Dear Customer,

Thank you for purchasing your radiant heating control from WarmlyYours. WarmlyYours is dedicated to making comfort easy and we continually strive to provide our customers with the best controls in the industry.

WarmlyYours sells this product under part number SCV-DUAL. The control's manufacturer identifies this same part with the model number of LCD-8 in all the documentation provided with the control.

If you have any technical questions related to this control or the installation of any of our radiant heating systems, please call our 24/7 installation team at (800) 875-5285 or visit our website at www.WarmlyYours.com.

WarmlyYours
Technical Team

Automatic Snow/Ice Melting System Controller
SNOW SWITCH® MODEL LCD–8 100–240 VAC
Installation and Operation Manual

Environmental Technology, Inc.
1850 N Sheridan Street
South Bend, Indiana 46628
(574) 233-1002 or (800) 234-4239
FAX (574) 233-2152 or (888) 234-4238
http://www.networketi.com/

Safety

Make all electrical connections in compliance with the National Electrical Code (NFPA 70) and local electrical code. If you have questions concerning the installation or application, contact Customer Service.

Abnormal Odor or Smoke

In the event of smoke or a burning or abnormal odor, immediately interrupt power to the unit by unplugging the unit or by turning off the circuit breaker protecting the unit.

Electrical Shock / Fire Hazard

Even when the snow melting elements are disconnected, as long as the circuit breaker is on and power is running to the unit, voltage is still being applied to the system's yellow leads. Therefore, never touch the ends of the yellow leads or let the two leads touch each other. Do not let the two yellow leads contact any component inside the unit.

Any installation involving electric heater wiring must be grounded to earth to protect against shock and fire hazard. Suitable ground fault detection and interrupting systems must be in use at all times to reduce shock and fire hazard and to protect equipment.

Electric wiring to heating elements must be installed in accordance with National Electrical Code (NEC) requirements and all other local and applicable electrical codes and any third party standards. Follow the installation instructions contained herein and those provided by the heater manufacturer.

Use a GFEP (Ground Fault Equipment Protection) circuit breaker on each branch circuit connected to the ice melting system. Clearly label each circuit breaker with its function. This is vitally important when there is more than a single point of disconnect.

Size the circuit breaker in accordance with the size of the expected load. The maximum current load for the LCD-8 is 16 Amp resistive. This product is intended for use in residential or light commercial applications.

Make certain that the heater shield is properly grounded. Failure to do so may result in damage to the equipment or fire.

Following installation and prior to beginning system operation, refer to and perform the Post-Installation Tests (page12) described in this manual.

Additional Information

More information is made available regularly through our website, www.networketi.com. Please visit us online for Data Sheets, Manuals, White Papers, technical articles, and more. The most current and up to date version of this and every other manual for our products can be found in Acrobat (PDF) format to view online or to print. This is to assist you in installing and using our products to the best effect possible. If you have any comments about this or any other product from Environmental Technology, Inc., please contact us.

Contacting Environmental Technology, Inc.

For assistance, contact Customer Service. Office hours are from 8:00 AM until 5:00 PM ET.

Voice:	(800) 234-4239 (USA and Canada) or (574) 233-1002 (elsewhere)
Fax:	(888) 234-4238 (USA and Canada) or (574) 233-2152 (elsewhere)
E-mail:	info@networketi.com
Mail:	Environmental Technology, Inc.
	1850 North Sheridan Street
	South Bend, IN 46628

General

Figure 1. LCD-8

LCD-8 Overview
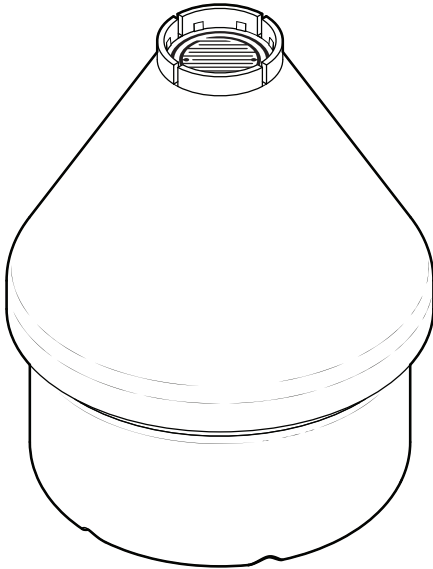
    The Snow Switch® Model LCD–8 (Figure 1) is a configurable aerial snow melting system controller which makes automatic snow melting a cost-effective alternative in even the smallest applications. Heaters operate at temperatures below the LCD-8's configurable set point, 38°F (3.3°C) default, only when required. The adjustable hold-on period, 3 hours default, continues heater operation after snow stops to ensure complete melting. The LCD–8 controller includes an internal magnetic reed switch used for manual heater cycling and configuring the controller's operational temperature set point and hold-on time.

