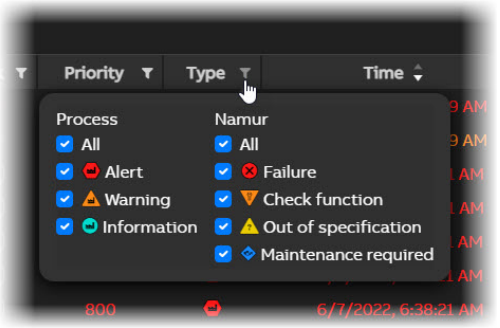
### From the Alarms Type column

You can also filter alarms from the **Type** column in the **Alarms** table.

To do so:

1 From the **Alarms** table, click the funnel icon next to the **Type** column title. The **Type** filter is displayed.

**Figure 45** Type Filter




2 In the **Type** filter, uncheck the boxes next to the alarm types that you want hide in the **Alarms** table, then click outside the filter. The filter disappears and only “checked” alarms remain in the **Alarms** table.

**NOTE:** When a filter is applied to a column, the funnel icon turns blue.

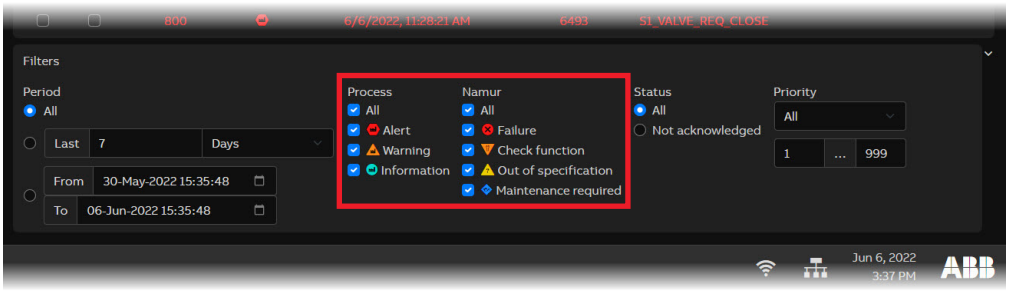
### From the Filters panel

You can also filter by alarm type from the **Filters** panel.

To do so:

1 From the **Alarms** panel, click the Advanced Filter icon (see Figure 34 on page 38). The **Filters** panel appears below the **Alarms** panel.

**Figure 46** Filters Panel by Type




2 Under **Process** and/or **NAMUR**, uncheck the boxes next to the alarm types that you want hide in **Alarms** table. The unchecked alarms are automatically hidden and only “checked” alarms remain in the **Alarms** table.

3 Close the **Filters** panel by clicking the Advanced Filter icon (see Figure 34 on page 38).

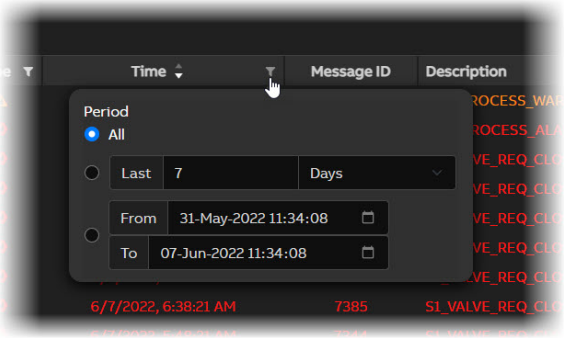
## Filtering by Time Period

In the **Alarms** table, you can choose to display only alarms that happened during a specific time period

To do so:

1 From the **Alarms** table, click the funnel icon next to the **Time** column title. The **Period** filter is displayed.

**Figure 47** Period Filter



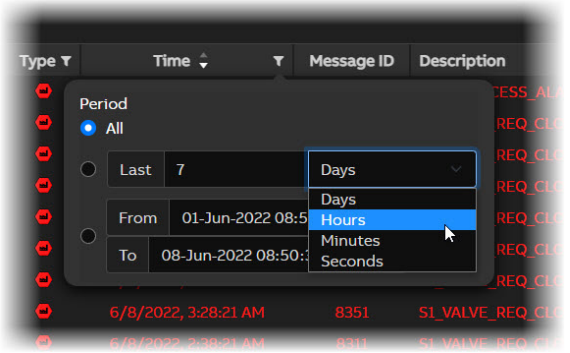

2 In the **Period** filter, you can either specify a relative time period (i.e., last 7 days, last 2 hours, etc.) or an absolute time period (from date and time *x* to date and time *y*).

**To set a relative time period:**

**a** Select the proper unit of time (days, hours, minutes, seconds).

**b** Enter the required number for that time period.

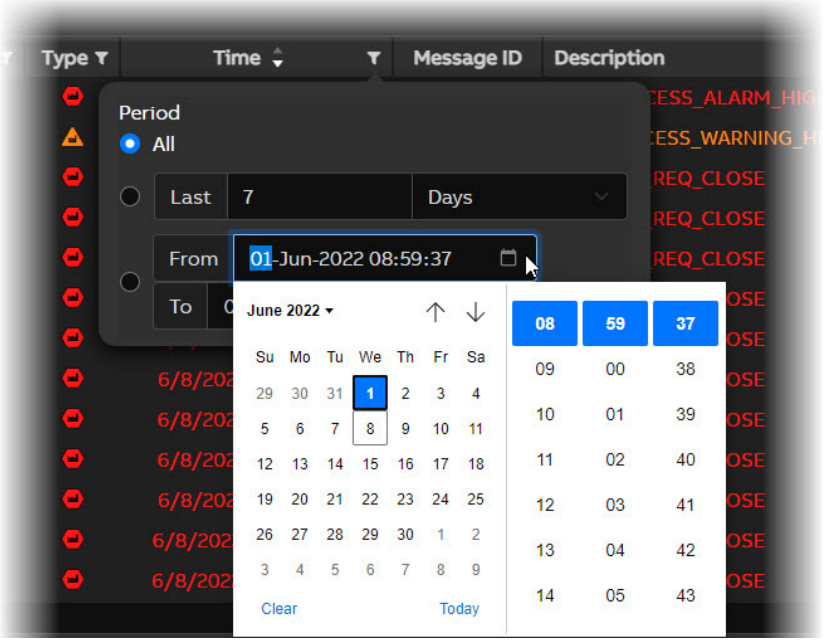
**Figure 48** Setting a relative time period filter




**To set an absolute time period:**

**a** In the **From** date field, click the calendar icon on the right-hand side of the field (see Figure 49 on page 47).

**Figure 49** Setting an absolute time period filter




**b** On the left-hand side of the filter, select the start **date** of the time period.

**c** On the right-hand side of the filter, select a start **time** for the time period.

**d** Repeat steps **b** and **c** for the end time period in the **To** date field.
The **Alarms** table is automatically updated.

**3** Click outside the filter. The filter disappears and only alarms that occurred during the specified time period remain in the **Alarms** table.

**NOTE:** When a filter is applied to a column, the funnel icon turns blue.

# Exporting Alarms

Alarms cannot be exported independently, but they can be exported as part of an events report (for more information on exporting events, see “Managing Reports” on page 59).

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CHAPTER 5

# Managing Events

Events happen inside the analyzer: configuration changes, alarm status changes (warning to alarm, warning to normal, etc.), system errors and reboots, etc. All these events are recorded by the Sensi+ gas analyzer. The following pages explain how to manage these events.

## Displaying Events

To display analyzer events, click **Events** from the Sensi+ application sidebar. By default, events are sorted in reverse chronological order (most recent first), and filtered to display only events that occurred during the last week.

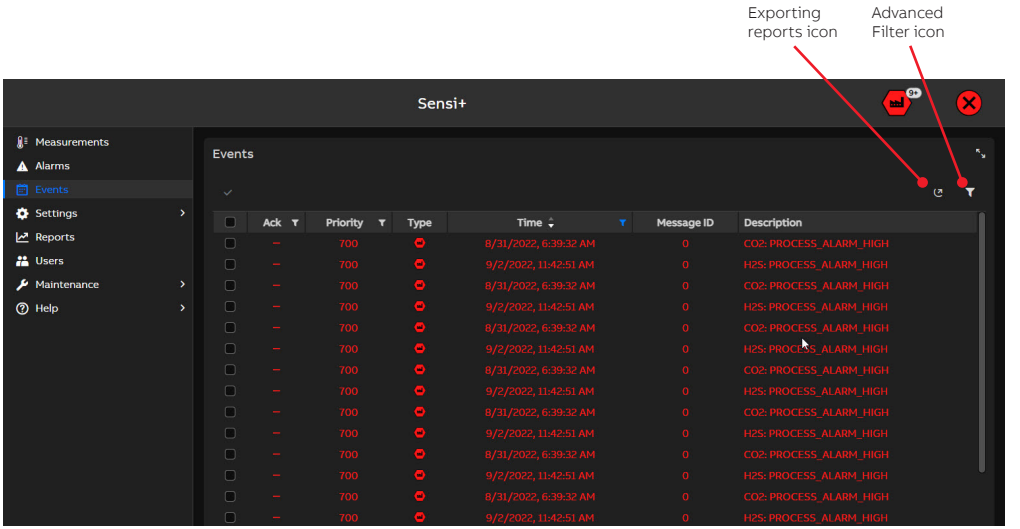
### Sorting Events

In the **Events** panel, you can sort events in chronological or reverse chronological order. By default, events are sorted in reverse chronological order (most recent first).

To sort events:

1 From the Sensi+ application sidebar, click **Events**.

**Figure 50** Events Panel




2 In the **Time** column, click ▼ to sort alarms starting with the latest, and ▲ to sort them starting from the earliest.

# Acknowledging Events

It is possible to acknowledge events for which actions have been taken. You can either acknowledge each event individually or all at once and you can do so while being connected remotely or when you are on site with a computer on hand.

From the **Events** table, you can acknowledge individual events, more than one event or all events at once. The following pages explain these procedures.

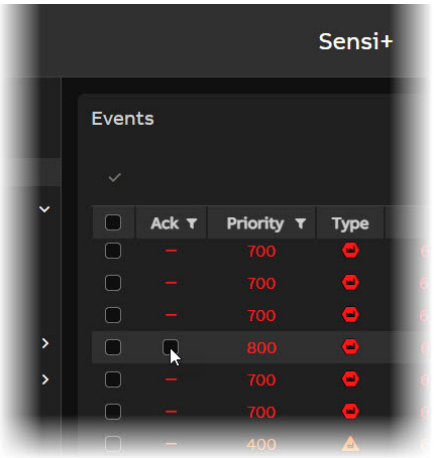
**NOTE:** Events displaying a dash in the **Ack** column cannot be acknowledged.

## Acknowledging One Event

To acknowledge just one event:

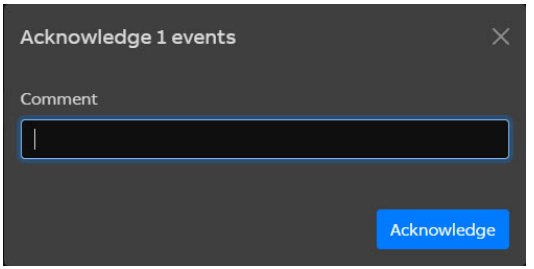
1 From the **Events** table, underneath the **Ack** column, check the box next to the event that you want to acknowledge (see Figure 51).

**Figure 51** Checking a box to acknowledge one event




2 As soon as you check the box in the **Ack** column, a **Comment** dialog box appears (see Figure 52) where you can enter a comment as to why you acknowledge the selected event.

**Figure 52** Commenting on event acknowledgment



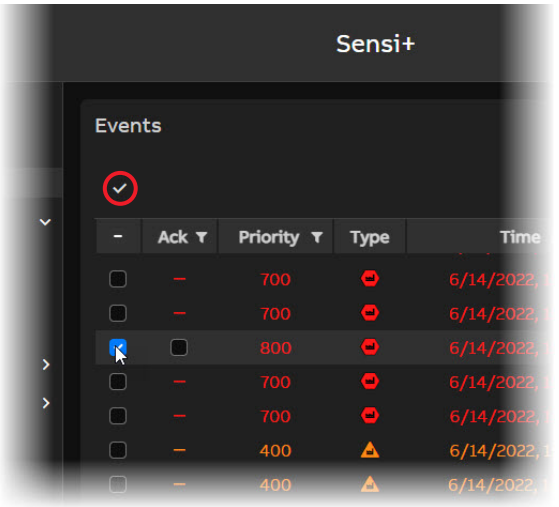

3 Once the comment is entered, click **Acknowledge**. The selected event is acknowledged and a checkmark appears in next to it in the **Ack** column.

## Acknowledging More Than One Event

To acknowledge more than one event:

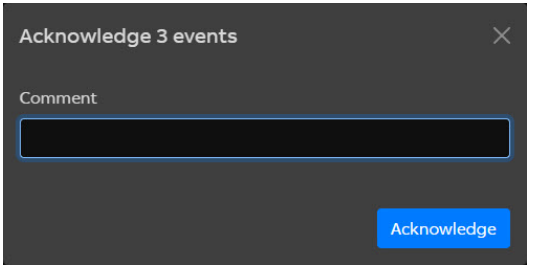
1 From the **Events** table, in the leftmost column (left of the **Ack** column), check the boxes next to the events that you want to acknowledge (see Figure 53).

**Figure 53** Checking boxes next to events to acknowledge




2 Click the checkmark at the top of the column (see Figure 53). As soon as click the checkmark, a **Comment** dialog box appears (see Figure 54) where you can enter a comment as to why you acknowledge the selected events.

**Figure 54** Commenting on events acknowledgment



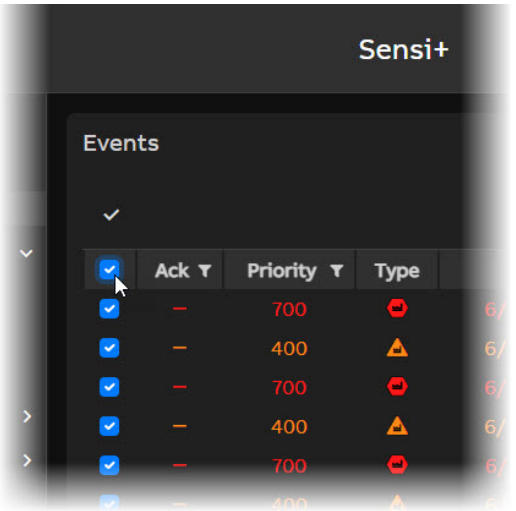

3 Once the comment is entered, click **Acknowledge**. The selected events are acknowledged and a checkmark appears in next to them in the **Ack** column.

## Acknowledging All Events at Once

To acknowledge all events at once:

1 From the **Events** table, in the leftmost column (left of the **Ack** column), check the box in the column title. This selects all current events (see Figure 55).

**Figure 55** Checking boxes next to events to acknowledge




2 Click the checkmark at the top of the column (see Figure 55). As soon as click the checkmark, a **Comment** dialog box appears (see Figure 54) where you can enter a comment as to why you acknowledge the selected events.

3 Once the comment is entered, click **Acknowledge**. All events are acknowledged and a checkmark appears in next to them in the **Ack** column.

# Filtering Events

In the **Events** panel, you can filter the content of the event table by status, priority and/or time period. You can filter the content from the general **Filters** panel or from a specific column in the **Events** table. The following pages explain these filtering options.

