



TELEDYNE
GAS MEASUREMENT INSTRUMENTS
Everywhereyoulook™

User Handbook

Protégé ZM SYSTEM GUIDE





WARNING: ALL INDIVIDUALS WHO, HAVE OR WILL HAVE, RESPONSIBILITY FOR USING, MAINTAINING, OR SERVICING THIS PRODUCT, MUST READ THIS ENTIRE MANUAL CAREFULLY. FAILURE TO USE THIS EQUIPMENT PROPERLY COULD RESULT IN SERIOUS INJURY OR DEATH.

LEGAL STATEMENT

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DESCRIPTION

This User Manual provides information for use only with the Protégé ZM Portable Gas Monitor system (or “the monitor”).

LIABILITY

Every care has been taken in the preparation of this User Manual, but the Company does not accept any responsibility for errors or omissions and their consequences. Information in this user guide is subject to change without notice. This User Manual does not constitute a specification or basis for a contract.

MODIFICATION NOTICES

The Company aims to notify customers of relevant changes in the product operation and maintain this user guide up to date. Due to continuous product improvement, there may be operational differences between the latest product and this user guide.

This User Manual is an important part of the Protégé ZM system, and it should be referred to for the life of the product.

SOFTWARE

Any software supplied must only be used in this product and may not be copied without the written permission of the Company. Reproduction or disassembly of such embodied programs or algorithms is prohibited. Ownership of such software is not transferable, and the Company does not warrant that the operation of the software will be error free or that the software will meet the customer’s requirements.

DISPOSAL ADVICE

Dispose of the monitor carefully and with respect for the environment. If returned, the Company will dispose of the monitor without charge.

AREAS OF USE

Exposure to certain chemicals can result in a loss of sensor sensitivity. Where such environments are known or suspected it is recommended that more frequent response checks are carried out. Chemical compounds that can cause loss of sensitivity include Silicones, Lead, Halogens and Sulphur.

Environmental factors may affect sensor readings. This includes changes in pressure, humidity and temperature. Note that both pressure and humidity changes can also affect the amount of oxygen present in the atmosphere.

Do not use the monitor in a potentially hazardous atmospheres containing greater than 21 % oxygen.

SPECIAL CONDITIONS OF USE

The monitor is designed for use in harsh environments. The monitor is sealed to IP67 and, if not subjected to misuse or malicious damage, will provide many years of reliable service.

The monitor may contain electrochemical sensors. Under conditions of prolonged storage, these sensors should be removed. These sensors contain potentially corrosive liquid and care should be taken when handling or disposing, particularly when a leak is suspected.

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1. General Information



WARNING: READ, UNDERSTAND AND FOLLOW THE ENTIRE CONTENT OF THIS GUIDE PRIOR TO USE. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

This guide describes the steps required to use the Protégé ZM Portable Gas Monitor and optional system products. This document is for gas detection personnel to manage their gas monitoring device. This document contains information on installation, configuration, operation, maintenance and troubleshooting.

This user guide assumes a basic knowledge of gas detection procedures.

1.1. Guide Conventions

The following visual elements are used throughout this guide, where applicable:

Icon	Description
	WARNING: THIS ICON AND TEXT INDICATE A POTENTIALLY HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR INJURY.
	Caution: This icon and text indicate an action or situation, which, if not avoided, could result in damage to the equipment.
	Note: This icon and text designates information of special note to the operator.
	This icon and text indicate the possibility of electrostatic discharge (ESD) in a procedure that requires the reader to take the proper ESD precautions.

1.2. Certifications and Approvals

For the list of approvals for the Protégé ZM monitor, please refer to the [Protégé ZM User Manual](#) (document no. 0087-0047).

The Test Station has the following approvals:

Symbol	Notes
	European Mark of Conformity
	Federal Communications Commission
	UL
	UKCA (UK Conformity Assessed)

The IR Connect has the following approvals:

Symbol	Notes
	European Mark of Conformity

1.3. General Safety Information



WARNING: READ AND FOLLOW THE ENTIRE CONTENT OF THIS GUIDE PRIOR TO USE. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.



WARNING: ALL INDIVIDUALS WHO HAVE OR WILL HAVE RESPONSIBILITY FOR USING OR TESTING THIS PRODUCT MUST READ AND UNDERSTAND THE CONTENTS OF THIS MANUAL. THE PRODUCT WILL PERFORM AS DESIGNED ONLY IF USED AND TESTED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. FAILURE TO FOLLOW MANUFACTURER'S INSTRUCTIONS WILL RENDER THE WARRANTY AND APPROVALS NULL AND VOID. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY ALSO RESULT IN SERIOUS INJURY OR DEATH.

The Company can take no responsibility for use of its equipment if it is not used in accordance with the instructions. If further operational or maintenance details are required but not provided in this guide, contact the Company or their agent. The Company shall not be liable for any incidental or consequential damages in connection with any modifications, errors or omissions in this guide.

All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to assure compliance with documented system data, repairs to components should be performed only by the manufacturer.

Additionally, industry standards, codes, and legislation are subject to change. Updated copies should be obtained by users to ensure the most recently issued regulations, standards and guidelines are available.

All pertinent state, regional, and local safety regulations must be observed when handling and disposing of hazardous material, Toxic (E-Chem Sensors, batteries and other similar items that may fall under the classification of hazardous material.

The Electrical, Electronic and Battery elements of this product must not be disposed of via municipal waste streams; they should be delivered to collection facilities. Information on collection facilities is given by the local authorities or importer's representative. Correct disposal will contribute to recycling of materials and prevent negative consequences for the environment.

For products sold in Europe, the end of life procedures for Battery operated Electronic products must comply with the RoHS Directive 2002/95/EC, the WEEE Directive 2002/96/EC and the Battery Directive 2006/66/EC. These directives dictate how to dispose of the electronic and battery elements of the product after use. For Protégé products sold in the UK only, the Company has provided a collection service. This service can be accessed by contacting Customer Services, who will be happy to assist. Please do not send products back to Teledyne GMI. In other parts of Europe, other systems are in place. Please contact your local provider of Teledyne GMI products for more details.

Only use approved replacement parts.

1.4. Warnings and Cautions – Monitor and Test Station Use and Care



WARNING: THIS EQUIPMENT MUST BE OPERATED AND SERVICED BY QUALIFIED PERSONNEL ONLY. READ AND UNDERSTAND THE GUIDE COMPLETELY BEFORE OPERATING OR SERVICING. QUALIFIED PERSONNEL AS DEFINED ACCORDING TO LOCAL, COUNTY, STATE, FEDERAL AND INDIVIDUAL COMPANY STANDARDS.



WARNING: WHEN IN DOUBT VACATE THE AREA IMMEDIATELY. YOU SHOULD VACATE THE AREA IMMEDIATELY SHOULD THE MONITOR INDICATE A WARNING OR ALARM CONDITION. YOU SHOULD KNOW, UNDERSTAND AND FOLLOW YOUR COMPANY'S SAFETY PROTOCOLS.



WARNING: ENSURE THE ATMOSPHERE IS FREE FROM TOXIC GASES PRIOR TO STARTING ANY OF THE PROCEDURES.



WARNING: WHEN THE PRIMARY MONITOR IS OFF LINE, ENSURE YOU HAVE ANOTHER ONLINE MONITOR TO ACTIVELY DETECT GASES. THE MONITOR MAY BE OFF LINE DUE TO SUCH ACTIVITIES, LIKE BUT NOT LIMITED TO, CALIBRATION, INSTALLATION, MAINTENANCE, TROUBLESHOOTING, CONFIGURATION, WIRING AND OTHER ACTIVITIES.



WARNING: IF THE MONITOR DOES NOT FUNCTION AS DESCRIBED HEREIN, REMOVE FROM SERVICE AND MARK FOR MAINTENANCE. ONLY USE APPROVED REPLACEMENT PARTS WHERE APPLICABLE.



WARNING: ONLY USE THE MONITOR TO MONITOR THE ATMOSPHERE FOR THE GASES AND CONCENTRATIONS FOR WHICH IT IS SET-UP TO DETECT.



WARNING: TO PREVENT IGNITION OF AN EXPLOSIVE ATMOSPHERE, READ AND ADHERE TO THE MANUFACTURER'S LIVE MAINTENANCE PROCEDURES.



WARNING: READ THIS MANUAL FOR INTRINSIC SAFETY PRECAUTIONS. SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY, RESULTING IN SERIOUS INJURY OR DEATH.



WARNING: PERFORM A BUMPTEST EVERY DAY. FAILURE TO PERFORM A DAILY FUNCTIONAL TEST COULD LEAD TO SERIOUS INJURY OR DEATH.



Caution: Monitor will not operate without power applied. Thus, it only detects gases while powered.



Caution: Periodically test for correct operation of the system's alarm events by exposing the monitor to a targeted gas concentration above the high alarm set point.



Caution: Verify the gas inlet ports are free of dirt and debris prior to use.



Caution: Do not expose the monitor to severe mechanical or electrical shock. Always conduct device start-up and bump test procedures after such exposure to verify the monitor's operation and accuracy.



Caution: Improper use of the Test Station may result in personal injury or death. Improper use includes, but not limited to, use without adequate training, or proper ventilation, disregard of the warnings and instructions provided with the product, and failure to inspect the product to be sure it is functioning prior to use.

1.5. Warnings and Cautions – Sensor Use and Care



WARNING: EXTENDED EXPOSURE OF THE DETECTOR TO HIGH CONCENTRATIONS OF TOXIC GASES MAY RESULT IN DEGRADED SENSOR PERFORMANCE. IF AN ALARM OCCURS DUE TO HIGH CONCENTRATION OF TOXIC GASES, EXIT TO A SAFE AREA, BUMP TEST, RECALIBRATE IF NECESSARY OR, IF NEEDED, CALL US.

1.6. Warnings and Cautions – Battery Use and Care



Caution: No attempt should be made to alter or repair the monitor.



Caution: Do not attempt to replace the monitor's battery. It is not replaceable.



Caution: Discard monitor as soon as the battery indicator shows fully discharged battery.

2. Introduction

2.1. Monitor Overview and Optional System Products

The Protégé ZM is a portable clip-on single gas disposable monitor that is operated with a single button and has a 2 year life span. Comes with a non-field replaceable lithium-ion battery, filter and sensor already installed and ready for use.

Gas indication displays via a direct reading backlit LCD, multiple bright LEDs, a loud audible alarm and a vibratory alarm. The monitor includes a downloadable data log for 25 events and records denoting exposures, calibrations, and gas values.

The personal gas detection monitor is designed for monitoring the atmosphere for potentially hazardous levels of gases. Select from 3 types: Hydrogen Sulphide (H₂S), Carbon Monoxide (CO) and Oxygen (O₂) enrichment or depletion. Below table lists their available options.

Item	Hibernate Mode Option	Factory Default Alarm Set Points *
Oxygen (O ₂)	No	Low = 19.5% High = 23.5%
Hydrogen Sulphide (H ₂ S)	Yes	Low = 10ppm High = 15ppm
Carbon Monoxide (CO)	Yes	Low = 35ppm High = 200ppm
Sulfur Dioxide (SO ₂)	Yes	Low = disabled High = 1 ppm
* Customer may change these set points using the IR Connect after delivery. To display the monitor alarm set points, press the button on the front of the monitor. Also, set points may be ordered with custom values from the factory.		



Caution: Use caution when changing alarm set points. Confirm these levels with your company safety officer.



WARNING: DO NOT USE IR COMMUNICATIONS WHEN AN EXPLOSIVE ATMOSPHERE MAY BE PRESENT.