    The LCD–8 controller is available as a model which operates from either an automatic selecting 100VAC – 240VAC or as a model which operates from 24VAC. These two voltage options combine with the configurable hold-on time and temperature set point to meet the need of a wide number of applications using just two part numbers.

    It controls heater loads up to 16 amps resistive or 3 amps inductive. The operating temperature range extends from –40°F to 140°F (–40°C to 60°C). The redesigned, patent pending, rugged polycarbonate enclosure provides excellent protection at temperature extremes, while allowing snow to shed to prevent iglooing over the moisture sensor.

    The internal magnetic reed switch allows for both configuration and manual heater operation without the need for external switches—which are susceptible to damage—or the need to open the enclosure.

    Verifying system functionality after installation or when troubleshooting used to require spray circuit cooler or ice for controller activation. The Sno-Test™ feature eliminates this need by performing a self-test after power application and operating heaters in a unique pattern for a few seconds. Reading the test results takes only an AC voltmeter or clamp-on ammeter.

    A configurable snow sensor with two light-emitting diode (LED) indicator lamps (Figure 2), the LCD-8 features a hold-on timer which allows its system to operate to a drier surface after melting snow.

- The hold-on timer can be configured for off, 1 hour, 3 hours or 5 hours. The operating temperature can be configured for none (precipitation sensor), 36°F, 38°F or 40°F.
- The low-temperature lockout (17°F), which disengages unit operation, can be enabled or not.
- Default configuration: 38°F operating temperature; 3 hour hold-on; no lockout.
- The LCD-8 uses an internal magnetic switch. The user swipes a magnet externally across this switch to start a hold-on cycle or to terminate a running hold-on cycle. This switch may also be used to reconfigure the unit, or to view the current configuration.
- The green LED, ordinarily on steady, blinks to indicate a concern with the unit. This LED is also used in the LCD-8's configuration process.
- The yellow LED indicator is lit whenever the output relay is powered ("on").
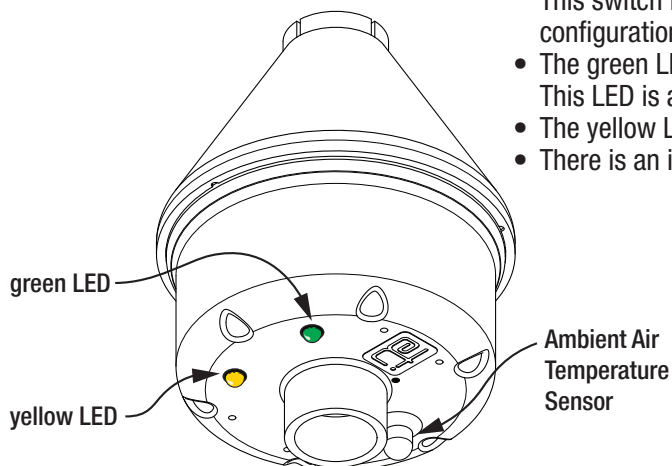- There is an initialization period where the heaters are tested.

green LED

yellow LED

Ambient Air Temperature Sensor

Figure 2. LCD-8 LEDs

UNPACKING THE LCD-8

Immediately upon receipt, inspect the container and packing material for any noticeable damage. Unpack the unit, taking care not to damage the packing materials. Confirm all components noted in "Packing List" above are included. Save the shipping container and related materials until normal operation has been established. If the unit must be returned, take care to ensure that it is repackaged as it was received.

As soon as the unit arrives at your facility, inspect it for mechanical damage. if any of the following problems is found, contact WarmlyYours Customer Service immediately.

> • contents incomplete or incorrect;
> • internal or external mechanical damage; or
> • defective operation

WarmlyYours can be reached 24/7 @ (800) 875-5285.

Installation

With user-supplied hardware, mount the LCD-8 securely in an upright position (sensor grid at top; see Figure 3) in a clear and open area typical of the area to be melted, either above the roof line or removed from the building and exposed to, rather than protected from, falling snow.

Avoid overhead trees, shrubs, wires, eaves, etc., and falling or blowing debris.