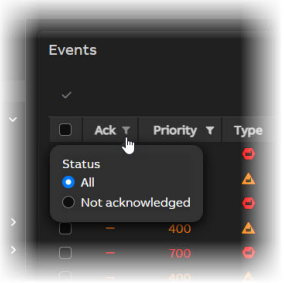
## Filtering by Event Status

The status of an event is either **Acknowledged** or **Not Acknowledged**. You can filter out all events that were acknowledged to keep only the events still needing acknowledgment.

To do so:

1 From the **Events** table, click the funnel icon next to the **Ack** column title. The **Status** filter is displayed.

**Figure 56** Status Filter




2 In the **Status** filter, select **Not acknowledged**, then click outside the filter. The filter disappears and only events to be acknowledged remain in the **Events** table.

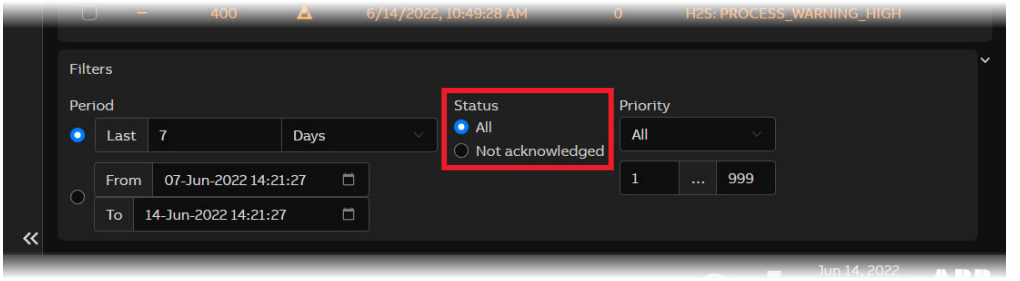
**NOTE:** When a filter is applied to a column, the funnel icon turns blue.

You can also filter by event status from the **Filters** panel.

To do so:

1 From the **Events** panel, click the Advanced Filter icon (see Figure 50 on page 49). The **Filters** panel appears below the **Events** panel.

**Figure 57** Filters Panel by Status



2 Under **Status**, select **Not acknowledged**. All acknowledged events are immediately removed from the **Events** table.

For more information on acknowledging events, see “Acknowledging Events” on page 50.

3 Close the **Filters** panel by clicking the Advanced Filter icon (see Figure 50 on page 49).

## Filtering by Priority

In Sensi+, events are assigned a priority, and a level within that priority, as shown in the table below.

**Table 6** Event Priorities

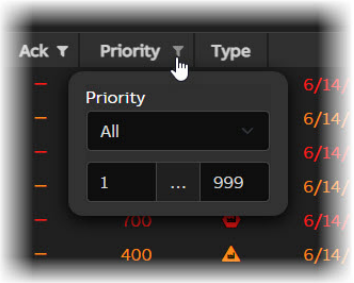
| Priority | Severity Level |
|---|---|
| Information | 0 to 99 |
| Notification | 100 to 399 |
| Warning | 400 to 699 |
| Alarm | 700 to 999 |

You can filter events by priority and/or by severity level.

To do so:

1 From the **Events** table, click the funnel icon next to the **Priority** column. The **Priority** filter is displayed.

**Figure 58** Priority Filter




2 In the **Priority** filter, select the required priority from the drop-down menu. All other priorities are removed from the current **Events** table.

3 If necessary, you can fine-tune the filter further by specifying a range of security levels in the text boxes located underneath. The modified range is immediately updated as you change the range of the severity level.

4 Click outside the filter. The filter disappears and only events with the specified priorities remain in the **Events** table.

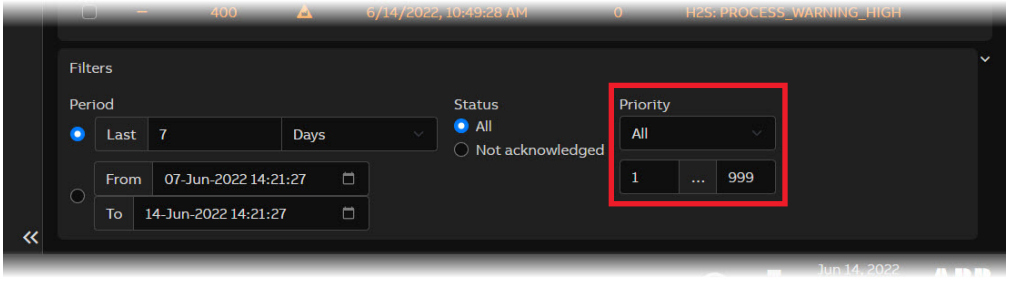
**NOTE:** When a filter is applied to a column, the funnel icon turns blue.

You can also filter by event priority from the **Filters** panel.

To do so:

1 From the **Events** panel, click the Advanced Filter icon (see Figure 34 on page 38). The **Filters** panel appears below the **Events** panel.

**Figure 59** Filters Panel by Priority




2 Under **Priority**, select the required priority from the drop-down menu. All other priorities are removed from the current **Events** table.

3 If necessary, you can fine-tune the filter further by specifying a range of security levels in the text boxes located underneath. The modified range is immediately updated as you change the range of the severity level.

4 Close the **Filters** panel by clicking the Advanced Filter icon (see Figure 50 on page 49).

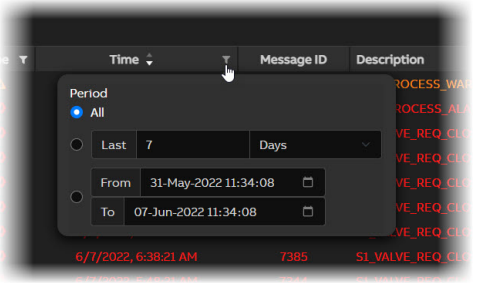
## Filtering by Time Period

In the **Events** table, you can choose display only events that happened during a specific time period.

To do so:

1 From the **Events** table, click the funnel icon next to the **Time** column title. The **Period** filter is displayed.

**Figure 60** Period Filter



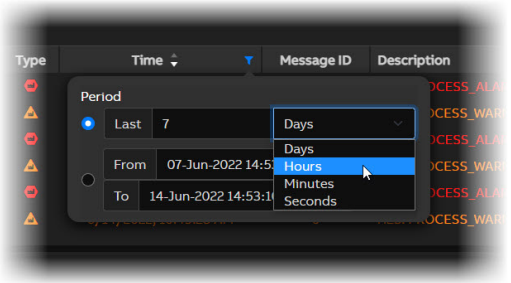

2 In the **Period** filter, you can either specify a relative time period (i.e., last 7 days, last 2 hours, etc.) (see or an absolute time period (from date and time *x* to date and time *y*).

**To set a relative time period:**

**a** Select the proper unit of time (days, hours, minutes, seconds).

**b** Enter the required number for that time period.

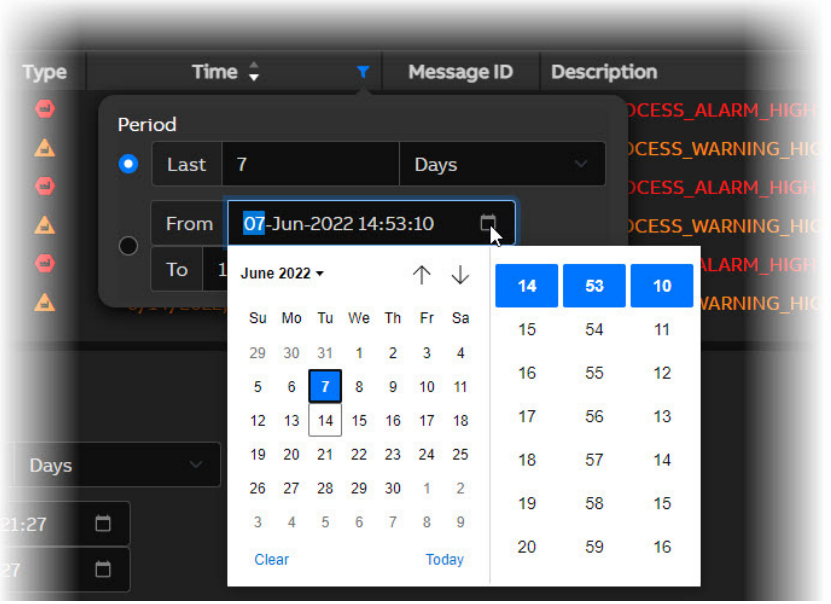
**Figure 61** Setting a relative time period filter




**To set an absolute time period:**

**a** In the **From** date field, click the calendar icon on the right-hand side of the field (see Figure 62).

**Figure 62** Setting an absolute time period filter




**b** On the left-hand side of the filter, select the start **date** of the time period.

**c** On the right-hand side of the filter, select a start **time** for the time period.

**d** Repeat steps **b** and **c** for the end time period in the **To** date field.
The **Alarms** table is automatically updated.

**3** Click outside the filter. The filter disappears and only alarms that occurred during the specified time period remain in the **Alarms** table.

**NOTE:** When a filter is applied to a column, the funnel icon turns blue.

## Exporting Events

Events can be exported from the **Reports** panel. For more information on exporting events, see “Managing Reports” on page 59.

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CHAPTER 6

# Managing Reports

With the Sensi+ Web remote interface, you can generate and download six types of reports:

- **Events**: content of the **Events** table (including alarms)
- **Results**: instrument data and measured gas concentrations
- **Results (compact)**: instrument data and measured gas concentrations, in a more compact format
- **Health Monitoring**: instrument health monitoring data
- **Health Monitoring (compact)**: instrument health monitoring data in a more compact format
- **Spectra**: all instrument spectra data acquired.

Compact reports focus on the main parameters and are recommended for Results and Health Monitoring exports

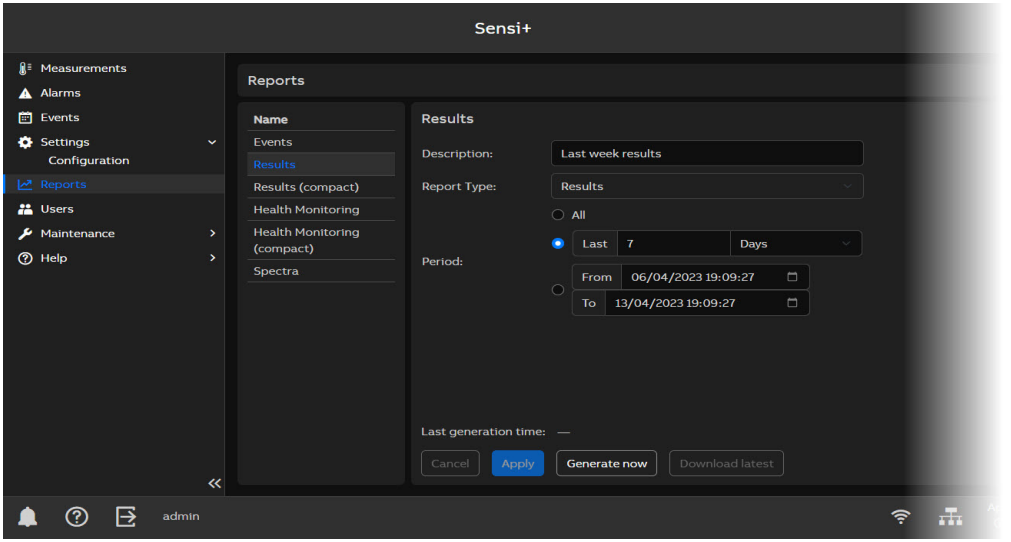
## Generating Reports

**NOTE:** Report generation can take between a few seconds and a few minutes depending on the type and size of the report to generate. You can cancel ongoing report generation by clicking **Cancel**.

To generate any of these reports:

1. In the Sensi+ application sidebar, select **Reports**.
2. In the **Reports** panel, under the reports **Name** list, select the report that you want to generate (see Figure 63).

**Figure 63** Selecting a report to generate




**3** Click **Generate now**. The report file is generated[1] and the date and time of that report appear next to **Latest generation time**.

**NOTE:** If the web browser is disconnected from the instrument or the Web page refreshed, all ongoing report generation is canceled.

To view the report content, you will need to download the report as explained in the next section.

1 In *.tsv* format, save for spectra files that are saved in *.h5* format.

# Downloading Reports

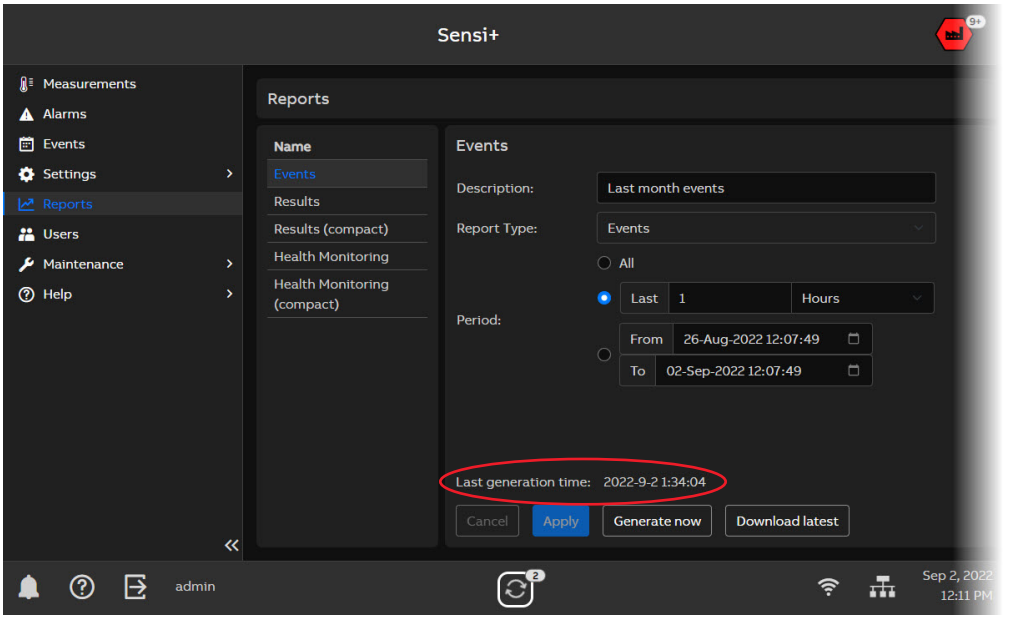
To download any of these reports:

1 In the Sensi+ application sidebar, select **Reports**.

2 In the **Reports** panel, under the report **Name** list, select the generated report that you want to download (to generate a report, see “Generating Reports” on page 59).

If there is no **Latest generation time** indicated, no report has been generated at this point. You will need to generate that report before downloading it, as explained in “Generating Reports” on page 59

**Figure 64** Downloading an existing report




3 Click **Download latest**. A **Save As** dialog box appears[1] in which you can browse to a directory where you want to save the report file (*.tsv* file, or *.h5* files for spectra data).

**NOTE:** *.tsv* files are tab-delimited text files. They can be opened in generic text applications like Microsoft® NotePad™ or in spreadsheet programs like Microsoft Excel®. *.h5* files are destined to be opened in an ABB-specific software for troubleshooting purposes.

4 If necessary, you can also change the name of the report file. By default, the report is named as indicated in the **Reports** list (*Events.tsv, Results.tsv, CompactResults.tsv, HealthMonitoring.tsv, CompactHealthMonitoring.tsv*).

