



Cellular Alert PRO

PRODUCT MANUAL

Item #3451, #3451H,
#3451W, #3451P120/24/12,
#3452, #3452H, #3452W,
#3452P120/24/12



Spectrum
Technologies, Inc.

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This manual will familiarize you with the features and operation of your new WatchDog Cellular Alert PRO. Please read this manual thoroughly before using your instrument. For customer support, or to place an order, call Spectrum Technologies, Inc. at 800-248-8873 or 815-436-4440 between 7:30 am and 5:30 p.m. CST, FAX at 815-436-4460, or E-Mail at info@specmeters.com.
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GENERAL OVERVIEW

This manual describes how to use your WatchDog Cellular Alert (Models: #3451, #3451H, #3451W, #3451P, #3452, #3452H, #3452W, #3452P) and how to keep it working accurately for many years.

This manual will describe how to use the PRO model which contains a cellular module.

Features:

- Control Panel with key pad for user control
- LCD display
- Relay terminal connections to control an external device
- NEMA 4 (IP66) enclosure
- LED light with red and green indicators
- Makes voice call or sends text message (or both)
- Note: User is responsible for service plan — Pay As You Go voice/text recommended, see page 5

CONTENTS

- External Sensor: 3451 - GSM, 3452 - CDMA
- 345_ Temperature Sensor with 6 ft (2m) cable
- 345_H Humidity sensor with radiation shield and mounting bracket
- 345_W Water Sensor with 6 ft (2m) cable
- 345_P12 12V Power Sensor Relay with cable
- 345_P24 24V Power Sensor Relay with cable
- 345_P120 120V Power Sensor Relay with cable
- Cellular module GSM: 3451_ (ie AT&T) CDMA: 3452_ (ie Verizon)
- Antenna
- U-Bolt (used for mounting)

SPECIFICATIONS

Hard Case with Handle—8 3/4" x 7" x 4" deep

Output Relay Specifications: Internal relay 250 V, 1 Amp AC or DC
Maximum switching power 60 W or 60 VA.

Operating Temperature Range: Limited by the batteries being used.
Most Alkaline batteries have a recommended operating range of -4°F to 131°F (-18°C to 55°C)

Uses 6-volt lantern battery (not included).

Temperature	Range	-40° to 140°F (-40° to 60°C)
	Accuracy	$\pm 1.1^{\circ}\text{F}$ ($\pm 0.6^{\circ}\text{C}$) at -4 to 122°F (-20 to 50°C), else $\pm 2.2^{\circ}\text{F}$ ($\pm 1.2^{\circ}\text{C}$)
Humidity	Range	0% - 100%
Water	Range	0 (dry) to 15 (wet), typical threshold level for irrigation events is 5.00
12V	Range	13 mA
24V	Range	52 mA
120V	Range	11 mA

IMPORTANT MODEM INFORMATION

GSM: Spectrum Technologies recommends the purchase of a 2G Pay As You Go SIM Card and Service Plan with voice and text capabilities. For example, a \$25 Pay As You Go SIM card with a 90 day life would work well.

Be sure to have the retailer properly test the SIM card to verify it works before leaving the store.

IMPORTANT: If the SIM card is running low of funds, the Cellular Alert might believe a call went through when it actually was intercepted by the carrier to play a recording notifying you of low card funds. Check for these messages regularly by testing the SIM card in a cell phone.

CDMA: CDMA Modems do not have a removable 'SIM' card and typically do not offer Pay As You Go plans. Consult with your cellular provider to obtain a cost effective plan. A machine-to-machine plan with voice and text capabilities will work with modem technology.

CDMA modems need to be 'provisioned' after a cellular plan is activated. **THE CDMA MODEM CANNOT COMPLETE A VOICE CALL OR TEXT MESSAGE UNTIL THIS IS DONE. PLEASE SEE PAGE 15—PROVISIONING CDMA MODEM.**

Some carriers send a text message or voice call after the first call of the day on prepaid accounts. This may cause the first call or calls to fail as your carrier sends welcome texts and screen banners. If your test call or text fails, please wait a minute and retry.

Be sure to test your Cellular Alert to ensure calls and/or texts are successfully received before it is used in production.

SETUP

PRO models that contain a GSM cellular module require a SIM card to make a voice call or send text messages to a designated phone. It also has the option of setting a relay.

