

# FrostAlert™ GSM

## Early Warning System



### User Guide

Revision 1.0

Orbit Communications Pty Ltd  
Unit 1, 16 Donaldson Street  
Wyong, NSW 2259  
Australia

Phone +61 (2) 43 554 554

Fax +62 (2) 43 554 994

Email [sales@orbitcoms.com](mailto:sales@orbitcoms.com)

Web [www.orbitcoms.com](http://www.orbitcoms.com)

All right reserved  
Copyright Orbit Communications Pty Ltd, 2010

## Table of Contents

Introduction	4
How it works	5
Installation	5
Operation	6
GSM Dialler	7
Serial Port	8
Software Install	9
Text Message Commands	11
Text Alert Messages	12
Tank Unit Wiring	13
Mechanical Details	14
Ordering Information	14
Safety Precautions	15
Warranty	16

# Introduction

FrostAlert™ GSM has been designed to provide reliable early warning for impending frost conditions. The temperature alarm trip-point is user-programmable and typically set a couple of degrees above freezing point. The system continuously monitors temperature in the field and sends an alert text message directly to a mobile phone in event of impending frost. The system operates on both GSM and Next-G/3G global mobile phone networks. The system is typically powered by renewable energy source (solar power supply). The temperature can be read from the unit remotely, at any time, using a mobile phone.



Figure 1. Direct SMS text alert

## How it works

The FrostAlert™ GSM system consists of single stand-alone sensor units that is installed near the crops or resources to be protected.. The unit is typically powered by a solar energy and sends alert messages directly to a mobile phone.

FrostAlert™ GSM is set up using supplied Windows® software (“EzGSM”). Typically the trip temperature is set 2 or 3 degrees Celsius above freezing in order to give plenty of warning before a frost condition occurs. In event that an alarm is activated. The alarm will automatically reset when the temperature rises 1 degree Celsius above the programmed trip temperature.

## Installation

The FrostAlert™ GSM unit is installed outside in a region that is prone to frost that is close to the crops that are to be protected. The position of the unit should be in an exposed location to enable the solar panel to receive sun all day. FrostAlert™ GSM has a built-in temperature probe that extends downward from the bottom of the enclosure. The unit should be mounted in such a way that the tip of the sensor is approximately at the height of the crops that are prone to frost damage.

The system is supplied with a high gain (5dBi) antenna to enable mobile phone coverage even in weaker signal areas. The antenna has a 1.5m cable and can be located on top of the FrostAlert™ GSM enclosure (using Velcro) or can be mounted onto metal surface using the magnetic base. The Antenna should be mounted vertically.

The solar panel is provided with a mounting bracket that holds the panel at a 45 degree angle to the sun. The mounting bracket can attach to a pole (such as 2” water pipe). The panel should be aimed at a point that is approximately where the sun will be located around mid-day to ensure maximum output.

## Operation

### Overview:

FrostAlert GSM™ is supplied with Windows© based software called “EzGSM”. The software enables up to 5 mobile phone numbers to be defined, a description for the site, a description for the item being monitored as well as HIGH temperature “trip-point” to be programmed into the unit.

The system requires a user-supplied SIM card. The SIM card is available from mobile phone vendors. It is recommended the SIM is not “Pre-Paid” as the FrostAlert™ system has no way of determining when the card’s credit expires. The SIM card should also have the PIN number removed before using with FrostAlert™. This can be done by the provider or by placing the SIM card into a mobile phone and disabling the SIM PIN feature using the phone’s setup function.

The standard FrostAlert™ system requires 12V or 24V DC to operate. The system is typically powered by a renewable energy source (solar power supply).

### Alert Messages:

FrostAlert™ GSM can send several text messages to the mobile phone numbers setup using the EzGSM software.

When the system is powered up, it will send a “Power Up” system message to notify that the system has been switched on.

The system also monitors the Battery voltage. In event the battery voltage drops below 10.5V a “Low Battery” alert message will be sent. Once the battery level is restored (rises above 11.5V) a “Battery Restore” message will be sent.

The temperature alert warnings will be sent when the temperature rises above the HIGH trip-point set up using EzGSM software. Once the temperature is restored for either alarm case, a “Temperature OK” message will be sent.

### Sending commands to FrostAlert™ GSM from mobile phone

The current temperature and Battery voltage can be obtained at any time using any mobile phone. The user sends a user defined password followed by the word “status” to the FrostAlert™ GSM unit. The unit will then send back the current Temperature and Battery voltage to the mobile phone that sent the request.

