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Rosemount® 5300 Series
High Transients and Emergency Shutdown (ESD) Installation Considerations

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This document is a supplement to the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

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1.1 Safety messages

Procedures and instructions in this section may require special precautions to ensure safety of personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

⚠ WARNING

Failure to follow these installation guidelines could result in death or serious injury.

Make sure only qualified personnel perform the installation.

Use the equipment only as specified in this manual. Failure to do so may impair the protection provided by the equipment.

Explosions could result in death or serious injury.

Verify that the operating environment of the transmitter is consistent with the appropriate hazardous locations certifications.

Before connecting a HART®-based communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.

Electrical shock could cause death or serious injury.

Use extreme caution when making contact with the leads and terminals.

⚠ WARNING

Any substitution of non-authorized parts or repair, other than exchanging the complete transmitter head or probe assembly, may jeopardize safety and is prohibited.

Unauthorized changes to the product are strictly prohibited as they may unintentionally and unpredictably alter performance and jeopardize safety. Unauthorized changes that interfere with the integrity of the welds or flanges, such as making additional perforations, compromise product integrity and safety. Equipment ratings and certifications are no longer valid on any products that have been damaged or modified without the prior written permission of Emerson Process Management. Any continued use of product that has been damaged or modified without prior written authorization is at the customer's sole risk and expense.

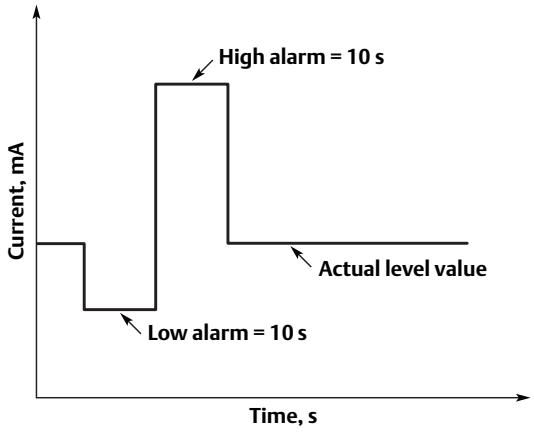
1.2 Installations with high transients for Ex “d” (Flameproof) units

In flameproof/explosion-proof installations, the energy barrier is built into the device, making the device more sensitive to ground potential differences and sudden voltage drops (might occur for example during lightning storms).

The function of the built-in barrier is to prevent excess energy from entering the device causing a breach of certification and causing damage to the electronics. This leads to a temporary drop in the voltage reaching the electronics and may cause a restart. More details on required power supply can be found in section “Maximum loop resistance” of the Rosemount 5300 Series Reference Manual (00809-0100-4530).

During start-up, the Rosemount 5300 by default outputs both low and high alarm for a short period, as shown in Figure 1-1. If measurement alarm has been set to low alarm, the high alarm period is removed and the low alarm period is stretched out for a total of 20 seconds.

Figure 1-1. Start-up sequence



If this behavior will cause issues in an installation, there are several ways to mitigate it as described in the following sections.

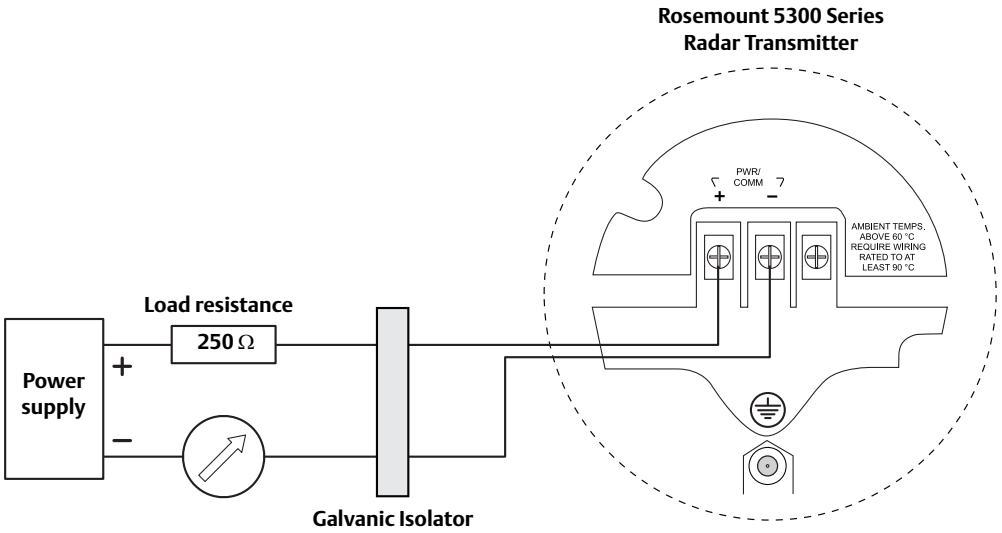
1.2.1 Grounding

Correct grounding will substantially reduce the effect caused by transients, but may not fully resolve a recurring problem. Refer to “Step 3: Connect the wiring” of the Rosemount 5300 Series Quick Installation Guide (00825-0100-4530) for a detailed explanation on how to properly ground the gauge.

