



AN-240

Function Codes in Protege GX

Application Note



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Introduction

The function codes feature in Protege GX provides the ability to program a function - such as arming an area or activating an output - that can be activated by authorized users from a card reader with a PIN pad. Any manual commands that are available in the Protege GX software can be achieved using function codes.

Function codes are assigned to the doors and the associated readers (entry, exit or both) from which they can be activated. At the reader, the user enters the specified digit (0-9) and presses **[ENTER]**, then completes the door's credential sequence to activate the function.

If you are using ICT readers with RGB LEDs and RS-485 wiring you can also program unique acknowledgement LED colors to indicate whether the function has succeeded or failed.

Common scenarios where a function code may be used include:

- Cleaners enter a function code to disarm an area and set the doors to unlock latched, allowing them to move around freely within the area without needing to enter credentials at each internal door.
- A user enters a function code to turn all lights in a building on or off.
- Gym staff enter a function code to open all lockers for inspection.
- A user enters a function code to shut down a whole building at the end of the day.

Note: The user must be authorized to perform the commands configured within the function code. i.e. If the user does not have access to unlock the door or disarm the area the function code will not complete those actions.

This application note provides the steps required to create a function code, assign it to a door, and initiate the function code at a reader. It also includes a programming example for a scenario of shutting down a building.

Prerequisites

Software Requirements

Software	Version
Protege GX software	4.2.201 or higher

Hardware Requirements

The following Protege modules support this functionality.

Component	Version	Notes
Protege GX Controller	2.08.844 or higher	The controller minimum firmware is required for function codes to operate, even if the function code is initiated via a reader expander.
Protege Reader Expander	1.12.520 or higher	To initiate a function code at a reader connected to a reader expander this minimum firmware is required.
tSec Reader	N/A	LED colors are only available for readers with RGB LEDs. For assistance identifying reader hardware, see Application Note 270: Identifying the Hardware on a Card Reader.

Programming Function Codes

Create the Function Code

1. Navigate to **Sites | Function codes** and add a function code with a descriptive **Name**.
2. Select the **Digit** (0-9) that will be used to initiate this function code. An authorized user can press this number followed by the **[ENTER]** key, then complete the door's credential sequence to activate the function code.
It is possible to create multiple function codes with the same digit. However, Protege GX will not allow multiple function codes with the same digit to be assigned to a door.

When using function codes you should confirm that no users have a single-digit PIN assigned.

3. Assign reader LED colors to display the status of the function code.

LED colors are only available for readers with RGB LEDs.

- **Start of function LED color:** The color which the reader LED will display to indicate that the function code has been initiated. This can be used to prompt the user to enter their credentials.
- **End of function success LED color:** The color which the reader LED will display to indicate that the function code has been completed successfully.
- **End of function failure LED color:** The color which the reader LED will display to indicate that the function code has failed to complete. For example, this color will be displayed if the user fails to enter a correct credential sequence.

4. Click **Add** to assign **Actions** to the function code, with the following options:

- **Device type:** Select from Door, Area or Output.
- **Name:** Select the specific device that will perform the action.
- **Action:** The available actions correspond to those available as manual commands when right clicking on a device record. For more information on specific options, see the corresponding Manual Commands section in the Protege GX Operator Reference Manual.

Then click **OK**.

5. **Allow unauthorized:** When this option is enabled, no credentials will be required to activate the function code. By default, the credentials set in the door's door type are required to activate a function code, but with this option selected a user can simply enter the assigned digit and press **[ENTER]** to activate.

If this option is enabled the event log will not indicate which user has activated the function code.

6. **Schedule:** The function code can only be used when the selected schedule is valid. If the schedule is invalid the reader will indicate that the function code has failed (using the **End of function failure LED color** and a long beep). To allow the function code to be activated at any time, set the schedule to *Always*.
7. **Timeout:** The length of time (in seconds) that the reader will wait for the user to enter their credentials after pressing the **[ENTER]** key. If no credentials are entered during this time the reader will indicate that the function code has failed (using the **End of function failure LED color** and a long beep).
8. Click **Save**.