## GSM Dialler

FrostAlert™ contains a GSM dialler unit that will operate on worldwide GSM and Next-G/3G mobile phone networks. All that is needed to use the FrostAlert™ unit is an active SIM card. These cards are normally provided through mobile phone vendors. *Note: It is recommended NOT to use a pre-paid SIM card as the system has no means to identify when the card requires topping up.*

FrostAlert™ has the facility to enable a PIN number to be entered for the SIM card but the SIM card must already be set up with the PIN number before installing in the FrostAlert™ unit. Typically it is convenient to ensure the PIN number function for the SIM card is disabled. (This can be done by vendor of the SIM or using a standard mobile phone to remove the PIN requirement before installing.)



Figure 6. Insert SIM Card into Dialler



Figure 7. Push in until SIM locks in place



Figure 8. RED Status LED

To install the SIM card into the GSM Dialler

1. Switch off the power (Switch on control board should be DOWN)
2. Insert SIM into slot as shown in Fig(6), press SIM fully into slot until it locks into place as shown in Fig(7). (Gold contacts on SIM are DOWN, Notch on card is on left side as shown).
3. To remove SIM, Press SIM using small flat object and release, the SIM should spring outward.
4. Switch on the power (Switch on control board should be UP)

The RED Status LED on the dialler indicates when the dialler is connected to a mobile network. Blink rate 1 second ON and OFF = no connection, 3 seconds ON and 1 second OFF = connected.

## Setting up FrostAlert™ GSM

The FrostAlert™ GSM system is supplied with Windows® software called “EzGSM”. This software is used to set up the system.

### Using EzGSM setup software

EzGSM must first be installed onto a desktop or laptop computer. The software is used to program the settings into the FrostAlert™ GSM unit. Once FrostAlert™ GSM has been set up, the cable can be removed and the system will operate as programmed. The settings will remain in the FrostAlert™ GSM unit even after power down and can only be modified using EzGSM software.

### Serial Port

FrostAlert™ GSM connects to the computer using an RS232 serial link. If the computer has a DB9 serial port (as shown below) then a straight-through RS232 cable can be used to directly connect the computer to the FrostAlert™ GSM unit. If the computer does not have a DB9 connector then a USB to RS232 convertor can be used to enable the FrostAlert™ unit to connect to the computer via the USB port instead. The USB to DB9 serial port adaptor is shown below. These can be obtained from most electrical outlets such as Dick Smith Electronics, Tandy, JB-HiFi.



