Application Note AN505E

Using the Refrigerator/Freezer Guard as a Vaccine Monitoring System

Disclaimer

This document is not intended to act as a substitute for the recommendations of the manufacturers of the biologics or your local Department of Health or supervising organization.
Actual temperature limit recommendations should be obtained from the package insert included with each different biological or per the manufacturers' advice.
The temperature limit examples used here of 35° – 46°F (2° – 8°C) for refrigerators and below +5°F (-15°C) for freezers are based on recommendations of the Centers for Disease Control[i].

Table of Contents

Installation

Refrigerator/Freezer Guard Placement

The Refrigerator/Freezer Guard should be placed in a location that is kept at room temperature, has access to an active analog telephone line, and is in a convenient location to wire to your vaccine storage refrigerators and freezers.
Please see the Refrigerator/Freezer Guard Manual and Installation Instructions for detailed installation instructions.

Sensor Placement

Placement of the temperature sensor is the key to correctly measuring the temperatures that your vaccines are being store at.
Place the sensor as close as possible to the vaccines stored within the refrigerator or freezer.
The ACI/1K-2W-BP-V, Bullet Probe Sensor in Vial, is recommended to more simply locate the sensor adjacent to stored vaccines. The vial will average the temperature and more closely represent the temperature of the vaccines.
If placing the sensor directly adjacent to the stored vaccines is not possible, the sensor must at least be placed at the same level as the vaccines.

Post Installation Temperature Calibration/Verification

After installation of the temperature sensors and prior to programming the temperature alarm limits, it is important to verify and if necessary calibrate the temperature readings to remove any errors due to extension wire length. For DCP-E or Molly30x options, you can download and follow the procedure at http://www.temperatureguard.com/documentation.htm . For other models the procedure is in the user manual.

Using the Refrigerator/Freezer Guard as a Vaccine Monitoring System

Programming the Refrigerator/Freezer Guard

Using Cold Storage Location Identification Messages

Using the Unit Identification Message

The Unit Identification Message should be recorded to allow persons receiving the telephone call to understand what the nature of the call is and where the problem is occurring.
An example of a suitable Unit Identification Message is “Springfield Pediatrics Vaccine Temp Monitor”.
This message is the first thing played by the Refrigerator/Freezer Guard during an alarm notification call.

To record the Unit Identification Message:

Call the telephone number that the Refrigerator/Freezer Guard is connected to
The Refrigerator/Freezer Guard will play “*Enter your PIN number*”
Enter the “Full Access” PIN
The Refrigerator/Freezer Guard will play the Main Menu options, “*Press 1 for status, 2 to setup limits, 3 to program, or 0 to hang up.*”
Press 3
The Refrigerator/Freezer Guard will play the Program Menu options, “*Press 1 to set telephone numbers, 2 to set local ID, 3 to record a message, 4 to set number of rings, 5 to change PIN number, or 0 to exit.”*
Press 3
The Refrigerator/Freezer Guard will play “*Press 1 to change*”
Press 1
You will hear a tone
Begin speaking after the tone. The Refrigerator/Freezer Guard will record your voice for about 4 seconds.
You will hear the tone again, marking the end of your message.
You will hear the Unit Identification Message you just recorded.

About the Sensor Identification Message

Each refrigerator or freezer that is being monitored should have its respective Sensor Identification Message recorded to exactly specify a cold storage unit.
An example of a suitable Sensor Identification Message is “fridge in room 102”.
This message is used by the Refrigerator/Freezer Guard each time the status of a sensor is played.

The Sensor Identification Message and Temperature Limits are programmed at the same time so the instructions have been combined. See the instructions below.

About Temperature Limits

Each refrigerator that is being used to store vaccines that are to be kept between 35° and 46°F should have its sensor lower temperature limit set to 35°F and upper temperature limit set to 46°F.
Each freezer that is being used to store vaccines that are to be kept below 5°F should have its sensor upper temperature limit set to 5°F. Temperature limits can be set to .1 degree.
Each sensor has a callout time delay that allows alarms to be suppressed until the temperature of the refrigerator or freezer has been out of limits for a set period of time. The purpose of this is to eliminate

alarms due to regular use of refrigerators or freezers.
The time delay examples used here of 5 minutes is a safe basic starting point. This time delay may need to be increased to better suit your situation.