Optional products for the monitor include Test Station and IR Connect:

- The Protégé ZM Test Station is an automated test and calibration station designed for use with Protégé ZM portable gas monitors. This station simplifies the maintenance of gas detectors by conducting critical procedures such as Bump tests, Calibration, Buzzer tests, LED tests, and Log data transfers, all through a one-button operation. It has the capability to test up to four gas monitors in a single session.

- The Protégé IR Connect is available for communication with a single monitor. It allows to quickly configure operating and alarm parameters of the monitor using the Protégé ZM IR Connect Software.

The monitor ships preconfigured and ready for operation using the factory default settings. However, user may to reconfigure some of the parameters based upon the application. See [Configuring the IR Connect Software Parameters](#) section for more details.

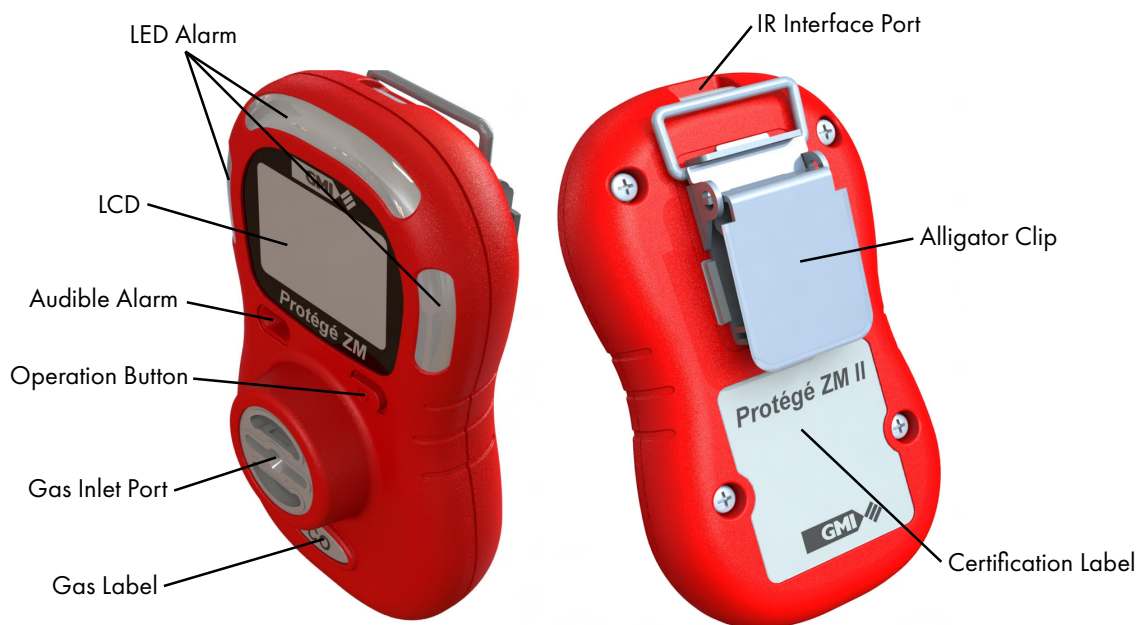


Figure 2-1: Major parts of the monitor

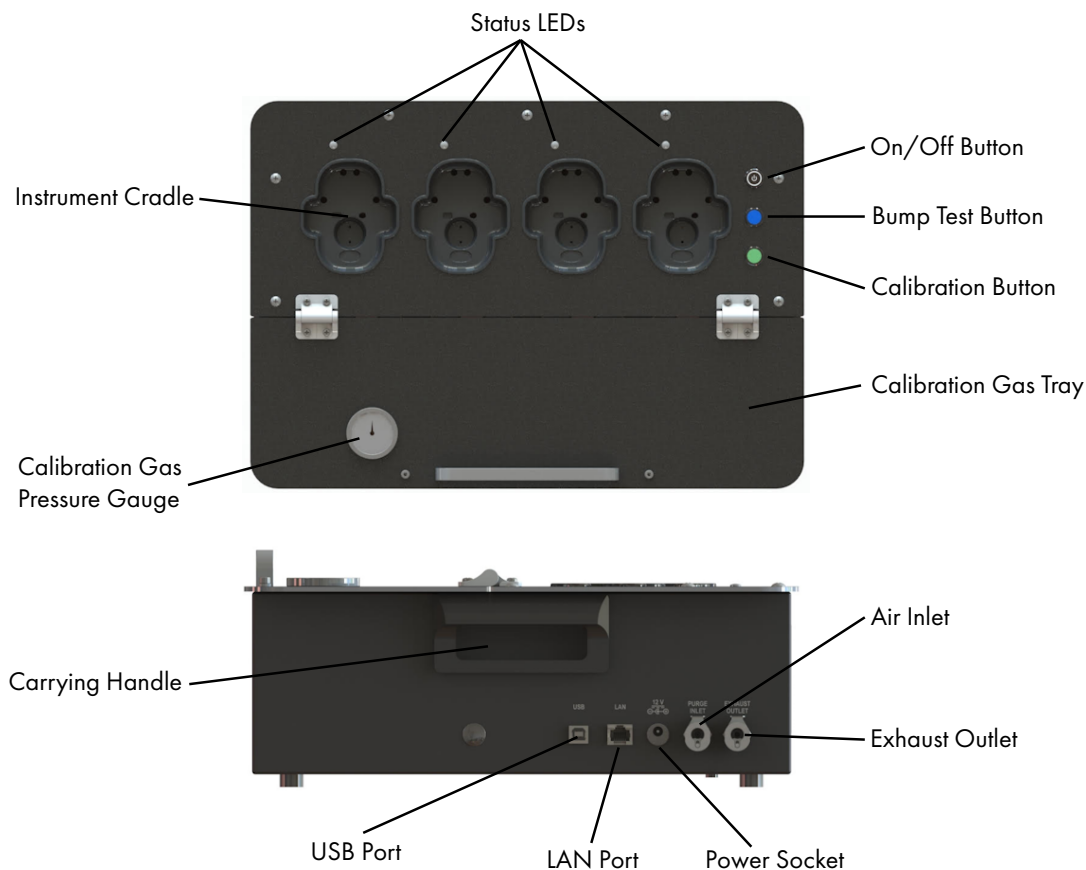


Figure 2-2: Major parts of the Test Station



Figure 2-3: Major parts of the IR Connect

3. Software Configuration and Use

3.1. Overview

The Protégé ZM System consists of two PC applications:

- IR Connect - allows user to modify the monitor's parameters, upgrade Firmware, and activate Hibernate Mode (if applicable) using IR Connect dongle.
- Test Station Software - allows user to, run the Test Station in PC mode, modify the Test Station's configuration for the standalone operation, retrieve monitor test logs and upgrade monitor firmware.



Note: The Protégé ZM software requires the installation of .NET Framework, Version 4.0 or higher.

Above software is only compatible with the Microsoft Windows operating system and supports the following versions: XP, Vista, 7, 8, 10, and 11.

Installers of the IR Connect and Test Station Software can be downloaded directly from the Teledyne Gas & Flame Detection website.

3.2. IR Connect

3.2.1. Connecting the Monitor

1. Connect the PC with the IR Connect dongle using the USB cable.
2. With the monitor powered on, lay it face down, positioning it within 1 to 2 inches (approximately 3 to 5 cm) in front of the IR Connect. Make sure that the IR interface port of the monitor has a direct line of sight to the front of the IR Connect. See [Figure 3-1](#) for reference.



Note: When face down, ensure monitor is level or it will not be able to communicate with the IR Connect.

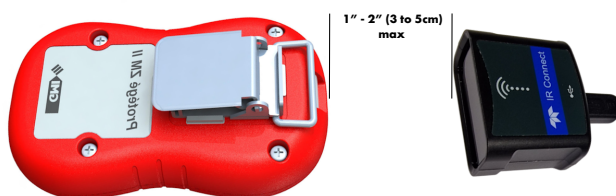


Figure 3-1: Connecting the Monitor to a PC

3. Launch the IR Connect Software. The monitor is now ready for a READ DEVICE command.
4. Click READ DEVICE button. If the read was successful, a Green Bar at the bottom of the screen appears as presented in [Figure 3-2](#).

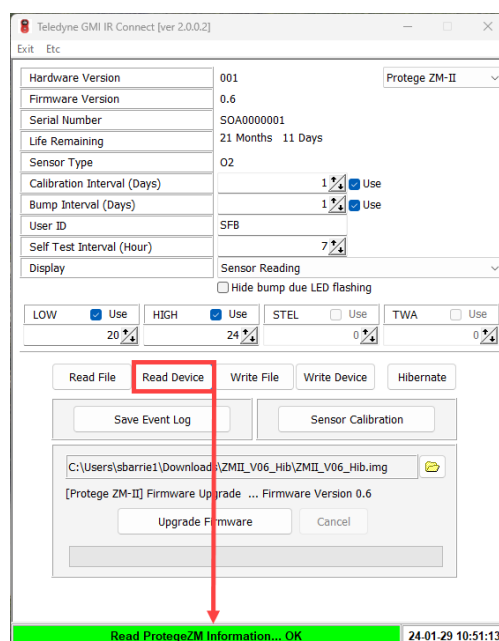


Figure 3-2: IR Connect - successful Read Device

3.2.2. Adjusting the Monitor Configuration

The various parameters available are displayed in [Figure 3-2](#) (appears after establishing communication between the IR Connect and the Monitor). These parameters, also detailed in the table below, allows users to program the individual Monitor to meet the specific requirements of the application.

Item	Details
Calibration Interval	Displays the following values based on the monitor's type: - H₂S: Default = 0days - CO: Default = 0days - O₂: Default = 30days - SO₂: Default = 0days Note: The O₂ monitor factory default Calibration Interval is set to 30days. Thus, every 30 days, the monitor displays a flashing CAL screen, indicating the monitor needs Calibrating.
Bump Interval	Setting a value automatically displays "BUP" on the monitor's LCD when the monitor has not been Bump Tested within the time frame and remains until cleared. This option aids in bump test accountability. Default = 0 days Range = 0 to 365 days For details on clearing this parameter, see Section 6.4. Clearing Bump Test Interval Alarm Alert.
User ID	Allows entering up to 6 characters to identify each individual device. Displays in two screens when all 6 characters are used. Note: Tab down to this field to select prior to entering ID. Otherwise field will not accept entry. Some alphabetic characters may not display correctly on the monitor's segmented display.

Item	Details
Self-Test Interval	Allows adjustments to this item. Default = 20hours Range = 6 to 24hours
Display	This setting adjusts the detector display to show either 'Sensor/Life Remaining', 'Sensor Reading', or 'Life Remaining'. In 'Sensor/Life Remaining' mode, the display shows the remaining life of the sensor when the instrument reads 0 (or 20.9% for O₂) and switches to showing the gas reading when the gas is detected. Default = Sensor/Life Remaining
Hide Bump Due LED Flashing	When checked, disables the monitor's LEDs from flashing when due for a Bump Test. When unchecked, the monitor's LEDs flash when due for a Bump Test. Default = Unchecked
High Alarm/Low Alarm Set Points	Allows adjusting the low/high alarm set point from the factory defaults. - H₂S: Default low/high = 10/15PPM Range = 1 to 100 PPM - CO: Default low/high = 35 / 200PPM Range = 1 to 300PPM - O₂: Default low/high = 19.5 / 23.5% Volume Range = 1 to 30% Volume - SO₂: Default low/high = disabled / 1 PPM Range = 1 to 20PPM Note: Ensure the set alarm limits do not exceed the local or site guidelines. Some sites may have different set points than others.



Note: Changed parameters appear in Green prior to WRITE DEVICE execution.

