AN-307

Programming a Man Down Switch in Protege GX

Application Note

Last Published: 11-May-22 10:41 AM

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Introduction

A 'man down switch' is a safety mechanism that is commonly used in hazardous areas. If the area is occupied and no active movement or response is detected for a set period of time, an alarm is activated so that people on site, the monitoring station and emergency services are notified.

This feature is valuable in a variety of high risk situations, such as:

- Industrial premises where there is a risk of chemical inhalation or other hazards.
- Prisons, detention centers or psychiatric units, to monitor against suicide attempts in isolation units.
- Anywhere that employees may be working alone in a hazardous environment.

This application note describes how to program a man down switch in a specific area, using the sensor inputs already present in that area.

Overview

When an area is being monitored by a man down switch, the following process occurs when users are in the area:

- A user disarms the physical area. This causes the 'man down' area to automatically arm.
- As the user enters and moves around the room, they trigger inputs such as door contacts and PIRs. Alternatively, the user may be required to press a specific button at set intervals.
- When a relevant input is activated, an 'activity' virtual output is activated on a timer. Each time an input is activated the timer retriggers, so that the activity output will remain on while people are moving.
- If no inputs are activated before the timer expires, the activity output turns off.
- When the activity output turns off, a logic control programmable function causes the 'inactivity' virtual output to turn on.
- When the inactivity output turns on, an input follows output programmable function causes the 'inactivity' virtual input to open.
- If the inactivity input opens, the man down area goes into alarm. A siren is activated and events and reports are generated to alert guards and monitors that someone is in trouble.
- The alarm can be deactivated by disarming the man down area.
- The inactivity output and input are deactivated after a brief time. The man down area will always rearm as long as the physical area is disarmed. This ensures that man down monitoring is always reset.
- When all users have left and the physical area is armed, the man down area is disarmed to prevent the inactivity alarm from being activated when there is no one in the area.

Programming Scenario

For this scenario, we will program a man down switch to monitor the chemical storeroom in an industrial factory. In this room there is a risk of chemical spillage and inhalation of toxic gas. When there are people working in the storeroom, we want to activate an alarm if there is no motion for 5 minutes so that they can be rescued.

It is assumed that the Storeroom Area has already been configured for standard access control and intruder detection. This should include at least one door contact and one PIR for testing purposes.

The programming below must be repeated for each area that is using this feature.

Creating Virtual Outputs and Inputs

This programming will require a number of virtual outputs and inputs. You should create these now so that they are available when required.

1. If you do not already have virtual outputs available, navigate to **Expanders | Output expanders** and create a virtual output expander:
   - From the toolbar, select the **Controller** that will control these outputs, then click **Add**.
   - Ensure that the **Virtual module** option is enabled.
   - Set the **Physical address** to a value above existing physical expanders (e.g. 32). Click **Save**.
   - Disable **Add trouble inputs** and click **Add now**.
   - It is recommended that you navigate to **Programming | Outputs** and rename the resulting outputs so that they include the term Virtual or VO in their names.
2. Select three virtual outputs and give them the following names:
   - Storeroom Armed VO
   - Storeroom Activity VO
   - Storeroom Inactivity VO
3. In **Expanders | Input Expanders**, repeat the above process to create virtual inputs.

Programming the Man Down Area

For each physical area monitored by the man down switch, we require a corresponding man down area. When the physical area is disarmed, the man down area is armed, so that it can generate an alarm if there is inactivity in the area. When the last user leaves and arms the physical area, the man down area is disarmed to prevent the inactivity alarm from being activated when the area is no longer occupied.

There are three parts required for this programming:

- The physical Storeroom Area must have an armed output.
- A schedule must be created that is valid when the armed output is activated.
- A Storeroom Man Down Area must be created that follows the above schedule, so that it is armed when the physical area is disarmed, and vice versa.

Setting the Armed Output

The armed output is activated when the physical area is armed, and deactivated when it is disarmed.

1. Navigate to **Programming | Areas** and select the Storeroom Area. This is the physical area that represents the chemical storeroom.
2. In the **Outputs** tab, locate the **Armed Output** field. Click the ellipsis button **[...]** to open the output programming in a breakout window.

3. In the **Outputs** tab, set the **Armed Output** to Storeroom Armed VO.
4. Click **Save**.

Programming Tip: When you are configuring the physical area (the Storeroom Area in this example), it is recommended that the **Exit Delay** is not too long. This ensures that when a user leaves the area and arms it, there is time for the physical area to be armed and the man down area disarmed before the inactivity alarm is triggered, as demonstrated in the final testing steps (see page 9).