Avoid vehicle and foot traffic. Do not create a safety hazard.

Avoid exposure to artificial heat sources and excessive shock and vibration.

The LCD-8 also should be positioned at a height above ground that reduces, eliminates or discourages damage caused by animals or vandals.
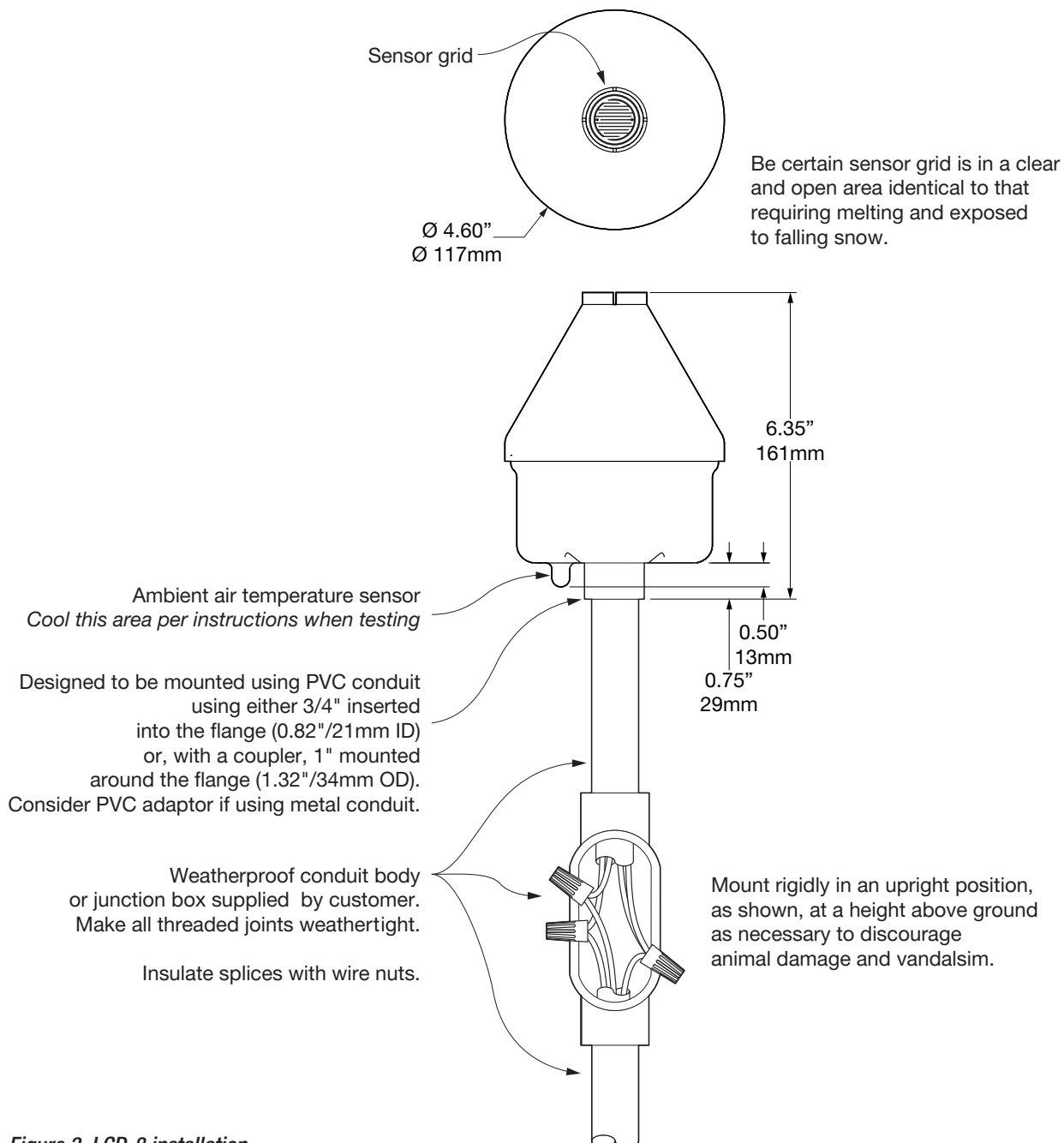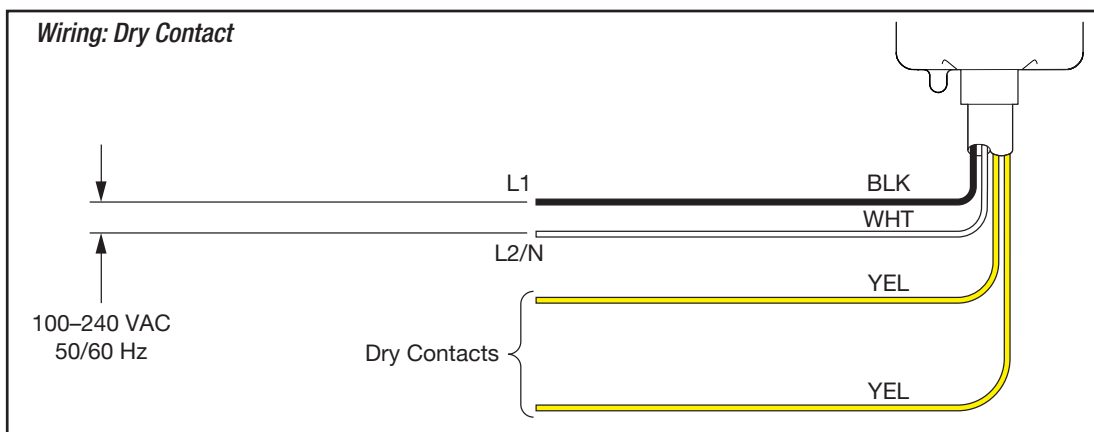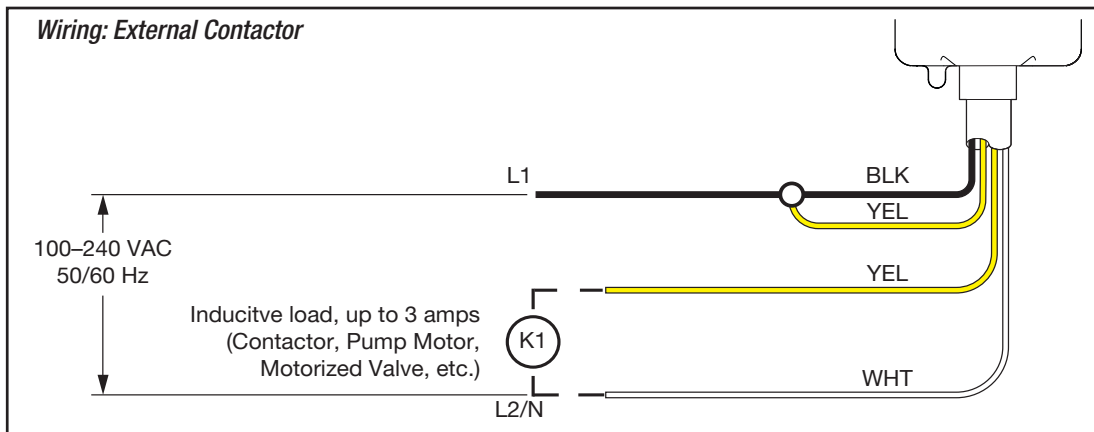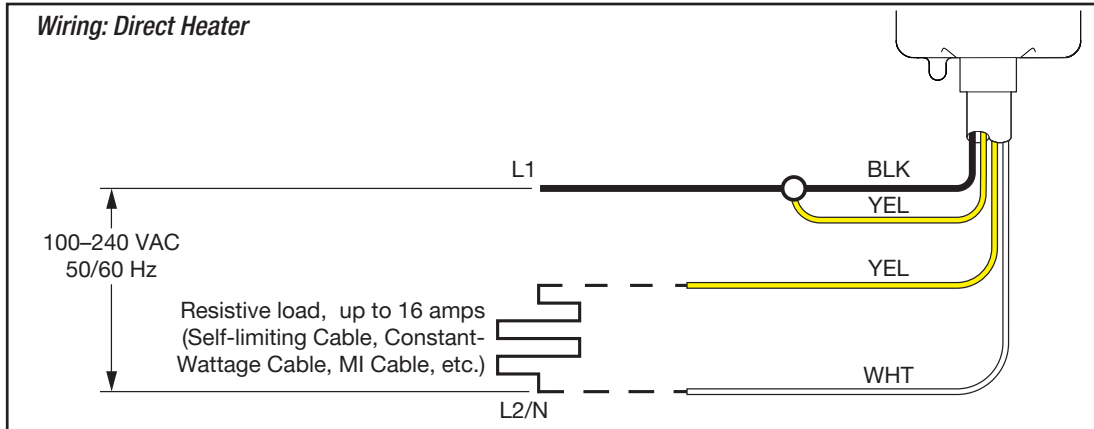
Sensor grid

Be certain sensor grid is in a clear and open area identical to that requiring melting and exposed to falling snow.

