Safety Manual
00809-0200-4925, Rev AC
July 2024

Rosemount™ 925FGD Fixed Gas Detector

Safety Manual for Safety Instrumented Systems

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Contents

1 Before you begin

1.1 About this document

This document provides information about how to install, commission, and proof test a Rosemount 925FGD Fixed Gas Detector to comply with safety instrumented systems (SIS) requirements.

Important
This manual assumes that the following conditions apply:

- The transmitter has been installed correctly and completely according to the instructions in the transmitter Reference Manual and Quick Start Guide.
- The installation complies with all applicable safety requirements.
- The operator is trained in local and corporate safety standards.

Table 1-1: Revision History

Revision	Release date
AA	September 2021
AB	March 2023

1.2 About this product

The Rosemount 925FGD Fixed Gas Detector functions as part of an industrial flame and gas detection system. The 925FGD, when installed and commissioned correctly, can detect combustible hydrocarbon gases on a scale of 0 to 100% lower explosive limit (LEL).

The Rosemount 925FGD is a system consisting of the following sub-models:

- Rosemount 925 Universal Gas Transmitter
- Rosemount 625ND infrared combustible gas sensor
- 905 junction box (optional: provides transmitter/sensor separation up to 750 ft. [228.6 m])

The communication between the Rosemount 925 and 625ND models Modbus® RTU and 24 Vdc connection. The Rosemount 925 input is 24 Vdc and provides an output for status individuation and primary variables along analog 4-20 mA and relay connections.

Functional Safety testing was conducted, and SIL2 rating was applied to the following versions:

- Rosemount 925FGD hardware version: AC
- Rosemount 925FGD firmware version: 1:0045
- Rosemount 625ND hardware version: AC
- Rosemount 625ND firmware version: 1.0027

1.3 Related documents

You can find all product documentation at Emerson.com.

For more information, see the following documents:

- Rosemount 925FGD Fixed Gas Detector Reference Manual
- Rosemount 925FGD Fixed Gas Detector Quick Start Guide

2 Installation and commissioning

Use this section to install and commission a Rosemount 925FGD Fixed Gas Detector with SIS features.

Installation wiring considerations

Refer to the Rosemount 925FGD Reference Manual for specifications and recommendations for proper installation.

IEC 61508 relevant requirements

The Rosemount 925FGD is certified per the relevant requirements of IEC 61508 or the Route 2_H approach.

Systematic capability	Random capability
SIL2	• Type B low-demand device • SIL 2 @ HFT = 0

Failure rates according to IEC 61508 in FIT

FIT = 1 failure/10^9 hours

Table 2-1: Failure Rates with Good Maintenance Assumptions in FIT @ SSI = 2 for a Rosemount 925FGD

Components of Rosemount 925FGD	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
Rosemount 925 Universal Gas Detector Transmitter - current output	0	130	1164	120
Rosemount 925 Universal Gas Transmitter - relay output	683	131	633	120

SIS-certified firmware versions

Emerson maintains an SIS-compliant modification process. Changes made after initial release do not affect overall SIS certification.

You can view version information on the display at **Transmitter Settings** → **Transmitter Information**. You can also view version information on the handheld communicator or AMS at **Overview** → **Device Information** → **Revisions**.

Safety precautions

Prior to making any changes to the Rosemount 925FGD Fixed Gas Detector, such as changing the configuration or replacing the sensor, take appropriate action to avoid a false trip by electronically bypassing the safety Programmable Logic Controller (PLC).

Important
Ensure alternate means are in place to maintain the process in a safe state.

⚠ WARNING

If the transmitter is in a classified area, do not open the wiring compartment unless the power to the transmitter has been removed or unless the area has been declassified. Contact customer support for further information.

Prior to placing the transmitter online and removing the bypass from the safety PLC, verify the transmitter configuration and all safety parameters.

2.1 Set up the Rosemount 925FGD

Make sure the Rosemount 925FGD is installed and configured for SIS applications.

Prerequisites

To maintain complete safety functionality and prevent system failures, it is required that a compatible Rosemount 625ND sensor be connected to the Rosemount 925 transmitter and that the sensor is calibrated correctly according to the Rosemount 925FGD Reference Manual.

The sensor does not require special installation in addition to the standard installation procedures in the sensor Reference Manual.

Important
Only trained instrumentation technicians shall perform installation, commissioning, and maintenance procedures for the Rosemount 925FGD.

Upon initial installation and startup or following the replacement of the Rosemount 625ND Infrared Sensor, the transmitter prompts the operator with the factory default configuration settings currently stored in the sensor.

Procedure

1. Accept or modify the default settings.
   The transmitter prompts the operator to perform a field calibration of the device in accordance with the Rosemount 925FGD Reference Manual.
2. Acknowledge the prompt.
   Assuming no faults are present, the Rosemount 925FGD functions in normal operation mode.

2.2 Diagnostics

The Rosemount 925FGD has multiple diagnostic features related to detector operation and performance.

The detector performs each diagnostic at least every 30 minutes. If the diagnostics detect a device failure or fault condition, the detector will change the 4-20 mA analog output to 2.00 mA and relay outputs will de-energize if applicable. The Rosemount 925FGD Reference Manual provides a complete list of these diagnostics and corresponding changes.