After making changes, click on 'WRITE DEVICE'. If the write is successful, a green bar will appear at the bottom of the screen, as shown in [Figure 3-3](#).

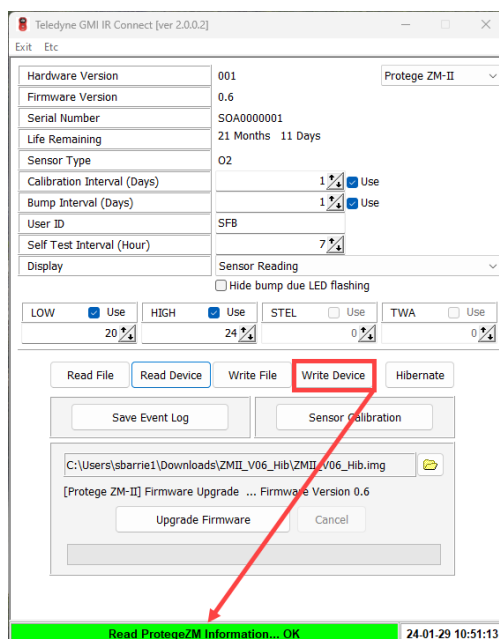


Figure 3-3: IR Connect - successful Write Device



WARNING: AFTER MAKING CHANGES TO HIGH/LOW ALARM PARAMETERS AND PERFORMING A WRITE DEVICE COMMAND, PERFORM A READ DEVICE COMMAND TO VERIFY CHANGES. THIS ENSURES DESIRED CHANGES HAVE BEEN STORED IN THE MONITOR MEMORY.

3.2.3. Saving and Loading Monitor Configuration Files

These functions enable users to store a specific configuration of the monitor on the PC using 'WRITE FILE' and, when required, load it onto another monitor using 'READ FILE'.

To save (WRITE) the monitor's configuration to PC:

1. Connect the Monitor to the PC using the IR Connect dongle.
2. Click 'WRITE FILE' to save a particular configuration. See [Figure 3-4](#).

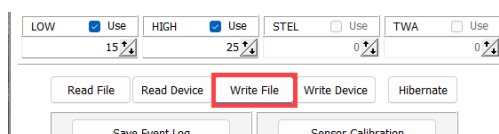


Figure 3-4: IR Connect - Write File

3. The Save Configuration dialog box will appear. Enter desired file name, select location on the PC where to store it and click Save.

To load (READ) the configuration to the Monitor:

1. Connect the Monitor to the PC using the IR Connect dongle.
2. Click 'READ FILE' to select the configuration. See [Figure 3-5](#).

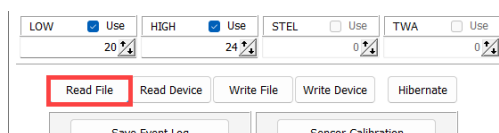


Figure 3-5: IR Connect - Read File

3. The Open Configuration dialog box will appear. Select the desired configuration file and click Open. This will load the selected configuration to the monitor.



WARNING: AFTER MAKING CHANGES TO HIGH/LOW ALARM PARAMETERS AND PERFORMING A WRITE DEVICE COMMAND, PERFORM A READ DEVICE COMMAND TO VERIFY CHANGES. THIS ENSURES DESIRED CHANGES HAVE BEEN STORED IN THE MONITOR MEMORY.

3.2.4. Upgrading the Monitor Firmware

Upgrades may include product improvements to add additional features or to enhance monitor performance. Most firmware upgrades are not required unless specifically notified by Teledyne GMI.

1. Connect the Monitor to the PC using the IR Connect dongle.
2. Click on the folder icon to select the firmware file (in *.img format).

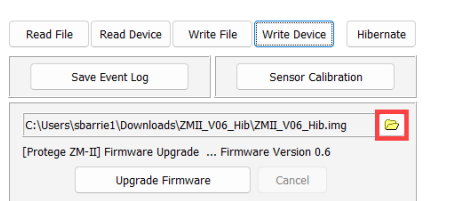


Figure 3-6: Select firmware file

3. Click on 'UPGRADE FIRMWARE'. The update process takes approximately 30 seconds to complete.

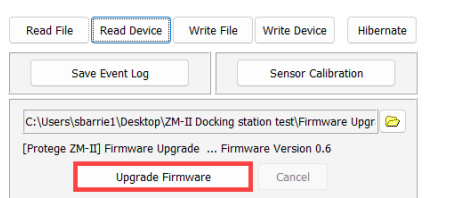


Figure 3-7: 'Upgrade Firmware' button

4. A successful upgrade is indicated by a green OK bar at the bottom of the application window, as illustrated in [Figure 3-8](#).

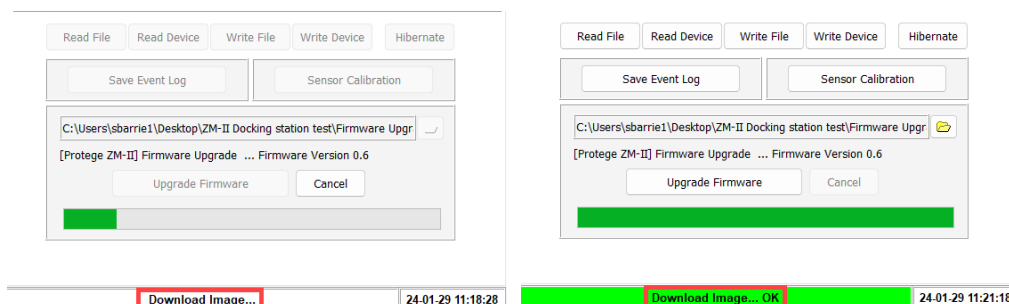


Figure 3-8: Firmware Upgrade in progress

3.3. Test Station Software

The Test Station Software enables users to execute the following tasks:

- Modify the software settings.
- Modify the setup of the Test Station.
- Change the monitor settings.
- Retrieve data from the monitor's datalogger.
- Analyze test data and generate test certificates for printing.

3.3.1. Connecting the Test Station to PC

Connection between the PC and the Test Station can be established using one of two methods:

- **USB:**
Using the USB-B to USB-A/C cable to connect to the port located on the side of the test station.
- **Ethernet:**
If a DHCP server is in use, connect the Test Station to the LAN using an Ethernet cable. The station will automatically receive an IP address, enabling it to connect to the Test Station Software on any connected PC within the same LAN network.
If a DHCP server is not in use, the station's LAN settings must be adjusted using USB communication first. The LAN settings can be found in the 'Docking Station' tab of the software.

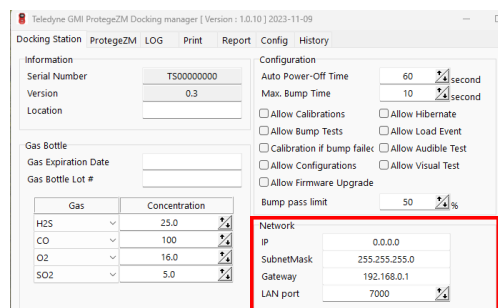


Figure 3-9: Test Station software - LAN Settings

1. Once the station is connected to the PC (via USB or LAN), launch the Test Station Software and chose connection type.

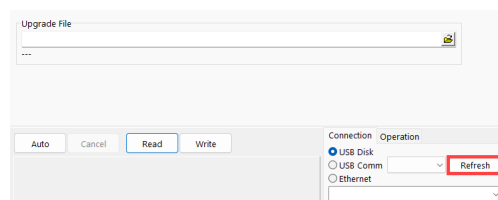


Figure 3-10: Test Station Software - choose connection type

2. Click the 'READ' button, as shown in [Figure 3-11](#). A successful connection will be indicated by the status bar at the bottom of the screen turning green and displaying a 'Complete OK' message.

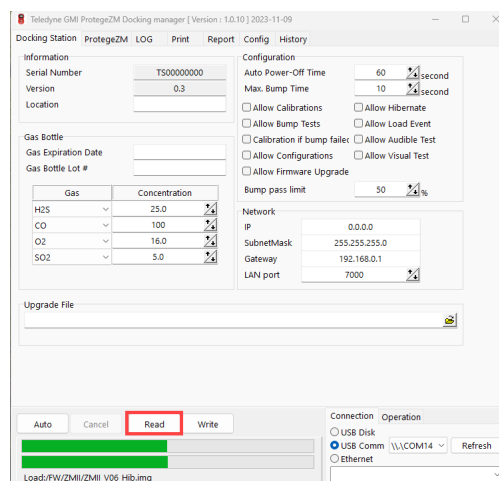


Figure 3-11: Test Station - Successful Connection

3.3.2. Adjusting Configuration of the Software

To adjust the configuration of the software, access the 'Config' tab within the software. Below tabled details the available configuration items:

Item	Details
Date Format	Customize how the date is displayed in the software, including on printed certificates and in datalogger.
User Information	Input details of the software user. This information will then be used when generating test certificates. See Section 3.3.6: Printing the Calibration and Bump Test Certificates for more details.
Auto Poll & Report schedule	When 'Auto-Mode' feature is enabled, the software will automatically download test results from connected Test Station (LAN only) at scheduled times, generate reports, and send to specified email addresses configured in the 'Send Report' tab. See Section 3.3.7: Auto-Mode for more details.
Alert Configuration	Set parameters for additional alerts in the scheduled auto report.
ETC	- Start Auto Mode at startup: Automatically enter Auto-Mode after launching the software. See Section 3.3.7: Auto-Mode for more details. - Purge log on Dock older than x days: Delete log files stored in connected Test Station if those are older than a specified number of days. - Automatic purge data at [Read] or [Auto]: Automatically delete downloaded data from the Test Station. - Upload FW images next cycle: Automatically update the Test Station and Monitor firmware when working in automatic test mode.

Item	Details
Print	Adjust various attributes of the test certificate format, including: • Text displayed in the document footer (Bottom Left / Right). • Template of the certificate's main section (Format). • Text style for the document (Font). • Change the document size to half of the original scale (Half-size).
Network	Modify network settings to allow LAN connection if DHCP is not in use.
Send Report	Configure the email address settings for Auto Poll schedule reporting and optional location to save the duplicate HTML report to.

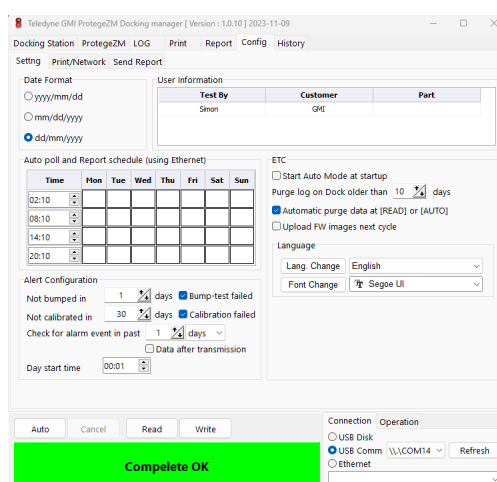


Figure 3-12: Test Station Software - Config Tab

3.3.3. Adjusting Configuration of the Test Station

To configure the Test Station, access the 'Docking Station' tab within the software. The following table outlines the available configuration options:

Item	Details
Location	Specify the location of the Docking Station.
Gas Bottle	Enter details about the installed gas cylinder, including: • Gas Expiration Date: The expiration date of the installed gas cylinder. • Gas Bottle Lot #: The lot number of the installed gas cylinder. • Gas Bottle setting: Define the composition of the installed gas cylinder (up to four gases).
Auto Power-Off Time	Adjust the time for the Test Station to automatically power down when idle. Setting it to 0 disables auto power-off.  Note: This value should be set to 0 when using automatic test mode.