Recording the Sensor Identification Message and Setting Temperature Limits

Call the telephone number that the Refrigerator/Freezer Guard is connected to
The Refrigerator/Freezer Guard will play "*Enter your PIN number*"
Enter the "Full Access" PIN
The Refrigerator/Freezer Guard will play the Main Menu options, "*Press 1 for status, 2 to setup limits, 3 to program, or 0 to hang up.*"
Press 2
The Refrigerator/Freezer Guard will play "*Enter Sensor Number*"
Enter the number of the sensor that is in the refrigerator or freezer you are monitoring.
The Refrigerator/Freezer Guard will play "*Sensor X message is …, press 1 to change"*
Press 1
You will hear a tone
Begin speaking after the tone. The Refrigerator/Freezer Guard will record your voice for about 2 seconds.
You will hear the tone again, marking the end of your message.
You will hear the Sensor Identification Message you just recorded.
The Refrigerator/Freezer Guard will play *"Sensor X lower limit is minus 100 degrees, press 1 to change."*
Press 1
The Refrigerator/Freezer Guard will play "*Enter number then press pound*"
Enter the lower temperature limit for this sensor

- For a sensor in a refrigerator, enter 35#. This will program the lower limit to 35°F.
- For a sensor in a freezer, enter *100#. This will program the lower limit to -100°F, since colder is not typically a problem with freezer stored vaccines. See the manual for setting .1 degree limits.

The Refrigerator/Freezer Guard will play the value you entered to confirm. Verify that it is correct.
The Refrigerator/Freezer Guard will play *"Sensor X upper limit is 100 degrees, press 1 to change."*
Press 1
The Refrigerator/Freezer Guard will play "*Enter number then press pound*"
Enter the upper temperature limit for this sensor

- For a sensor in a refrigerator, enter 46#. This will program the upper limit to 46°F.
- For a sensor in a freezer, enter 5#. This will program the upper limit to 5°F.

The Refrigerator/Freezer Guard will play the value you entered to confirm. Verify that it is correct.
The Refrigerator/Freezer Guard will play "*Callout time delay is 0 minutes*, *press 1 to change."*
Press 1
The Refrigerator/Freezer Guard will play "*Enter number then press pound*"
Enter 5#. This will program a time delay of 5 minutes before the alarm buzzer is activated.
(By default the Refrigerator/Freezer Guard waits an additional 2 minutes after the alarm buzzer is activated before making alarm notification calls to give onsite staff time to react to the alarm)
The Refrigerator/Freezer Guard will play the value you entered to confirm. Verify that it is correct.

Using the Refrigerator/Freezer Guard as a Vaccine Monitoring System

About Door Open Alarms

Use of a door open alarm is recommended. Doors being left open are a frequent cause of temperature related vaccine storage problems. Problems can be quickly eliminated by connecting a door sensor to the Refrigerator/Freezer Guard. If a door is left open the Refrigerator/Freezer Guard will turn on its alarm buzzer and indicate the door open status on the display. If the door is not closed within 2 minutes, alarm notification calls will be made.

Enabling Door Open Alarms

Call the telephone number that the Refrigerator/Freezer Guard is connected to.
The Refrigerator/Freezer Guard will play "*Enter your PIN number*"
Enter the "Full Access" PIN
The Refrigerator/Freezer Guard will play the Main Menu options, "*Press 1 for status, 2 to setup limits, 3 to program, or 0 to hang up.*"
Press 2
The Refrigerator/Freezer Guard will play "*Enter Sensor Number*"
Press 9
The Refrigerator/Freezer Guard will play "*Door callout time delay is 0 minutes, press 1 to change*"
Press 1
Enter 2#. This will program a time delay of 2 minutes before the alarm buzzer is activated. (By default the Refrigerator/Freezer Guard waits an additional 2 minutes after the alarm buzzer is activated before making alarm notification calls to give onsite staff time to react to the alarm)
The Refrigerator/Freezer Guard will play the value you entered to confirm. Verify that it is correct.

About Alarm Reminder Calls

Use of Alarm Reminder Calls is highly recommended to ensure that problems are resolved and not merely acknowledged and forgotten.

Without Alarm Reminder Calls enabled the Refrigerator/Freezer Guard would cease alarming regarding an alarm condition after the PIN has been entered or the Cancel Alarm button has been pressed. Even if the problem is never fixed, the Refrigerator/Freezer Guard will not alert you to the problem.