DB9 Connector

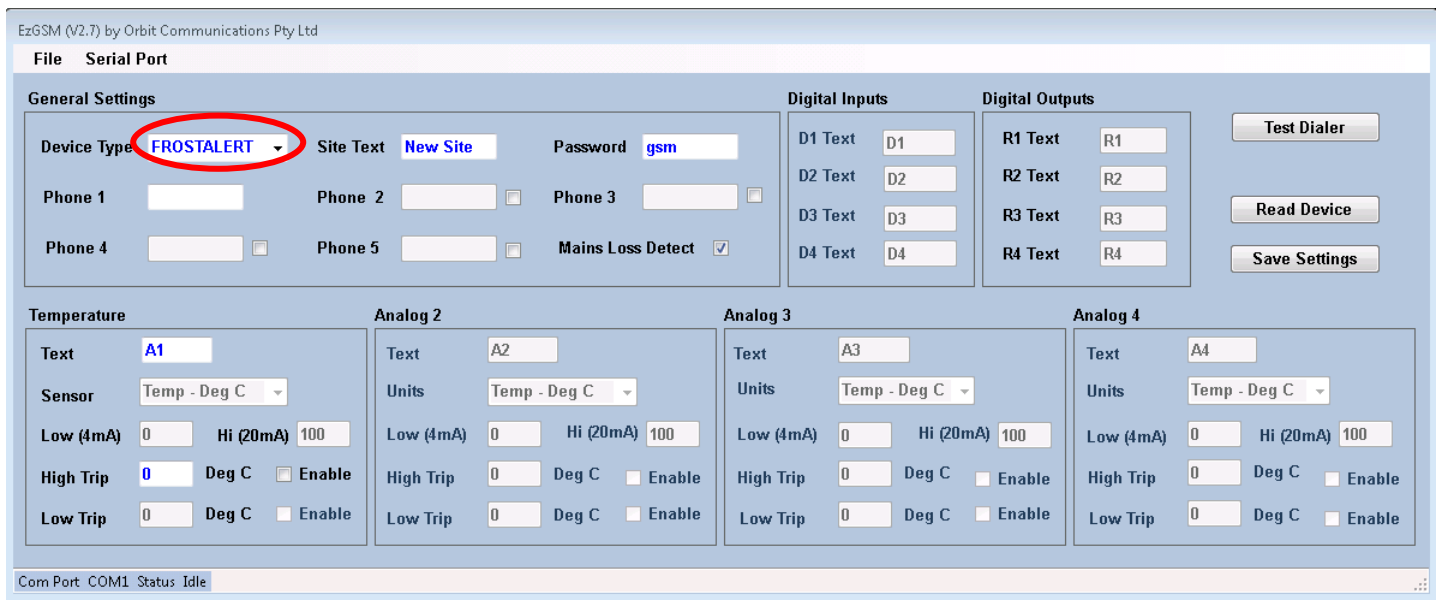


USB to DB9 Adaptor

## Running the software:

Install EzGSM onto the computer by running the setup file provided on CD ROM that came with the GenTemp™ unit. Once EzGSM software is installed, an icon will be placed on the desktop of the computer. Run the software using the desktop icon.

Note: The first time EzGSM is run, the program may prompt for a serial port. Enter the number of the serial port that is to be used to program FrostAlert™. The appropriate serial port may be selected also by clicking “Serial Port” from the main menu and selecting from list of installed ports.



The screenshot shows the EzGSM (V2.7) software interface. The 'Device Type' dropdown menu is highlighted with a red circle and set to 'FROSTALERT'. Other settings include Site Text 'New Site', Password 'gsm', and various sensor and digital input/output configurations.

General Settings	Digital Inputs	Digital Outputs
