USER GUIDE
Sensi+
GLA533-NG Gas Analyzer
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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.

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**

- 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.

**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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- Information about your product is also available on the product page: https://bit.ly/3CHoNkE
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
Connecting to Sensi+

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-xxxxxxxxxx).

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]).\(^2\)

![Analyzer Address in the Web Browser](image)

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.
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 your Web page automatically logs you out.
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 linearly 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

![Login dialog box]

Configuring Sensi+  11
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.

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).

**NOTE:** You can also click the circled « to synchronize 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**.

   ![Configuring Sensi+ general parameters](image)

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+ (H₂S, CO₂, and H₂O) can be displayed with one of the following measurement units: ppmv, %vol, mg/ m³ or lbs/ mmAcf.

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.

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.

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:

![Illustration of the Various Components of Gas Process Parameters](image)

**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 CO₂ 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).
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 H₂S in Figure 20).

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 CO₂ 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 H₂S contaminant High High alarm is raised. For more information, see “Changing the H₂S High High Alarm Delay” on page 22. There is no delay for the other contaminants.
Enter the appropriate values in the **High Alarm Threshold** and **High High Alarm Threshold** text fields.

**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.

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 H₂S High High Alarm Delay

The H₂S high high alarm delay is the delay between the moment the H₂S 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+ H₂S High High alarm delay](image)

2. In the **H₂S 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](image)

---

Configuring Sensi+ 23
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.

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

<table>
<thead>
<tr>
<th>Connector</th>
<th>State Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D01</td>
<td>H₂S High High Alarm</td>
</tr>
<tr>
<td>D02</td>
<td>H₂S Failed</td>
</tr>
<tr>
<td>D03</td>
<td>CO₂ High High Alarm</td>
</tr>
<tr>
<td>D04</td>
<td>CO₂ Failed</td>
</tr>
<tr>
<td>D05</td>
<td>H₂O High High Alarm</td>
</tr>
<tr>
<td>D06</td>
<td>H₂O Failed</td>
</tr>
<tr>
<td>D07</td>
<td>Reserved</td>
</tr>
<tr>
<td>D08</td>
<td>Reserved</td>
</tr>
<tr>
<td>A01</td>
<td>H₂S</td>
</tr>
<tr>
<td>A02</td>
<td>CO₂</td>
</tr>
<tr>
<td>A03</td>
<td>H₂O</td>
</tr>
<tr>
<td>A04</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

**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).
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.

![Creating a user profile](image)

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

<table>
<thead>
<tr>
<th>Access Right</th>
<th>Operator</th>
<th>Maintenance</th>
<th>Administrator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurements panel</td>
<td>No restrictions</td>
<td>No restrictions</td>
<td>No restrictions</td>
</tr>
<tr>
<td>Alarms and Events panels</td>
<td>Export, Filter</td>
<td>Acknowledge, annotate, export, filter</td>
<td>Acknowledge, annotate, export, filter</td>
</tr>
<tr>
<td>Configuration panel</td>
<td>View</td>
<td>View and modify</td>
<td>View and modify</td>
</tr>
<tr>
<td>Reports panel</td>
<td>No restrictions</td>
<td>No restrictions</td>
<td>No restrictions</td>
</tr>
<tr>
<td>Users panel</td>
<td>Not visible</td>
<td>Not visible</td>
<td>View and modify</td>
</tr>
<tr>
<td>Maintenance panel</td>
<td>View analyzer local display</td>
<td>• View analyzer local display • View and modify Validation panel • View and modify Advanced panel • View and modify Service panel</td>
<td>• View analyzer local display • View and modify Validation panel • View and modify Analyzer panel • View and modify Advanced panel • View and modify Service panel</td>
</tr>
<tr>
<td>Help panel</td>
<td>No restrictions</td>
<td>No restrictions</td>
<td>No restrictions</td>
</tr>
</tbody>
</table>

- **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.