Ø 4.60"
Ø 117mm

6.35"
161mm

0.50"
13mm
0.75"
29mm

Ambient air temperature sensor
Cool this area per instructions when testing

Designed to be mounted using PVC conduit using either 3/4" inserted into the flange (0.82"/21mm ID) or, with a coupler, 1" mounted around the flange (1.32"/34mm OD). Consider PVC adaptor if using metal conduit.

Weatherproof conduit body or junction box supplied by customer. Make all threaded joints weathertight.

Insulate splices with wire nuts.

Mount rigidly in an upright position, as shown, at a height above ground as necessary to discourage animal damage and vandalsim.

Figure 3. LCD-8 installation

Install in accordance with the requirements of all applicable electrical and building codes and regulations. Ensure that all conduit and cable terminations are watertight.

NEC Article 426.28 requires Equipment Ground Fault Protection (GFEP) for Ice and Snow Melting Equipment. This functionality is not provided as part of this controller and shall be provided as part of the overall system.

Wiring: Direct Heater

L1

100–240 VAC 50/60 Hz

BLK
YEL

YEL

Resistive load, up to 16 amps (Self-limiting Cable, Constant-Wattage Cable, MI Cable, etc.)

WHT

L2/N

Wiring: External Contactor

L1

100–240 VAC 50/60 Hz

BLK
YEL

YEL

Inducitve load, up to 3 amps (Contactor, Pump Motor, Motorized Valve, etc.)   K1

WHT

L2/N

Wiring: Dry Contact

L1

BLK

WHT

L2/N

YEL

100–240 VAC 50/60 Hz

Dry Contacts

YEL

Operation

Initialization Sequence

Upon power up, the LCD-8 performs an initialization sequence, allowing a user or technician to verify its operation.

First, the external relay energizes for ten seconds. Next, the relay powers off and the cup heaters energize for ten seconds. Finally, both are off for another ten seconds. During this time, the green LED blinks slowly—one (1) second on, one (1) second off. Normal operation follows.

When energized, the controller's green LED is on continuously. During an alarm condition, the green LED blinks quickly, alternating between on and off twice a second. Exceptions are when the green LED conveys information during the configuration process or when the unit is in an automated testing device.

When the system detects moisture and the ambient temperature is below the operating temperature, if there is one, this defines a "snow" event. For a precipitation sensor (operating temperature off), moisture is detected at any temperature: this could be snow or rain.

Four States of LCD-8 Controlled System

The system can be in one of four states, three with lockout disabled or one in lockout enabled:

- **Idle:** the LCD-8 monitors during conditions lacking moisture and/or cold air temperature
- **Call for Heat:** the LCD-8's sensors recognize snow or ice as moisture
- **Holding:** the LCD-8 continues system operation for hold-on duration unless snow begins again; when hold-on time is over or parameter is set to zero (0), systems returns to Idle state
- **Lockout enabled:** low-temperature lockout, where temperature is too cold for system to operate effectively and energy is conserved

The heater is on during a snow event or within its holding state.

Initiating Hold-On State

The user can also swipe the magnet to start a hold-on cycle or to terminate a hold-on cycle. If a manual cycle is started, it operates for the normal hold-on duration *(note: if the hold-on time is set to 0, operation lasts one hour)*. However, if the ambient temperature is above 50°F when the cycle starts, the cycle duration is ten (10) minutes. If the temperature rises above 50°F during the cycle, operation truncates to 10 minutes. This 10-minute constraint is only for manually-triggered hold-on cycles; a cycle resulting from snow proceeds for the full duration. Note: this does not apply to a precipitation sensor.

Special Case: Hold-On Time is 0

For the special case that only occurs with a manual swipe when the hold-on time is set to zero (0), the heater operates for at least one hour, even if there is a snow condition. In terms of a strict state description in this one case, a snow condition does not cause the system to enter the snow state, but rather to stay in the hold-on state. If the snow remains after the one hour, the heater remains energized.

In the "enabled" Lockout state, the heater is not on. When snow is detected, the system enters the Snow state if the ambient air temperature is above 17°F, but it enters the Lockout state instead if the temperature is below 17°F. Additionally, this Lockout state is entered if the temperature falls below 17°F during an automatic hold-on cycle. If the temperature rises above 17°F in the Lockout state but with no moisture detected (not snowing), the hold-on timer is restarted. In the Lockout state, the heater is not on.

