



IMPORTANT INSTRUCTIONS - SAVE THESE INSTRUCTIONS

Read all instructions before installing. Please adhere to instructions published in this manual. Failure to do so may be dangerous and may void certain provisions of your warranty.

ArcticSense Installation, Operation and Maintenance Manual



TABLE OF CONTENTS

A. GENERAL	3
B. INSTALLATION	5
C. OPERATION	7
D. MAINTENANCE AND TROUBLESHOOTING	8

A. GENERAL



WARNING. Read and adhere to the following. Failure to do so may result in severe or fatal injury. Warranty will be void.



CAUTION. This symbol indicates a potentially hazardous situation, which, if not avoided, may result in personal injury or damage to the equipment. Electrical hazard. Authorized personnel only

- ArcticSense is a modular microprocessor-based controller that monitors field mounted moisture and/or temperature sensors and outputs a dry contact relay based on operator adjustable setpoints. It has been specifically designed and ruggedized for railroad and other harsh industrial environments and has been tested to both IEC62236-4 and AREMA standards. The omnidirectional precipitation sensor reliably detects snow and ice including blowing and drifting conditions common in the days following an active weather event. ArcticSense is typically used for snow and ice detection but can also be configured as a thermostat or moisture detector.
- Specifications

SNOW DETECTION CONTROLLER (SDC)	
Input Voltage	24 VAC 60Hz
Minimum Input Power	3A
Output Contact	NO SPST 2A, 120 VAC/30VDC
Environmental	-40F to 140F (-40C to 60C). No ingress protection. Requires suitable enclosure
Mounting	35mm DIN rail
Wire Size	14-22 AWG
Ambient Temperature Sensor	1
Precipitation Sensor(s)	1-3
Dimensions	4.4" (112mm) W x 3.4" (86mm) H x 2" (52mm) D

AMBIENT TEMPERATURE SENSOR (ATS)	
Pre-terminated Lead w/RJ12 Connector	84" (2134mm) Standard. Optional 6" (153mm), 72" (1829mm) & 132" (3353mm)
Mounting	(2) Mounting Holes That Accept #8 Hardware
Environmental	-40F to 140F (-40C to 60C). Suitable for outdoor use.
Dimensions	3" (76mm) W x 1" (26mm) H x 1.5" (39mm) D

OMNIDIRECTIONAL PRECIPITATION SENSOR (OPS)	
Pre-terminated Leads	Four 18 AWG copper
Mounting	1/2" NPT Female
Environmental	-40F to 140F (-40C to 60C). Suitable for outdoor use.
Dimensions	2.3" (58mm) W X 2.1" (53mm) H x 2.3" (58mm) D

- Adjustable Parameters

Snow / Rain Temperature: 32F (0C) to 54F (12C) (Default 39F/4C)
Delay On: 0 - 15 Minutes (Default 0 Minutes)
Delay Off: 0 - 60 Minutes (Default 0 Minutes)
Moisture Sensitivity: 1 - 6 (Default 3)