   ![Editing a user profile](image)

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.
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

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Icon</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Alarm (red)</td>
<td>![High Alarm Icon]</td>
<td>Indicates High High alarms. Current measured value exceeds the specified alarm range.</td>
</tr>
<tr>
<td>Warning Alarm (amber)</td>
<td>![Warning Alarm Icon]</td>
<td>Indicates High alarms. Current measured value exceeds the specified warning range.</td>
</tr>
<tr>
<td>Information (cyan)</td>
<td>![Information Icon]</td>
<td>Notification Only occurs on uncertain gas quality.</td>
</tr>
<tr>
<td>None (green)</td>
<td>![None Icon]</td>
<td>No high alarm, warning or information related to the process.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Icon</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| Failure                 | ![x]  | HIGH SEVERITY
Analyzer has an invalid signal due to hardware malfunction (temperature/pressure sensor, electronic board, pump, variable valve, pressure leak, processing error, etc.) |
| Out of specification   | ![?] | MEDIUM SEVERITY
Analyzer is operating beyond its setup, permissible range or specification (temperature or pressure range, etc.). |
| Check function          | ![⚠️] | LOW SEVERITY
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
Analyzer has a valid signal, but function may drop or cease to function soon, such as for preventive pump replacement notifications, preventive laser strength or cell cleanliness notification. |
| Diagnosis active        | ![✔️] | NO ERROR
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](image)

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.

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](image)

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](image)

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 been 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](image)

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](image)

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 been 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](image)

   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 been 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.

   ![Status Filter](image)

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.

   ![Filters Panel by Status](image)
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>
<thead>
<tr>
<th>Priority</th>
<th>Severity Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td>0 to 99</td>
</tr>
<tr>
<td>Notification</td>
<td>100 to 399</td>
</tr>
<tr>
<td>Warning</td>
<td>400 to 699</td>
</tr>
<tr>
<td>Alarm</td>
<td>700 to 999</td>
</tr>
</tbody>
</table>

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.

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.

   ![Filters Panel by Priority](image)

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.

![Filters Panel - Only Process Alarms](image)

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.

![Type Filter](image)

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.

![Filters Panel by Type](image)

2. Under **Process** and/or **NAMUR**, uncheck the boxes next to the alarm types that you want hide in the **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](image)

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](image)

   **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).
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.

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](image)

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](image)

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](image)

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](image)

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](image)

2. Click the checkmark at the top of the column (see Figure 55). As soon as you 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.

   ![Status Filter](image)

   *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.

   ![Filters Panel by Status](image)

   *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>
<thead>
<tr>
<th>Table 6 Event Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Priority</strong></td>
</tr>
<tr>
<td>Information</td>
</tr>
<tr>
<td>Notification</td>
</tr>
<tr>
<td>Warning</td>
</tr>
<tr>
<td>Alarm</td>
</tr>
</tbody>
</table>

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.

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](image)

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](image)

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.
Page intentionally left blank
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).
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.

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\(^1\) 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](image)

3. Click **Download latest**. A **Save As** dialog box appears 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.
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

<table>
<thead>
<tr>
<th>Power</th>
<th>Process</th>
<th>NAMUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid YELLOW</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>(power on;</td>
<td>(during boot and</td>
<td>(during boot</td>
</tr>
<tr>
<td>during software</td>
<td>warmup process;</td>
<td>process)</td>
</tr>
<tr>
<td>boot process;</td>
<td>during software</td>
<td></td>
</tr>
<tr>
<td>during software</td>
<td>update with USB key)</td>
<td></td>
</tr>
<tr>
<td>Solid GREEN</td>
<td>OFF</td>
<td>Blinking GREEN</td>
</tr>
<tr>
<td>(when powered</td>
<td>(during boot and</td>
<td>(during warmup;</td>
</tr>
<tr>
<td>up; software</td>
<td>warmup process)</td>
<td>normal initialization</td>
</tr>
<tr>
<td>booted)</td>
<td></td>
<td>phase)</td>
</tr>
<tr>
<td>Solid GREEN</td>
<td>Solid GREEN</td>
<td>Solid GREEN</td>
</tr>
<tr>
<td>(when powered</td>
<td>(when process values are</td>
<td>(when powered up;</td>
</tr>
<tr>
<td>up; software</td>
<td>valid; software booted,</td>
<td>software booted, no</td>
</tr>
<tr>
<td>booted)</td>
<td>no process error)</td>
<td>NAMUR error)</td>
</tr>
</tbody>
</table>
Resetting the Analyzer After Triggered Digital Output

The method to reset the analyzer once a digital output has been 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 been 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 been 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](image)

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](image)

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 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](image)

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.