If in the Idle state and the temperature is below 17°F when a magnet swipes the magnetic switch, the system initiates its manual cycle as usual. If the temperature falls below 17°F during the cycle, it is ignored. If the unit is in the Lockout state and the user swipes the magnetic switch, the temperature reading is ignored. This will be maintained until the end of the snow event (that is, until a return to the Idle state).

The override ends when the heaters turn off. However, if a manual cycle is initiated while when the environment is frigid, and then snow starts, the heaters remain energized until the snow stops and for the hold-on time thereafter.

Note: Avoid selecting both low-temperature lockout and a hold-on time of zero (0) hours, as the heaters may not energize.

Alarms

When the LCD-8 operates normally, its green LED is lit continuously. Under an alarm condition, this LED will flash rapidly—on and off twice a second. The alarm may or may not inhibit operation, depending on circumstances.

Three possible conditions exist which initiates an alarm:
- **Bad cup thermistor.** If the cup thermistor is bad, the unit will not do automatic snow melting. The rationale is that we can't turn on the cup heater without risking damage to the unit; and if snow or freezing rain falls with the cup cold, it may stay there for weeks, and the unit would never shut off. The manual hold-on cycle will work.
- **Bad ambient thermistor.** If the ambient thermistor is bad, the unit will operate normally if it is configured as a precipitation sensor; if it is configured as a snow sensor, it will not do automatic snow melting. The manual hold-on cycle will work.
- **Corrupted configuration.** If the configuration is corrupted, the unit will operate under its default configuration.

The bad thermistor alarms will clear if the thermistor repairs itself. The corrupted configuration alarm will clear if the unit is reconfigured: in that case the user is advised to cycle power, confirming reconfiguration.

GREEN LED PULSE PATTERN

Prior to learning how to change the configuration of the LCD–8, it is first necessary to understand how the device communicates with the user; see Table 1. As there is no display on the unit, the only means of communicating with the device is to carefully observe the pulse pattern of the green LED.

Hold-On Time (in hours)	0 Hours (1 Pulse)	1 Hour (2 Pulses)	3 Hours (3 Pulses)	5 Hours (4 Pulses)
Temperature Set Point (in °F)	OFF* (1 Pulse)	36°F (2.22°C) (2 Pulses)	38°F (3.33°C) (3 Pulses)	40°F (4.44°C) (4 Pulses)
Low Temperature Lock-Out	OFF (1 Pulse)		ON (2 Pulses)	

When the Temperature Set-Point feature is configured to be in the "OFF" setting, the LCD–8 senses moisture only and activates the heaters regardless of temperature.

Table 1. LCD–8 CONFIGURATION OPTIONS AND GREEN LED PULSE PATTERN

LCD-8 Magnetic Reed Switch

The LCD-8 uses an internal magnetic reed switch (Figure 4), where the user swipes a magnet (Figure 5) externally across this switch (Figure 6) to start a hold-on cycle or to terminate a running hold-on cycle. The magnetic switch determines whether the user's action "swipes" or "holds" the magnet during LCD-8 configuration.
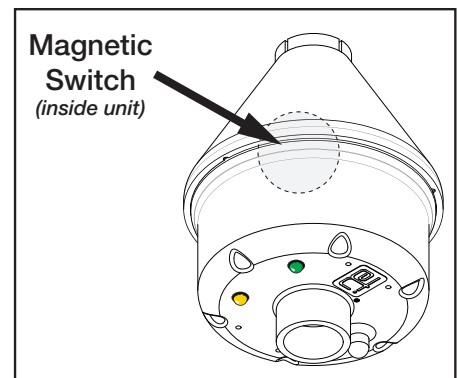

Magnetic Switch *(inside unit)*

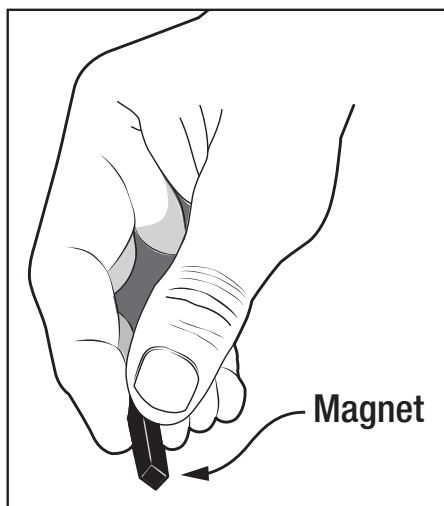*Figure 4. Magnetic Reed Switch (internal)*