A SIM card and service plan (Pay As You Go recommended) is necessary but not included.

SIM Card Setup

A SIM card may be purchased from a cellular phone carrier.

Detach antenna from the Velcro at the top of the case. Then remove the module from the Cellular Alert case by gently pulling the module off the Velcro that is underneath it and sliding it up to disengage it from the DB15 Silver Connector as shown in the picture to the right.

Remove the SIM card tray from the end of the module pressing the small button next to it. The tray will slide out. See picture to the right.

Place the SIM card into the tray. Slide the SIM card tray back into the slot until it locks making sure the SIM card is facing the top of the module.



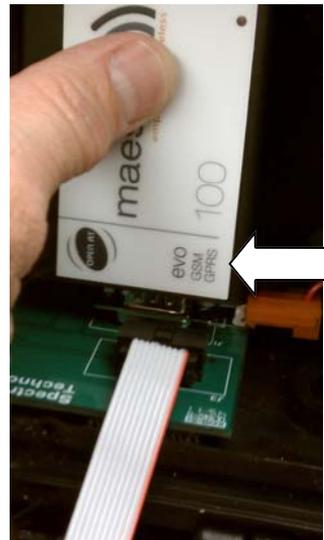
The CDMA modem does not require nor have a SIM card holder. When activating the unit your service provider will need the modem's ESN and MEID number listed on the back. The CDMA modem has two identical connectors on top. Use the one labeled 'CDMA' for the antenna.



Slide the module into the DB15 connector and then snap it onto the Velcro at the back of the case. Reattach the antenna to the Velcro at the top of the case.



SLIDE



SNAP

The modem can be identified as GSM or CDMA by reading either "evo GSM GPRS" or "CDMA gpsOne" on the bottom right where arrow is pointing.

SENSOR SETUP

Sensor Setup for Temperature, Water, and Humidity

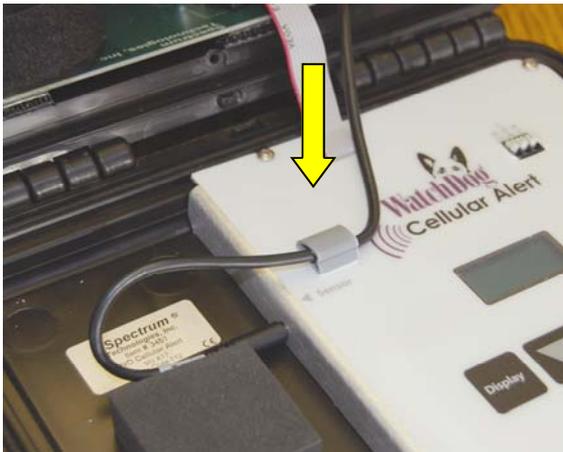
Run the sensor plug into the case through the gland nut. Pass the cable through the cable hook on the panel. Using the cable hook keeps the wire from tangling with the dialer mechanism. Tighten the gland nut once the cable is positioned.

Plug the sensor into the sensor port on the side of the control panel. Place the sensor where you want to measure.

Power Alert Setup

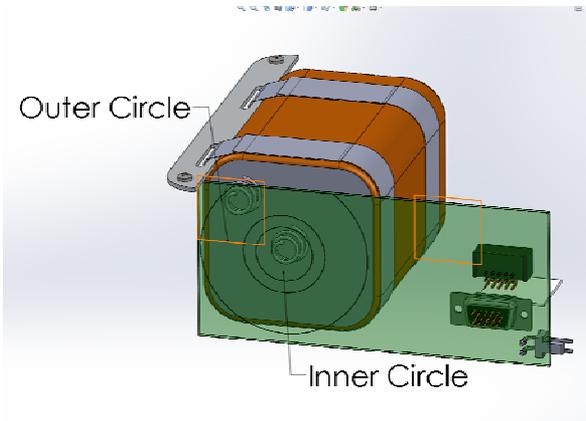
See the Power Alert Installation (page 18).

WIRE HOOK



BATTERY SETUP

Press the battery against the foam on top (see picture to the right) while ensuring the spring posts are properly aligned on the circuit board below (see picture below). Caution: There are two silver circles on the board. One post should be on the inner circle and one post should be on the outer circle. In no case should both posts be on the same circle. Damage will occur.