   ![Analyzer Local Display in the Sensi+ Application](image)

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

![Figure 75](#) Extracting files to the USB storage device

3. Copy the following files from the **SCRIPTS_ARCHIVE** folder 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.xx.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.
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
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:

<table>
<thead>
<tr>
<th>Instrument State</th>
<th>Healthy (energized)</th>
<th>Failed (open)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tariff High Limit Reached</td>
<td>Tariff limit exceeded (pipe shut off)</td>
<td>Normal level (pipe open)</td>
</tr>
</tbody>
</table>

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)
Acquisition blocks are in sync with the data acquisition (rate every ~1.5s).
Health Monitoring blocks are not necessarily 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

<table>
<thead>
<tr>
<th>Start Address</th>
<th>Length</th>
<th>IPC Value Name</th>
<th>Value Type</th>
<th>Description</th>
<th>Bytes</th>
<th>Physical Units</th>
<th>Value Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>30000</td>
<td></td>
<td>Input registers Modbus standard offset</td>
<td></td>
<td>Function FC=04 Read input registers (3×) (read-only)</td>
<td>2</td>
<td>ppmv</td>
<td>See “TCP/IP Modbus parameters details” on page C106</td>
</tr>
<tr>
<td>1000</td>
<td>1</td>
<td>H2S_UnitID</td>
<td>UINT16</td>
<td>UnitID selected by user (or default configuration)</td>
<td>2</td>
<td>ppmv (default)</td>
<td>See “UnitID” on page C101</td>
</tr>
<tr>
<td>1001</td>
<td>1</td>
<td>CO2_UnitID</td>
<td>UINT16</td>
<td>UnitID selected by user (or default configuration)</td>
<td>2</td>
<td>ppmv (default)</td>
<td>See “UnitID” on page C101</td>
</tr>
<tr>
<td>1002</td>
<td>1</td>
<td>H2O_UnitID</td>
<td>UINT16</td>
<td>UnitID selected by user (or default configuration)</td>
<td>2</td>
<td>ppmv (default)</td>
<td>See “UnitID” on page C101</td>
</tr>
<tr>
<td>1003</td>
<td>1</td>
<td>spare_UnitID</td>
<td>UINT16</td>
<td>UnitID selected by user (or default configuration)</td>
<td>2</td>
<td>ppmv (default)</td>
<td>See “UnitID” on page C101</td>
</tr>
<tr>
<td>1004</td>
<td>1</td>
<td>temp_UID</td>
<td>UINT16</td>
<td>Temperature UnitID selected by user (or default configuration)</td>
<td>2</td>
<td>C (default)</td>
<td>See “UnitID” on page C101</td>
</tr>
<tr>
<td>1005</td>
<td>1</td>
<td>press_UID</td>
<td>UINT16</td>
<td>Pressure UnitID selected by user (or default configuration)</td>
<td>2</td>
<td>hPa (default)</td>
<td>See “UnitID” on page C101</td>
</tr>
<tr>
<td>1006</td>
<td>1</td>
<td>nbrProcessAlarms</td>
<td>UINT16</td>
<td>Number of current Process alarms</td>
<td>2</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>1007</td>
<td>1</td>
<td>nbrNamurAlarms</td>
<td>UINT16</td>
<td>Number of current NAMUR alarms</td>
<td>2</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Start Address</td>
<td>Length</td>
<td>IPC Value Name</td>
<td>Value Type</td>
<td>Description</td>
<td>Bytes</td>
<td>Physical Units</td>
<td>Value Range</td>
</tr>
<tr>
<td>---------------</td>
<td>--------</td>
<td>------------------------</td>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------</td>
<td>---------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>1008</td>
<td>1</td>
<td>activePumpId</td>
<td>UINT16</td>
<td>Current active pump</td>
<td>2</td>
<td>N/A</td>
<td>0 (OFF),1,2,3</td>
</tr>
<tr>
<td>1009</td>
<td>1</td>
<td>laser0_wicState</td>
<td>UINT16</td>
<td>Current internal dataprocessing state and flags (fit status, autotune request)</td>
<td>2</td>
<td>N/A</td>
<td>See “WIC States” on page C101</td>
</tr>
<tr>
<td>1010</td>
<td>1</td>
<td>laser1_wicState</td>
<td>UINT16</td>