With Alarm Reminder Calls enabled, the Refrigerator/Freezer Guard will resume alarming after the preset time has expired without a resolution to the problem.

Examples:

<u>Scenario 1 "Without Alarm Reminder Calls Enabled"</u>
Sensor 1 is installed inside a vaccine storage refrigerator.
Lower temperature limit is set to 35°F.
Upper temperature limit is set to 46°F.
Time delay is set to 10 minutes.
The temperature of the refrigerator rises to 47°F and stays there for 11 minutes.
The buzzer turns on.

The office is closed, so the Cancel Alarm button is not pressed within 2 minutes and alarm notification calls begin.
Contact person #1 receives an alarm notification call and enters the PIN when prompted.
This action acknowledges the alarm condition of sensor 1 being above the upper limit of 46°F and cancels any further alarming by the Refrigerator/Freezer Guard for sensor 1 being above the upper limit.
Contact person #1never goes in to lower the temperature of the refrigerator.
The temperature continues to rise to 65°F and stays there for the entire weekend possibly ruining thousands of dollars worth of vaccines.

Scenario 1 "With Alarm Reminder Calls Enabled"
Sensor 1 is installed inside a vaccine storage refrigerator.
Lower temperature limit is set to 35°F.
Upper temperature limit is set to 46°F.
Time delay is set to 10 minutes.
Alarm Reminder Calls are Enabled and the reminder callout time delay is set for 120 minutes.
The temperature of the refrigerator rises to 47°F and stays there for 11 minutes.
The buzzer turns on.
The office is closed so, the Cancel Alarm button is not pressed within 2 minutes and alarm notification calls begin.
Contact person #1 receives an alarm notification call and enters the PIN when prompted.
This action acknowledges the alarm condition of sensor 1 being above the upper limit of 46°F and cancels any further alarming by the Refrigerator/Freezer Guard for sensor 1 being above the upper limit.
Contact person #1doesn't go lower the temperature of the refrigerator.
Since the problem still exists in 120 minutes, the Refrigerator/Freezer Guard resumes alarming.
The buzzer turns back on.
The Refrigerator/Freezer Guard resumes making alarm notification calls.
Contact person #1 receives a call and is reminded to go in to fix the problem.
Contact person #1 would also have heard that, now 2 hours later, the temperature has risen even higher than the 47°F warning they heard originally and that it is now 55°F.

Enabling Alarm Reminder Calls

Call the telephone number that the Refrigerator/Freezer Guard is connected to
The Refrigerator/Freezer Guard will play "*Enter your PIN number*"
Enter the "Full Access" PIN
The Refrigerator/Freezer Guard will play the Main Menu options, "*Press 1 for status, 2 to setup limits, 3 to program, or 0 to hang up.*"
Press 3
The Refrigerator/Freezer Guard will play the Program Menu options, "*Press 1 to set telephone numbers, 2 to set local ID, 3 to record a message, 4 to set number of rings, 5 to change PIN number, or 0 to exit."*
Press 6
The Refrigerator/Freezer Guard will play "Alarm Reminder is off, press 1 to change"
Press 1
The Refrigerator/Freezer Guard will play "Callout time delay is 60 minutes, press 1 to change"
Press 1

The Refrigerator/Freezer Guard will play “Enter number then press pound”
Enter the amount of time (in minutes) that you would like the Refrigerator/Freezer Guard to wait before reactivating the alarm buzzer and resuming the alarm notification calls, then press #.
The Refrigerator/Freezer Guard will play the value you entered to confirm. Verify that it is correct.

About Alarm Notification Telephone Numbers

Up to eight different contact numbers can be programmed to alert staff to a potentially dangerous event regarding your refrigerators or freezers.
Each of these numbers will be called until a person enters the PIN when prompted to or a person presses the Alarm Cancel button on the face of the Refrigerator/Freezer Guard.
If all eight numbers are called and no one enters the PIN, the Refrigerator/Freezer Guard will wait 20 minutes and repeat this cycle.
This will continue until someone enters the PIN when called, someone calls in and enters the PIN, someone presses the Alarm Cancel button, or the reason for the alarm goes away.
Some suggestions for use:
Program contact number 1 with a pager number. This will allow a record of call attempts to be logged and available for later review, besides being an excellent way to receive alarm notifications.
If you do not have eight different numbers to call, repeat a number. If they get the first call and enter the PIN, they will not get a second call.