5 In the **Save As** dialog box, click **Save**. The report file is downloaded in the selected directory.

1 Depending on the web browser used. Some web browsers save automatically to a specific folder, i.e., Downloads.

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CHAPTER 7

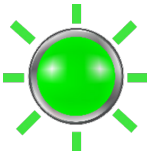
# Troubleshooting and Maintenance

As usual with ABB products, reliability is of the essence. Troubleshooting might happen occasionally. Most of the time, service has to be performed by authorized ABB service personnel. If such situations arise, you will need to contact ABB after-sales service. When in contact with ABB service personnel, you might be asked to provide certain information about your system. The following pages provide relevant details.

## Diagnosing Problems

Most problems that could happen within the Sensi+ gas analyzer will be recorded as events in the **Events** table. You will be informed of these problems either with alarms or by looking at the LEDs on the analyzer housing. The meaning of the various LEDs is explained below.

**Table 7** Analyzer LED Behavior

| Power | | Process | | NAMUR | |
|---|---|---|---|---|---|
|  | Solid YELLOW (power on; during software boot process; during software update with USB key) |  | OFF (during boot and warmup process) |  | OFF (during boot process) |
|  | Solid GREEN (when powered up; software booted) |  | OFF (during boot and warmup process) |  | Blinking GREEN (during warmup; normal initialization phase) |
|  | Solid GREEN (when powered up; software booted) |  | Solid GREEN (when process values are valid; software booted, no process error) |  | Solid GREEN (when powered up; software booted, no NAMUR error) |

| Power | Process | | NAMUR | |
|---|---|---|---|---|
| | | |  | Solid YELLOW (analyzer Out Of Specification [see page 35])[1] |
| |  | Solid ORANGE (Warning [see page 35]) |  | Solid ORANGE (Check Function; temporarily invalid [see page 35]) |
| |  | Solid RED (Alarm [see page 35]) |  | Solid RED (Alarm [see page 35]) |
| |  | Solid BLUE (notifications) |  | Solid BLUE (valid system data, but requires maintenance) |

# Resetting the Analyzer After Triggered Digital Output

The method to reset the analyzer once a digital output has beed triggered depends on whether or not your system is equipped with a return loop.

**If your system is equipped with a return loop:**

1. Acknowledge the alarm (see “Acknowledging One Alarm” on page 39).
2. Fix the source of the contamination (or inform the gas provider that there is contamination that needs to be fixed).
3. Once the source of the contamination has beed fixed, reopen the block valve.

**If your system is not equipped with a return loop:**

1. Acknowledge the alarm (see “Acknowledging One Alarm” on page 39).
2. Stop the gas input (by either shutting down the inlet valve or by asking your gas provider to shutdown its outlet valve).
3. Fix the source of the contamination (or inform the gas provider that there is contamination that needs to be fixed).
4. Once the source of the contamination has beed fixed, reopen the block valve.

1 Yellow NAMUR alarm also lights up during analyzer startup and when the analyzer is in validation mode.

# Rebooting the Analyzer

After performing certain maintenance tasks, you might need to reboot the analyzer.

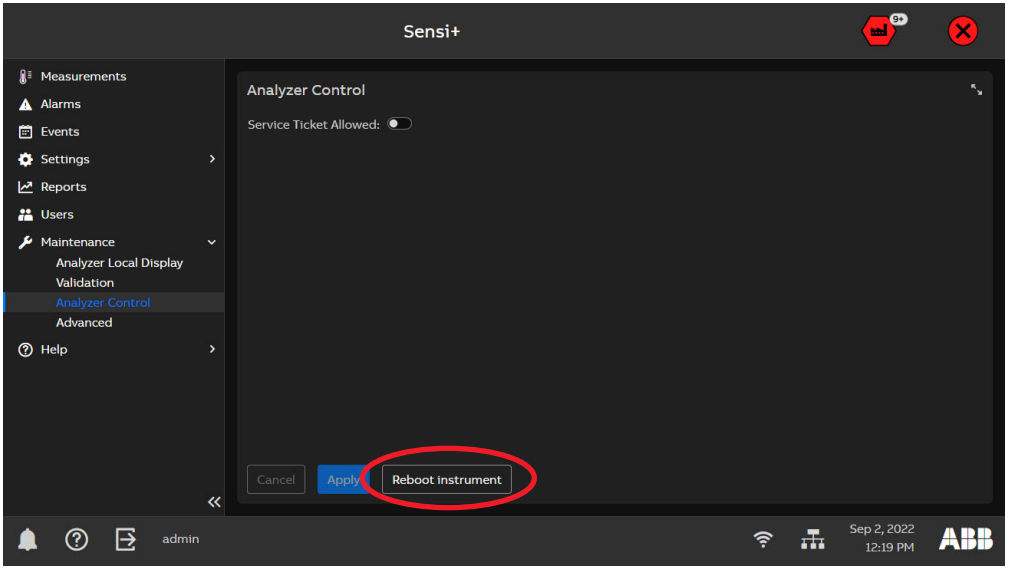
**NOTE:** You need Administrator access rights to reboot the analyzer.

To do so:

1 In the Sensi+ application sidebar, select **Maintenance > Analyzer Control**.

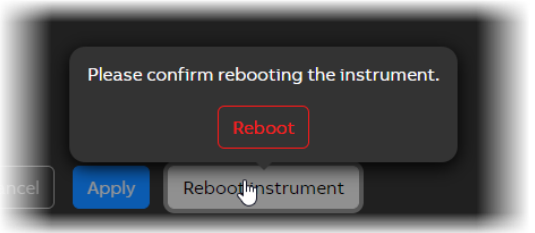
2 Click **Reboot instrument** (see Figure 65).

**Figure 65** Rebooting the analyzer




3 In the confirmation dialog box that appears, click **Reboot**.

**Figure 66** Confirming the Reboot




The instrument will shut down and restart, going through all the initialization process. All digital outputs (DOs) reset upon reboot. They will gradually return to their “ready” state until the reboot is complete. You can follow the reboot process by watching the LEDs behavior, as indicated in Table 7 on page 63.

# Performing Analyzer Validation

Analyzer validation is typically performed at the end of commissioning to ensure that the system is working properly from the start.

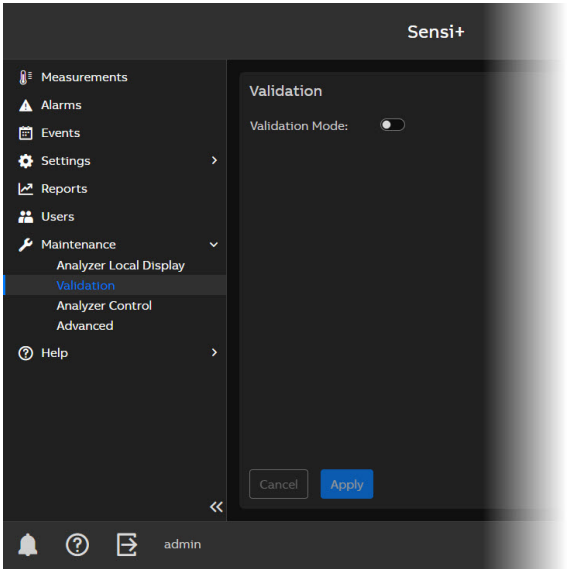
To perform a validation:

1 Connect the computer and the analyzer (see “Connecting to the Analyzer” on page 2).

2 Log in to the analyzer as administrator (see “Logging Into the Analyzer” on page 4).

3 In the Sensi+ application sidebar, select **Maintenance > Validation** (see Figure 67).

**Figure 67** Validation panel




4 From the **Validation** panel, click the **Validation Mode** toggle button, then click **Apply**.

This raises a NAMUR orange alarm (see “Introducing NAMUR and Process Alarm Conventions” on page 35). **Failed** digital outputs (DO2, DO4 and DO6; see “Output Connectors Factory Set States” on page 27) become set to their failed state (open) (see “Digital Output Logic and Wiring” on page B87) while all other outputs (digital or analog) remain unchanged and perform as usual.

5 Prepare the system to switch from live stream to validation gas bottle.

6 Connect the validation gas bottle to the gas input port and make sure that it is ready for the switch from live stream.

7 Switch stream to the validation gas bottle and note the required information.

8 Switch back to live stream and disconnect the validation gas bottle.

9 Wait until measurements return to their normal/expected values.

10 Once the measured values have returned to normal, go back to the **Validation** panel (**Maintenance > Validation** [see Figure 67]), click the **Validation Mode** toggle button, then click **Apply**.

**NOTE:** The validation mode remains active after a Web page refresh but is cancelled after a manual reboot

# Exporting Service Logs

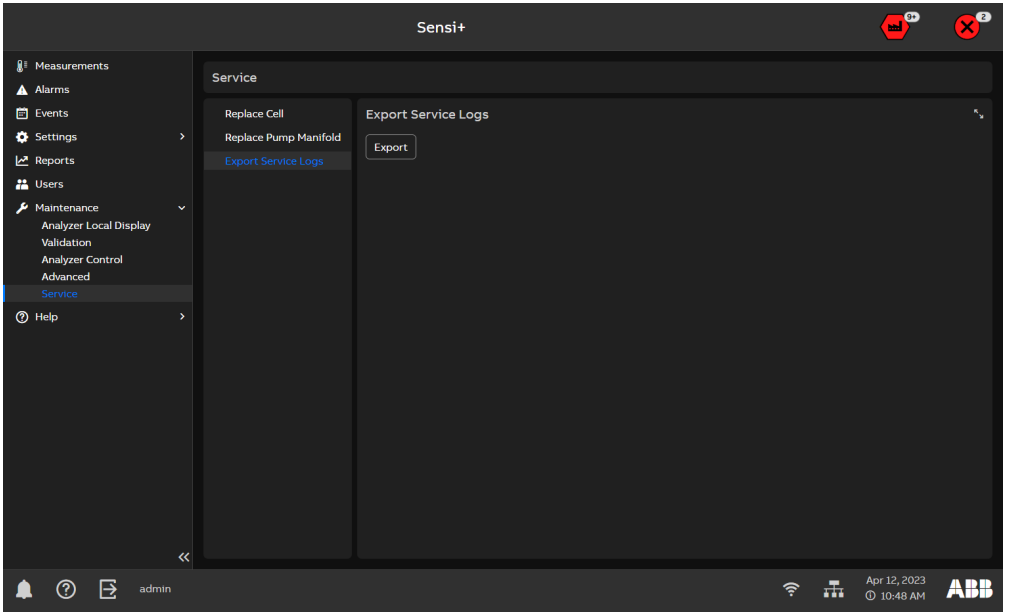
Occasionally, you will need to export Sensi+ service logs to send over to ABB service representatives.

**NOTE:** You need administrator or maintenance access rights to perform this operation.

To do so:

**1** In the Sensi+ application sidebar, select **Maintenance > Service > Export Service Logs**

**Figure 68** Maintenance Export Service Logs Panel




**2** In the **Export Service Logs** panel, click **Export**.

Sensi+ creates then exports a *.zip* file of all analyzer service logs to the default **Downloads** folder[1].

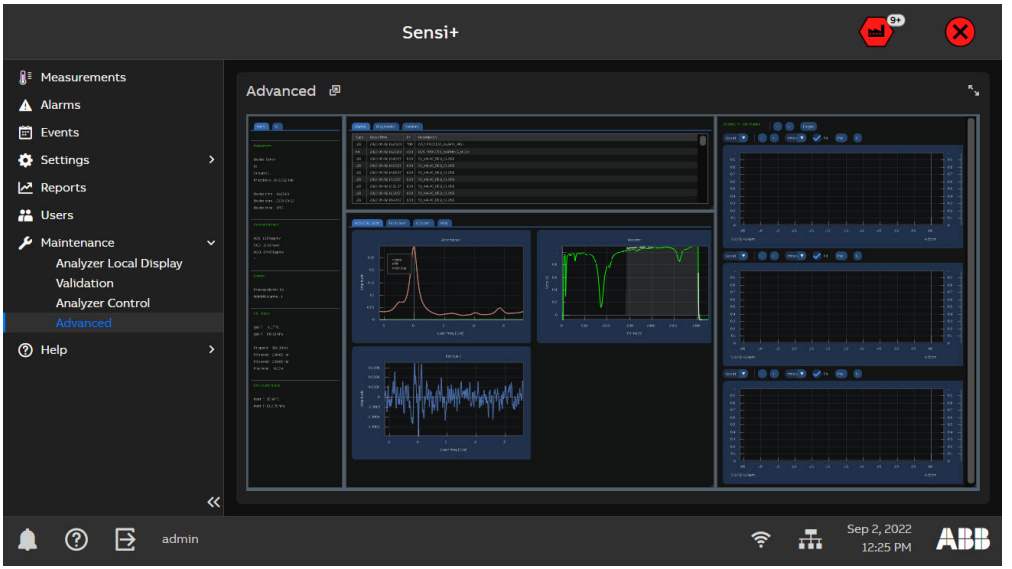
1 Saving behavior and options vary depending on your browser.

# Performing Advanced Troubleshooting

Performing advanced troubleshooting is reserved for personnel who has received the appropriate training. During this training, they will have received all the instructions needed to understand the underlying analyzer behavior.

An advanced troubleshooting panel is accessible from the Sensi+ application sidebar under **Maintenance > Advanced**.

**Figure 69** Advanced Maintenance Panel



# Servicing Analyzer Parts

Over the life of the analyzer, you may need to replace the gas cell or the pump manifold. Once these operations are performed, you will need to change information regarding these parts. The following sections explain how to change this information.

## Replacing the Gas Cell

**NOTICE**

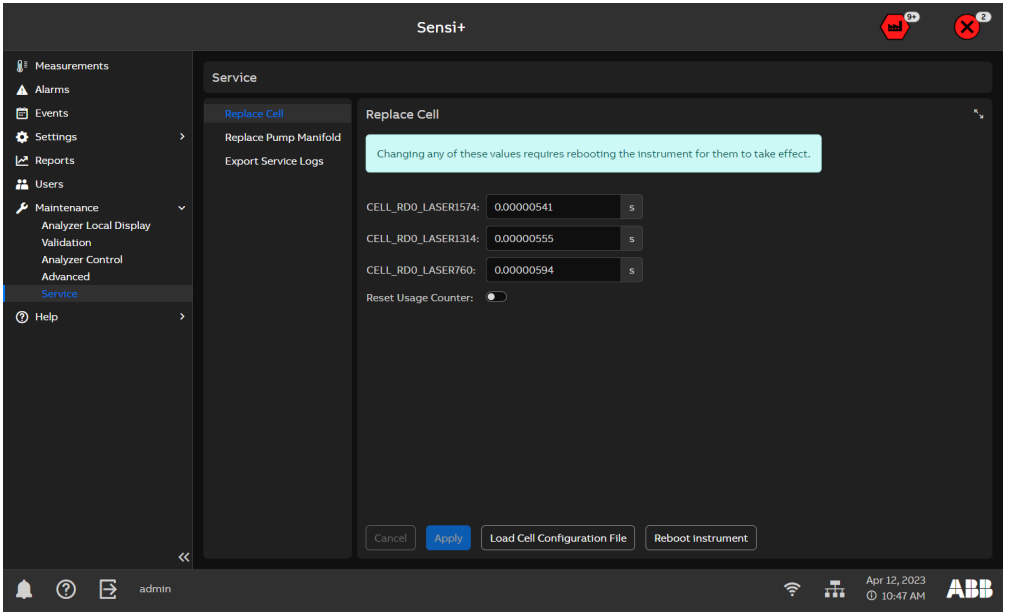
A detailed procedure to physically replace a gas cell is covered and made available during Sensi+ trainings.