<td>Current internal dataprocessing state and flags (fit status, autotune request)</td>
<td>2</td>
<td>N/A</td>
<td>See “WIC States” on page C101</td>
</tr>
<tr>
<td>1011</td>
<td>1</td>
<td>spare_wicState</td>
<td>UINT16</td>
<td>Current internal dataprocessing state and flags (fit status, autotune request)</td>
<td>2</td>
<td>N/A</td>
<td>See “WIC States” on page C101</td>
</tr>
<tr>
<td>1100</td>
<td>Acquisition UINT32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>2</td>
<td>H2S_Status</td>
<td>UINT32</td>
<td>Gas' Process Alarms and Quality</td>
<td>4</td>
<td>N/A</td>
<td>See “Bitfield PROCESS” on page C101 and “Bitfield NAMUR” on page C102</td>
</tr>
<tr>
<td>1102</td>
<td>2</td>
<td>CO2_Status</td>
<td>UINT32</td>
<td>Gas' Process Alarms and Quality</td>
<td>4</td>
<td>N/A</td>
<td>See “Bitfield PROCESS” on page C101 and “Bitfield NAMUR” on page C102</td>
</tr>
<tr>
<td>1104</td>
<td>2</td>
<td>H2O_Status</td>
<td>UINT32</td>
<td>Gas' Process Alarms and Quality</td>
<td>4</td>
<td>N/A</td>
<td>See “Bitfield PROCESS” on page C101 and “Bitfield NAMUR” on page C102</td>
</tr>
<tr>
<td>1106</td>
<td>2</td>
<td>Spare_Status</td>
<td>UINT32</td>
<td>Gas' Process Alarms and Quality</td>
<td>4</td>
<td>N/A</td>
<td>See “Bitfield PROCESS” on page C101 and “Bitfield NAMUR” on page C102</td>
</tr>
<tr>
<td>1108</td>
<td>2</td>
<td>processStates</td>
<td>UINT32</td>
<td>Global Process Status Corresponding icon displayed on local HMI (&quot;process&quot; - top right) (Only most severe alarms)</td>
<td>4</td>
<td>N/A</td>
<td>See “Bitfield PROCESS” on page C101</td>
</tr>
<tr>
<td>Start Address</td>
<td>Length</td>
<td>IPC Value Name</td>
<td>Value Type</td>
<td>Description</td>
<td>Bytes</td>
<td>Physical Units</td>
<td>Value Range</td>
</tr>
<tr>
<td>--------------</td>
<td>--------</td>
<td>-------------------</td>
<td>------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>---------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>1110</td>
<td>2</td>
<td>namurStates</td>
<td>UINT32</td>
<td>Global NAMUR Status Corresponding icon displayed on local HMI (&quot;namur&quot; - top right) (Only most severe alarms)</td>
<td>4</td>
<td>N/A</td>
<td>See “Bitfield NAMUR” on page C102</td>
</tr>
<tr>
<td>1112</td>
<td>2</td>
<td>timestamp_System</td>
<td>UINT32</td>
<td>Monotonic time (always increased since boot time, delta time)</td>
<td>4</td>
<td>s</td>
<td>Monotonic time relative to last system boot</td>
</tr>
<tr>
<td>1114</td>
<td>2</td>
<td>timestamp.UTC</td>
<td>UINT32</td>
<td>Clock time (representative of instrument time)</td>
<td>4</td>
<td>s</td>
<td>Number of seconds since 1970-01-01 (epoch time)</td>
</tr>
<tr>
<td>1116</td>
<td>2</td>
<td>StreamId</td>
<td>UINT32</td>
<td>0 = Sampling 8 = Validation</td>
<td>4</td>
<td>N/A</td>
<td>[0 to 8]</td>
</tr>
<tr>
<td>1118</td>
<td>2</td>
<td>dataQuality</td>
<td>UINT32</td>
<td>Reserved for future use</td>
<td>4</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>1120</td>
<td>2</td>
<td>processAlarmFlag</td>
<td>UINT32</td>
<td>All active process flags</td>
<td>4</td>
<td>N/A</td>
<td>All gases process status OR'ed See “Bitfield PROCESS” on page C101</td>
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<td>Errors when reading hardware devices for auxiliary measurements (temperature sensors, pressure sensors, etc)</td>
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<td>See “Acquisition Error Registry” on page C102</td>
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<td>Specific NAMUR alarms detected on one or more laser that impact measurement quality. Sets all its associated gas(es) to uncertain quality.</td>
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<td>Bitfield: 0 = ok 1 = first laser 2 = second laser 4 = third laser</td>
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**1500 Health Monitoring UINT16**