BATTERY SETUP

When the batteries are first connected, the display will show the firm-ware version on the first line and indicate whether the cellular module cable is connected (w/modem) on the second. This will transition to the Run or Off menu after 5 seconds.

Once the battery is in place, it needs to be secured tightly with the Velcro straps provided.

GSM: When using an international cell phone frequency (900/1800 MHz) it is necessary to let the unit know to reset the cellular module. Disconnect the battery and hold the UP button while connecting the battery. Continue holding the UP button for two seconds, until a warbling beep occurs indicating the button can be released. Then press and release the SET button. The cellular module will be set to international frequencies and display INTL 900/1800 for a few seconds. Be sure to verify communications using the TEST procedure.

To change the mode back to US frequencies (850/1900MHz) use the same procedure except hold the DOWN button and reconnect the battery.



PROGRAMMING THE CONTROL PANEL

Pressing the DISPLAY button will activate the LCD. When the LCD is on, the DISPLAY button is used to scroll through the various modes. These modes are Off, Test, Setup, Run. Once the desired mode is displayed, select it by pressing the SET button.

NOTE: The first time the Cellular Alert is used, at least one phone number must be programmed into the Alert section of the SETUP mode. Then the Test Mode can be used to verify communications.

Off Mode—Turns the Cellular Alert off—Cancels Run Mode.

Test Mode—Used to test the alert function. When the Test Mode is chosen, the LCD display will show diagnostic and status information. The bars across the top of the display show signal strength. To the right of the signal strength indicator the # of communication errors is displayed. A strength of 10 to 31 will appear as shown in the picture. The lower number in both signal strength and errors, the better. If the signal strength is not the best, reposition the antenna to obtain a better signal strength. This is done by moving the antenna out of the case and running the antenna wire into the case through the gland nut hole. There is a 6 foot cable attached to the antenna. Once the strength of the signal is good, press the SET button. It should display “Call Test or Text Test”. The SET button will trigger a voice call or text message or both (depending on the choices made in the Alert Setup Mode) to be sent to the designated phone number(s). If the test is successful the LCD will read ‘Test Passed’. If not successful the LCD will read ‘Test Failed’. Verify that the correct phone(s) received call and/or text message.



Setup Mode— Used to set the type of sensor, limits for the alert and the type of alert desired. One sensor at a time can be attached to the alert. The Setup mode involves moving through a sequence of different levels to define each option. The arrow buttons are used to scroll through options, the Set button is used to select options, and the Display button is to move back to the previous level. The first level of options is 'Sensor', 'Limit', 'Alert', and 'Notify'. Details about each option are given below. The default programming sequence is to select the Sensor type, then the threshold Limit, Alert type and the Notify threshold. However, it is possible to skip straight to the Limit, Alert, or Notify options from the initial Setup Mode screen. Use the arrow button to scroll to the desired option and select it by pressing the SET button.

PROGRAMMING THE CONTROL PANEL

Sensor— In the Sensor setup the choices are: Temperature in Fahrenheit, Temperature in Celsius, Humidity, Wetness, and Voltage. Using the up and down arrows, toggle between the choices. Once the desired sensor is displayed, press the SET button. The display will toggle to Limit mode. Press SET again to enter Limit setup mode.

Limit— The Limit selection determines whether an alarm occurs when the sensor value becomes greater than or becomes less than the threshold limit set here. Select Above or Below using the up and down arrow buttons, then SET to select your choice. The display will toggle to allow you to set the threshold value. Use the up and down arrow buttons to change the value and then press the SET button to select the value shown. The display will toggle to Alert. Press SET again to enter the Alert setup mode.

Alert— The unit prompts for up to four phone numbers you desire to call and/or text with an alert. To key in a new phone number, use the up/down arrow buttons, pressing SET after each number once it is reached.

There is room for four phone numbers of 17 digits each. Following the last digit of each phone number choose 'OK', which is the digit below zero, and press SET which will then continue to the next phone number. If less than four phone numbers are desired, select 'OK' in place of the first digit and press SET. That phone number and any remaining slots will be inactive.

PROGRAMMING THE CONTROL PANEL

Alert Mode (continued)

Note: In the US, entering a '1' before the number is not necessary with most cellular providers. Outside of the US the prefix required may vary by country and provider. To delete the current phone number, use the up/down arrow buttons to go below zero where a back arrow will appear ←. Holding the SET button down will erase all the numbers and continue into the previous phone number. Pressing the SET button temporary will erase the prior number only.