Device Type: <b>FROSTALERT</b>	D1 Text: D1	R1 Text: R1
Site Text: New Site	D2 Text: D2	R2 Text: R2
Password: gsm	D3 Text: D3	R3 Text: R3
Phone 1: [ ]	D4 Text: D4	R4 Text: R4
Phone 2: [ ]		
Phone 3: [ ]		
Phone 4: [ ]		
Phone 5: [ ]		
Mains Loss Detect: <input checked="" type="checkbox"/>		

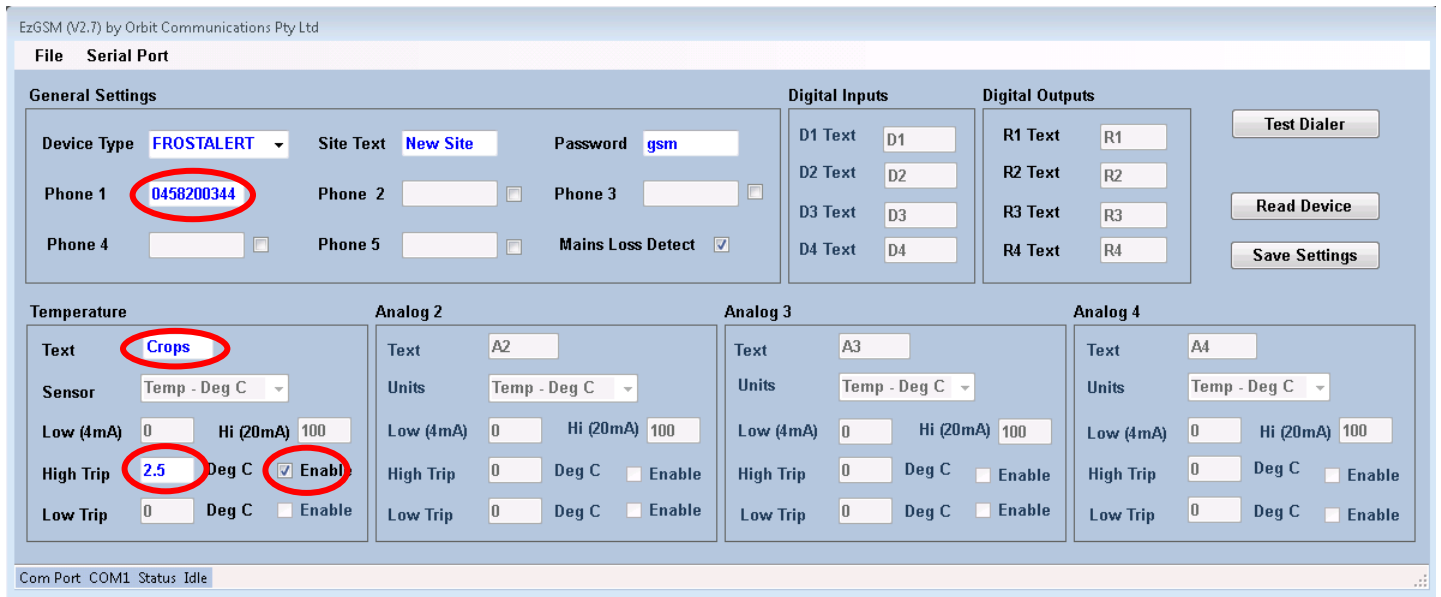
Temperature	Analog 2	Analog 3	Analog 4
Text: A1	Text: A2	Text: A3	Text: A4
Sensor: Temp - Deg C	Units: Temp - Deg C	Units: Temp - Deg C	Units: Temp - Deg C
Low (4mA): 0	Low (4mA): 0	Low (4mA): 0	Low (4mA): 0
Hi (20mA): 100	Hi (20mA): 100	Hi (20mA): 100	Hi (20mA): 100
High Trip: 0 Deg C <input type="checkbox"/> Enable	High Trip: 0 Deg C <input type="checkbox"/> Enable	High Trip: 0 Deg C <input type="checkbox"/> Enable	High Trip: 0 Deg C <input type="checkbox"/> Enable
Low Trip: 0 Deg C <input type="checkbox"/> Enable	Low Trip: 0 Deg C <input type="checkbox"/> Enable	Low Trip: 0 Deg C <input type="checkbox"/> Enable	Low Trip: 0 Deg C <input type="checkbox"/> Enable