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### 2000 Instrument Configuration

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</tr>
<tr>
<td>1</td>
<td>warmup (instrument startup procedure/stabilization)</td>
</tr>
<tr>
<td>2</td>
<td>autotune (automated spectral alignment in progress)</td>
</tr>
<tr>
<td>3</td>
<td>operation (normal operation measurement mode)</td>
</tr>
</tbody>
</table>

#### High byte

<table>
<thead>
<tr>
<th>High byte</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>256</td>
<td>bad_fit</td>
</tr>
<tr>
<td>512</td>
<td>req_auto_tune</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x1</td>
<td>ERROR_EEPROM_DEFAULT_MANUF</td>
</tr>
<tr>
<td>0x2</td>
<td>ERROR_EEPROM_DEFAULT_CONFIG</td>
</tr>
<tr>
<td>0x4</td>
<td>ERROR_EEPROM_DEFAULT_USER_SPACE</td>
</tr>
<tr>
<td>0x8</td>
<td>ERROR_USB_NOT_CONNECTED</td>
</tr>
<tr>
<td>0x10</td>
<td>ERROR_ADS124S08_THERM_ERROR</td>
</tr>
<tr>
<td>0x20</td>
<td>ERROR_EEPROM_RESET_COUNTER</td>
</tr>
<tr>
<td>0x40</td>
<td>ERROR_EEPROM_ERROR</td>
</tr>
<tr>
<td>0x80</td>
<td>ERROR_EEPROM_LASER_COUNTER_UPDATE</td>
</tr>
</tbody>
</table>

### Bit Wise c155sx STATUS

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x1</td>
<td>STATUS_LASER_ILOCK</td>
</tr>
<tr>
<td>0x2</td>
<td>STATUS_MOSFET_CLAMP</td>
</tr>
<tr>
<td>0x4</td>
<td>STATUS_I_SOURCE_ENABLE</td>
</tr>
<tr>
<td>0x8</td>
<td>STATUS_TEC_CTRL_ON</td>
</tr>
<tr>
<td>0x10</td>
<td>STATUS_TEC_CTRL_LOCK</td>
</tr>
<tr>
<td>0x100</td>
<td>STATUS_SLOT_ID0</td>
</tr>
<tr>
<td>0x200</td>
<td>STATUS_SLOT_ID1</td>
</tr>
<tr>
<td>0x400</td>
<td>STATUS_SLOT_ID2</td>
</tr>
<tr>
<td>0x10000</td>
<td>STATUS_LASER_HS_ID1</td>
</tr>
<tr>
<td>0x20000</td>
<td>STATUS_LASER_HS_ID2</td>
</tr>
<tr>
<td>0x40000</td>
<td>STATUS_LASER_HS_ID3</td>
</tr>
<tr>
<td>0x80000</td>
<td>STATUS_LASER_HS_ID4</td>
</tr>
<tr>
<td>0x80</td>
<td>ERROR_EEPROM_LASER_COUNTER_UPDATE</td>
</tr>
</tbody>
</table>

### Bit Wise s350 ERROR

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x1</td>
<td>ERROR_EEPROM_DEFAULT_MANUF</td>
</tr>
<tr>
<td>0x2</td>
<td>ERROR_EEPROM_DEFAULT_CONFIG</td>
</tr>
<tr>
<td>0x4</td>
<td>ERROR_EEPROM_DEFAULT_USER_SPACE</td>
</tr>
<tr>
<td>0x8</td>
<td>ERROR_USB_NOT_CONNECTED</td>
</tr>
<tr>
<td>0x10</td>
<td>ERROR_ADS124S08_THERM_ERROR</td>
</tr>
<tr>
<td>0x20</td>
<td>ERROR_ADS124S08_PRESSURE_ERROR</td>
</tr>
<tr>
<td>0x40</td>
<td>ERROR_PRESSURE_READ_OVERRUN_ERROR</td>
</tr>
<tr>
<td>0x80</td>
<td>ERROR_EEPROM_ERROR</td>
</tr>
</tbody>
</table>
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_MANUFCONFIG
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)
<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Unset</td>
</tr>
<tr>
<td>1</td>
<td>RS232</td>
</tr>
<tr>
<td>2</td>
<td>RS485 full</td>
</tr>
<tr>
<td>3</td>
<td>RS485 full term</td>
</tr>
<tr>
<td>4</td>
<td>RS485 full RxTx term</td>
</tr>
<tr>
<td>5</td>
<td>RS485 half</td>
</tr>
<tr>
<td>6</td>
<td>RS485 half term</td>
</tr>
</tbody>
</table>
### TCP/IP Modbus parameters details

<table>
<thead>
<tr>
<th>Port</th>
<th>502</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slave address</td>
<td>1</td>
</tr>
<tr>
<td>Default Endianness</td>
<td>Big Endian</td>
</tr>
</tbody>
</table>

#### Modbus Register Type
- **Input Register (read-only)**
- **Standard offset 30000**
- **Function FC=04 to read registers**

---

![Modbus Register Diagram](image)
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 CH₄ reference gas with a known contaminant concentration.
2. After stabilization, note the value read by the analyzer as value \(C_1\text{reading}\).