After physically replacing the analyzer gas cell, you will need to load the gas cell configuration file and reset the usage counter.

To do so:

1 In the Sensi+ application sidebar, select **Maintenance > Service > Replace Cell**

**Figure 70** Maintenance Replace Cell Panel




2 At the bottom of the pane, click **Load Cell Configuration File**. A standard Windows® **Open** dialog box appears where you can browse and locate the configuration file that you need to load.

3 Once located, open the configuration file.

4 Toggle the **Reset Usage Counter** switch.

5 Click **Apply**.

6 Click **Reboot instrument**.

This will complete the replacement of your analyzer gas cell.

# Replacing the Pump Manifold

**NOTICE**

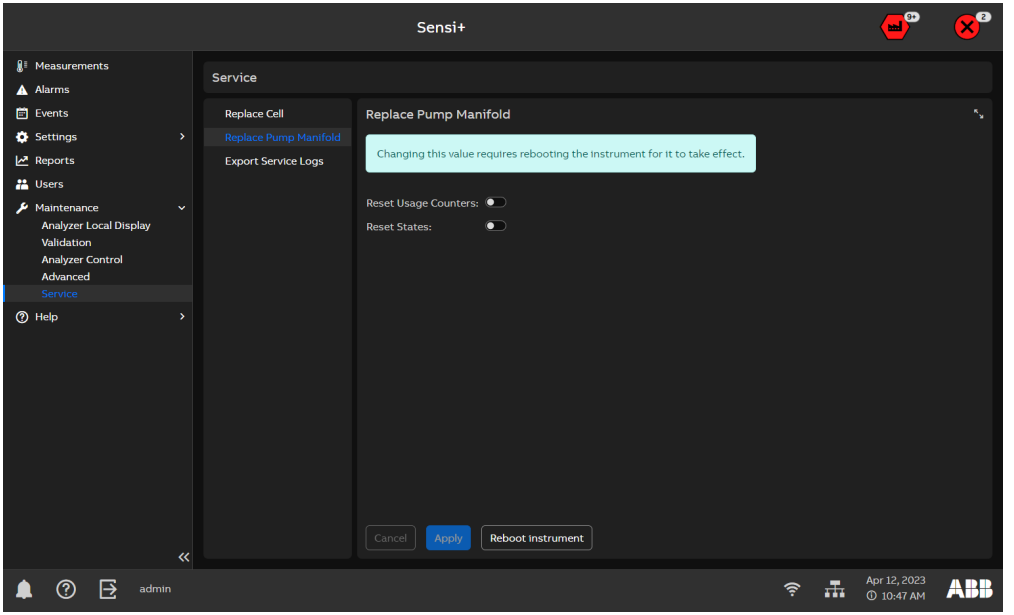
A detailed procedure to physically replace a gas pump manifold is covered and made available during Sensi+ trainings.

After physically replacing the pump manifold, you will need to reset the usage counter and the pump manifold states.

To do so:

1 In the Sensi+ application sidebar, select **Maintenance > Service > Replace Pump Manifold**

**Figure 71** Maintenance Replace Pump Manifold Panel




2 Toggle the **Reset Usage Counter** switch.

3 Toggle the **Reset States** switch.

4 Click **Apply**.

5 Click **Reboot instrument**.

This will complete the replacement of your pump manifold.

# About Your Sensi+ Gas Analyzer

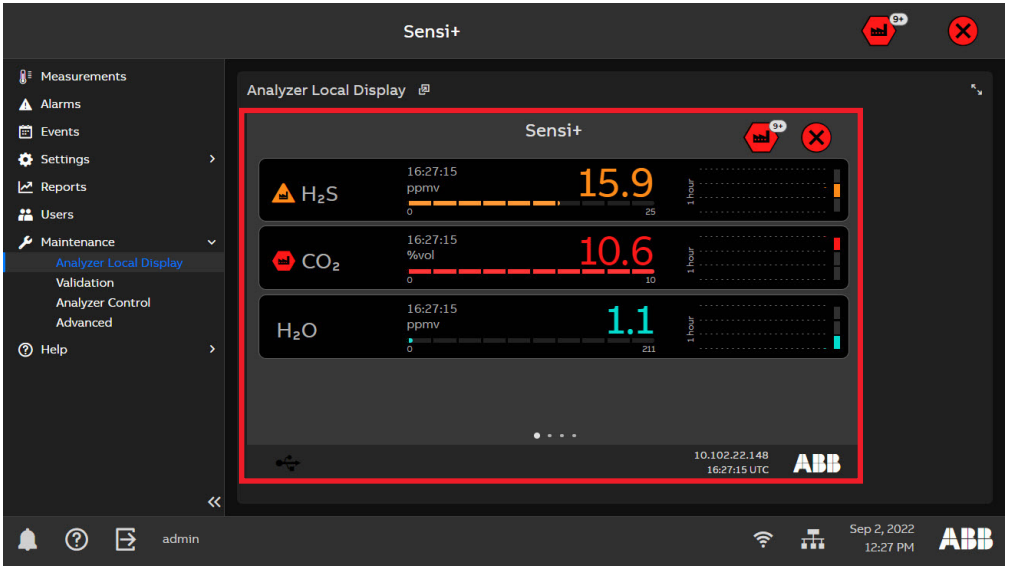
Should you need to contact the ABB after-sales service for troubleshooting purposes, you might be asked to provide specific information about your analyzer. This information is accessed either directly on the analyzer physical screen or remotely from the analyzer local display panel in the Web remote interface.

To access this information:

1 In the Sensi+ application sidebar, select **Maintenance > Analyzer Local Display**. The exact information displayed on the analyzer physical screen appears on the remote interface.

**NOTE:** The first of four dots is highlighted at the bottom of the analyzer local display. These dots are **panel identifiers** to help you navigate through the information panels of the local display.

**Figure 72** Analyzer Local Display in the Sensi+ Application



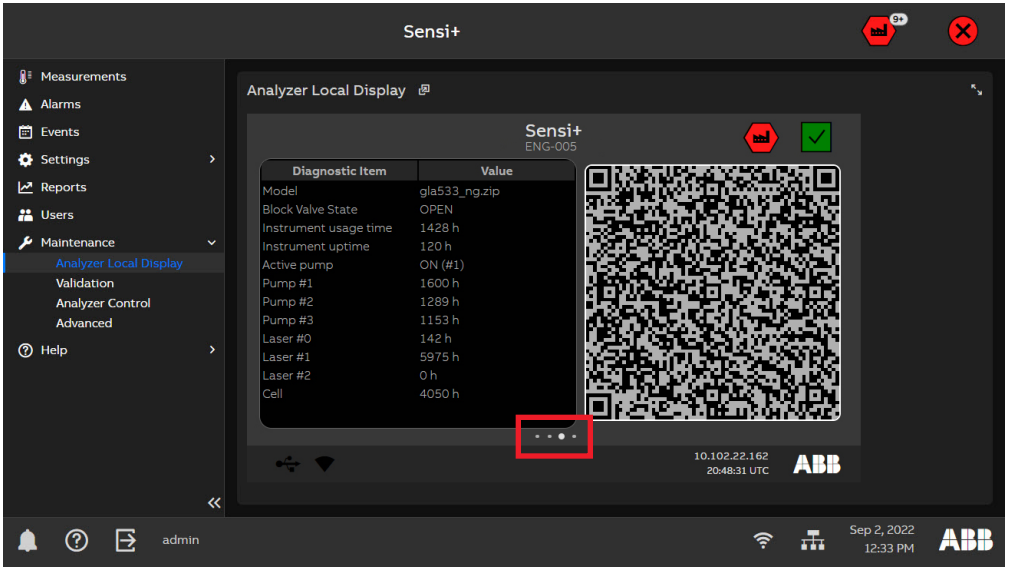

2 Click on the **Analyzer Local Display** page.

3 On your computer keyboard, press the right arrow twice or reach the third panel of the local display. This gives you access to some basic mechanical information about the analyzer, including a QR code.

**NOTE:** From the Web remote interface, you can use all keyboard arrow keys (up, down, left, right) to navigate through the various local graphical user interface (GUI) screens, as you would with gesture on the real local GUI.

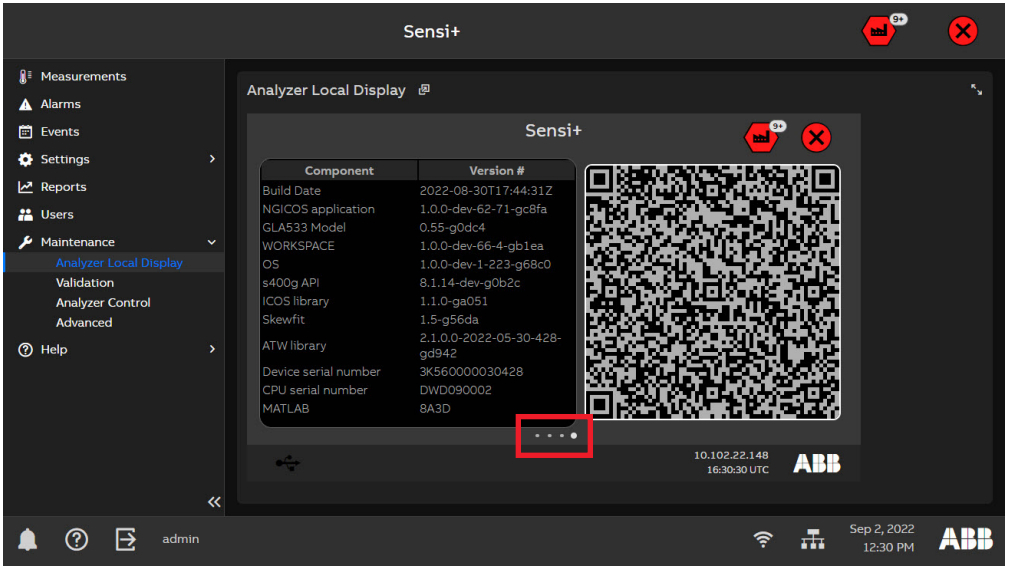
**NOTE:** The QR codes give you access to the ABB web product page.

**Figure 73** Analyzer Local Display Basic Mechanical Data




**4** Press the right arrow one more time to reach the fourth panel of the local display. This gives you access to various software and firmware data about the analyzer, including a QR code.

**Figure 74** Analyzer Local Display Basic Software Data



# Backing Up the Analyzer System

Before performing software updates (see “Installing Software Updates” on page 75) or serious troubleshooting tasks, it is recommended to backup the complete analyzer system and not just system results and events (see “Managing Reports” on page 59).

**NOTICE**

You will need the following to perform a complete analyzer backup:

- the latest software package (GLA533NG_Vx.x.x.ZIP, where x.x.x is the package software version) available here.
- a 128 GB (minimum) exFAT-formatted USB storage device (NOT labelled “ABB_USB”). An external SSD drive is recommended)

**THIS PROCEDURE WILL STOP ANALYZER OPERATION. Make sure that you manage the impacts of such a stoppage on your process before proceeding.**

To perform the analyzer backup:

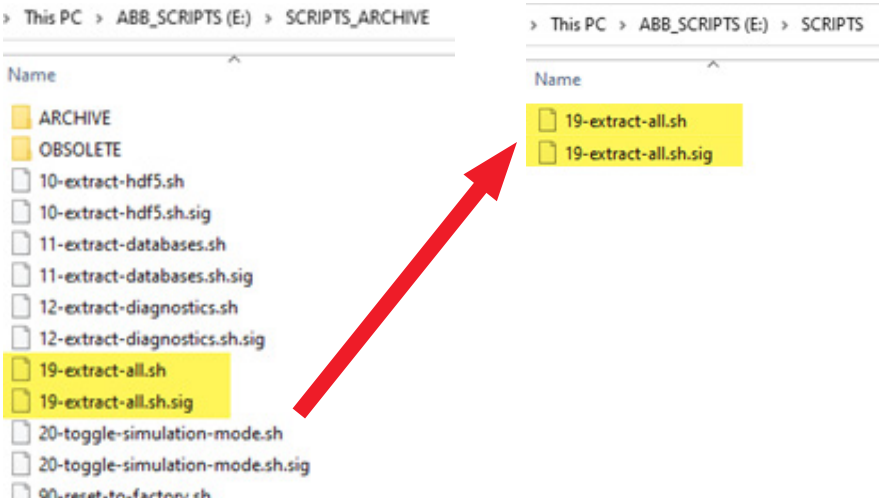
1 Connect the USB storage device to the computer where the software package is available.

2 Extract the following files on the USB storage device.

**Figure 75** Extracting files to the USB storage device


3 Copy the following files from the **SCRIPTS_ARCHIVE** folder to the **SCRIPTS** folder.

**Figure 76** Copying files to the SCRIPTS folder




4 While the Sensi+ is running, connect the USB storage device in the external USB service port. Upon doing so, a series of events will happen automatically:
   - The USB indicator on the Sensi+ local display (bottom left of the screen) will briefly light up when the storage device is detected:
   - The backup script closes the Sensi+ application and the desktop appears.
   - Files are backed up.
   - The Sensi+ application restarts.
5 When you see the white screen with the ABB logo, disconnect the USB storage device from the Sensi+.
6 Connect the USB storage device to your computer and verify that a folder named **FROM_INSTRUMENT** has been created.
7 Verify that the Sensi+ is operating properly.

**NOTE:** Upon completion of the analyzer backup, delete **the content** of the SCRIPTS folder on the USB storage device.

# Installing Software Updates

At some point in the future, you might be asked by ABB service representatives to update your analyzer software. Software updates can only be performed locally via a USB key.

Before performing any software update, it is **strongly recommended** to export your system results and events (see “Managing Reports” on page 59) as well as a complete analyzer backup (see “Backing Up the Analyzer System” on page 73).

**NOTICE**

You will need the following to perform a complete software update:

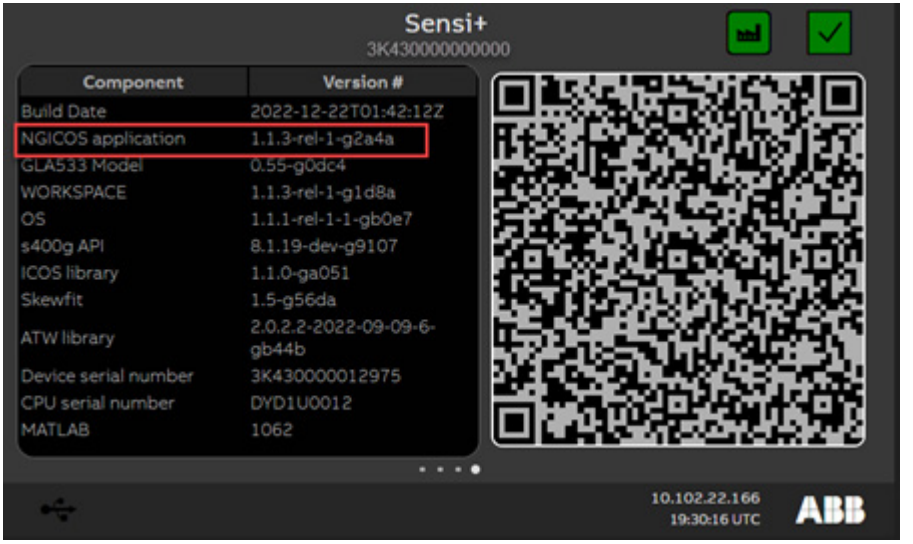
- the latest software package (GLA533NG_Vx.x.x.ZIP, where x.x.x is the package software version) available here.
- an 8 GB (minimum) exFAT-formatted USB storage device (NOT labelled “ABB_USB”).