Voice call and text message can each be set to on or off using the options YES or NO. Use the up and down arrow buttons to choose YES or NO and press SET. The display will toggle from Voice Call to Text Message, and then onto the Notify mode. Press SET again to enter the Notify setup mode.

The text message will read similar to: "ALERT Temp F, limit 34.0 F, current 33.7 F".

If both Voice Call and Text Message are set to NO only the relay will be activated during an alert.

The relay choice is used to trigger a switch that will perform an action (See setting up a relay function on page 16), such as sound a horn, turn on a fan, or turn on an irrigation system, it will not trigger the modem to make a call.

PROGRAMMING THE CONTROL PANEL

Notify - The Notify mode sets a second threshold and will send text messages to the same phone number(s) as programmed in the Alert mode at a selected interval when the sensor value is between the Limit threshold and the Notify threshold. When the Limit threshold is reached, the unit will go into Alert Mode. If the sensor value leaves the Notify threshold range in the other direction, an “All Clear” text message will be sent marking the end of the Notify mode.

Note: The Notify mode will not make phone calls, only send a text message regardless of the voice/text setting of the Alert mode.

The unit prompts for a time interval to be chosen. Using the up and down arrow buttons choose 15 min, 30 min, 45 min, 60 min or OFF. If OFF is chosen, no notification text messages will be sent and the unit will only utilize the Limit threshold of the Alert mode, and the display will toggle back to Setup mode.

Press SET to choose the interval or OFF. The display will toggle to the threshold sensor value. ‘Above’ or “Below’ is not editable and will be the same as set in the Limit setup. Use the up and down arrow buttons to change the value and press SET to select a value. The Limit and Notify thresholds cannot overlap. When a sensor value is selected the display will toggle back to Setup mode.

Run Mode— Used to start monitoring. This mode will show the current sensor value. Verify the sensor value on the Cellular Alert is equal to a known standard.

PARAMETER RESET—If at anytime the control panel setup is showing incorrect options, the Cellular Alert may need a factory reset. Please follow these steps:

1. Lift battery to disconnect power
2. Press and hold **Display**
3. Release battery to make contact with battery platform
4. Continue holding **Display** until beeps are heard
5. Immediately release button and press **Set** when tone heard
6. After pressing **Set** a short 3 beep tone will be heard

OPERATION

When the programmed threshold is surpassed and the cellular module sends an alert but the call is unsuccessful (due to line being busy, down, etc.), the cellular module will redial after 1, 2, 4, 8, 16, 32 and 60 minutes. It will then attempt to dial every hour until it is successful or the sensor value falls above or below the threshold. With some phone systems, the Cellular Alert will recognize an answering machine/voicemail as a successful call and will not continue to redial. With many phone systems, the Cellular Alert will leave a voicemail of beeping sounds but also recognize that it was a failed attempt and retry until successful.

If the cellular module is set up to send a text message only, there is no way to verify if the text was successfully received. Spectrum recommends both Voice Call and Text Message options are set to YES.

If a voice call is programmed the receiving phone will hear beeps—not a prerecorded recording.

PROVISIONING CDMA MODEM

CDMA modems must be provisioned before they can make a voice call or text message. Please follow these steps:

1. Lift battery to disconnect power
2. Press and hold both **Display** and **down arrow** buttons
3. Release battery to make contact with battery platform
4. Continue holding buttons until beeps are heard
5. Immediately release buttons and press **Set** when tone heard
6. After pressing **Set** a short 3 beep tone will be heard
7. Modem will begin powering up as usual
8. After set options is completed ATD* 22899; will be displayed
This will continue to be displayed for several seconds
If successful an 'all ok' beep sequence will be heard
If failed a 'negative' beep sequence will be heard
9. System ready to run, returns to main menu

OUTPUT RELAY FUNCTION SETUP

The Cellular Alert has a relay that may be used to trigger an action such as turning on a fan or turning on an irrigation system. This action will be triggered when the sensor crosses above or below the Limit threshold that was determined when programming the control panel.

The internal relay is limited to 250 V, 1 Amp AC or DC. Higher voltage or current than this will require an interface relay. The maximum switching power is 60 W or 60 VA.

The terminal block for the relay appears to the right of the WatchDog logo on the control panel. It contains three wire terminals, NO—NormallyOpen
COM—Common
NC—Normally Closed.