Com Port: COM1 Status: Idle

Select “FrostAlert” as the Device Type using the pull-down list.

The description of the site (Site Text) is set as “New Site” by default. This can be changed to any meaningful text that describes or helps identify the site where the FrostAlert™ unit is to be installed. This text is sent with every message to identify which site the message has been sent from.

Enter a password up to 5 characters long in the “Password” box. This is the word that MUST be sent before each command. It can be set to blank and therefore no password needs to be sent with commands to the unit but it is recommended a password be used for security purposes.



The screenshot shows the EzGSM (V2.7) software interface. The 'General Settings' section includes fields for Device Type (FROSTALERT), Site Text (New Site), Password (gsm), and five phone numbers. Phone 1 is set to 0458200344. The 'Temperature' section shows settings for Analog 1, with Text set to 'Crops', Sensor set to 'Temp - Deg C', Low (4mA) at 0, Hi (20mA) at 100, High Trip at 2.5 Deg C, and the 'Enable' checkbox checked. The 'Digital Inputs' and 'Digital Outputs' sections have text fields for D1-D4 and R1-R4 respectively. The status bar at the bottom shows 'Com Port: COM1 Status: Idle'.

Enter at least 1 mobile phone number that alert messages can be sent to. FrostAlert can send alert messages up to 5 phone numbers. The small tick box next to each number must be ticked to enable another number to be added.

Enter a description of the object being monitored (“Crops” in above example).

The High and Low temperature alarm limits can be programmed individually. One or both types of alarms and values for alarm can be set as desired. The “Enable” box must be ticked for an alarm to be active.

Click “Save Settings” button to store the values into the FrostAlert™ unit.

Click the “Test Dialler” button to send a test message to the phone number entered. Typical delivery time on Next-G/3G network is around 5 seconds. This may vary between various network providers and network usage at the time.

The FrostAlert™ unit is not programmed and ready for use. Whenever the program rises above the level set for a HIGH Trip, a High Temperature alert message will be sent and visa-versa when the level drops below the LOW Trip value (if wither or both are Enabled).

## Text Message commands

The format for commands sent to the FrostAlert device...

**[Password] [Single Space] [Command]**

The password is selected using EzGSM software provided. Note: The text is NOT case sensitive but there must be only a SINGLE SPACE between password and command.

Example: Send a command to switch ON R1 Output. Assume the password was set to **site3**

Create a text message on the mobile phone using the phone number set using the supplied configuration software and then enter the following text as the message and Send...