Programming Alarm Notification Telephone Numbers

Call the telephone number that the Refrigerator/Freezer Guard is connected to
The Refrigerator/Freezer Guard will play “*Enter your PIN number*”
Enter the “Full Access” PIN
The Refrigerator/Freezer Guard will play the Main Menu options, “*Press 1 for status, 2 to setup limits, 3 to program, or 0 to hang up.*”
Press 3
The Refrigerator/Freezer Guard will play the Program Menu options, “*Press 1 to set telephone numbers, 2 to set local ID, 3 to record a message, 4 to set number of rings, 5 to change PIN number, or 0 to exit.”*
Press 1
The Refrigerator/Freezer Guard will play "*Select contact*"
Select 1 for the first contact number, 2 for the second contact number, 3 for the third contact number, or 4 for the fourth contact number
The Refrigerator/Freezer Guard will play "*Contact* x *is Empty, press one to change”*
Press 1
The Refrigerator/Freezer Guard will play “*Enter number then press pound”*
Enter the number, followed by a #

- ► For pager numbers, enter * as the first digit of the number
- ► Enter the full telephone number (1 + area code if necessary)
- ► If an extra delay between digits or after dialing is required, entering * will provide a two second delay. Do not enter * for the first digit unless programming a pager number.
- ► Entering only the # key will erase the currently programmed contact telephone number.

The Refrigerator/Freezer Guard will play the value you entered to confirm. Verify that it is correct.

Using the Refrigerator/Freezer Guard as a Vaccine Monitoring System

About PIN Numbers

The Refrigerator/Freezer Guard has two programmable PIN numbers. The Full Access PIN must be entered before a user can modify any Refrigerator/Freezer Guard programmed values. The Acknowledge Only PIN can be given out to staff to allow them to confirm alarm notification calls, but does not allow them to make any changes to the Refrigerator/Freezer Guard programmed values.

Programming PIN Numbers

Call the telephone number that the Refrigerator/Freezer Guard is connected to
The Refrigerator/Freezer Guard will play "*Enter your PIN number*"
Enter the "Full Access" PIN
The Refrigerator/Freezer Guard will play the Main Menu options, "*Press 1 for status, 2 to setup limits, 3 to program, or 0 to hang up.*"
Press 3
The Refrigerator/Freezer Guard will play the Program Menu options, "*Press 1 to set telephone numbers, 2 to set local ID, 3 to record a message, 4 to set number of rings, 5 to change PIN number, or 0 to exit."*
Press 5 to program the Full Access PIN or # to program the Acknowledge Only PIN
The Refrigerator/Freezer Guard will play "PIN number is 0000, press 1 to change"
Press 1
The Refrigerator/Freezer Guard will play "Enter Number"
Enter the 4 digit PIN

►**The PIN number must be 4 digits and must not include a # sign.**

The Refrigerator/Freezer Guard will play the value you entered to confirm. Verify that it is correct.

Using the Refrigerator/Freezer Guard

The Refrigerator/Freezer Guard should be checked regularly to verify that it is on and functioning.

When the alarm buzzer is on, look at the Refrigerator/Freezer Guard's display to determine the cause for the alarm.
If the cause of the alarm is a door being left open, close the door.
If the cause of the alarm is a refrigerator's or freezer's temperature is out of limits, take corrective action to bring the temperature within range. Observe the temperature reading regularly and take notes on the length of the time the temperature was out of limits. You may need to provide this information to the manufacturer of the stored vaccines to determine their potency.

When receiving an alarm notification call, listen to the Refrigerator/Freezer Guard to determine the cause of the alarm.
If the cause of the alarm is a door being left open, have someone close the door.
If the cause of the alarm is a refrigerator's or freezer's temperature is out of limits, enter your PIN ONLY if you plan take corrective action to bring the temperature within range. Observe the temperature reading regularly and take notes on the length of the time the temperature was out of limits. You may need to provide this information to the manufacturer of the stored vaccines to determine their potency.
If the cause of the alarm is a loss of power, contact your maintenance personnel to take corrective

action.

[i] Guidelines for Maintaining and Managing the Vaccine Cold Chain, October 24, 2003. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5242a6.htm