Item	Details
Max Bump Time	Set the maximum allowable time for a bump test. If the monitor being tested fails to reach the Bump Pass Limit before this specified time, the bump test will FAIL.
Bump Pass Limit	Define the pass limit value for the bump test. The test is considered a PASS if the monitor readings fall within a specified percentage of the calibration gas concentration before the Max Bump Time elapses.
Allow Calibration / Bump Test	Enable or disable the functionality of the Bump Test and Calibration buttons.
Calibration if bump failed	Configure the Test Station to automatically attempt calibration of the monitor in the event of a failed bump test.
Allow Configurations	Set the Test Station to automatically load the configuration of the tested monitor. Refer to Section 3.3.4: Adjusting Configuration of the Monitor for more detail.
Allow Firmware Updates	Enable the Test Station to automatically update the firmware of the tested monitor.
Allow Hibernate	Configure the Test Station to automatically hibernate the tested monitor.
Allow Load Event	Set the Test Station to automatically download the datalogger content from the tested monitor.
Allow Audible / Visual Test	Enable the Test Station to test the audible and visual alarms of the monitor.
Network	Modify network settings for the station to allow LAN connection if DHCP is not in use.
Upgrade File	Use this function to select the Test Station firmware update file.

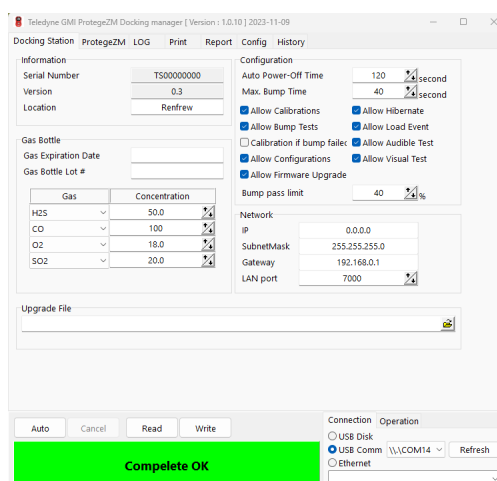


Figure 3-13: Test Station Software - Docking Station tab



Note: Click the 'WRITE' button after altering the parameters to ensure the new settings are saved to the device.

3.3.4. Adjusting Configuration of the Monitor

The Test Station has the ability to change the Monitor's settings using two approaches:

- Automatically, by transferring a pre-set configuration from its memory to the monitor during bump test or calibration. This process requires the activation of the 'Allow Configurations' feature on the Test Station.
- Manually, by using the Test Station Software to transfer a pre-set configuration from the Test Station memory to a monitor that is placed in the station's cradle.

To modify the monitor configurations stored in the Test Station:

1. Open the Test Station Software and go to the 'ProtegeZM' tab.

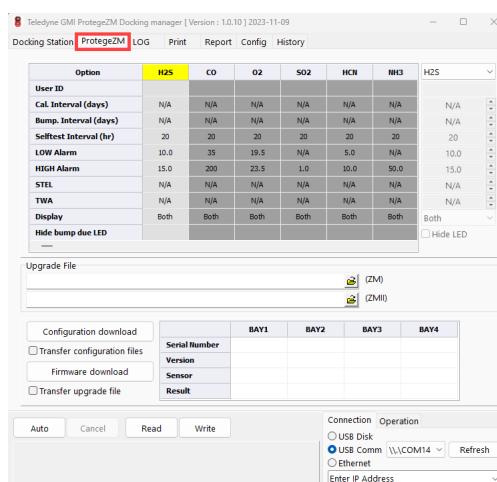


Figure 3-14: Test Station Software - ProtegeZM tab

2. Click the 'READ' button. This action will load the current configuration presets from the Test Station's memory. A successful connection is confirmed with the green status bar at the bottom of the screen and 'Complete OK' message.

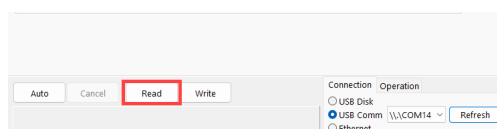


Figure 3-15: Test Station Software - Read

3. After the loading is complete, the table will display all the monitor configuration attributes that can be modified. These attributes typically include:
 - User ID
 - Calibration interval (in days)
 - Bump Test interval (in days)
 - Self-Test interval (in days)

- LOW Alarm threshold
- HIGH Alarm threshold
- STEL Alarm threshold
- TWA Alarm threshold
- Display mode
- Option to enable/disable visual alarm for Bump Due
- Option to enable/disable the ability to perform manual Self-Test

For more information on these attributes, refer to [Section 3.2.2: Adjusting the Monitor Configuration](#).

Option	H2S	CO	O2	SO2	HCN	NH3
User ID						
Cal. Interval (days)	N/A	N/A	N/A	N/A	N/A	N/A
Bump. Interval (days)	N/A	N/A	N/A	N/A	N/A	N/A
Selftest Interval (hr)	20	20	20	20	20	20
LOW Alarm	10.0	35	19.5	N/A	5.0	N/A
HIGH Alarm	15.0	200	23.5	1.0	10.0	50.0
STEL	N/A	N/A	N/A	N/A	N/A	N/A
TWA	N/A	N/A	N/A	N/A	N/A	N/A
Display	Both	Both	Both	Both	Both	Both
Hide bump due LED						

Figure 3-16: Test Station Software - monitor configuration table

- To change a configuration preset, select the required monitor type from the dropdown box situated to the right of the configuration table. Once selected, the corresponding header in the main table will highlight in yellow.

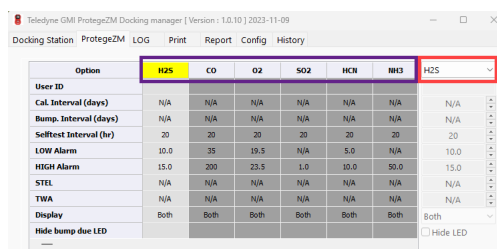


Figure 3-17: Selecting the device type

- Edit the necessary values. After modification, the background of the attribute will change to white, indicating the change.

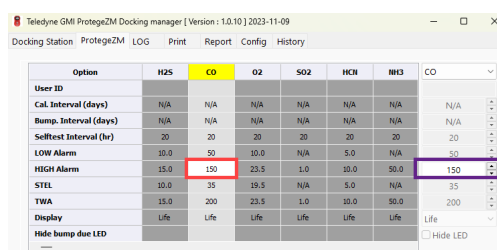


Figure 3-18: Changing the attributes



Note: Only the modified values (with a white background) will be transferred to the Test Station or the monitor. Values that remain unchanged (grey background) will not be applied.

- Optional: The Test Station is equipped with the capability to store a firmware upgrade file for the monitor and can automatically update any older monitor firmware during a bump test or calibration. To utilize this feature, the 'Allow Firmware Updates' option must be enabled in the 'Docking Station' tab.

To load the firmware file, click the folder button.

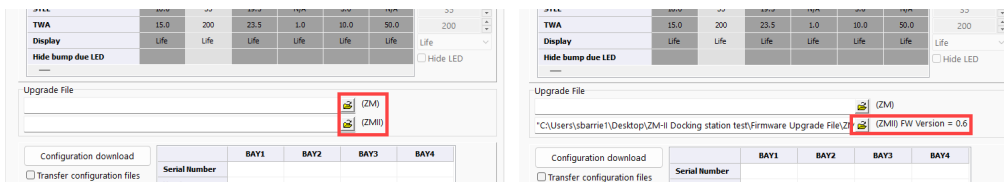


Figure 3-19: Loading the monitor firmware file

- Click the 'WRITE' button to save the updated configuration presets and optional firmware file, to the Test Station memory.

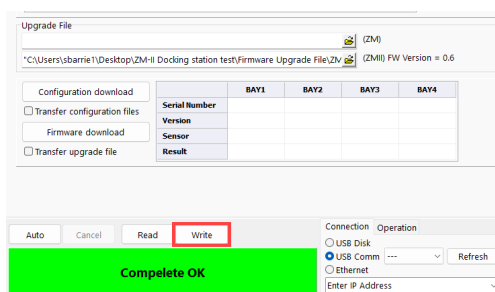


Figure 3-20: Changing the attributes - WRITE

To manually transfer a configuration to a monitor placed in the Test Station cradle:

- Complete steps 1 to 7 from the above instructions.
- Place the monitors to reconfigure into the cradles of the Test Station.
- Click the 'Configuration download' button. This action will initiate the transfer of the configuration preset stored in the station to the monitors.

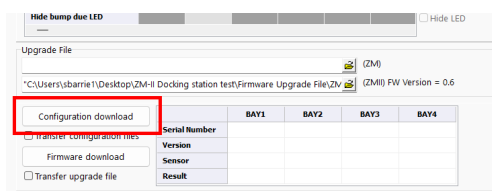


Figure 3-21: 'Configuration download' button

Upon completion of the download, the result will be displayed in the status table located adjacent to the 'Configuration download' button.

	BAY1	BAY2	BAY3	BAY4
Serial Number				
Version				
Sensor				
Result				

➔

	BAY1	BAY2	BAY3	BAY4
Serial Number	000000000	AA21460011	AA21460010	
Version	2.7	2.7	2.7	
Sensor	CO	SO2	O2	
Result	PASS	PASS	PASS	UNDETECT

Figure 3-22: Configuration download status

- PASS - Indicates that the configuration update was completed successfully.
- UNDETECT - Indicates that no monitor is inserted in the corresponding cradle.

4. Optional: To update the monitor firmware, click the 'Firmware download' button. This will load the firmware update file stored in the station. Upon completion of the download, the result will be displayed in the status table.

	BAY1	BAY2	BAY3	BAY4
Serial Number				
Version				
Sensor				
Result				

→

	BAY1	BAY2	BAY3	BAY4
Serial Number	0000000000	AA21460011	AA21460010	
Version	2.7	2.7	2.7	
Sensor	CO	SO2	O2	
Result	PASS	PASS	NO TEST	UNDETECT

Figure 3-23: Firmware download status

- PASS - Firmware update was completed successfully.
- NO TEST - No firmware update performed. Monitor's firmware is already up-to-date.
- UNDETECT - Indicates that no monitor is inserted in the corresponding cradle.

3.3.5. Retrieving and Analyzing the Log Data

The 'Log' tab allows the user to retrieve and analyze logged information stored on the Test Station.

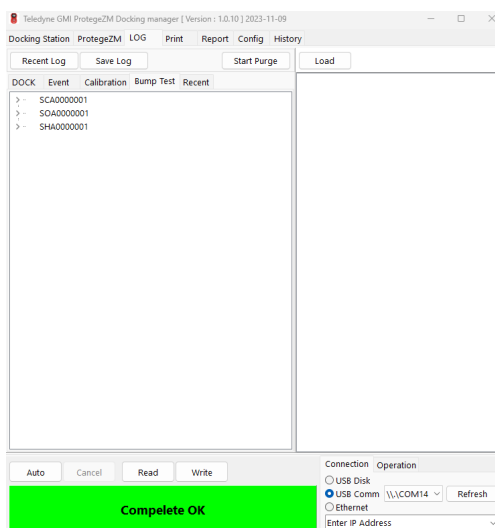


Figure 3-24: Test Station Software - Log tab

To access the data stored in the Test Station, click the 'Read' button located at the bottom of the window in the 'Log' tab. This data includes the test history, event logs, calibration logs, and bump test logs.