**“Site3 R1ON”**

FrostAlert™ will send an acknowledgement message back to the mobile phone to indicate the required action has been performed.

### Available Commands

Command	Description
<b>R1ON</b>	Sets R1 Output ON
<b>R1OFF</b>	Sets R1 Output OFF
<b>R2ON</b>	Sets R2 Output ON
<b>R2OFF</b>	Sets R2 Output OFF
<b>STATUS</b>	Returns Temperature, Battery Voltage and IO state

Most mobile phones have a facility to save text “Templates”. This provides a convenient method of sending the commands without needing to re-type them each time. First set up an entry into the mobiles Phone Book that has the phone number of the FrostAlert device then create a template for each of the commands shown in the table above. To send a command you then select to send a message to the FrostAlert (select from the phone book) and then “insert” the appropriate text template and finally “Send”.

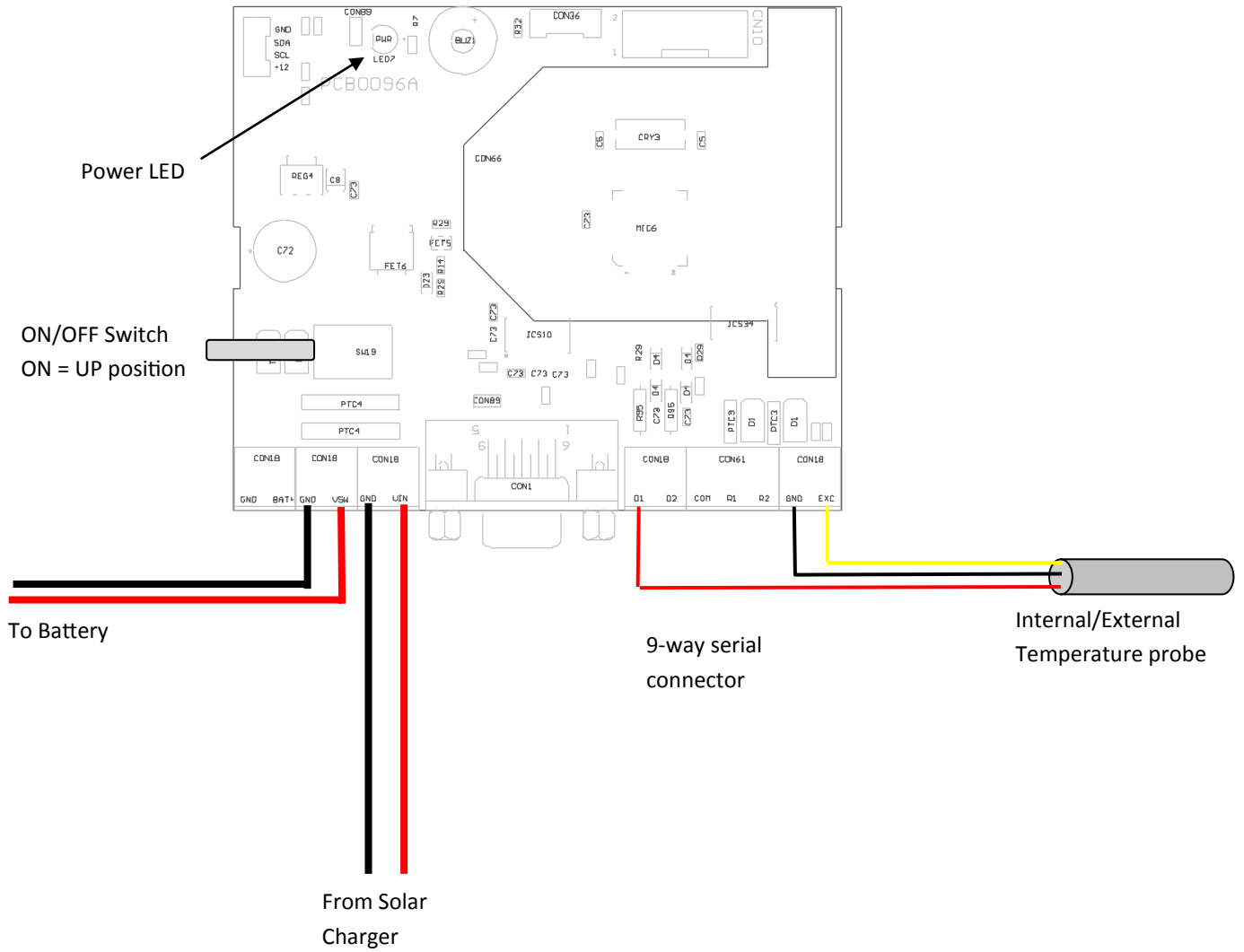
## Text Alert messages

The following messages are sent from FrostAlert™

Message	Description
Under Temp	Temperature dropped below alarm level
Temp Restore	Temperature within normal limits
Low Battery	Backup Battery below 10.5V
Battery OK	Backup Battery OK
Power Up	System has been powered up
Status	Returns Temp, Battery and IO Status