2.3 Enable or disable software write-protection

The HART® software lock prevents changes to the transmitter configuration from all sources; all changes requested via HART by the Field Communicator, AMS Device Manager, or the LOI will be rejected. You can only set the HART lock via HART communication. You can enable or disable the HART lock with a Field Communicator or AMS Device Manager.

To enable HART lock:

Procedure

Go to **Configure** → **Manual Setup** → **SecurityLock/Unlock**.

2.4 Enable passcode protection

For added security, the transmitter has the screen lock enabled; a procedure sequence is required to unlock the screen. The screen lock is intended to prevent unintentional activation of any infrared buttons on the local operator interface (LOI); any personnel can unlock the screen.

For added security, you can replace the screen lock function with a four digit passcode to prevent unauthorized personnel from making any changes to the transmitter.

Procedure

1. To enable a passcode via LOI, go to **Menu** → ***Unlock Sequence*** → **Transmitter Settings** → **Security Settings** → **Enable Passcode**.
2. To enable the passcode via HART®, go to **Configure** → **Manual Setup** → **Security** → **Configure Passcode**.

2.5 Installation consideration

Below is a list of installation requirements for integrating the 925FGD in a Safety Instrumented System.

Safety Outputs	Available safety outputs are conventional 4-20 mA analog loop current or electromechanical relays in de-energize to trip mode. However, both safety outputs should not be used at the same time. **Note** The LCD display is NOT to be used as an output for safety critical operation
Control Systems	PLC and any application in a connected logic solver must be set up for monitoring of current loop to detect out-of-range values if analog output is the safety output. When using the alarm relay as the safety output, the fault relay output of the 925FGD will be monitored.
HART®	HART® protocol must only be used for service information and configration. The HART write protection must be enabled while operating in the safety mode.

2.6 Sensor effectiveness

For optimal gas detection effectiveness, there are additional considerations which should be taken in to consideration when designing your flame and gas detection system. For additional information on this, refer on the 925FGD Reference Manual.

3 Proof tests

Conduct proof tests, otherwise known as bump tests, of sensor modules using one of the gas delivery options described in Calibration options.

To conduct proof testing without changing any detector outputs, enable the Inhibit output feature. This feature can be found in the *Transmitter Settings* section of the LOI menu or via HART® communication.

Provide calibration gas to the sensor for approximately two seconds or until the primary variable displays a gas concentration equal to concentration of the calibration gas, within the acceptable accuracy tolerances.

3.1 Proof test 1

Emerson recommends the following comprehensive proof test to detect failures in the Rosemount 925FGD.

Proof test 1 has a DU failure detection rate of 48 percent. Since the SIL certificate is for the system, you can perform the following proof test.

Procedure

1. Bypass the safety function and take appropriate action to avoid a false trip.
2. Calibrate the Rosemount 625ND and 925 system as explained in the *Rosemount 925FGD* Reference Manual.
3. Bump the Rosemount 625ND and 925 system as explained in the *Rosemount 925FGD* Reference Manual.
4. Check the 4-20 mA analog output and the lower explosive limit (LEL) reading on the LCD display.
5. Check analog relay(s) status.
6. Inspect the system for any leaks, visible damage, or contamination.
7. Remove the bypass and restore normal operation.

4 Operating constraints

4.1 Reliability data

The Rosemount 925FGD:

- Has a specified safety deviation of two percent. Internal component failures are listed in the device failure rate if they will cause an error of two percent or greater.
- Reports an internal failure within 30 minutes of fault occurrence, worst case scenario.
- Generates a valid signal within 60 seconds of a power-on startup.

FMEDA report

The *Failure Mode, Effects, and Diagnostics Analysis* (FMEDA) report is used to calculate the failure rate. An FMEDA report for a Rosemount 925FGD contains:

- All failure rates and failure modes
- Common cause factors for applications with redundant devices that should be included in reliability calculations
- The expected lifetime of your gas detection transmitter and sensor, as the reliability calculations are valid only for the lifetime of the equipment

Obtain an FMEDA report from Emerson.com.

Environmental and application limits

See the sensor and detector Product Data Sheets for performance, environmental, and hazardous area limitations.

Using the gas detection transmitter and sensor outside environmental or application limits invalidates the reliability data in the FMEDA report.

4.2 Equipment upgrades

Only approved Rosemount personnel at a Rosemount manufacturing facility may perform field updates of firmware.

4.3 Report failures

Procedure

If you detect any failures that compromise safety, contact Rosemount customer service.

4.4 Replace or dispose of equipment

4.4.1 Replace equipment

If you need to replace hardware, purchase all spare parts from Emerson. Consult Rosemount Customer Care for additional information.

You cannot use customer-supplied components on any Emerson printed circuit assemblies.

Procedure

1. Replace the hardware.
2. Verify the transmitter configuration and all safety parameters.
3. Enable write-protection.

4.4.2 Dispose of equipment

Procedure

Follow the guidelines for equipment disposal as outlined in the *Rosemount 925FGD* Reference Manual.

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For more information: **Emerson.com/global**

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