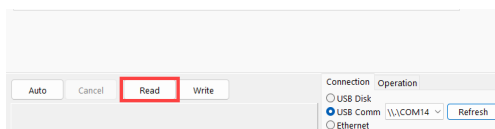


Figure 3-25: Test Station Software - Read

Once the connection is established, the user can perform the following operations:

- Recent Log - This function loads the most recent calibration, bump test, and event logs into the 'Recent' tab.
- Save Log - This option allows users to save all logs (including test history, event, calibration, and bump test logs) to their PC. After the saving process is complete, the software clears all logs from the Test Station, except for the most recent calibration, bump test, and event logs.

- Start Purge - This function clears all logs from the Test Station..
- Load - This option is used to load a single log of bump test and calibration from local storage onto the Test Station.

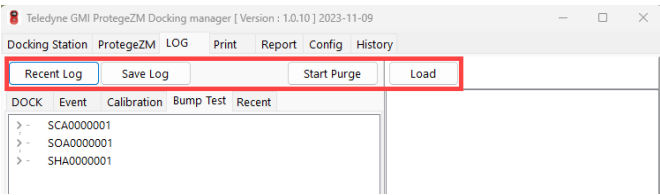


Figure 3-26: Log tab operations

Once downloaded, the log files are organized into five categories, each accessible through the corresponding tab in the software:

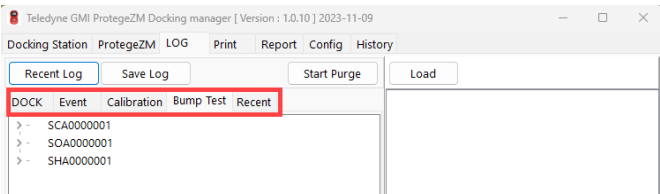
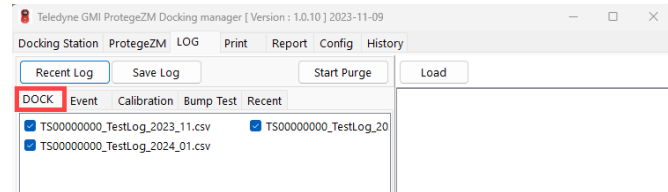
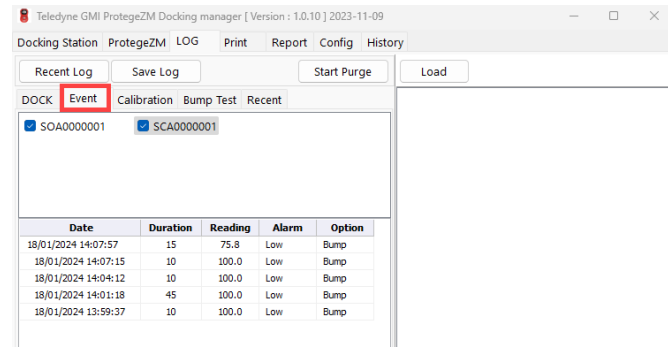
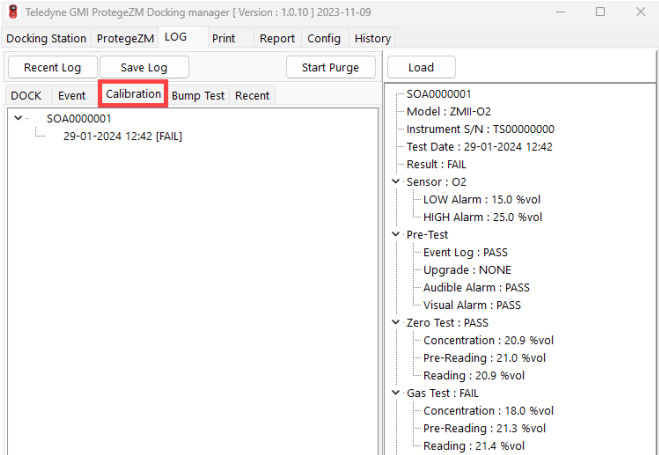
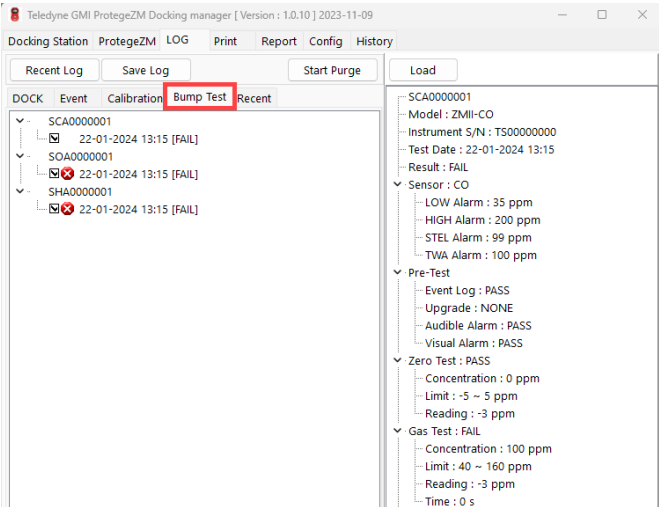
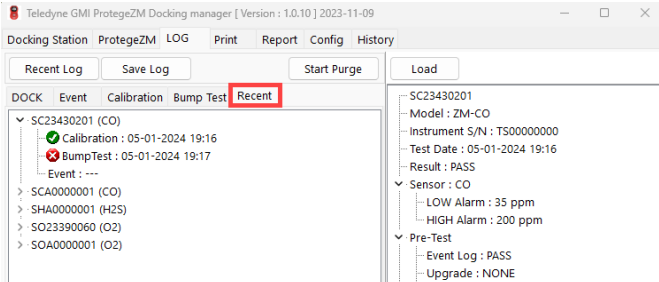


Figure 3-27: Log - log categories

Tab	Description																														
Dock	This tab contains files of the monthly test summary.  Note that these files serve as a historical backup, and Test Station Software does not support on-screen preview of these files.																														
Event	This tab displays event logs from the monitors that have been calibrated using the Test Station.  <table><tr><th>Date</th><th>Duration</th><th>Reading</th><th>Alarm</th><th>Option</th></tr><tr><td>18/01/2024 14:07:57</td><td>15</td><td>75.8</td><td>Low</td><td>Bump</td></tr><tr><td>18/01/2024 14:07:15</td><td>10</td><td>100.0</td><td>Low</td><td>Bump</td></tr><tr><td>18/01/2024 14:04:12</td><td>10</td><td>100.0</td><td>Low</td><td>Bump</td></tr><tr><td>18/01/2024 14:01:18</td><td>45</td><td>100.0</td><td>Low</td><td>Bump</td></tr><tr><td>18/01/2024 13:59:37</td><td>10</td><td>100.0</td><td>Low</td><td>Bump</td></tr></table>	Date	Duration	Reading	Alarm	Option	18/01/2024 14:07:57	15	75.8	Low	Bump	18/01/2024 14:07:15	10	100.0	Low	Bump	18/01/2024 14:04:12	10	100.0	Low	Bump	18/01/2024 14:01:18	45	100.0	Low	Bump	18/01/2024 13:59:37	10	100.0	Low	Bump
Date	Duration	Reading	Alarm	Option																											
18/01/2024 14:07:57	15	75.8	Low	Bump																											
18/01/2024 14:07:15	10	100.0	Low	Bump																											
18/01/2024 14:04:12	10	100.0	Low	Bump																											
18/01/2024 14:01:18	45	100.0	Low	Bump																											
18/01/2024 13:59:37	10	100.0	Low	Bump																											

Tab	Description
Calibration	This section contains the calibration history of the monitors. When a user selects any log from the list, its details will appear on the right side of the screen, and a print preview will be available in the 'Print' tab. 
Bump Test	This tab shows the bump test history of the monitors. Similar to the Calibration History tab, selecting a log will display its details on the right, and a print preview will be shown in the 'Print' tab. 
Recent	This tab displays the most recent calibration, bump test, and event information for each monitor stored in the system. 

3.3.6. Printing Calibration and Bump Test Certificates

The 'Print' tab enables the user to create and print a calibration or bump test certificate based on the data selected in the 'Log' tab.

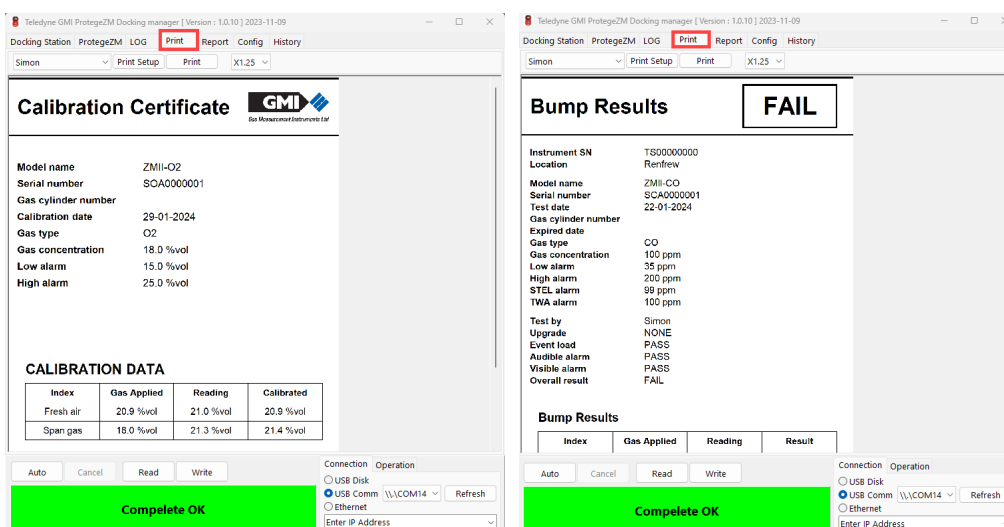


Figure 3-28: Test Station Software - Print tab

The following functions are available in this tab:

- Select User - Choose the name to be printed on the certificate. Tester information can be added in the 'Config' tab.
- Print Setup: Select printer and configure the printing settings.
- Print: Execute the printing of the certificate.
- Set Scale: Adjust the preview scale. Note that this function only alters the preview scale and does not affect the actual print scale, which is governed by the printer settings.

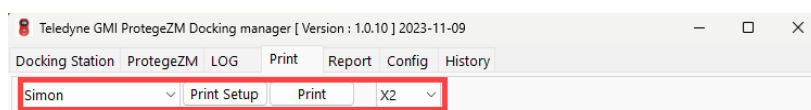


Figure 3-29: Print tab functions

3.3.7. Auto-Mode

In Auto-mode, Test Station Software operates continuously based on a schedule set in the 'Configuration' tab. To activate Auto-mode, the station should be connected via the Ethernet.

When operating in Auto-mode, software systematically performs the following procedure:

- Checks the connection status of the station.
- Retrieves new event, calibration, and bump test logs from all connected stations.
- Saves newly acquired data to local storage.
- Adjusts the station clock if there is a discrepancy in time.
- Updates the report in the 'Report' tab.
- Deletes files that are old or no longer needed.
- Uploads firmware upgrade files, if any have been selected.

- Generates a report file and sends it via email at the scheduled time.

To initiate the Auto-Mode, click on the 'Auto' button located in the bottom section of the window. Once activated, the software will display the date and time of the next scheduled download.