When using the Arm function to arm an area, the area may fail to arm if any inputs in that area are open. To arm the area using this function, ignoring the state of any inputs during the arming process, enable the **Use unattended brute force arming** option under **Areas | Options (1) | General options**.

Assign the Function Code to Doors

The function code must be assigned to the required doors so that it can be activated from the associated readers.

1. Navigate to **Programming | Doors | Function codes**.
2. Select the door where the function code can be activated, then click **Add** to display the Function Codes list.
3. Select the function code and click **OK**.
4. Set the **Direction** to specify which reader(s) can be used to activate the function code: Entry, Exit or Entry/Exit.
5. Click **Save**.

Assign the Doors to Reader Expanders

For sites using third-party and OSDP readers which require a smart reader record for configuration, the door that the reader controls will also need to be assigned to the reader port that the reader is physically connected to.

Function codes will not operate correctly from a reader where the **Reader 1/2 door** in the connected port's reader expander record is <not set>.

1. Navigate to **Expanders | Reader expanders** and select the reader expander record of the module that the reader is connected to.
2. Select the **Reader 1/2** tab for the reader port that the reader is physically connected to.
3. Set the **Reader 1/2 door** to the door controlled by the reader.
4. Click **Save**.

Entering a Function Code at a Reader

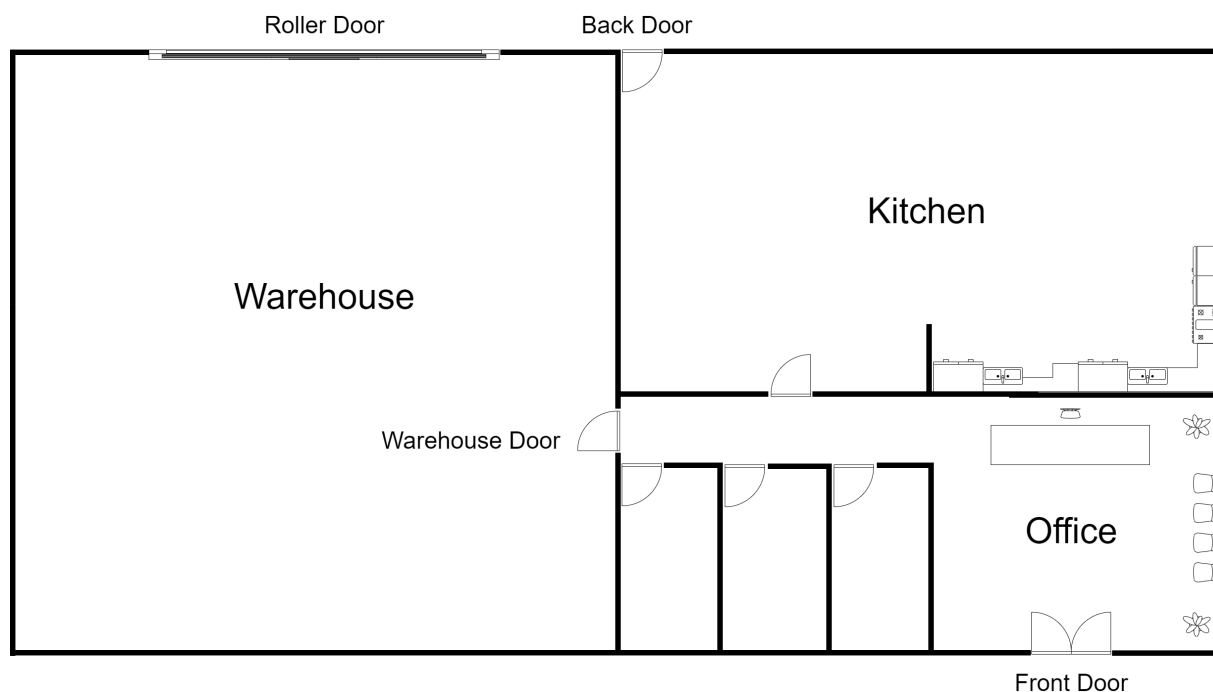
Function codes can only be activated at readers associated with doors that have the programming assigned.