This value will be compared to a reference concentration defined on certificate \(C_1\text{ref}\).

To obtain the correct values for offsets:

1. In Sensi+, run a pure CH₄ reference gas **without** contaminant.
2. After stabilization, note the value read by the analyzer as value \(C_2\text{reading}\).

**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:

\[
\text{Span gain} = \frac{(C_1\text{ref} - C_2\text{ref})}{(C_1\text{reading} - C_2\text{reading})}
\]

where:

- \(C_1\text{ref}\): reference concentration from cylinder 1 certificate
- \(C_1\text{reading}\): concentration from cylinder 1 measured with Sensi+
- \(C_2\text{ref}\): reference concentration from cylinder 2 certificate
- \(C_2\text{reading}\): concentration from cylinder 2 measured with Sensi+

### Calculating Offset Values

The formula to calculate offsets is:

\[
\text{Offset} = C_2\text{ref} - (C_2\text{reading} \times \text{Span gain})
\]

where:

- \(C_2\text{ref}\): Reference concentration from cylinder 2 certificate
- \(C_2\text{reading}\): concentration from cylinder 2 measured with Sensi+

**NOTE:** If offsets are not used, set \(C_2\text{ref}\) and \(C_2\text{reading}\) at 0.
## 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

<table>
<thead>
<tr>
<th></th>
<th>H₂S</th>
<th>H₂O</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Linear range</strong>¹</td>
<td>0–100 ppvm</td>
<td>0–500 ppvm</td>
<td>0–40%</td>
</tr>
<tr>
<td><strong>Repeatability</strong>¹</td>
<td>±0.1 ppm or ±1% of reading</td>
<td>±1 ppm or ±1% of reading</td>
<td>±100 ppm or ±1% of reading</td>
</tr>
<tr>
<td><strong>Accuracy</strong>¹</td>
<td>±0.2 ppm or ±2% of reading</td>
<td>±2 ppm or ±2% of reading</td>
<td>±300 ppm or ±2% of reading</td>
</tr>
<tr>
<td><strong>Minimum detectable range</strong>¹</td>
<td>0.2 ppm</td>
<td>2 ppm</td>
<td>150 ppm</td>
</tr>
<tr>
<td><strong>Measurement update time</strong></td>
<td>&lt;2 s</td>
<td>&lt;2 s</td>
<td>&lt;2 s</td>
</tr>
<tr>
<td>**Rise (fall) time (T10–90)**¹</td>
<td>&lt;10 s</td>
<td>&lt;35 s</td>
<td>&lt;10 s</td>
</tr>
<tr>
<td><strong>Trending range</strong>²</td>
<td>100–10,000 ppmv</td>
<td>0–98% RH</td>
<td>0–100%</td>
</tr>
</tbody>
</table>

### Electrical Specifications

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voltage input</strong></td>
<td>10.5 to 30.0 V DC</td>
</tr>
<tr>
<td><strong>Overvoltage category</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Electrical installation category</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Maximum power consumption</strong></td>
<td>50.0 W</td>
</tr>
<tr>
<td><strong>Maximum current</strong></td>
<td>10.0 A</td>
</tr>
</tbody>
</table>

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

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

## Mechanical Specifications

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

## Laser

<table>
<thead>
<tr>
<th>Laser Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>DFB laser diode</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>50 mW max.</td>
</tr>
<tr>
<td><strong>Class</strong></td>
<td>1</td>
</tr>
</tbody>
</table>

## Communication

<table>
<thead>
<tr>
<th>Communication Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Digital interfaces (internal)</strong></td>
<td>2 × RJ45 1000Base-T Ethernet ports</td>
</tr>
<tr>
<td></td>
<td>2 × USB ports</td>
</tr>
<tr>
<td><strong>Digital interfaces (external)</strong></td>
<td>RJ45 1000Base-T Ethernet port</td>
</tr>
<tr>
<td></td>
<td>USB port</td>
</tr>
<tr>
<td><strong>Protocols</strong></td>
<td>Modbus TCP/IP over Ethernet</td>
</tr>
<tr>
<td><strong>Analog interfaces</strong></td>
<td>4 isolated analog 4–20 mA outputs</td>
</tr>
</tbody>
</table>
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