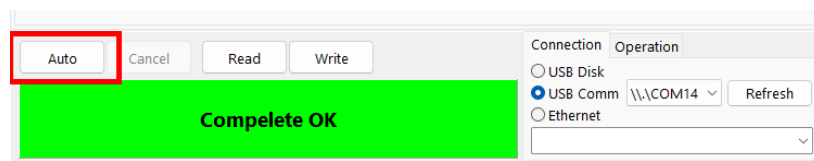


Figure 3-30: Auto-Mode

4. Test Station Operation

4.1. Test Station LEDs and Buttons

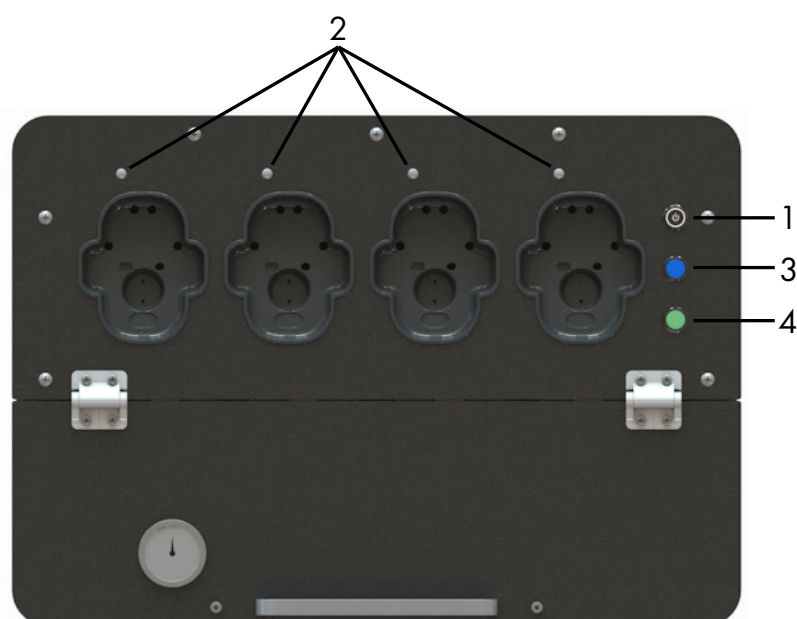


Figure 4-1: Test Station LEDs and Buttons

No.	Item	State	Indicator
1	Power LED	Solid Green	Battery Charged
		Blinking Green	Battery Low
		Solid Orange	Firmware update in progress
		Blinking Red	USB memory not installed
2	Unit 1 to 4 LEDs	Solid Orange	Test in progress
		Solid Green	Test PASS
		Solid Red	Test FAIL
3	Bump Test button		Press to start the monitor Bump Test
4	Calibration button		Press to start the monitor Calibration

4.2. Preparing the Test Station

4.2.1. Charging

The test station is powered by an external 12VDC adapter and an internal rechargeable battery. To charge the battery, connect the provided power adapter to the DC jack located on the side of the station. A full charge takes approximately 3 hours. Once fully charged, the station can conduct up to 750 bump test cycles.



Caution: The station can only be charged using the DC power adapter included in the package.



Note: The station does not charge while bump tests or calibrations are in progress.



Note: If the battery is low (indicated by the power button blinking green), charge the station for 30 minutes before performing a bump test or calibration.

4.2.2. Installation of the Calibration Gas Cylinder

To conduct tests on gas detectors, the test station requires a calibration gas cylinder to be installed. Follow these steps to install the gas cylinder:

1. Loosen the screws from the calibration gas tray and lift the access panel.

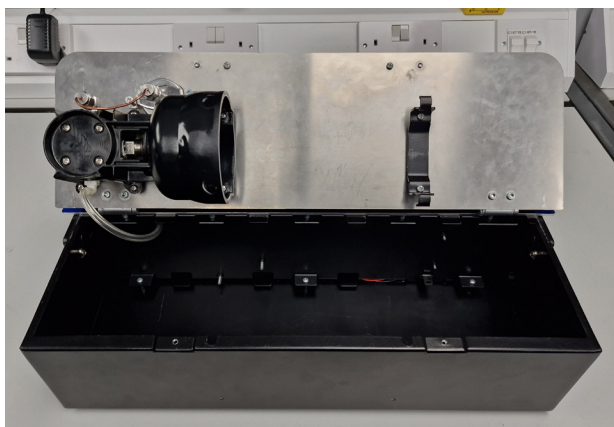


Figure 4-2: Lift the access panel

2. Place the gas cylinder into its holder and screw it into the fitting until it is tightly secured.



Figure 4-3: Secure the gas cylinder

3. Verify that the calibration gas pressure gauge is correctly displaying pressure of the installed gas cylinder.
4. Secure the bottom section of the back of the cylinder with a rubber strap.

Ensure that the types and concentrations of the gases match the test station's configuration. The Test Station Software enables you to set specific gas concentrations. The default configuration for gas concentrations is as follows:

- H₂S (Hydrogen Sulfide): 25 ppm
- CO (Carbon Monoxide): 100 ppm
- O₂ (Oxygen): 18% Volume
- SO₂ (Sulphur Dioxide): 10 ppm



WARNING: WHEN GAS CYLINDER, ENSURE THAT THE FITTING IS COMPATIBLE WITH THE TEST STATION. USING AN INCORRECT FITTING MAY RESULT IN GAS LEAKS.



Caution: Only use certified calibration gas that has not expired.

4.2.3. Connecting the clean air and exhaust paths

When using the test station, it's crucial to position it in an environment with clean air. If it's being used in an area where adequate ventilation isn't available, the station must be connected to an independent supply of clean air. This can be either outdoor air or a gas cylinder equipped with an on-demand flow regulator.

Additionally, ensure that the exhaust from the station is directed towards a well-ventilated area or outside.

The connection to the station should be established using nylon tubing.



Figure 4-4: Connect Air & Exhaust tubing

4.2.4. Before Use Checklist

Before and after each use, inspect the Test Station to ensure it is in operational order:

- Check that all components are in operating order and undamaged.
- Ensure the Gas Cylinder has an adequate amount of gas for testing purposes.
- Verify that each Sensor Cavity is free and clear of debris.

- Inspect the AC Power module to ensure it is undamaged.
- Clean the Test Station. Remove devices and disconnect from the power source. Use only a soft cloth to wipe surfaces. If necessary, a mild detergent may be used. Ensure it is dried thoroughly before applying power or replacing devices.



WARNING: DO NOT USE THE EQUIPMENT WHEN AN EXPLOSIVE ATMOSPHERE MAY BE PRESENT.



WARNING: DO NOT INSTALL NEAR HEAT SOURCES OR ON VIBRATING SURFACES.



WARNING: THE EQUIPMENT IS INTENDED FOR INDOOR USE ONLY.



Caution: This equipment utilizes potentially dangerous gas for calibrations. It is mandatory to connect the equipment to a venting system or operate it in an area with adequate ventilation.

4.2.5. Powering Up the Station

To activate the Test Station press the power button. If the station's battery is sufficiently charged and the USB memory stick is correctly installed, the illumination on the power button will turn solid green, indicating that the station is ready for operation.

The color and pattern of the illumination on the Power Button reflect the station's status. Refer to [Section 4.1: Test Station LEDs and Buttons](#) for detailed information on the meaning of each color and pattern.



Note: By default, the station is configured to automatically power off after 60 seconds of idling. For information on how to modify this setting, please refer to [Section 3.3.3: Adjusting the Configuration of the Test Station](#).

4.3. Hibernating the Monitor Using Test Station

If 'Allow Hibernate' function is enabled in the Test Station configuration (please refer to [Section 3.6: Adjusting the Test Station Configuration](#) for more details) the monitors will automatically get hibernated after the test.

This function only applies to the H₂S and CO monitors.



Note: Monitor's event log is automatically stored onto the Test Station's USB Memory.

5. Calibration & Bump Test



WARNING: OPERATING A DEVICE THAT HAS EXCEEDED ITS CALIBRATION DATE CAN CAUSE FALSE READINGS OF DETECTED GASES. READINGS OBTAINED WHILE MONITOR IS OUT OF CALIBRATION ARE INVALID AND COULD LEAD TO DEATH OR INJURY.

The Company recognizes the potential of the monitor as a life saving device when operated and maintained correctly. As such, verifying proper operation of the monitor in the form of Calibration and regular Bump Testing is essential to ensure the monitor performs as intended in a potentially hazardous environment.

The frequency at which Calibration and Bump Testing occur is best determined based on local regulatory standards, company policies, and industry best practices.

Calibration is performed to ensure the device detects target gases within specified operating parameters. Calibration is the adjustment of the monitor's response to match a known concentration of gas. Sensors can lose sensitivity through normal degradation, exposure to high gas concentrations, or sensor poisoning.

5.1. Calibrating and Bump Testing using Test Station

Equipment required:

- Calibration gas – Verify the concentration level exceeds the set points of the monitor, and ensure the expiration date of the cylinder has not passed.
- Test Station

1. Ensure the appropriate gas bottle is installed and the Test Station is powered on.
2. Power up each monitor that is undergoing testing.
3. Place the monitors in the four slots of the Test Station.
4. Press the 'Bump Test' or 'Calibration' button to start the tests. During the test, the status LEDs will turn orange.



Note: A bump test will take 10 to 30 seconds, and calibration will take approximately 90 seconds.

5. Upon completion of the test, the LEDs will turn green for PASS or red for FAIL.
6. Remove tested monitors.

Note: During every test, the Test Station also performs the following maintenance operations:



- Saving each monitor's event logs on the USB drive.
- Updating the monitor's configuration, (if enabled in the settings).
- Updating the monitor's firmware (if enabled in the settings).
- Verifying the correct functionality of the monitor's buzzer and LEDs.
- Hibernating the monitor (if enabled in the settings).

5.2. Bump Testing using Calibration Adapter

Equipment required:

- Calibration gas – Verify the concentration level exceeds the set points of the monitor, and ensure the expiration date of the cylinder has not passed.
 - Tygon tubing – 2 feet of 3/16" ID
 - Regulator – Set to provide flow at 0.5LPM
 - Calibration Adapter – Shipped with monitor
1. Verify the concentration level of the calibration gas in the cylinder exceeds alarm settings of the monitor.
 2. Attach the Regulator to the gas cylinder and verify cylinder pressure.
 3. Connect Tygon tubing to both the Regulator and Calibration Adapter.
 4. Attach Calibration Adapter to monitor and apply gas.

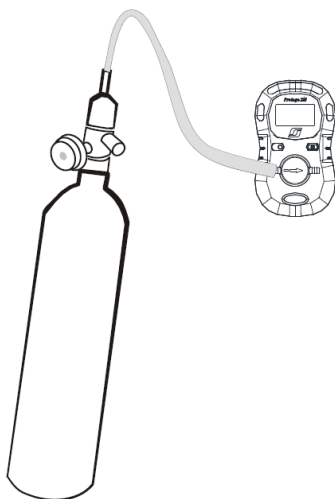


Figure 5-1: Attached gas cylinder

5. Verify monitor responds to target gas and activates the visual, audible, and vibrating alarms.
6. Turn off gas cylinder and remove Calibration Adapter.



WARNING: IF THE MONITOR FAILS TO ACTIVATE ALL ALARMS WITHIN ONE MINUTE, THE MONITOR MUST BE TAKEN OUT OF SERVICE. FAILURE TO DO SO COULD LEAD TO DEATH OR INJURY.

5.3. Calibrating the Monitor Using the IR Connect Software

Equipment required:

- Calibration gas – Verify the concentration level exceeds the set points of the monitor, and ensure the expiration date of the cylinder has not passed.
- IR Connect dongle
- Regulator – Set to provide flow at 0.5LPM
- Calibration Adapter – Shipped with monitor

1. Launch the IR Connect software.
2. Connect the monitor to the PC as described in [Section 3.5](#) of this manual.
3. Press the 'SENSOR CALIBRATION', and a dialog box will appear as shown in [Figure 5-2](#).