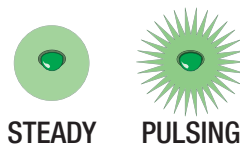STEADY   PULSING

Magnet

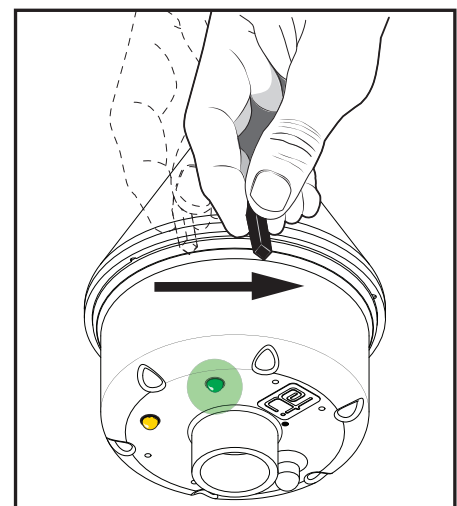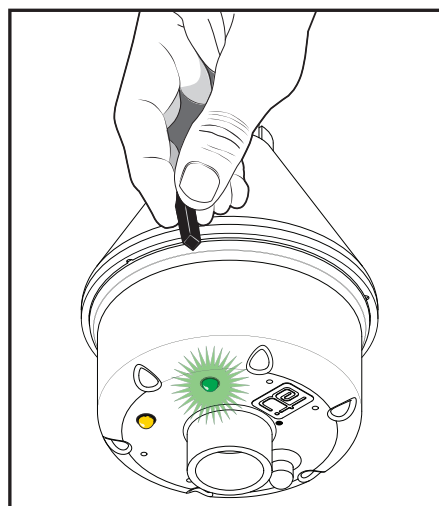*Figure 5. Magnet (external)*

Figure 6. Positioning (left) and swiping (right) external Magnet over internal Magnetic Switch

LCD-8 Configuration

The user is able to configure three operating parameters on the Snow Switch Model LCD–8.
These are:

- the hold-on time in hours;
- the temperature set point in degrees Fahrenheit; and
- low temperature lock-out operation.

The definitions of each of these parameters, as well as how to determine their current setting and how to change those settings, will be explained in this section of the manual.

HOLD-ON TIME

Hold-on time refers to the number of hours that the heaters will continue to operate once the unit no longer detects precipitation. Hold-on time ensures that not only is all the snow melted from the protected surface, but also that the system continues to dry and evaporate the surface without refreezing. The factory default hold-on time setting is 3 hours.

TEMPERATURE SET-POINT

The temperature set-point refers to the temperature at which the LCD-8 activates the heaters given the presence of moisture. When set to its default, "Off," the controller activates the heaters based only on the presence of moisture at *any* temperature. The factory default temperature set point is 38°F (3.33°C).

LOW TEMPERATURE LOCK-OUT

The low temperature lock-out function disables unit operation in temperatures less than 17°F (–8.33°C) in those climates or during those seasons where it is simply too cold to make operation practical. The factory default low temperature lock-out setting is Off, meaning that the unit will try to activate the heaters regardless of ambient temperature.

Setting the configuration

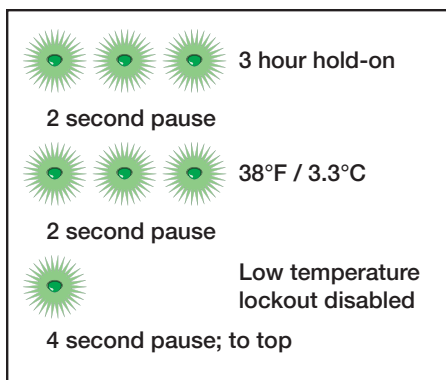There are three fields available for configuration. Each has several numerical values possible, as follows:

Field 1: Hold-On Time
Values   1: off
2: 1 hour
*3: 3 hours**
4: 5 hours
Field 2: Operating Temperature
Values   1: none (precipitation sensor)
2: 36°F / 2.2°C
*3: 38°F / 3.3°C**
4: 40°F / 4.4°C
Field 3: Low Temperature Lockout
Values   *1: disabled**
2: enabled
*default value