Creating the Arming Schedule

This schedule is operational at all times, but is qualified by the armed output. Therefore, it is only valid when the Storeroom Area is armed.

1. Navigate to **Sites | Schedules** and create a new schedule with the name Storeroom Armed Schedule.
2. In the **Periods** section, tick all days of the week in **Period 1**.
3. Set the **Holiday Mode** to Ignore Holiday.
4. In the **Options** tab, set the following:
   - **Validate Schedule if Qualify Output ON**: Enabled.
   - **Qualify Output**: Storeroom Armed VO.
5. Click **Save**.

Creating the Man Down Area

Finally, create the man down area, apply the arming schedule and configure other relevant settings.

1. Navigate to **Programming | Areas** and **Add** a new area called Storeroom Man Down Area.
2. In the **Configuration** tab, configure the following settings:
   - The **Exit Time** should be set to 0 so that the area can be armed without delay.
   - Set the **Alarm 1 Time** as required for the bell output.
   - Set the **Arm/Disarm Schedule** to the Storeroom Armed Schedule created above.
   - Enable both **Disarm Area when Schedule Starts** and **Arm Area when Schedule Ends**.
3. In the **Outputs** tab, set a **Bell Output** that will be activated when there is no activity.
4. In the **Options (2)** tab, enable the **Always Verify Area Schedule** option. This ensures that the man down area will always rearm if the physical area is disarmed.

   The area checks the Arm/Disarm schedule every minute. Therefore, there will be up to a one minute delay between the Storeroom Area arming and the Storeroom Man Down Area disarming.
5. Click **Save**.

Optional: You may wish to add this area to one or more area groups, so that users can disable the man down alarm from a keypad.

Programming the Sensor Inputs

In the storeroom, there are some physical sensor inputs that are used for normal door control and intruder monitoring, such as door contacts and PIR inputs. It is expected that these inputs are already programmed into the physical Storeroom Area with appropriate input types (e.g. Instant, Delay).

These inputs can also be programmed into the Storeroom Man Down Area with a different input type, allowing them to be used for monitoring activity while there are legitimate users in the room. This input type will activate a virtual output for a certain length of time when any input in the room is opened, and reset the output activation time if another input is opened.

1. Navigate to **Programming | Input Types** and create a new input type with the name Activate Storeroom Activity Output.
2. Set the **Control Output Time** to 300 seconds (i.e. 5 minutes). This is the length of time permitted with no movement before the man down area goes into alarm.
3. Set the **Control Output** to Storeroom Activity VO.
4. In the **Options (1)** tab, enable the **Force Input** option. This allows the man down area to be rearmed even when there are inputs open.
5. In the **Options (2)** tab, enable **Activate Control Output on Alarm** and **Input Retriggers Output Time**.

   Do not enable any options related to generating alarms or reporting.
6. Click **Save**.
7. Navigate to **Programming | Inputs**. Select all of the physical inputs in the Storeroom Area that will be used for monitoring activity in the area, including the door contact and any PIR inputs.

   You can use **Shift + Click** or **Control + Click** to select multiple records.

   This should not include the virtual inputs programmed above.
8. In the **Areas and Input Types** tab, all of these inputs should already have **Area 1** set to the Storeroom Area. Set the following:
   - **Area 2**: Storeroom Man Down Area
   - **Input Type 2**: Activate Storeroom Activity Output
9. Click **Save**.
10. The controller will generate a health status message informing you that you need to fully disarm the Storeroom Man Down Area (including the 24HR portion) and rearm to implement the programming.

When any of these inputs is opened (e.g. when a worker moves in front of a PIR), the Storeroom Activity VO will be activated for 5 minutes. If another input opening is detected, the timer will be reset for another 5 minutes.

Programming the Inactivity Alarm Input

The inactivity alarm input is a virtual input which is controlled by a programmable function. When the Storeroom Activity VO **turns off** (i.e. there is no motion detected for 5 minutes), this input is opened and generates an alarm in the Storeroom Man Down Area.