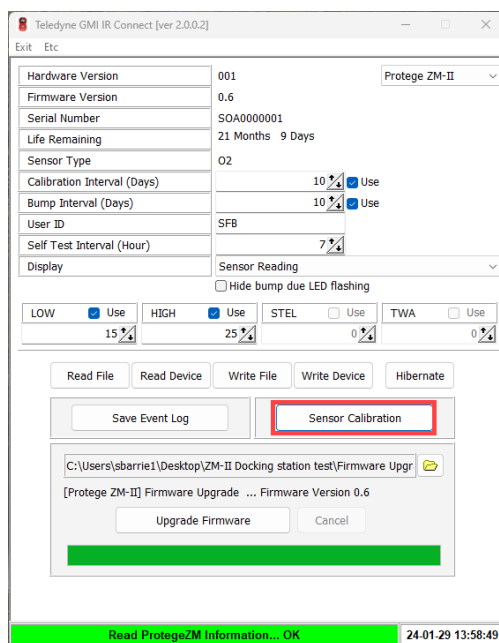


Figure 5-2: IR Connect - Sensor Calibration

4. Select the concentration value of the Span Gas.
5. Press 'CALIBRATION'. The monitor's LCD will display the 'CAL' message, and the software dialog box will display a sequence of messages:
 - 'Zero Calibration... OK'
 - Apply SPAN Gas (XX)... ppm
 - SPAN Calibration...

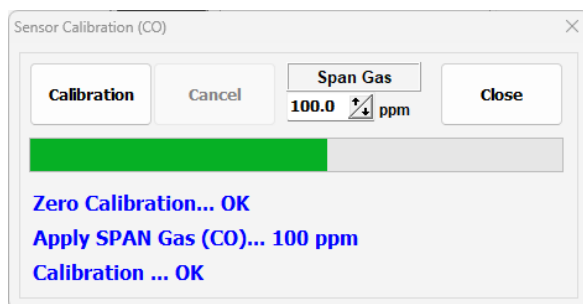


Figure 5-3: IR Connect -Calibration Sequence

6. Lift the monitor to apply the calibration gas.



Note: At this stage, the monitor will disconnect from the IR Connect. This is intentional and does not affect the final result of the process.

7. Attach the Calibration Adapter to the monitor and apply gas, as presented in [Figure 5-1](#).
8. When the monitor's calibration is successful, all LEDs flash, and the monitor beeps, vibrates, and the LCD reflects the reading.



Note: Since the IR Connect is no longer connected to the monitor, once the count-down in Status Bar is finished, the Dialog Box will display a 'Calibration... Time-out' message.

9. Press 'CLOSE'.

5.4. Calibrating the O₂ Monitor Using the Front Button

By default, the Protégé ZM O₂ monitor is configured to require calibration every 30 days. The user will be notified through an on-screen message.



WARNING: ONLY PERFORM O₂ CALIBRATION IN CLEAN AIR (20.9% OXYGEN) THAT IS FREE OF HAZARDOUS GASES.

If the monitor is due for calibration, the screen will alternately display "CAL" and Life Remaining / Gas Concentration.



If the button is pressed for 5 seconds, the detector will perform calibration, and the icon will blink.



Once calibration is successfully completed, the detector will display the Life Remaining/Gas Concentration. This will be followed by the activation of the buzzer, the vibrator, and flashing LEDs.



WARNING: AFTER A FAILED CALIBRATION, THE DETECTOR WILL CONTINUOUSLY OPERATE THE BUZZER, AND THE LEDS WILL TURN ON AND OFF REPEATEDLY. THE MONITOR MUST BE TAKEN OUT OF SERVICE. FAILURE TO DO SO COULD LEAD TO DEATH OR INJURY.

6. Maintenance

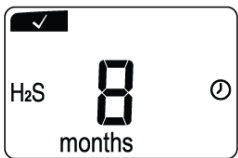
6.1. Self-Testing the Monitor

Before daily use, the monitor prompts the user to perform a self-test. This procedure is a straightforward and reliable method to ensure the safe operation of the monitor. The test involves activating the audio, visual, and vibration alarms, as well as testing the sensor.



WARNING: THE SELF-TEST DOES NOT REPLACE A BUMP TEST OR CALIBRATION IN ENSURING THE MONITOR'S RESPONSE TO GAS.

LCD	Steps
	When the TEST icon appears in the upper left-hand corner of the monitor, it indicates that a self-test is required. The user should press the button on the front of the monitor to initiate the self-test.
	After initiating the self-test, a specific screen will appear. It is essential to ensure that the following occurs during the self-test: • The monitor emits one audible beep. • All LEDs light up, and the monitor vibrates. • All elements of the LCD display become visible.
 	Once the full LCD elements are displayed, the low, high, STEL and TWA alarm set points are shown.

LCD	Steps
	A successful self-test results in the monitor reverting to the standard operating screen, displaying a CHECK MARK where the TEST icon was previously, accompanied by a short audible beep. By default, the monitor prompts another self-test 20 hours after the button was pressed.  Note: The interval for this prompt can be modified using the IR Connect Software.
	OPTIONAL: If the monitor is programmed with a USER ID, after the alarm set points are displayed, a combination of numbers or letters will scroll across the LCD. This can include up to two screens with a maximum character limit of six for the USER ID.
	OPTIONAL: If the monitor has been exposed to gas exceeding the low alarm set point, a value with "MAX" next to it will appear, representing the peak value that the monitor has recorded. Following this, another screen displays a value with a time unit (hours, days, or months), indicating the time elapsed since the peak reading.
	OPTIONAL: After the peak reading and elapsed time screens, another screen with "CLP" (Clear Last Peak) will appear. If the user presses the button while this is displayed, the peak value on the monitor resets.  Note: Although the value is cleared from the display, it is stored in the monitor's event log and may be cleared on the next screen.



Caution: In the event of a self-test failure, the monitor will emit five short beeps and flash before displaying "TEST".



Caution: Should the self-test fail three consecutive times, the monitor will enter Fail Safe mode. In this case, it is advised to contact the service provider for assistance.



Caution: During normal operations, the battery level is continuously monitored. If the battery remains low for more than three hours, the monitor will automatically enter Fail Safe mode.



Caution: If the battery's self-test fails five consecutive times, the LCD screen will go blank. Should this occur, discontinue use of the monitor and contact the service provider for assistance.

6.2. Retrieving the Event Log using IR Connect

By default, the monitor stores the last twenty-five (25) alarm events. It uses a First In First Out (FIFO) method for storage. This means that the twenty-sixth event replaces the first event, and so on. This information can be downloaded to a PC using the IR Connect Software. For each alarm event, the monitor records the following details:

- Product Name
- Log Type
- Serial Number
- Firmware Version
- ID
- Life Remaining
- Total Number of Events
- Duration of Events
- Number of Self-Tests
- Event Date
- Event Time
- Bump Test (Yes or No)
- Duration (Seconds)
- Sensor Reading (PPM or %)
- Alarm Condition (Low, High, or OL)

1. Launch the IR Connect software.
2. Connect the monitor to the PC as described in [Section 3.2.1: Connecting the Monitor](#).
3. Click on SAVE EVENT LOG to save the log. This allows the selection of a specific folder to save the event log.

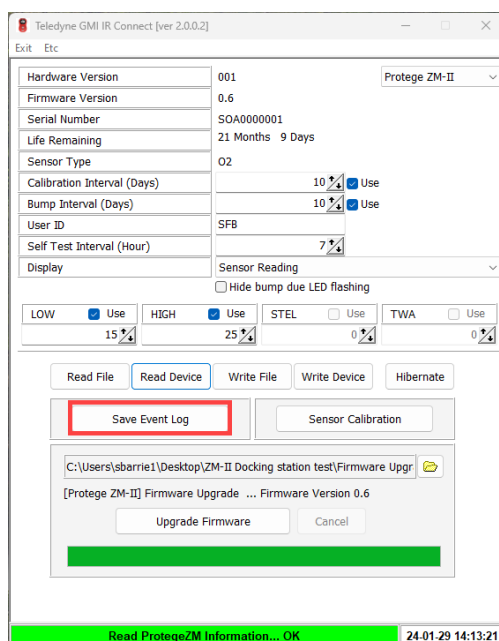


Figure 6-1: IR Connect - Save Log

4. Click SAVE on the Save Logging Data Dialog Box, to save the .CSV file.

6.3. Hibernating the Monitor using the IR Connect Software

This operation preserves the battery when the monitor is not in service.



Note: The hibernation function is only available in the CO and H₂S monitors.



Note: It is recommended to save the event log prior to placing the monitor in hibernation. Once hibernation occurs, all prior event logs are erased.

1. Launch the IR Connect software.
2. Connect the monitor to the PC as described in [Section 3.2.1: Connecting the Monitor](#).
3. Press HIBERNATE. A screen appears asking you if you want to proceed. If you have already saved the event log, click YES. See [Figure 6-2](#) for more details.

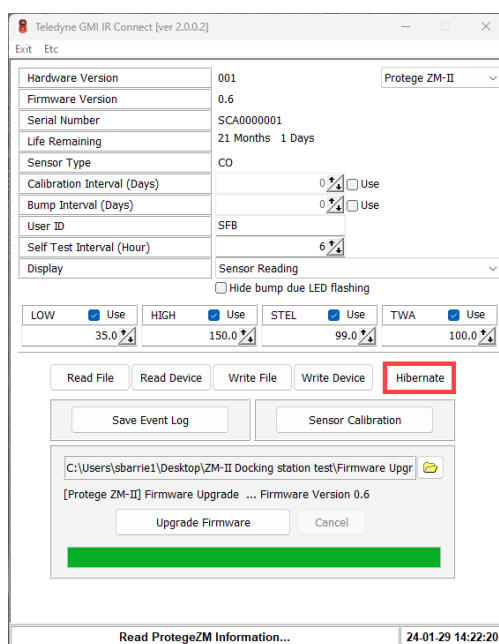


Figure 6-2: IR Connect - Hibernate

4. A successful hibernation is indicated by a green OK bar at the bottom of the application window, as illustrated in [Figure 6-3](#).

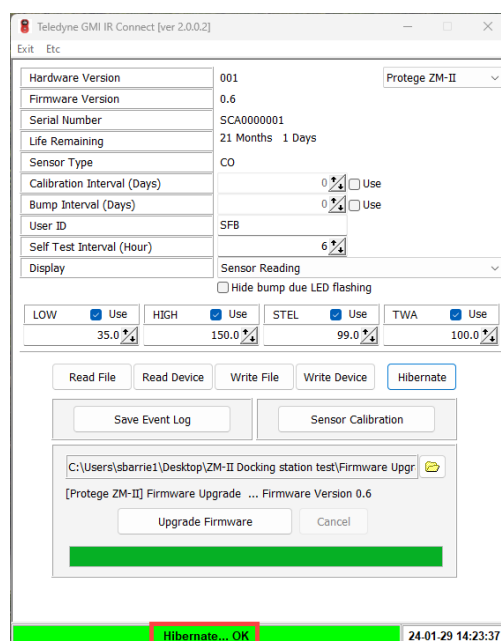


Figure 6-3: IR Connect - Hibernate OK

6.4. Clearing Bump Test Interval Alarm Alert

When a monitor is due for a bump test, it alternates between displaying “BUP” and the current reading. A bump test can be performed at any time using the Test Station with a target gas, or directly on the monitor. To initiate a bump test on the monitor, press the front button once. This will display several screens, followed by the word “GAS” while the “TEST” icon flashes. The monitor then waits 45 seconds for the target gas to be applied, or for a button press to skip the bump test. Once the gas is applied, a check mark appears.