3 hour hold-on

2 second pause

38°F / 3.3°C

2 second pause

Low temperature lockout disabled

4 second pause; to top

Figure 7. LED response, default configuration

To Enter the Configuration Process

- Hold the magnet to the switch for 3 seconds
- The green LED will go off
- Remove the magnet
- Process begins

The unit will flash the values of the three Field parameters in order, repeatedly. The pattern begins with

- Field 1's green LED pulses
- 2 seconds between Field 1 and Field 2
- Field 2's green LED pulses
- 2 seconds between Field 2 and Field 3
- Field 3's LED pulses
- 4 seconds between Field 3 and returning to Field 1;

the four (4) second gap helps the user identify Field 1, the starting point of the sequence, even after the sequences of pulses have repeated several times. The LCD-8's default configuration is represented in Figure 6, above.

After changing the parameters of any field, the LCD-8 returns to the display mode.

To Display the Current Values

Hold the magnet over the magnetic switch for 3 seconds. The green LED turns off then flashes a brief message (3 short pulses and a long pulse), and return to normal mode. This can be done even if the parameters have not been changed.

To Change a Field's Parameters

Hold the magnet to the switch during the pause after that field. The green LED turns and remains on until the magnet is removed. That sets the value to 1. Positioning the magnet on again, the LED turns on, then remove the magnet: that sets that value to 2. Continue in this fashion.

There are two (2) seconds between swipes. After 2 seconds, the LCD-8 maintains the entered value and returns to display mode. If a value exceeds parameters, the green LED flickers briefly and returns to displaying the previous values.

Note: if the magnet is held for 3 seconds during the process of setting a value (having been released at least once), the green LED flickers briefly and restarts the display process.

To Abandon the Process with No Changes

Allow the LCD-8 to sit for two (2) minutes. The unit will flash the green LED quickly for 2 seconds and return to normal operation, displaying a steady green LED. This can be done at any time in the process.

Note: changes to the operating temperature or the state of the low-temperature lockout take effect immediately. Changing the hold-on time does not affect any active hold-on cycles; new values will be used the next time a hold-on cycle initiates.

Post–Installation LCD-8 Test

Most problems result from installation errors. Before testing, verify that unit is properly installed.

1. Connect power to snow melting system. Wait 15 seconds; system should not actuate.
2. Using ice water or other cooling agent, cool ambient air temperature sensor to below 38°F (3.3ºC); system should not actuate. Apply moisture to moisture sensing grid. System should actuate in less than 15 seconds.
3. Dry moisture sensing grid. Disconnect power to snow melting system. Wait 1 minute, then reconnect power. If system actuates, ensure sensing grid is dry and ambient air temperature is above 38°F (3.3°C), then repeat this step.

SPECIFICATIONS

General

Area of use	Nonhazardous locations
Approvals	c (UL) us LISTED 109R Type 873 Temperature Regulating Equipment

Enclosure

Protection	NEMA 3R
Cover attachment	Polycarbonate with machine screws
Entries	1 x 3/4" entry (bottom)
Material	Polycarbonate
Mounting	Pole mount
Dimensions	4.6" (W) x 6.1" (H) / 117mm (W) x 155mm (H)

Control

Supply voltage	ETI PN 24619: 100VAC – 240VAC; 50/60 Hz ETI PN 24781: 24VAC; 50/60 Hz
Load	3 amp maximum inductive 16 amp maximum resistive
Heater Hold-On timer	0, 1, 3 (default) or 5 hours; configured by magnetic reed switch
Set point temperature	Off (moisture only), 36°F, 38°F (default), 40°F; configured by magnetic reed switch

Interface

Status indicators	SUPPLY (green): Power on; will flash while in configuration mode HEAT (yellow): Heating cycle in progress

Wire and Cable Ratings

Power cable	Size for heater load (16 amps maximum)
Heater cable	Size for maximum heater load

Environmental

Operating temperature	–40°F to 104°F (–40°C to 40°C)
Storage temperature	–67°F to 167°F (–55°C to 75°C)

ORDERING INFORMATION

Order Number	Description
24619	LCD–8 Aerial Snow Controller, 100–240 VAC (QTY 1)
24781	LCD–8, 24VAC
18703	Red Wire Nuts (QTY 4)
24782	LCD–8 Manual (QTY 1)

LIMITED WARRANTY

ETI's two year limited warranty covering defects in workmanship and materials applies. Contact Customer Service for complete warranty information.

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