1.2.2 Isolators

Installing isolators will create a galvanic separation in the circuitry, shield the barrier from any ground potential differences and make the installation much more robust.

Figure 1-2. Installation using external galvanic isolator



1.2.3 Alarm delay

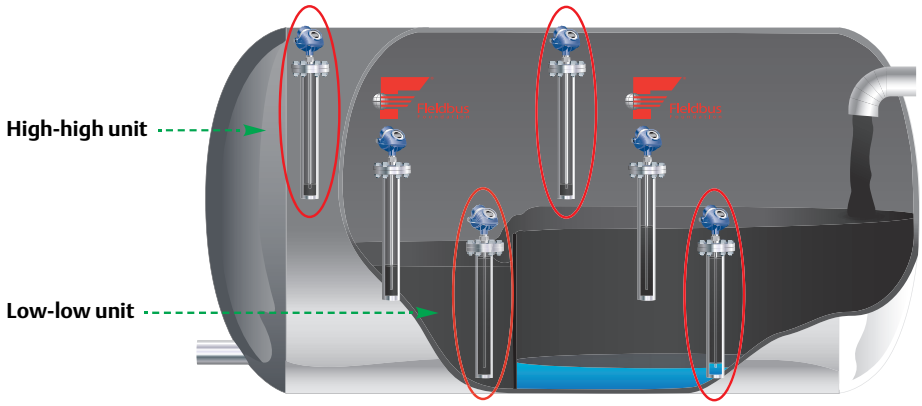
If isolators cannot be used, an alarm delay will mask out any start-up alarms caused by intermittent trips. A configured alarm delay must never be longer than your calculated process safety time. For most installations the alarm delay should be set to a value that is slightly longer than the entire start-up time.

1.3 Installation and configuration considerations for ESD systems

Figure 1-3 shows a common example of an Emergency Shutdown (ESD) system in a separator. High-high and low-low transmitters act as redundant safeguards. They will trigger emergency shutdowns or redirect flow of the application. In addition, there are one or several process control units that continuously measure and report the actual level in the tank to the host system and operators.

The high-high unit will always be empty during normal operation, and will indicate empty in the host system. The low-low unit will always be full during normal operation, and will indicate full in the host system as well.

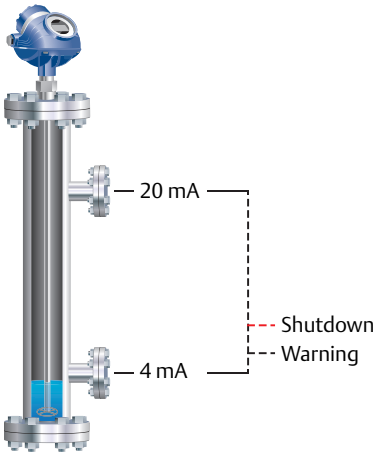
Figure 1-3. ESD system in a separator



1.3.1 High-high unit

The alarm levels must be located near the bottom inlet with considerable margin to the Blind Zones to ensure robust and accurate readings. Guidelines in the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530) are to be closely followed regarding alarm levels and handling disturbances in the near zone.

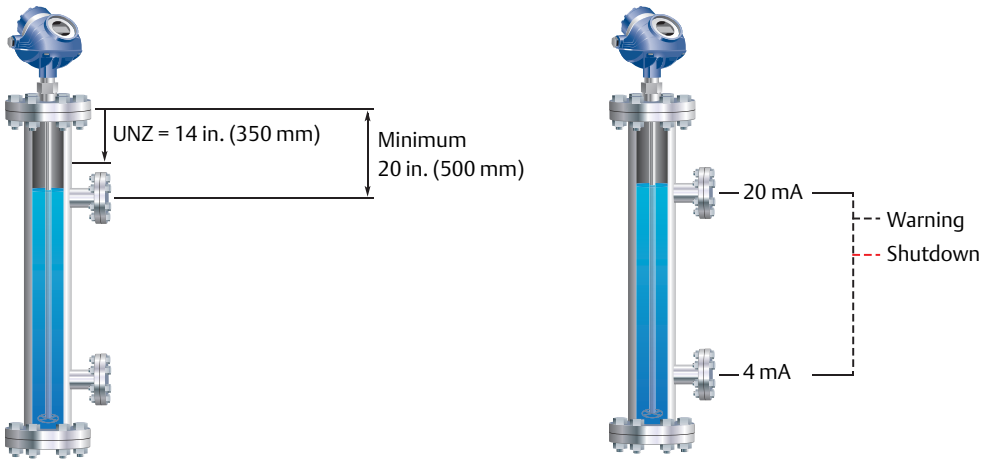
Figure 1-4. High-high unit



1.3.2 Low-low unit

The distance from flange to upper inlet must be at least 20 in. (500 mm). If this requirement is not met, a spool piece can be added. When the requirement of 20 in. (500 mm) is met, an Upper Null Zone (UNZ) of 14 in. (350 mm) must be configured, so that any disturbance in the near zone above the upper inlet is ignored.

Figure 1-5. Low-low unit



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