6.5. Upgrading the Monitor Firmware using IR Connect

Upgrades may include product improvements to add additional features or to enhance monitor performance. Most firmware upgrades are not required unless specifically notified by Teledyne GMI.

1. Launch the IR Connect software.
2. Connect the monitor to the PC as described in [Section 3.2.1: Connecting the Monitor](#).
3. Perform READ DEVICE as described in [Section 3.2.1: Connecting the Monitor](#).
4. Click on the Folder icon to select the firmware file (in *.img format), and then click on “UPGRADE FIRMWARE,” as shown in [Figure 6-4](#). This process takes approximately 30 seconds to complete.



Note: Do not move the monitor during the firmware upgrade.

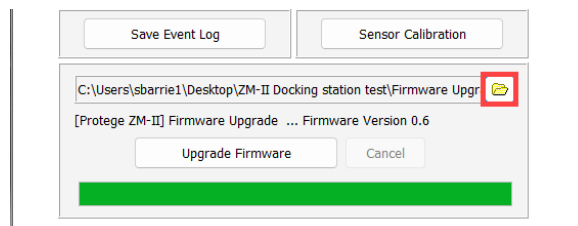


Figure 6-4: IR Connect - Firmware Upgrade

5. A successful upgrade is indicated by a green OK bar at the bottom of the application window, as illustrated in Figure 6-5.

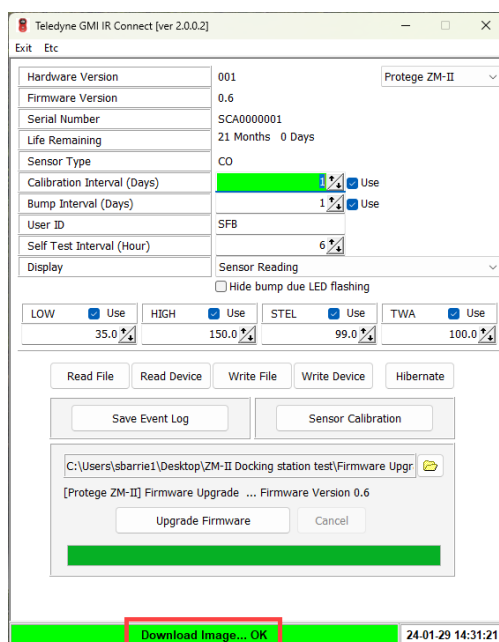


Figure 6-5: IR Connect - Successful firmware upgrade

6.6. Monitor Error Codes

Error Code	Cause	Solution
E01	Configuration memory corrupt	Press the button to acknowledge the error. Then reconfigure the device using the IR Connect.
E02	Gas memory corrupt	Press the button to acknowledge the error. Then reconfigure the device using the IR Connect. Calibrate the device.
E03	Program memory corrupt	Contact Teledyne GMI.
E05	Bad battery	Contact Teledyne GMI
E06	Bad sensor	Contact Teledyne GMI.

6.7. Troubleshooting



Caution: Repairs on the equipment should only be attempted by trained and qualified personnel.



Note: Do not move the monitor during the firmware upgrade.

Item	Symptom / Cause	Solution
IR Connect Software	Monitor Connect Error dialog box appears while trying to Read or Write to the Monitor and a Red Bar appears at the bottom.	• Make sure the monitor is positioned face down in front of the IR Connect, maintaining a distance of 1" to 2". • Check that the IR Port on the IR Connect is free from dirt or debris. • Ensure both the IR Connect and the Monitor are located in an area without high light levels, as bright light sources (such as a bright light bulb or direct sunlight) can interfere with IR connectivity.
	IR Connect is not Found Error dialog box appears while trying to Read or Write to the Monitor and a Red Bar appears at the bottom.	• Verify that the USB Cable is properly connected at both the PC and the IR Connect. • If the USB Cable connections are secure, uninstall and then reinstall the IR Connect Software.
	During a Write Device, a Write Protege ZM Information Dialog Box appears stating "Check sensor type and Alarm setting."	• Make sure that the sensor type and its corresponding settings displayed in the IR Connect software match the actual monitor you are attempting to configure.
	Dialog Box error appears during a READ. IR Connect is not found. IR Connect Re-Install driver (A)	• Ensure there is no damage to the USB Cable.

Item	Symptom / Cause	Solution
Test Station Software	Bump Test failed	• Confirm that the IR Connect is successfully communicating with the Test Station. • Check that both the Sensor Cavities and the Audible Alarm Cavities are free of dirt or debris. • Verify that the Calibration Gas level is appropriate. • Make sure the Test Station is not positioned in direct bright sunlight. • Attempt to use the Monitor again. If the Monitor fails three times, please get in touch with Teledyne GMI for further assistance.
	Red status Bar appears after READ or WRITE attempted	• Check that the Test Station is powered up. • Confirm that the USB Pen Drive is properly installed. • Check the USB Driver properties through the control panel for any errors. If an error is found, proceed to update the USB Driver.
	Red Status Bar appears during a WRITE with "No Memory Stick" message.	• Access the Main PCB and disconnect the Lithium Battery connector for approximately 10 seconds, then reconnect it. • Make sure to use a high-quality, branded USB memory stick in the Test Station to prevent future issues.
Test Station Hardware	Power LED does not lite up	• Confirm the AC power adapter connection. • Swap the relevant LED plug with other connections to determine if the applicable LED is faulty on the Main PCB.
	Power LED blinks	• Ensure USB memory stick is installed.

7. Accessories

Category	Part Number EMEA & APAC	Part Number Americas	Description
Monitor	2025956	074-0564	Calibration Cap / Adapter
	66118	096-3167	Tygon Tubing 3/16" ID , 10' length
	2025957	073-0355	Alligator belt clip
Calibration Station	2027001		Bump Test & Calibration Station
	2027003		Carry case for the Test Station
	2027002		Wall mount bracket for the Test Station
IR Connect	2025940	093-0588	IR Connect (incl. USB cable)
Calibration Gas	2019125	077-0018	Gas cylinder regulator 0.5 L/min
	2019127	077-0272	Single gas cylinder: H ₂ S (25ppm)
	99167	077-0246	Single gas cylinder: CO (100ppm)
	2026297	077-0039	Single gas cylinder: O ₂ (18% volume)
	99147	Call Sales	Single gas cylinder: SO ₂ (10ppm)
	99181	Call Sales	Combi gas cylinder: H ₂ S (25ppm) / CO (100ppm) /O ₂ (18% volume)

Appendix A: Specifications

Monitor Specifications	
Battery Life	2 years, 2 minutes of alarm time per day
Alarms	Visual, vibrating, audible 95dB
Test	Full function self-test on activation and every 20hours; Continuous automatic battery tests
Datalogg	Last 25 events
Housing	Impact Adsorbent Overmould
Dimensions	3.7"x2.2"x1.3" (94 x 56 x 33mm)
Weight	2.7oz (76g)
IS Temperature Range	H ₂ S & CO: -40 to +122°F (-40 to +50°C) O ₂ : -22 to +140°F (-30 to +60°C)
Operating Temperature Range	H ₂ S, CO and O ₂ : -4 to +122°F (-20 to +50°C) For values outside this temperature range, user may experience reduced performance or alarm functionality.
Operating Humidity	5% to 95% RH, Non-Condensing

Ranges				
Gas Type	Hydrogen Sulphide(H ₂ S)	Carbon Monoxide (CO)	Oxygen (O ₂)	Sulfur Dioxide (SO ₂)
Range	1 - 100 PPM	1 - 300 PPM	1 - 30% Vol	1 - 20 PPM
Resolution	1 PPM	1 PPM	0.1% Vol	0.1 PPM
Low Alarm	10 PPM	35 PPM	19.5% Vol	disabled
High Alarm	15 PPM	200 PPM	23.5% Vol	1 PPM
Calibration Gas	25 PPM	100 PPM	18% Vol	10 PPM



Note: The alarm set points are set to factory defaults. Users have the option to change these values using either the IR Connect software or the Test Station.

IR Connect Specifications

Range	2 to 16" (50 to 400mm)
Power	USB (5V)
Dimensions	1.5"x1.7"x1.1" (39 x 45 x 29mm)
Weight	0.7oz (20g)
Operating Temperature	50 to 104°F (10 to 40°C)
Operating Humidity	5% to 95% RH, Non-Condensing

Bump Test & Calibration Station Specifications

Test Performed	Bump Test & Calibration
Test Capacity	Up to four (4) monitors simultaneously
DC Battery	7.4VDC 2750mAh Lithium Ion
AC power adaptor	Input Voltage: 100 to 240VAC, 50/60Hz, 0.5A
Test Station DC	Input Power: 12VDC, 1.5A Max.
Bump Time	<30 seconds
Calibration Time	<2 minutes
Regulator Flow Rate	0.3 L/min
Pump Cycles per battery charge	750
Memory	Ships with a 16GB USB memory stick installed
Cal Gas Cylinders	Compatible with 34L, 58L or 103L cylinders. C10 Valve
Dimensions	20"x13.4"x4.5" (497 x 340 x 115mm)
Weight	17.2 lbs. (7.8kg) (without gas cylinder)
Operating Temperature	40 to 104°F (5 to 40°C)
Operating Humidity	10% to 90% RH, Non-Condensing

Appendix B: Gas Interferences

It is known that a limited number of chemical compounds can interfere with gas detection. Teledyne GMI endeavours to identify potential gas interferences that may affect gas sensors. However, it is important to note that not all existing chemical compounds have been tested for interference.

The table below provides a list of known toxic gas interferences.

Applied Gas	CO Monitor	H ₂ S Monitor	SO ₂ Monitor
Carbon Monoxide (CO)	1	< 0.02	0
Hydrogen Sulphide (H ₂ S)	0	1	< 0.02
Sulphur Dioxide (SO ₂)	0	< 0.15	1
Nitric Oxide (NO)	< 0.2	< 0.01	0.1
Nitrogen Dioxide (NO ₂)		< 0.1	-1
Hydrogen (H ₂)	< 0.3		0
Ethanol (C ₂ H ₅ OH)	< 0.01		
Ammonia (NH ₃)	0	0	0
Chlorine (Cl ₂)	< 0.06	0	<0.06
Ethylene (C ₂ H ₄)	1	0	
Acetylene (C ₂ H ₂)	0.9		< 3

The table illustrates how 1 ppm of an interference gas is detected by each specific monitor type. For example, 1 ppm of carbon monoxide (CO) registers as less than 0.02 ppm on an H₂S monitor.

A zero signifies no interferences, while no entry (blank) indicates that interference testing has not been conducted.

Caution: The above does not provide a complete guarantee against potential interferences, and it should not be assumed that no additional interferences can occur.



The selectivity ratios presented are intended solely as reference points and should not be employed as calibration factors. The actual cross-sensitivities for specific gas types may differ from the values presented in the table.

Appendix C: Technical Support

This product is designed to provide you with reliable, trouble-free service. Contact your regional technical support if you have technical questions, need support, or if you need to return a product. Details can be found at:

www.teledynegasandflamedetection.com



Note: When returning a product, contact Technical Support to obtain a Return Material Authorization (RMA) number prior to shipping.



TELEDYNE

GAS MEASUREMENT INSTRUMENTS

Everywhereyoulook™



AMERICAS
14880 Skinner Road
Cypress,
TX 77249, USA
Tel: +1-713-559-9200

EMEA
Inchinnan Business Park
Renfrew, PA4, 9RG
Scotland, UK
Tel.: +44 (0) 141 812 3211

ASIA PACIFIC
290 Guigiao Road
Pudang, Shanghai 201206
People's Republic of China
Tel.: +86-21-3127-6373



www.teledynegasandflamedetection.com