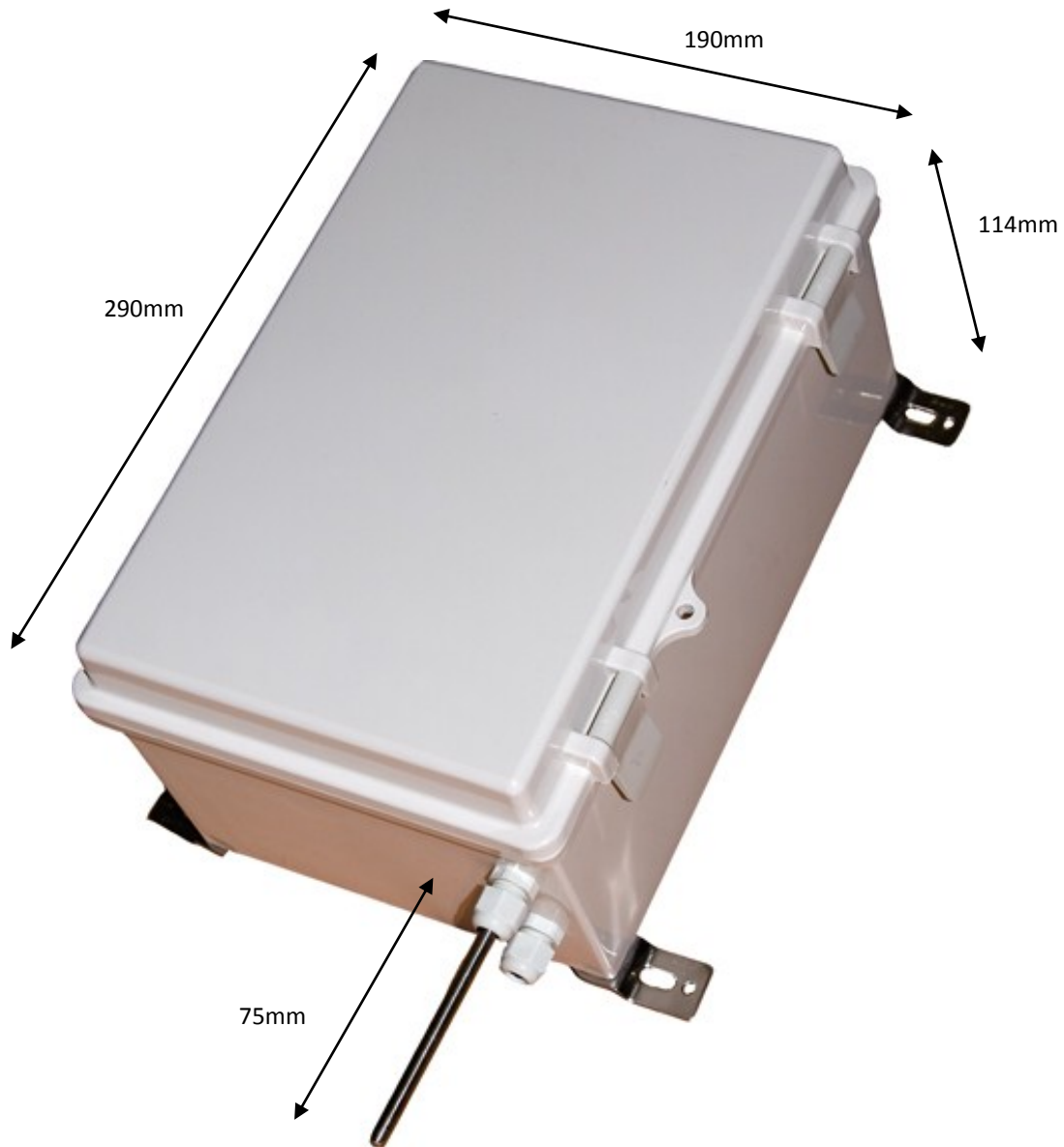
Example of sent text alert

**“New Site: Crops under Temperature 2.3 Degrees C”**



**Figure 3. Wiring diagram for FrostAlert**

### Mechanical Details



### Ordering Information

Part Code	Description
FRA0004	GSM Remote sensing unit
SOL0007	Solar power supply

## Safety Precautions

The following safety precautions must be observed whenever the Orbit wireless device system is in operation or in service. Failure to comply with these precautions violates the safety standards of the design, manufacture and intended use of the product

- The system is not to be used:

In hospitals or places where medical equipment may be in use.

In an aircraft (whether on the ground or in the air)

Refuelling points

Explosive areas

- Restricted use of the Orbit wireless device

Near any chemical plant

Near any Fuel depot

The Orbit wireless device system receives and transmits radio frequency energy while switched on, therefore interference can occur if the Orbit wireless device is located near TVs, radios, PCs or any inadequately shielded equipment.

### **WEEE directive 2002/96/EC, disposal of old electronic equipment**

This product shall not be treated as household waste. It must be placed at an appropriate collection point for the recycling of electrical and electronic equipment. By ensuring the correct disposal of this equipment, it will help the environment and human's health. The recycling will help to conserve the natural resources.

### **Important**

Due to the nature of wireless systems, transmission and reception of data can never be guaranteed. Data may be corrupted (i.e. Have errors) or be totally lost at certain times due to the environment, other machinery or malfunction of electronic components. Although significant loss of data are rare when wireless devices such as the Orbit wireless device system are used in a normal manner, Orbit's wireless device system should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death or loss of property. Orbit Communications Pty Ltd accepts no responsibility for damages of any kind resulting from errors in data transmitted or received using Orbit's Orbit wireless device systems, or for the failure of the Orbit wireless device system to transmit or receive such data.

Do not operate the Orbit wireless device system in areas where blasting is in progress, where explosive atmospheres may be present, near medical equipment, near life support equipment, or any equipment which may be susceptible to any form of radio interference, in such areas, Orbit's wireless device system must be powered OFF.

Do not operate Orbit wireless device system in any aircraft, whether the aircraft is on the ground or in flight. In an aircraft the Orbit wireless device system must be powered OFF.

The information in Orbit Communications Pty Ltd documents are subject to change without notice and do not represent a commitment on the part of Orbit Communications Pty Ltd. Orbit Communications Pty Ltd and its affiliates specifically disclaim liability for any and all direct, indirect, special, general, incidental, consequential, punitive or exemplary damages including, but not limited to, loss of profits or revenue or anticipated profits or revenue arising out of the use or inability to use any Orbit Communications Pty Ltd product, even if Orbit Communications Pty Ltd and/or its affiliates have been advised of the possibility of such damages or they are foreseeable or for claims by any third party.

Notwithstanding the foregoing, in no event shall Orbit Communications Pty Ltd and/or its affiliates aggregate liability arising under or in connection with the Orbit Communications Pty Ltd product, regardless of the number of events, occurrences or claims giving rise to liability, be in excess of the price paid by the purchaser for the Orbit Communications Pty Ltd product.

## Warranty

All products manufactured by Orbit Communications Pty Ltd are warranted to be free from defects in materials and workmanship under normal use and service for 36 months from the date of shipment unless otherwise specified. Orbit Communications' obligation under this warranty is limited to repairing or replacing (at Orbit's discretion) defective products. The customer shall assume all costs of removing, reinstalling and shipping defective products to Orbit Communications. Orbit Communications will return such products by surface carrier prepaid. This warranty shall not apply to any Orbit product that has been subject to modification, misuse, neglect, accidents of nature or shipping damage. This warranty is in lieu of all other warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose. Orbit Communications is not liable for special, indirect, accidental, or consequential damages.

Products may not be returned to Orbit Communications without prior authorization. To obtain a Returned Product Authorization (RPA), contact Orbit Communications by phone, fax or email. An RPA number will be issued after our staff determines the nature of the problem. Please write the RPA number on the outside of the shipping container. Any non-warranty products returned for repair should be accompanied by a purchase order to cover the cost of the repairs.