**THIS PROCEDURE WILL STOP ANALYZER OPERATION. Make sure that you manage the impacts of such a stoppage on your process before proceeding.**

To perform the software update:

**1** Make sure that the current version of the analyzer software is 1.1.x or later.

**Figure 77** Verifying analyzer software version on the analyzer display




**NOTICE**

If an older version is installed (pilot versions) **CONTACT ABB** as remote assistance is required to perform the update of your device. **Do not perform the other steps of this procedure.**

2 Check the content of the software package:

**Figure 78** Content of the GLA533NG_Vx.x.x.ZIP Package

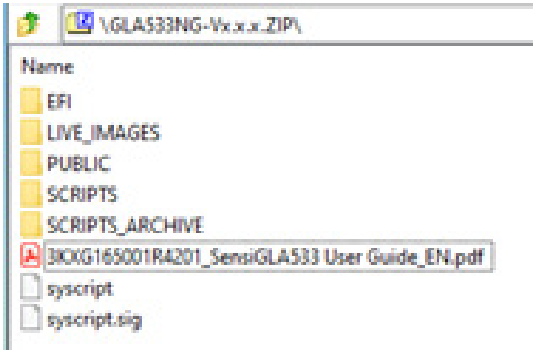
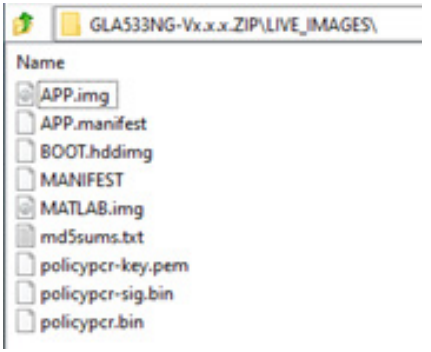



**Figure 79** Content of the LIVE_IMAGE Folder




3 From the software package, unzip the folder **LIVE_IMAGES** to the root of the USB storage device. The content on the USB storage device should be as follows:

**Figure 80** Content of the USB Storage Device


4 While the analyzer is running, connect the USB storage device in the external USB **SERVICE** port.

5 Power the analyzer OFF, then ON.

6 Follow the instruction displayed on the analyzer screen.

**NOTICE**

**DO NOT POWER OFF THE ANALYZER DURING THE UPDATE.**

7 **WHEN THE REQUEST APPEARS** on screen, disconnect the USB storage device.
The instrument will reboot automatically.

8 On the analyzer screen, make sure that the new software version corresponds to the one expected.

9 Power OFF the analyzer for 10 seconds, then ON again.

10 Make sure that the analyzer operates as expected and that its configurations are still valid.

If there is no other analyzer software to update, ABB recommends deleting the content of the USB storage device.

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APPENDIX A

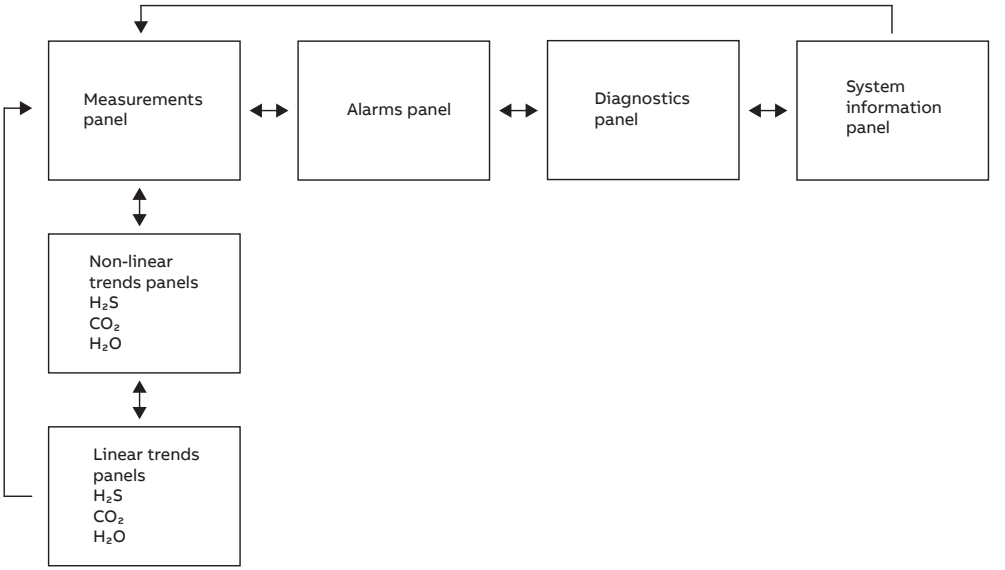
# The Local Graphical User Interface

The Sensi+ gas analyzer screen displays a graphical user interface (GUI) (Measurements panel; see Figure 82 on page A80) once the start-up sequence is completed. The following pages provide further details on the information available on the various information panels that can be displayed.

You navigate through the information panels by swiping your hand in front of the gesture sensors located below the screen (refer to the Sensi+ Installation and Commissioning Guide if you need to locate the gesture sensors).

Hand swipes up, down, left, and right, made one inch in front of gesture sensors, allow you to access the different information panels, as illustrated below.

**Figure 81** Gesture navigation



# Information Panels

The following sections provide more details on the various information panels accessible on the gas analyzer screen.

For more information on the configuration of the displayed units of measurement, alarms and alarm thresholds, as well as a more complete description of the various types of alarms, see the appropriate sections elsewhere in this guide.

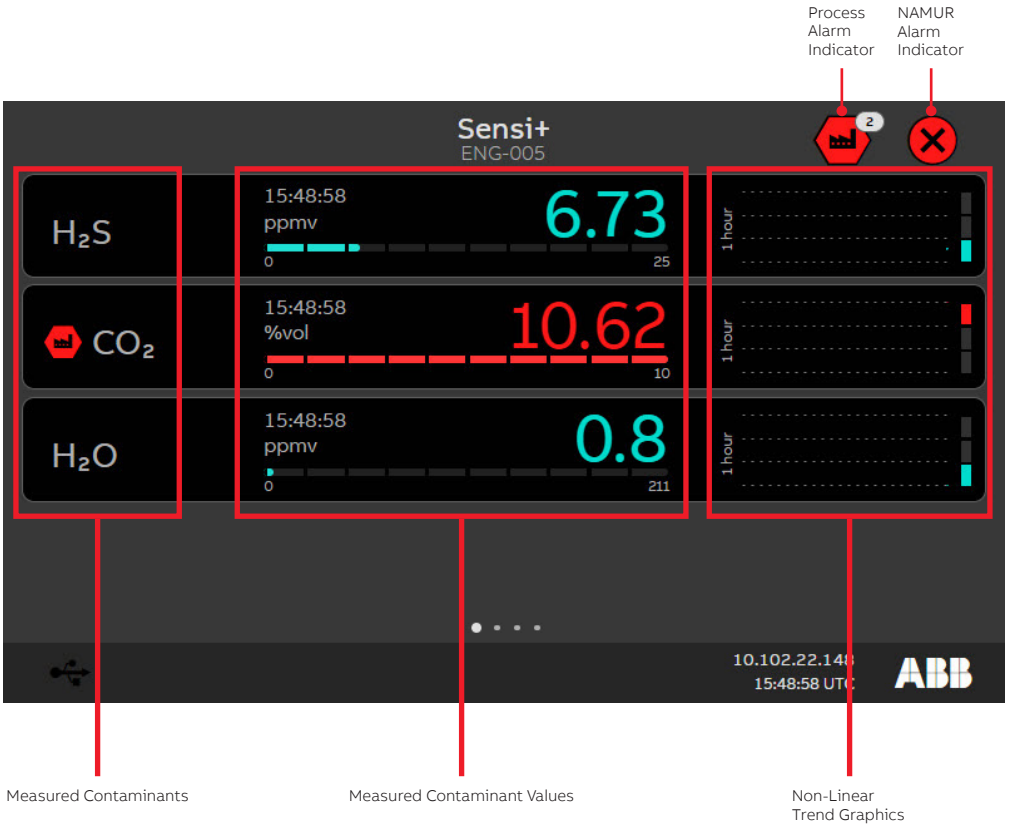
**You cannot modify the information displayed directly from the analyzer GUI.**

## Measurements Panel

This is the main panel indicating the contaminants measured, the measurements themselves, and the general trends (see “Configuring Gas Measurement Units” on page 15, and “Configuring Gas Parameters” on page 17), as well as the presence of process and NAMUR alarms (see “Introducing NAMUR and Process Alarm Conventions” on page 35).

**NOTE:** The NAMUR and process alarms colors (cyan, amber, red) carry the same meaning throughout the GUI.

**Figure 82** Measurements Panel

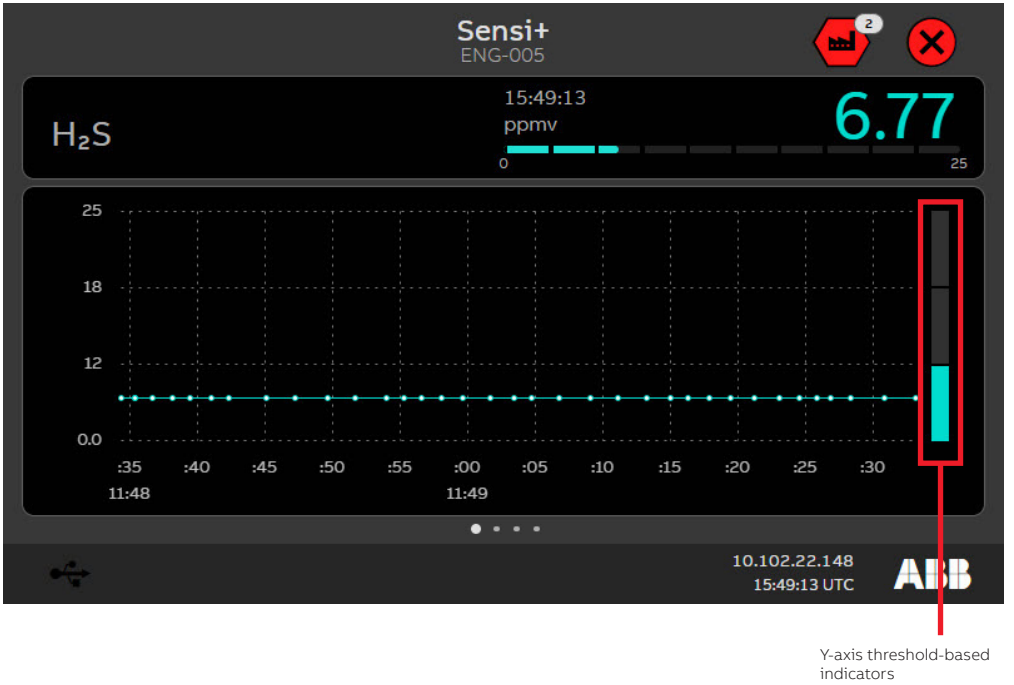


## Non-Linear Trend Panels

Non-linear trend panels use warning and alarm threshold limits (illustrated by the cyan, amber and red colors) as the Y-axis separation. Each contaminant has its own non-linear trend panel.

These panels are designed to specifically highlight transitions between normal contaminant concentration values and outlying concentration values. They constitute a more detailed view of the non-linear trend graphics displayed in the Measurements panel (see Figure 82 on page A80)

**Figure 83** Non-Linear Thread Panel

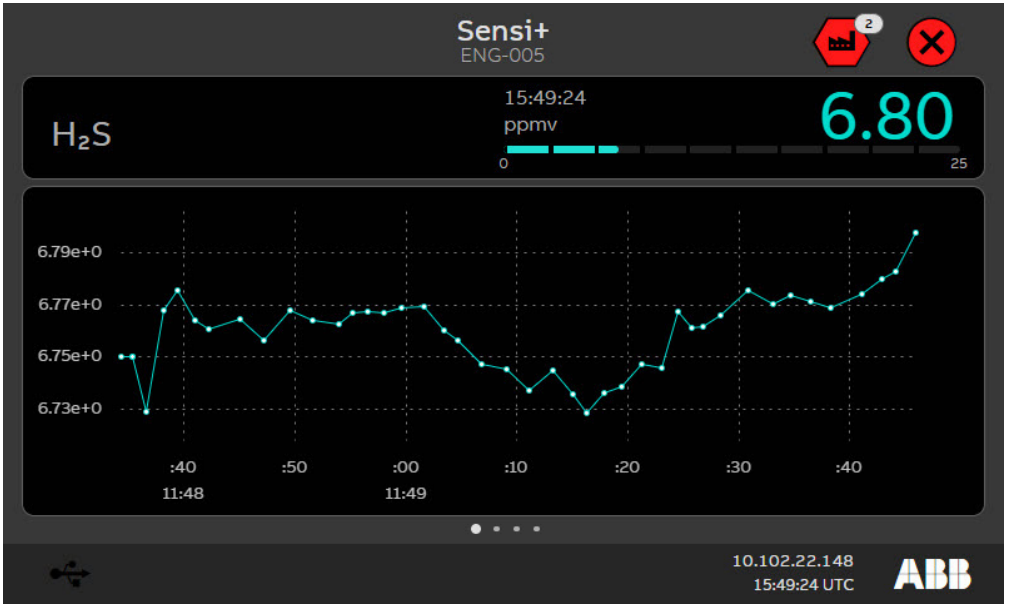


## Linear Trend Panels

In linear trend panels, the scaling gives a linear representation of the measured values but less appreciation of the alarm and warning thresholds. Each contaminant has its own non-linear trend panel.

The main difference with non-linear trend panels is the Y-axis scaling.

**Figure 84** Linear Trend Panel



## Alarms

The alarms panel displays the various ongoing alarms that the analyzer is experiencing. You cannot manage these alarms (acknowledgment, filtering, etc.) from the local GUI. You must connect to the analyzer via the Web remote interface (as explained in the guide) and follow the instructions given in “Managing Alarms” on page 35 and “Managing Events” on page 49).