1. Navigate to **Programming | Inputs** and select one of the virtual inputs created above (see page 5). Give it the name Storeroom Inactivity VI.
2. In the **Areas and Input Types** tab, set the following:
   - **Area 1**: Storeroom Man Down Area
   - **Input Type 1**: Instant
3. Click **Save**.
4. The controller will generate a health status message informing you that you need to fully disarm the Storeroom Man Down Area (including the 24HR portion) and rearm to implement the programming.

Any input type that generates an alarm can be used for this programming. For example, you may wish to give users a warning period before the man down alarm is activated. In this case, you would use the Delay input type.

Creating the Programmable Functions

Two programmable functions are required to activate the Storeroom Inactivity VI when there is inactivity. The first programmable function creates a Storeroom Inactivity VO that turns on briefly when the Storeroom Activity VO turns off. The second programmable function causes the Storeroom Inactivity VI to be opened when the Storeroom Inactivity VO turns on.

Activating the Inactivity Output

1. Navigate to **Automation | Programmable Functions**, select the **Controller** from the toolbar and add a new programmable function.
2. Name the record Pulse On Storeroom Inactivity VO or similar.
3. Set the **Type** to Logic Control.
4. In the **Logic Control** tab, set the following:
   - **Logic Function Mode**: 4 - Follow Pulse Off First Output
   - **First Output to Check**: Storeroom Activity VO
   - **Output to Control**: Storeroom Inactivity VO
5. We want the Storeroom Inactivity VO to deactivate after a brief time, so that the man down monitoring resets after an alarm. Click the ellipsis **[...]** button next to **Output to Control** to open the output programming in a breakout window.
6. Set the **Activation Time** to 5 seconds, then click **Save**.
7. Close the breakout window, then click **Save** for the programmable function.

Opening the Inactivity Alarm Input

1. In **Automation | Programmable Functions**, select the **Controller** from the toolbar and add a new programmable function.
2. Name the record Activate Storeroom Man Down Alarm or similar.
3. Set the **Type** to Input Follows Output.
4. In the **Input Follows Output** tab, set the following:
   - **Input Follows Output**: Storeroom Inactivity VI
   - **Output to Follow**: Storeroom Inactivity VO
   - **Log Input Events**: Enabled
5. Click **Save**.
6. Wait for the programming to be downloaded to the controller, then right click and **Start** both programmable functions.

Testing the Programming

To test the programming, we will simulate a worker disarming the chemical storeroom area and entering through the door. They trigger a PIR as they walk around the room, then stay still for a length of time. If the configuration is correct, the man down area should go into alarm.

It is recommended that you review this testing process using a status page or floor plan that displays the events, areas, inputs and outputs in use.

Before you begin, check for any health status messages instructing you to disarm and rearm the Storeroom Man Down Area (including the 24HR portion). This ensures that the input programming is active.

1. Disarm the Storeroom Area by any method. The Storeroom Armed VO should turn off, and the Storeroom Armed Schedule should become invalid.
2. After a delay of up to one minute, the Storeroom Man Down Area will be force armed.
3. At this stage, if no action is taken, there should be no further movement. The man down processing is only initiated when an input is opened (i.e. when there is someone in the room).
4. Badge at the entry reader or press a REN button, then open and close the door. When the door contact is opened, the Storeroom Activity VO will be activated on a timer.
5. Open a PIR input as the worker moves past a motion detector. The Storeroom Activity VO will be activated again and the timer will be reset.
6. Wait for the 5 minute timer to elapse without opening any more inputs. The Storeroom Activity VO will turn off.
7. The first programmable function will cause the Storeroom Inactivity VO to turn on.
8. The second programmable function will cause the Storeroom Inactivity VI to open. The alarm will be activated in the Storeroom Man Down Area.
9. After 5 seconds, the Storeroom Inactivity VO and Storeroom Inactivity VI will both be activated. The Storeroom Man Down Area should remain in an alarm state.
10. Silence the alarm by disarming the Storeroom Man Down Area. Within 1 minute, it will be rearmed again.
11. To simulate the worker leaving the area, badge out and open and close the door contact again. The Storeroom Activity VO will turn on.
12. Immediately arm the Storeroom Area again. The Storeroom Armed VO should turn on, and the Storeroom Armed Schedule should become valid. After a delay of up to 1 minute, the Storeroom Man Down Area will be disarmed.
13. When the Storeroom Activity VO is deactivated by the timer, the Storeroom Inactivity VO and Storeroom Inactivity VI will be activated. However, since the Storeroom Man Down Area is disarmed, this will not cause an alarm.

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