To insert the wires, press on the white button and insert the wire into the corresponding terminal. Release the button when the wire is in place to lock it. **To avoid short circuiting, ensure that no bare wire is exposed above the terminal block.**



INSTALLATION

A U bolt is included with each Alert. Using the U bolt, attach it to the handle of the case. The case can then be attached to a pole.

In frost alert mode (Item #3451 or 3452), the Cellular Alert should be installed in the area that is most likely to have the first frost. The temperature sensor should be at least three inches from the ground for an accurate temperature.

In humidity mode (Item #3451H or 3452H), the sensor should be placed in an area that gives a representative reading. The sensor and radiation shield should also be attached to the pole using the bracket supplied.

In water mode (Item #3451W or 3452W), the sensor should be placed in a furrow. Take care that the sensor grid is not touching the soil. Contact with damp soil could trigger the alert condition.



If the signal strength is weak, then it might be necessary to mount the antenna higher. Remove the antenna from the case, and disconnect the antenna cable from the modem. From outside the case, insert the antenna cable through the bottom gland (alongside the sensor cable). Connect the cable to the modem and tighten the gland. The antenna is water resistant but not waterproof. A suggested installation technique would be to attach the antenna inside of a PVC pipe with a capped top. Mounting the antenna to a metal pole can cause interference, degrading your cellular connection.

POWER ALERT INSTALLATION

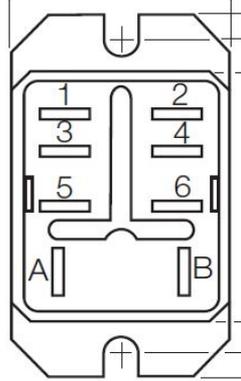
Feed the power cord through the gland.

The P120 (120VAC) model includes a protective housing for the sensor relay.

Once fed through the gland, the power cord must be connected to the sensor relay.

Open the protective housing (using a Phillips screwdriver, not included).

Plug the two power wires onto the A and B spades on the relay.



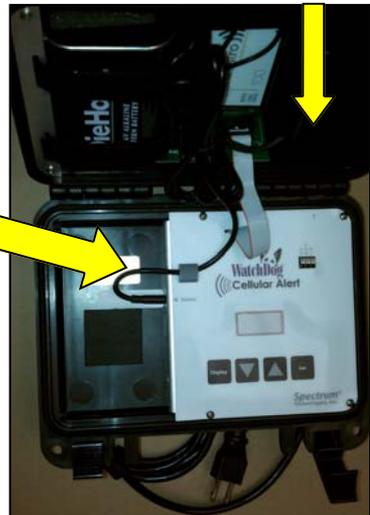
Place the relay into the protective housing. Reassemble the protective housing using the 4 screws.



Plug the sensor cord into the sensor port. Adjust the relay/housing to fit in the case. Tighten the gland nut. Close the case.

Insert Relay/Housing Here

Sensor Port



Plug (P120) or wire (P24, P12) the power cord into the circuit you want to monitor. For setup limit, set the voltage limit to alert below 1 Volt.

LED LIGHT DEFINITION

There is an LED light that shows through the outside of the case. The light indicates what mode the Cellular Alert is in. The following chart shows the patterns:

<u>Light Pattern</u>	<u>Mode</u>
Short green flash each 5 seconds	Run mode, sensor in normal or Notify range
Short green flash, followed immediately by short yellow flash each 5 seconds	Run mode, sensor in normal or Notify range, battery low
Short red flash each second	Run mode, sensor beyond Alert limit
Short red flash, followed immediately by short yellow flash each 5 seconds	Run mode, sensor beyond Alert limit, battery low
Short red and green flash every 5 seconds	Run mode, sensor beyond Alert limit, alarm active

WARRANTY

This product is warranted to be free from defects in material or workmanship for one year from the date of purchase. During the warranty period Spectrum will, at its option, either repair or replace products that prove to be defective. This warranty does not cover damage due to improper installation or use, lightning, negligence, accident, or unauthorized modifications, or to incidental or consequential damages beyond the Spectrum product. Before returning a failed unit, you must obtain a Returned Materials Authorization (RMA) from Spectrum. Spectrum is not responsible for any package that is returned without a valid RMA number or for the loss of the package by any shipping company.

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