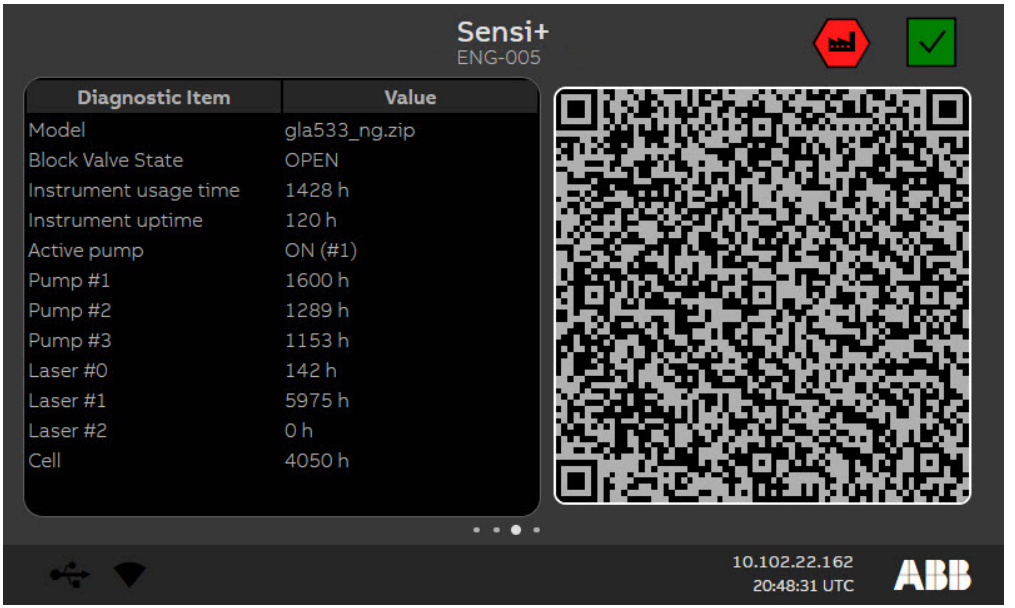
**Figure 85** Alarms Panel

## Diagnostics

The diagnostic panel provides information on the state of important analyzer mechanical components (pump and block valve).

The QR code on the right directs you to the ABB web product page.

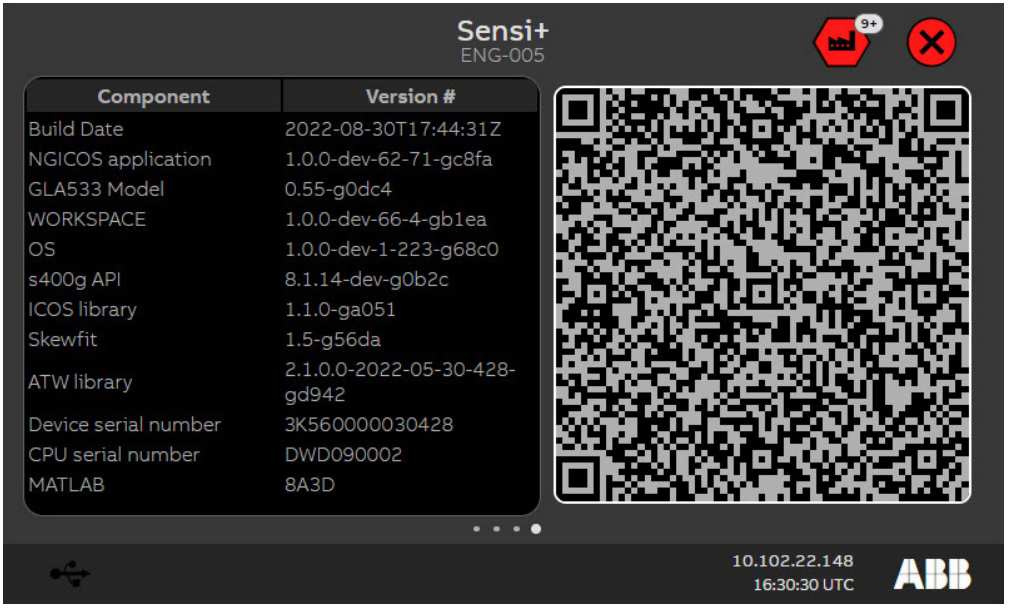
**Figure 86** Diagnostics Panel



## System Information

The system information panel provides technical information specific to your analyzer. The QR code on the right directs you to the ABB web product page.

**Figure 87** System Information Panel



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APPENDIX B

# Digital Output Logic and Wiring

## Logic

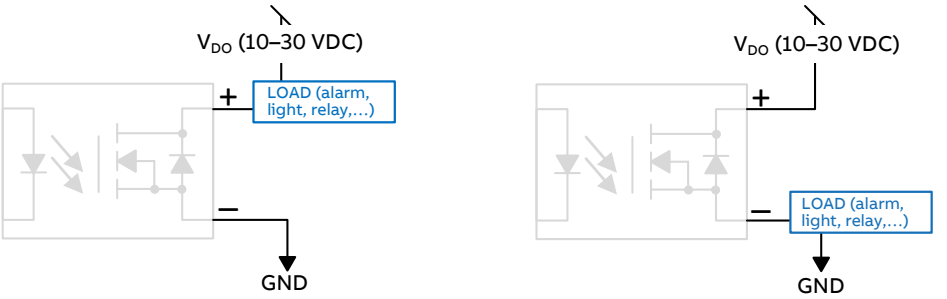
Below is an example for two critical parameters reported via digital outputs and how external equipment/wiring needs to be planned accordingly:

| | | |
|---|---|---|
| **Instrument State** | Healthy (energized) |  |
| | Failed (open) |  |
| **Tariff High High Limit Reached** | Tariff limit exceeded (pipe shut off) |  |
| | Normal level (pipe open) |  |

## Wiring

Solid state relays require to be wired in a specific way to ensure proper operation. The following wirings must be matched.

**Figure 88** Low-Side Switch Wiring (left) and High-Side Switch Wiring (right)



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APPENDIX C

# Modbus Table

Acquisition blocks are in sync with the data acquisition (rate every ~1.5s).

Health Monitoring blocks are not necessarly in sync with the acquisition and may be read at slower rate if desired

Configuration block is not in sync with the acquisition and read at slower rate.

## Table

| Start Address | Length | IPC Value Name | Value Type | Description | Bytes | Physical Units | Value Range |
|---|---|---|---|---|---|---|---|
| 30000 | | Input registers Modbus standard offset | | Function FC=04 Read input registers (3×) (read-only) | | | See “TCP/IP Modbus parameters details” on page C106 |
| **1000** | **Acquisition UINT16** | | | | | | |
| 1000 | 1 | H2S_UnitID | UINT16 | UnitID selected by user (or default configuration) | 2 | ppmv (default) | See “UnitID” on page C101 |
| 1001 | 1 | CO2_UnitID | UINT16 | UnitID selected by user (or default configuration) | 2 | ppmv (default) | See “UnitID” on page C101 |
| 1002 | 1 | H2O_UnitID | UINT16 | UnitID selected by user (or default configuration) | 2 | ppmv (default) | See “UnitID” on page C101 |
| 1003 | 1 | spare_UnitID | UINT16 | UnitID selected by user (or default configuration) | 2 | ppmv (default) | See “UnitID” on page C101 |
| 1004 | 1 | temp_UID | UINT16 | Temperature UnitID selected by user (or default configuration) | 2 | C (default) | See “UnitID” on page C101 |
| 1005 | 1 | press_UID | UINT16 | Pressure UnitID selected by user (or default configuration) | 2 | hPa (default) | See “UnitID” on page C101 |
| 1006 | 1 | nbrProcessAlarms | UINT16 | Number of current Process alarms | 2 | N/A | |
| 1007 | 1 | nbrNamurAlarms | UINT16 | Number of current NAMUR alarms | 2 | N/A | |

| Start Address | Length | IPC Value Name | Value Type | Description | Bytes | Physical Units | Value Range |
|---|---|---|---|---|---|---|---|
| 1008 | 1 | activePumpId | UINT16 | Current active pump | 2 | N/A | 0 (OFF),1,2,3 |
| 1009 | 1 | laser0_wicState | UINT16 | Current internal dataprocessing state and flags (fit status, autotune request) | 2 | N/A | See “WIC States” on page C101 |
| 1010 | 1 | laser1_wicState | UINT16 | Current internal dataprocessing state and flags (fit status, autotune request) | 2 | N/A | See “WIC States” on page C101 |
| 1011 | 1 | spare_wicState | UINT16 | Current internal dataprocessing state and flags (fit status, autotune request) | 2 | N/A | See “WIC States” on page C101 |
| **1100** | **Acquisition UINT32** | | | | | | |
| 1100 | 2 | H2S_Status | UINT32 | Gas' Process Alarms and Quality | 4 | N/A | See “Bitfield PROCESS” on page C101 and “Bitfield NAMUR” on page C102 |
| 1102 | 2 | CO2_Status | UINT32 | Gas' Process Alarms and Quality | 4 | N/A | See “Bitfield PROCESS” on page C101 and “Bitfield NAMUR” on page C102 |
| 1104 | 2 | H2O_Status | UINT32 | Gas' Process Alarms and Quality | 4 | N/A | See “Bitfield PROCESS” on page C101 and “Bitfield NAMUR” on page C102 |
| 1106 | 2 | Spare_Status | UINT32 | Gas' Process Alarms and Quality | 4 | N/A | See “Bitfield PROCESS” on page C101 and “Bitfield NAMUR” on page C102 |
| 1108 | 2 | processStates | UINT32 | Global Process Status Corresponding icon displayed on local HMI ("process" - top right) (Only most severe alarms) | 4 | N/A | See “Bitfield PROCESS” on page C101 |

| Start Address | Length | IPC Value Name | Value Type | Description | Bytes | Physical Units | Value Range |
|---|---|---|---|---|---|---|---|
| 1110 | 2 | namurStates | UINT32 | Global NAMUR Status<br>Corresponding icon displayed on local HMI ("namur" - top right) (Only most severe alarms) | 4 | N/A | See “Bitfield NAMUR” on page C102 |
| 1112 | 2 | timestamp_System | UINT32 | Monotonic time (always increased since boot time, delta time) | 4 | s | Monotonic time relative to last system boot |
| 1114 | 2 | timestamp_UTC | UINT32 | Clock time (representative of instrument time)<br>Corresponds to the start time of the current acquisition | 4 | s | Number of seconds since 1970-01-01 (epoch time) |
| 1116 | 2 | StreamId | UINT32 | 0 = Sampling<br>8 = Validation | 4 | N/A | [0 to 8] |
| 1118 | 2 | dataQuality | UINT32 | Reserved for future use | 4 | N/A | |
| 1120 | 2 | processAlarmFlag | UINT32 | All active process flags | 4 | N/A | All gases process status OR'ed<br>See “Bitfield PROCESS” on page C101 |
| 1122 | 2 | acqErrorReg | UINT32 | Errors when reading hardware devices for auxilliary measurements (temperature sensors, pressure sensors, etc) | 4 | N/A | See “Acquisition Error Registry” on page C102 |
| 1124 | 2 | eventsLaserReg | UINT32 | Specific NAMUR alarms detected on one or more laser that impact measurement quality.<br>Sets all its associated gas(es) to uncertain quality. | 4 | N/A | Bitfield:<br>0 = ok<br>1 = first laser<br>2 = second laser<br>4 = third laser |

| Start Address | Length | IPC Value Name | Value Type | Description | Bytes | Physical Units | Value Range |
|---|---|---|---|---|---|---|---|
| 1126 | 2 | eventsReg | UINT32 | Bitfield that contains information of active alarms (NAMUR) that impact quality of ALL gases measurements (pressure, temperature, interlock) | 4 | N/A | See “Events Registry” on page C102 |
| 1128 | 2 | interlockStatus | UINT32 | Enclosure interlock status | 4 | N/A | 0 = Good (both compartments well closed), 1 = EBOX interlock active (compartment open), 2 = OBOX interlock active (compartment open) |
| 1130 | 2 | configuration_checksum | UINT32 | For future use | 4 | N/A | Future use |
| **1200** | **Acquisition UINT64** | | | | | | |
| 1200 | 4 | Acquistition Id | UINT64 | Acquisition counter since commissioning | 8 | N/A | |
| **1300** | **Acquisition FLOAT32** | | | | | | |
| 1300 | 2 | H2S_Concentration | FLOAT32 | Filtered value of the $H_2S$ concentration | 4 | See “UnitID” on pageC101 | Configured units |
| 1302 | 2 | H2S_Min | FLOAT32 | Min. display range & 4–20 mA conversion range | 4 | See “UnitID” on pageC101 | |
| 1304 | 2 | H2S_Max | FLOAT32 | Max. display range & 4–20 mA conversion range | 4 | See “UnitID” on pageC101 | |
| 1306 | 2 | H2S_High_High_ Threshold | FLOAT32 | Alarm High High threshold. By default linked to DO_1 | 4 | See “UnitID” on pageC101 | Configured units |
| 1308 | 2 | H2S_SpanGain | FLOAT32 | Span gain user configuration | 4 | N/A | Configured units |
| 1310 | 2 | H2S_ZeroOffset | FLOAT32 | Zero offset user configuration | 4 | See “UnitID” on pageC101 | Configured units |

| Start Address | Length | IPC Value Name | Value Type | Description | Bytes | Physical Units | Value Range |
|---|---|---|---|---|---|---|---|
| 1312 | 2 | CO2_Concentration | FLOAT32 | Filtered value of the $CO_2$ concentration | 4 | See “UnitID” on pageC101 | Configured units |
| 1314 | 2 | CO2_Min | FLOAT32 | Min. display range & 4-20 mA | 4 | See “UnitID” on pageC101 | |
| 1316 | 2 | CO2_Max | FLOAT32 | Max. display range & 4–20 mA | 4 | See “UnitID” on pageC101 | |
| 1318 | 2 | CO2_High_High_ Threshold | FLOAT32 | Alarm High High threshold. By default linked to DO_3 | 4 | See “UnitID” on pageC101 | Configured units |
| 1320 | 2 | CO2_SpanGain | FLOAT32 | Span gain user configuration | 4 | N/A | Configured units |
| 1322 | 2 | CO2_ZeroOffset | FLOAT32 | Zero offset user configuration | 4 | See “UnitID” on pageC101 | Configured units |
| 1324 | 2 | H2O_Concentration | FLOAT32 | Filtered value of the $H_2O$ concentration | 4 | See “UnitID” on pageC101 | Configured units |
| 1326 | 2 | H2O_Min | FLOAT32 | Min. display range & 4–20 mA | 4 | See “UnitID” on pageC101 | |
| 1328 | 2 | H2O_Max | FLOAT32 | Max. display range & 4–20 mA | 4 | See “UnitID” on pageC101 | |
| 1330 | 2 | H2O_High_High_ Threshold | FLOAT32 | Alarm High High threshold. By default linked to DO_5 | 4 | See “UnitID” on pageC101 | Configured units |
| 1332 | 2 | H2O_SpanGain | FLOAT32 | Span gain user configuration | 4 | N/A | Configured units |
| 1334 | 2 | H2O_ZeroOffset | FLOAT32 | Zero offset user configuration | 4 | See “UnitID” on pageC101 | Configured units |
| 1336 | 2 | Spare_Concentration | FLOAT32 | Filtered value of the spare concentration | 4 | See “UnitID” on pageC101 | Configured units |