1. Enter the single-digit code then press the **[ENTER]** key at the card reader PIN pad of a programmed door.
If the function code is invalid (e.g. invalid code, invalid schedule, or not assigned to the door), the reader will sound a long beep and display the 'End of Function Failure' LED color (if available).
2. Wait for acknowledgment from the reader. The reader will beep three times and display the 'Start of Function' LED color (if available).
3. Provide the required credential sequence (card, PIN, card + PIN, or other credential sequence) within the defined time period. If the credential sequence ends with a PIN, remember to press **[ENTER]**.
4. Wait for acknowledgment from the reader. The reader will beep twice and display the 'End of Function Success' LED color (if available). This indicates that the function code action has been activated.

If the function code activation fails (e.g. invalid credential or expired timeout period), the reader will sound a long beep and display the 'End of Function Failure' LED color (if available).

Programming Example

In this programming example we will configure a typical shut down scenario where a building will be secured by the last person leaving at the end of the day using a single function code. All access doors will be locked and areas armed, internal lights will be turned off and security lights turned on.



Requirements

The following doors need to be locked to secure against access and internal movement through the warehouse.

- Front door
- Back door
- Warehouse door
- Warehouse roller door

Internal areas will need to be armed:

- Office
- Kitchen
- Warehouse

The lighting banks need to be turned off:

- Office lights
- Kitchen lights
- Warehouse lights

Finally, the front and rear security lights need to be turned on. We will also activate the carpark lights for 5 minutes so that our diligent employees can find their cars when they leave.

Any outputs can be programmed to turn off, on, or activate for a timed period. This could include things like external gates, signs or watering systems.

Scenario Programming

Before You Begin

To test this programming scenario you will need an operational Protege GX system with at least one controller online and a connected card reader with PIN pad, configured for the front door.

The following records must be programmed before you begin:

- **Doors:** Front Door, Back Door, Warehouse Door, Warehouse Roller Door
- **Areas:** Office, Kitchen, Warehouse
- **Outputs:** Office Lights, Kitchen Lights, Warehouse Lights, Security Lights, Carpark Lights
- **Schedule:** Shut Down (5pm-10pm M-F)
- **User:** Donny D (with a valid credential and access assigned)

The user must have the required access to perform the function code actions. The function code checks the user's access level and will not complete any actions that the user would not have permission to perform directly.

Create The Function Code

1. Navigate to **Sites | Function codes** and add a function code called Building Shut Down Function.
2. Select 8 as the **Digit** that will be used to initiate this function code.
3. Assign the reader LED colors:
 - Set the **Start of function** to Orange to indicate initiation of the function code action.
 - Set the **End of function success** to Green to indicate successful completion of the function code action.
 - Set the **End of function failure** to Red to indicate that the function code action has failed.
4. Add the actions to lock the doors.
 - Click **Add**.
 - Set the **Device type** to Door.
 - Select the Front Door record.
 - Set the **Action** to Lock.
 - Click **OK**.
 - Repeat for the Back Door, Warehouse Door and Warehouse Roller Door records.
5. Add the actions to arm the areas.
 - Click **Add**.
 - Set the **Device type** to Area.
 - Select the Office record.
 - Set the **Action** to Arm.
 - Click **OK**.
 - Repeat for the Kitchen and Warehouse area records.
6. Add the actions to turn the lights off.
 - Click **Add**.
 - Set the **Device type** to Output.
 - Select the **Controller** the output is associated with.
 - Select the Office Lights record.
 - Set the **Action** to Deactivate.
 - Click **OK**.
 - Repeat for the Kitchen Lights and Warehouse Lights output records.
7. Add the action to turn the security lights on.