| Start Address | Length | IPC Value Name | Value Type | Description | Bytes | Physical Units | Value Range |
|---|---|---|---|---|---|---|---|
| 1338 | 2 | Spare_Min | FLOAT32 | Min. display range & 4–20 mA | 4 | See “UnitID” on pageC101 | |
| 1340 | 2 | Spare_Max | FLOAT32 | Max. display range & 4–20 mA | 4 | See “UnitID” on pageC101 | |
| 1342 | 2 | Spare_High_High_ Threshold | FLOAT32 | Alarm High High threshold By default linked to DO_7 | 4 | See “UnitID” on pageC101 | Configured units |
| 1344 | 2 | Spare_SpanGain | FLOAT32 | Span gain user configuration | 4 | N/A | Configured units |
| 1346 | 2 | Spare_ZeroOffset | FLOAT32 | Zero offset user configuration | 4 | See “UnitID” on pageC101 | Configured units |
| 1348 | 2 | gasPressure | FLOAT32 | Pressure of the gas cell | 4 | See “UnitID” on pageC101 | native units |
| 1350 | 2 | gasTemperature | FLOAT32 | Temperature of the gas cell | 4 | See “UnitID” on pageC101 | native units |
| 1352 | 2 | ambientPressure | FLOAT32 | OBOX (bottom compartment) ambient pressure | 4 | See “UnitID” on pageC101 | |
| 1354 | 2 | ambientTemperature | FLOAT32 | OBOX (bottom compartment) ambient temperature | 4 | See “UnitID” on pageC101 | |
| 1356 | 2 | eboxPressure | FLOAT32 | EBOX (upper compartment) pressure | 4 | See “UnitID” on pageC101 | |
| 1358 | 2 | eboxTemperature | FLOAT32 | EBOX (upper compartment) temperature | 4 | See “UnitID” on pageC101 | |
| 1360 | 2 | annunPressure | FLOAT32 | Annunciation Pressure: OBOX-EBOX | 4 | See “UnitID” on pageC101 | |
| 1362 | 2 | laser0_model0_ baseline_A | FLOAT32 | Indication of laser signal | 4 | N/A | |

| Start Address | Length | IPC Value Name | Value Type | Description | Bytes | Physical Units | Value Range |
|---|---|---|---|---|---|---|---|
| 1364 | 2 | laser0_model0_ ringdownModel_ ringdown | FLOAT32 | Indication of laser ringdown | 4 | s | |
| 1366 | 2 | laser0_pcbTemperature | FLOAT32 | Laser 0 PCB temperature | 4 | C | |
| 1368 | 2 | laser0_tecTemperature | FLOAT32 | Laser 0 TEC temperature | 4 | C | |
| 1370 | 2 | laser0_ tecTemperatureSetpoint | FLOAT32 | Laser 0 TEC temperature setpoint | 4 | C | |
| 1372 | 2 | laser1_model0_ baseline_A | FLOAT32 | Indication of laser signal | 4 | N/A | |
| 1374 | 2 | laser1_model0_ ringdownModel_ ringdown | FLOAT32 | Indication of laser ringdown | 4 | s | |
| 1376 | 2 | laser1_pcbTemperature | FLOAT32 | Laser 1 PCB temperature | 4 | C | |
| 1378 | 2 | laser1_tecTemperature | FLOAT32 | Laser 1 TEC temperature | 4 | C | |
| 1380 | 2 | laser1_ tecTemperatureSetpoint | FLOAT32 | Laser 1 TEC temperature setpoint | 4 | C | |
| 1382 | 2 | spare_model0_ baseline_A | FLOAT32 | Indication of laser signal | 4 | N/A | |
| 1384 | 2 | spare_model0_ ringdownModel_ ringdown | FLOAT32 | Indication of laser ringdown | 4 | s | |
| 1386 | 2 | spare_pcbTemperature | FLOAT32 | Spare PCB temperature | 4 | C | |
| 1388 | 2 | spare_tecTemperature | FLOAT32 | Spare TEC temperature | 4 | C | |
| 1390 | 2 | spare_ tecTemperatureSetpoint | FLOAT32 | Spare TEC temperature setpoint | 4 | C | |
| **1500** | **Health Monitoring UINT16** | | | | | | |
| 1500 | 1 | s350_pump_ disabledcount | UINT16 | Number of pumps tagged 'Disabled' | 2 | N/A | 0,1,2,3 |
| 1501 | 1 | s370_DI_value | UINT16 | Bit wise : State of each DI | 2 | N/A | Bit wise : bit0=RESERVED bit1=input #1 bit2=input #2 |
| 1502 | 1 | s370_DO_status | UINT16 | Bit wise : State of each DO | 2 | N/A | Bit wise : bit0=RESERVED bit1=output #1 bit2=output #2 …, bit10=output #10 |

| Start Address | Length | IPC Value Name | Value Type | Description | Bytes | Physical Units | Value Range |
|---|---|---|---|---|---|---|---|
| **1600** | **Health Monitoring UINT32** | | | | | | |
| 1600 | 2 | c155s0_error | UINT32 | Laser 0 error register | 4 | N/A | See “Bit Wise c155sx ERROR” on page C103 |
| 1602 | 2 | c155s0_status | UINT32 | Laser 0 status register | 4 | N/A | See “Bit Wise c155sx STATUS” on page C103 |
| 1604 | 2 | c155s1_error | UINT32 | Laser 1 error register | 4 | N/A | See “Bit Wise c155sx ERROR” on page C103 |
| 1606 | 2 | c155s1_status | UINT32 | Laser 1 status register | 4 | N/A | See “Bit Wise c155sx STATUS” on page C103 |
| 1608 | 2 | c155s2_error | UINT32 | Laser Slot 2 error register | 4 | N/A | See “Bit Wise c155sx ERROR” on page C103 |
| 1610 | 2 | c155s2_status | UINT32 | Laser Slot 2 status register | 4 | N/A | See “Bit Wise c155sx STATUS” on page C103 |
| 1612 | 2 | s350_error | UINT32 | s350 Board Error | 4 | N/A | See “Bit Wise s350 ERROR” on page C103 |
| 1614 | 2 | s350_status | UINT32 | s350 Board Status | 4 | N/A | See “Bit Wise s350 STATUS” on page C104 0 = OK, error otherwise |
| 1616 | 2 | s350_pump_speed | UINT32 | Pump speed of active pump in Hz | 4 | Hz | |
| 1618 | 2 | s350_uptime | UINT32 | Up time of MCU in seconds | 4 | seconds | |
| 1620 | 2 | s370_comm_status | UINT32 | Communication status with the s370 board | 4 | N/A | 0 = OK, 1 = Comm error with board |
| 1622 | 2 | s370_error | UINT32 | s370 Board Error | 4 | N/A | See “Bit Wise s370 ERROR” on page C104 |
| 1624 | 2 | s370_output420_ status_1 | UINT32 | s370 4-20mA status register 1 | 4 | N/A | See “Bit Wise output420 STATUS” on page C104 |
| 1626 | 2 | s370_output420_ status_2 | UINT32 | s370 4-20mA status register 2 | 4 | N/A | See “Bit Wise output420 STATUS” on page C104 |
| 1628 | 2 | s370_output420_ status_3 | UINT32 | s370 4-20mA status register 3 | 4 | N/A | See “Bit Wise output420 STATUS” on page C104 |

| Start Address | Length | IPC Value Name | Value Type | Description | Bytes | Physical Units | Value Range |
|---|---|---|---|---|---|---|---|
| 1630 | 2 | s370_output420_ status_4 | UINT32 | s370 4-20mA status register 4 | 4 | N/A | See “Bit Wise output420 STATUS” on page C104 |
| 1632 | 2 | s380_comm_status | UINT32 | Communication status with the s380 board | 4 | N/A | 0 = OK, 1 = Comm error with board |
| 1634 | 2 | laser0_usage_time | UINT32 | Total number of hours of usage | 4 | hours | |
| 1636 | 2 | laser1_usage_time | UINT32 | Total number of hours of usage | 4 | hours | |
| 1638 | 2 | spare_usage_time | UINT32 | Total number of hours of usage | 4 | hours | |
| 1640 | 2 | pump1_usage_time | UINT32 | Total number of hours of usage | 4 | hours | |
| 1642 | 2 | pump2_usage_time | UINT32 | Total number of hours of usage | 4 | hours | |
| 1644 | 2 | pump3_usage_time | UINT32 | Total number of hours of usage | 4 | hours | |
| 1646 | 2 | ebox_usage_time | UINT32 | Total number of hours of usage | 4 | hours | |
| **1700** | **Health Monitoring UINT64** | | | | | | |
| 1700 | 4 | Health Monitoring Id | UINT64 | Health Monitoring counter since commissioning | 8 | N/A | |
| 1704 | 4 | Status | UINT64 | RESERVED for future use | 8 | N/A | |
| 1708 | 4 | Concatenated error flag1 | UINT64 | Concatenated error flag for future use | 8 | N/A | |
| 1712 | 4 | Concatenated error flag2 | UINT64 | Concatenated error flag for future use | 8 | N/A | |
| **1800** | **Health Monitoring FLOAT32** | | | | | | |
| 1800 | 2 | c155s0_pd_monitor | FLOAT32 | Laser diode power monitor in A | 4 | A | |
| 1802 | 2 | c155s0_tec_current | FLOAT32 | Laser 0 TEC current in A | 4 | A | |
| 1804 | 2 | c155s0_tec_voltage | FLOAT32 | Laser 0 TEC voltage in V | 4 | V | |
| 1806 | 2 | c155s0_uptime | FLOAT32 | Up time of MCU in seconds | 4 | seconds | |
| 1808 | 2 | c155s1_pd_monitor | FLOAT32 | Laser diode power monitor in A | 4 | A | |
| 1810 | 2 | c155s1_tec_current | FLOAT32 | Laser 1 TEC current in A | 4 | A | |
| 1812 | 2 | c155s1_tec_voltage | FLOAT32 | Laser 1 TEC voltage in V | 4 | V | |

| Start Address | Length | IPC Value Name | Value Type | Description | Bytes | Physical Units | Value Range |
|---|---|---|---|---|---|---|---|
| 1814 | 2 | c155s1_uptime | FLOAT32 | Up time of MCU in seconds | 4 | seconds | |
| 1816 | 2 | c155s2_pd_monitor | FLOAT32 | Laser diode power monitor in A | 4 | A | |
| 1818 | 2 | c155s2_tec_current | FLOAT32 | Laser slot2 TEC current in A | 4 | A | |
| 1820 | 2 | c155s2_tec_voltage | FLOAT32 | Laser slot2 TEC voltage in V | 4 | V | |
| 1822 | 2 | c155s2_uptime | FLOAT32 | Up time of MCU in seconds | 4 | seconds | |
| 1824 | 2 | proc_capacity | FLOAT32 | Processing Queue size/max | 4 | N/A | |
| 1826 | 2 | proc_procTime | FLOAT32 | Data Processing Time | 4 | seconds | |
| 1828 | 2 | s350_gascellctrl_ outduty | FLOAT32 | Proportional valve duty cycle in % [0:100] | 4 | % | |
| 1830 | 2 | s350_gascellctrl_ setpoint | FLOAT32 | Pressure setpoint from 0 to 1 (0:min,1:max of pressure device range) | 4 | hPa | |
| 1832 | 2 | s350_heater_current | FLOAT32 | Current in A | 4 | A | |
| 1834 | 2 | s350_mcutemp | FLOAT32 | MCU temperature in C | 4 | C | |
| 1836 | 2 | s350_pump_ctrl_speed | FLOAT32 | Pump speed in % [0:100] | 4 | % | |
| 1838 | 2 | s350_pump_current | FLOAT32 | Current in A | 4 | A | |
| 1840 | 2 | s350_valve_current | FLOAT32 | Current in A | 4 | A | |
| 1842 | 2 | s370_AO_1 | FLOAT32 | 4-20ma output current in mA | 4 | mA | |
| 1844 | 2 | s370_AO_2 | FLOAT32 | 4-20ma output current in mA | 4 | mA | |
| 1846 | 2 | s370_AO_3 | FLOAT32 | 4-20ma output current in mA | 4 | mA | |
| 1848 | 2 | s370_AO_4 | FLOAT32 | 4-20ma output current in mA | 4 | mA | |
| 1850 | 2 | s370_readout_1030V_ input | FLOAT32 | Power Entry Voltage | 4 | V | |
| 1852 | 2 | sbc_cpuTemp | FLOAT32 | Temperature of the CPU | 4 | C | |
| 1854 | 2 | sbc_driveStorageAvail | FLOAT32 | % of disk storage available | 4 | % | |
| 1856 | 2 | sbc_memoryAvail | FLOAT32 | % of memory available | 4 | % | |

| Start Address | Length | IPC Value Name | Value Type | Description | Bytes | Physical Units | Value Range |
|---|---|---|---|---|---|---|---|
| 1858 | 2 | s370_output420_Vloop_AO_1 | FLOAT32 | Analog Output (4-20mA) Loop Voltage | 4 | V | |
| 1860 | 2 | s370_output420_Vloop_AO_2 | FLOAT32 | Analog Output (4-20mA) Loop Voltage | 4 | V | |
| 1862 | 2 | s370_output420_Vloop_AO_3 | FLOAT32 | Analog Output (4-20mA) Loop Voltage | 4 | V | |
| 1864 | 2 | s370_output420_Vloop_AO_4 | FLOAT32 | Analog Output (4-20mA) Loop Voltage | 4 | V | |
| 1866 | 2 | s370_output420_Temperature_AO_1 | FLOAT32 | Analog Output (4-20mA) IC Temperature | 4 | C | |
| 1868 | 2 | s370_output420_Temperature_AO_2 | FLOAT32 | Analog Output (4-20mA) IC Temperature | 4 | C | |
| 1870 | 2 | s370_output420_Temperature_AO_3 | FLOAT32 | Analog Output (4-20mA) IC Temperature | 4 | C | |
| 1872 | 2 | s370_output420_Temperature_AO_4 | FLOAT32 | Analog Output (4-20mA) IC Temperature | 4 | C | |
| **2000** | **Instrument Configuration** | | | | | | |
| 2000 | 1 | s370_serial_config port#1 | UINT16 | Serial port#1 configuration (Future use) | 2 | N/A | See “S370 serial config” on page C105 |
| 2001 | 1 | s370_serial_config port#2 | UINT16 | Serial port#2 configuration (Future use) | 2 | N/A | See “Bit Wise output420 STATUS” on page C104 |
| 2002 | 1 | s370_AO_1 output420_config | UINT16 | AO_1 configuration (active/passive) | 2 | N/A | See “Bit Wise S370 output420 config” on page C104 |
| 2003 | 1 | s370_AO_2 output420_config | UINT16 | AO_2 configuration (active/passive) | 2 | N/A | See “Bit Wise S370 output420 config” on page C104 |
| 2004 | 1 | s370_AO_3 output420_config | UINT16 | AO_3 configuration (active/passive) | 2 | N/A | See “Bit Wise S370 output420 config” on page C104 |
| 2005 | 1 | s370_AO_4 output420_config | UINT16 | AO_4 configuration (active/passive) | 2 | N/A | See “Bit Wise S370 output420 config” on page C104 |

| Start Address | Length | IPC Value Name | Value Type | Description | Bytes | Physical Units | Value Range |
|---|---|---|---|---|---|---|---|
| 2006 | 1 | instrument_model | UINT16 | Instrument model i.e: GLA533-NG-WWW-XX-YYY-AL-R-ZZ | 2 | N/A | |
| 2007 | 1 | sw_app_version_major | UINT16 | SW application version (Major,Minor,Patch) | 2 | N/A | |
| 2008 | 1 | sw_app_version_minor | UINT16 | SW application version (Major,Minor,Patch) | 2 | N/A | |
| 2009 | 1 | sw_app_version_patch | UINT16 | SW application version (Major,Minor,Patch) | 2 | N/A | |
| 2010 | 1 | workspace_version_major | UINT16 | Workspace version (Major,Minor,Patch) | 2 | N/A | |
| 2011 | 1 | workspace_version_minor | UINT16 | Workspace version (Major,Minor,Patch) | 2 | N/A | |
| 2012 | 1 | workspace_version_patch | UINT16 | Workspace version (Major,Minor,Patch) | 2 | N/A | |
| 2013 | 2 | Gas Configuration | UINT16 | RESERVED for future use | 2 | N/A | |
| | | | | | | | |
| TOTAL (address space of 16 bits) | 296 | | | TOTAL (Bytes) | 590 | | " " |

# Description Details

## UnitID

| | |
|---|---|
| 1 | NoUnits |
| 2 | C |
| 3 | F |
| 4 | K |
| 5 | W |
| 6 | mW |
| 7 | kW |
| 8 | cm-1 |
| 9 | micron |
| 11 | ppmv |
| 12 | %vol |
| 13 | mg/m3 |
| 20 | g |
| 21 | Volts |
| 22 | hPa |
| 23 | m |
| 24 | A |
| 25 | s |
| 26 | mV |
| 27 | kV |

## WIC States

| | |
|---|---|
| **Low byte** | |
| 0 | disabled (no correction in case of incorrect fit diagnostic) |
| 1 | warmup (instrument startup procedure/stabilization) |
| 2 | autotune (automated spectral alignment in progress) |
| 3 | operation (normal operation measurement mode) |
| **High byte** | |
| 256 | bad_fit |
| 512 | req_auto_tune |

## Bitfield PROCESS

| |
|---|
| PROCESS_NO_ERROR = 0x00 |
| PROCESS_NOTIFICATION = 0x20 |
| PROCESS_WARNING = 0x40 |
| PROCESS_ALARM = 0x80 |

## Bitfield NAMUR

| |
|---|
| NAMUR_NO_ERROR = 0x00 |
| NAMUR_FAILURE = 0x01 |
| NAMUR_FUNCTION_CHECK = 0x02 |
| NAMUR_OUT_OF_SPEC = 0x04 |
| NAMUR_MAINTENANCE = 0x08 |

## Bitfield QUALITY

| |
|---|
| QUALITY_GOOD=0x00000000U |
| QUALITY_UNCERTAIN=0x00100000U |
| QUALITY_UNCERTAIN_SENSOR_NOT_ACCURATE=0x00380000U (trending) |

## Acquisition Error Registry

| |
|---|
| const uint32_t  acquisition = 0x0001 |
| const uint32_t  getFeedback = 0x0002 |
| const uint32_t getThermistor = 0x0004 |
| const uint32_t readOBoxSensors = 0x0008 |
| const uint32_t readEBoxSensors = 0x0010 |
| const uint32_t getPcbTemperature[3] = {laser0 = 0x0020  laser1 = 0x0040  spare = 0x0080} |
| const uint32_t getTecTemperature[3] = {laser0 = 0x0100  laser1 = 0x0200  spare = 0x0400} |
| const uint32_t getTecSpTemperature[3] = {laser0 = 0x0800  laser1 = 0x1000  spare = 0x2000} |

## Events Registry

| |
|---|
| static constexpr uint32_t EVENT_CELL_TEMPERATURE_LL = 0x0001; |
| static constexpr uint32_t EVENT_CELL_TEMPERATURE_HH = 0x0002; |
| static constexpr uint32_t EVENT_CELL_PRESSURE_LL = 0x0004; |
| static constexpr uint32_t EVENT_CELL_PRESSURE_HH = 0x0008; |
| static constexpr uint32_t EVENT_OBOX_TEMPERATURE_LL = 0x0010; |
| static constexpr uint32_t EVENT_OBOX_TEMPERATURE_HH = 0x0020; |
| static constexpr uint32_t EVENT_OBOX_PRESSURE_LL = 0x0040; |
| static constexpr uint32_t EVENT_OBOX_PRESSURE_HH = 0x0080; |
| static constexpr uint32_t EVENT_EBOX_INTERLOCK = 0x0100; |
| static constexpr uint32_t EVENT_OBOX_INTERLOCK = 0x0200; |

## Bit Wise c155sx ERROR

| |
|---|
| 0x1=ERROR_EEPROM_DEFAULT_MANUF |
| 0x2=ERROR_EEPROM_DEFAULT_CONFIG |
| 0x4=ERROR_EEPROM_DEFAULT_USER_SPACE |
| 0x8=ERROR_USB_NOT_CONNECTED |
| 0x10=ERROR_ADS124S08_THERM_ERROR |
| 0x20=ERROR_EEPROM_RESET_COUNTER |
| 0x40=ERROR_EEPROM_ERROR |
| 0x80=ERROR_EEPROM_LASER_COUNTER_UPDATE |

## Bit Wise c155sx STATUS

| |
|---|
| 0x1=STATUS_LASER_ILOCK |
| 0x2=STATUS_MOSFET_CLAMP |
| 0x4=STATUS_I_SOURCE_ENABLE |
| 0x8=STATUS_TEC_CTRL_ON |
| 0x10=STATUS_TEC_CTRL_LOCK |
| 0x100=STATUS_SLOT_ID0 |
| 0x200=STATUS_SLOT_ID1 |
| 0x400=STATUS_SLOT_ID2 |
| 0x10000=STATUS_LASER_HS_ID1 |
| 0x20000=STATUS_LASER_HS_ID2 |
| 0x40000=STATUS_LASER_HS_ID3 |
| 0x80000=STATUS_LASER_HS_ID4 |
| 0x80=ERROR_EEPROM_LASER_COUNTER_UPDATE |

## Bit Wise s350 ERROR

| |
|---|
| 0x1=ERROR_EEPROM_DEFAULT_MANUF |
| 0x2=ERROR_EEPROM_DEFAULT_CONFIG |
| 0x4=ERROR_EEPROM_DEFAULT_USER_SPACE |
| 0x8=ERROR_USB_NOT_CONNECTED |
| 0x10=ERROR_ADS124S08_THERM_ERROR |
| 0x20=ERROR_ADS124S08_PRESSURE_ERROR |
| 0x40=ERROR_PRESSURE_READ_OVERRUN_ERROR |
| 0x80=ERROR_EEPROM_ERROR |

## Bit Wise s350 STATUS

| |
|---|
| 0xFF: board revision 0=A, 1=B, 2=C, ..., |
| 0x10000=STATUS_LASER_0_RESET |
| 0x20000=STATUS_LASER_1_RESET |
| 0x40000=STATUS_LASER_2_RESET |
| 0x80000=STATUS_LASER_BOOT |
| 0x100000=STATUS_CLIENT_BOOT |
| 0x200000=STATUS_BCKPL_SPARE_4 |
| 0x400000=STATUS_BCKPL_SPARE_5 |

## Bit Wise s370 ERROR

| |
|---|
| 0x01=ERROR_EEPROM_DEFAULT_MANUF |
| 0x02=ERROR_EEPROM_DEFAULT_MANUFCOM_CONFIG |
| 0x04=ERROR_EEPROM_DEFAULT_MANUFPOWER_CONFIG |
| 0x08=ERROR_EEPROM_DEFAULT_USER_SPACE |
| 0x10=ERROR_USB_NOT_CONNECTED |
| 0x20=ERROR_UARTBRIDGE1_RXOVERFLOW |
| 0x40=ERROR_UARTBRIDGE2_RXOVERFLOW |
| 0x80=ERROR_EEPROM_ERROR |

## Bit Wise output420 STATUS

| |
|---|
| AD5421 fault register (table 19) |
| 0x00FF Vloop/Temperature value |
| 0x0100=Vloop 12V |
| 0x0200=Vloop 6V |
| 0x0400=Temp 100C |
| 0x0800=Temp 140C |
| 0x1000=Iloop under |
| 0x2000=Iloop over |
| 0x4000=PEC |
| 0x8000=SPI |

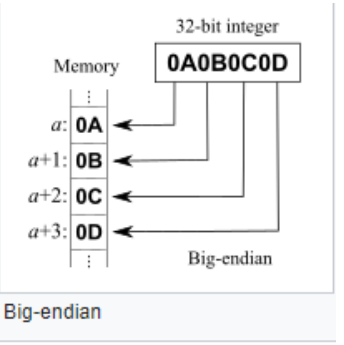
## Bit Wise S370 output420 config

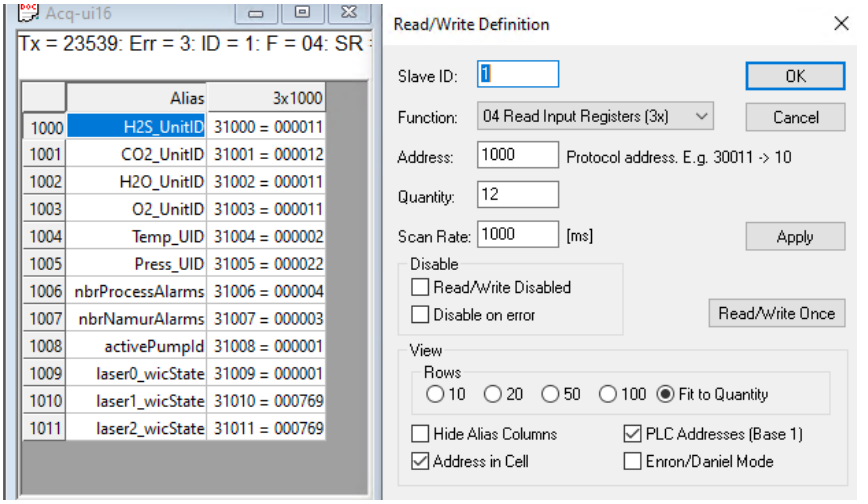
| |
|---|
| General config for 4-20ma, bit wise : |
| 0x1=4-20ma output in active mode (otherwise passive mode) |

## S370 serial config

| |
|---|
| 0=Unset |
| 1=RS232 |
| 2=RS485 full |
| 3=RS485 full term |
| 4=RS485 full RxTx term |
| 5=RS485 half |
| 6=RS485 half term |

# TCP/IP Modbus parameters details

| | |
|---|---|
| **Port** | 502 |
| **Slave address** | 1 |
| **Default Endianness** | Big Endian<br>  <br><br>Big-endian |
| **Modbus Register Type** | Input Register (read-only) |
| | Standard offset 30000 |
| | Function FC=04 to read registers |



APPENDIX D

# Calculating Zero Offsets and Span Gains

**NOTICE**

**DO NOT** modify offsets and gains unless recommended by ABB after-sales service or engineering departments.

Zero offsets and span gains are factory-calibrated on a reference cylinder to optimize analyzer accuracy.

To adjust offsets and span gains, you must be logged in as an administrator

## Obtaining Calculation Values

To obtain the correct values for span gains:

1. In Sensi+, run a pure $CH_4$ reference gas with a known contaminant concentration.
2. After stabilization, note the value read by the analyzer as value **C1reading**.
   This value will be compared to a reference concentration defined on certificate **C1ref**.

To obtain the correct values for offsets:

1. In Sensi+, run a pure $CH_4$ reference gas *without* contaminant.
2. After stabilization, note the value read by the analyzer as value **C2reading**.

**NOTE:** In most cases, moisture will always be present, even in a certified dry gas. Before changing $H_2O$ offset it is important to confirm $H_2O$ concentration in the zero reference cylinder.

## Calculating Gain Values

The formula to calculate a gain value is: **Span gain = (C1ref – C2ref)/(C1reading – C2reading)**

where:

- **C1ref:** reference concentration from cylinder 1 certificate
- **C1reading:** concentration from cylinder 1 measured with Sensi+
- **C2ref:** reference concentration from cylinder 2 certificate
- **C2reading:** concentration from cylinder 2 measured with Sensi+

## Calculating Offset Values

The formula to calculate offsets is : **Offset = C2ref – (C2reading × Span gain)**

where:

- **C2ref:** Reference concentration from cylinder 2 certificate
- **C2reading:** concentration from cylinder 2 measured with Sensi+

**NOTE:** If offsets are not used, set **C2ref** and **C2reading** at 0

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APPENDIX E

# Technical Specifications

The following pages indicate the Sensi+ gas analyzer technical specifications.

**NOTICE**

While the initial (cold start) accuracy of the sensor is likely to be within specifications, a settling period of approximately 12 hours is strongly recommended to allow electronic components to fully warm up and the internal temperature to stabilize.

## Measurement Specifications

| | $H_2S$ | $H_2O$ | $CO_2$ |
|---|---|---|---|
| Linear range[1] | 0–100 ppvm | 0–500 ppvm | 0–40% |
| Repeatability[1] | ±0.1 ppm<br>or ±1% of reading | ±1 ppm<br>or ±1% of reading | ±100 ppm<br>or ±1% of reading |
| Accuracy[1] | ±0.2 ppm<br>or ±2% of reading | ±2 ppm<br>or ±2% of reading | ±300 ppm<br>or ±2% of reading |
| Minimum detectable range[1] | 0.2 ppm | 2 ppm | 150 ppm |
| Measurement update time | <2 s | <2 s | <2 s |
| Rise (fall) time (T10–90)[1] | <10 s | <35 s | <10 s |
| Trending range[2] | 100-10,000 ppmv | 0–98% RH | 0–100% |

## Electrical Specifications

| | |
|---|---|
| **Voltage input** | 10.5 to 30.0 V DC |
| **Overvoltage category** | 1 |
| **Electrical installation category** | 1 |
| **Maximum power consumption** | 50.0 W |
| **Maximum current** | 10.0 A |

1 As per IEC 61207 definitions

2 For safe operation, the maximum trending level shall not be exceeded. For operation at high levels, contact ABB.

# Environmental Specifications

| | |
|---|---|
| **Operating temperature** | –14 °C to 55 °C (7 °F to 131 °F) (cold range can be extended when installation is using heated shelter/cabinet) |
| **Survival temperature** | –18 °C to 60 °C (0 °F to 140 °F) |
| **Shipping/storage temperature** | –30 °C to 60 °C (–22 °F to 140 °F) |
| **Operating ambient humidity** | 5% to 95% RH, non-condensing (applicable to internal parts only) |
| **Installation location** | Indoor/outdoor including wet area (excluding flooding) |
| **Pollution degree** | 2 |
| **Operating altitude (max.)** | 2000 m (6562 ft) |

# Mechanical Specifications

| | |
|---|---|
| **Overall dimensions (L × W ×H)** | 525 × 385 × 364 mm (20.7 × 15.6 × 14.3 in)<br>(L is 654 mm [25.7 in] with optional Wi-Fi antenna) |
| **Weight** | 50.0 kg (110 lb) |
| **Interface to electronics** | 1″ NPT or M32, female threads (as selected on order) |
| **Process inlet pressure** | 35.0 – 48.0 kPa gauge (5.0 – 7.5 psig) |
| **Sample flow rate** | 0.4 SLPM (0.014 scfm) |
| **Enclosure** | IP66/NEMA 4X<br>Explosion-proof<br>Flameproof<br>Dual seal with annunciation |

# Laser

| | |
|---|---|
| **Type** | DFB laser diode |
| **Output** | 50 mW max. |
| **Class** | 1 |

# Communication

| | |
|---|---|
| **Digital interfaces (internal)** | • 2 × RJ45 1000Base-T Ethernet ports<br>• 2 × USB ports |
| **Digital interfaces (external)** | • RJ45 1000Base-T Ethernet port<br>• USB port |
| **Protocols** | Modbus TCP/IP over Ethernet |
| **Analog interfaces** | 4 isolated analog 4–20 mA outputs |

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