- Click **Add**.
 - Set the **Device type** to Output.
 - Select the **Controller** the output is associated with.
 - Select the Security Lights record.
 - Set the **Action** to Activate.
 - Click **OK**.
8. Add the action to turn the carpark lights on for 5 minutes.
 - Click **Add**.
 - Set the **Device type** to Output.
 - Select the **Controller** the output is associated with.
 - Select the Carpark Lights record.
 - Set the **Action** to Activate timed.
 - Set the **Time (seconds)** to 300 (5 minutes).
 - Click **OK**.
 9. Leave the **Allow unauthorized** option disabled. We only want users to be able to perform the shut down function with valid credentials.
 10. Select the Shut Down **Schedule**.
 11. Set the **Timeout** to 5 (seconds) to allow the user to enter their credentials after pressing the **[ENTER]** key.
 12. Click **Save**.

Assign The Function Code to the Door

In our scenario we only want to allow users to shut down the building when exiting the front door.

1. Navigate to **Programming | Doors | Function codes** and select the Front Door record.
2. Click **Add**, select the Building Shut Down Function created above, and click **OK**.
3. Because the front door will lock once the function code is activated, the user must be outside before initiating the shut down. Set the **Direction** to Entry to enable the function code for the outside card reader only.
4. Click **Save**.

Testing the Function Code

Once the function code is correctly configured and assigned to the door we can test the operation.

Before You Begin

To prepare for testing, ensure that all items are in their expected state:

- Front Door, Back Door, Warehouse Door and Warehouse Roller Door: Unlocked latched
- Office, Kitchen and Warehouse areas: Disarmed
- Office Lights, Kitchen Lights and Warehouse Lights outputs: On
- Security Lights and Carpark Lights outputs: Off

Initiate the Function Code

1. At the front door entry reader PIN pad, press **8** then the **[ENTER]** key.
2. Wait for acknowledgment from the reader. The reader will beep three times and display the 'Start of Function' LED color (if available).
3. Within 5 seconds, present or enter Donny D's credential at the reader.
4. Wait for acknowledgment from the reader. The reader will beep twice and display the 'End of Function Success' LED color (if available).

Review the Events

The following events should be generated as the function code actions are completed.

1. The doors will be locked.
User Donny D (UN1) Locked Door Front Door (DR1)
User Donny D (UN1) Locked Door Back Door (DR2)
User Donny D (UN1) Locked Door Warehouse Door (DR3)
User Donny D (UN1) Locked Door Warehouse Roller Door (DR4)
2. The areas will begin to arm.
Area Office Area (AR1) Arming Started by Donny D (UN1) At Front Door (DR1)
Area Kitchen Area (AR2) Arming Started by Donny D (UN1) At Front Door (DR1)
Area Warehouse Area (AR3) Arming Started by Donny D (UN1) At Front Door (DR1)
3. The interior lighting outputs will be deactivated.
Output Office Lights (1) Off By Donny D (UN1)
Output Kitchen Lights (2) Off By Donny D (UN1)
Output Warehouse Lights (3) Off By Donny D (UN1)
4. The security lights output will be activated.
Output Security Lights (4) On By Donny D (UN1)
5. The carpark lights output will be activated for 5 minutes.
Output Carpark Lights (5) On Timed By Donny D (UN1)
6. The areas will complete arming.
Area Office Area (AR1) Armed by Donny D (UN1) At Front Door (DR1)
Area Kitchen Area (AR2) Armed by Donny D (UN1) At Front Door (DR1)
Area Warehouse Area (AR3) Armed by Donny D (UN1) At Front Door (DR1)
7. The carpark lights output will stop timed activation after 5 minutes.
Output Carpark Lights (5) Off TIMER

Failure Events

Following are examples of events which may be generated if the function code fails to complete successfully.

1. End of function failure - incorrect PIN credential presented at the reader.

```
User INVALID USER PIN Not Valid Using Port Port 1 In Keypad Input
```

Note: There is no event generated if the user fails to complete the door's credential sequence within the defined timeout period.

2. Area fails to arm due to an open input.

```
Input Kitchen PIR 2 (ZN22) Tamper  
Area Kitchen Area (AR2) Arming Failure by Donny D (UN1)  
Area Kitchen Area (AR2) Arming Cancelled by Donny D (UN1) At Front Door  
(DR1)
```

To arm the area using this function, ignoring the state of any inputs during the arming process, enable the **Use unattended brute force arming** option under **Areas | Options (1) | General options**.

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