4. Components



Figure 1 – Ambient Temperature Sensor



Figure 2 – Snow Detection Controller



Figure 3 – Omnidirectional Precipitation Sensor

5. Schematic

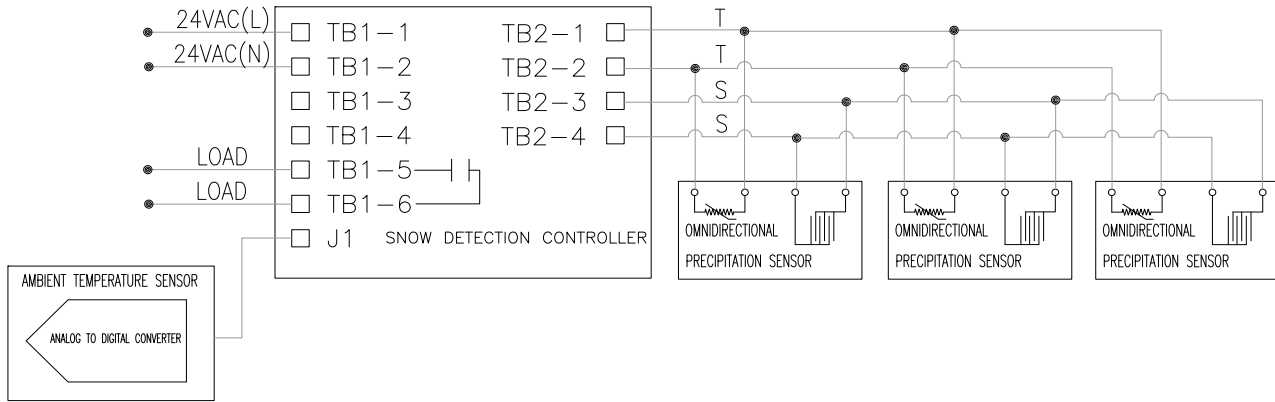



Figure 4 – Schematic

B. INSTALLATION

1. Identify a suitable location for mounting the ArcticSense snow detection controller. Important considerations include:
 - a. The snow detection controller requires an IP52 or greater enclosed space.
 - b. Minimum and maximum allowable operating temperatures are -40°F to +140°F (-40°C to +60°C).
 - c. Availability of 24VAC, 60hz power. 3A minimum.
 - d. The snow detection controller must be mounted within appropriate cabling distance of an exterior location suitable for mounting the ambient temperature sensor. See B.5. Refer to the lead length of the ambient temperature sensor used for your project. It is NOT practical to extend the lead on the ambient temperature sensor.
 - e. 4.4"W x 3.4"H x 2"D (112mmW x 86mm H x 52mm D)
2. Install a 5" (127mm) length of 35mm DIN rail and mount the snow detection controller on the DIN rail.
3.  Terminate 24VAC 60hz power to TB1-1 & TB1-2. 3A minimum. (See Figure 5 below)

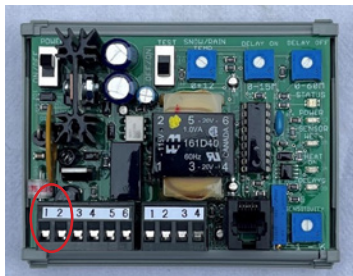


Figure 5


4.  Terminate load to TB1-5 & TB1-6. TB1-5 & TB1-6 are Normally Open SPST dry contacts rated for 2A @ 120VAC/30VDC. (See Figure 6 below)



Figure 6

5. If utilizing a ArcticSense ambient temperature sensor identify a suitable location for mounting the ambient temperature sensor. If your project doesn't utilize the ambient temperature sensor skip to step B.9. Important considerations include:
 - a. Ambient temperature sensor must be mounted in a location exposed to outside ambient temperatures. Avoid mounting sensor in close proximity to sources of heat that might impact ambient temperature measurement accuracy.
 - b. It is NOT practical to extend the lead on the ambient temperature sensor. It should be mounted within appropriate cabling distance of the snow detection controller. Refer to your project bill of materials to identify the lead length of the ambient temperature sensor used for your project.
 - c. It is recommended to mount the ambient temperature sensor in a shaded area, protected from direct sunlight.
6. Mount the ambient temperature sensor using #8 fasteners or cable ties.
 - a. If mounting to a flat surface allow a minimum of 0.375" (9.5mm) clearance to afford an appropriate bend radius for the lead protruding from the back of the ambient temperature sensor.
 - b. If mounting to a flat surface, with a through-hole, make a 1/2" nominal knockout (0.875") and install a knockout bushing.



Figure 7

7. Route the ambient temperature sensor lead back to the snow detection controller in accordance with acceptable practices for your project. Allow 0.500" x 0.500" (13mm x 13 mm) for free passage of the RJ-12 male jack.

8. Plug the ambient temperature sensor into the snow detection controller J1. (See Figure 8)

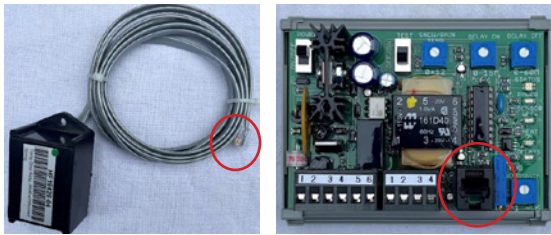


Figure 8

9. If utilizing ArcticSense omnidirectional precipitation sensor(s) identify suitable location(s) for mounting. Important considerations include:


- a. For increased reliability it's recommended to use 2 omnidirectional precipitation sensors. One should be located above maximum snow depth to detect falling snow (aerial) and one should be located near ground level to detect blowing snow (ground)
- b. Minimize overhead obstructions, like trees and buildings, that could impact snow patterns.
- c. There are multiple mounting configurations available. Refer to your project's bill of materials to identify your configuration. Typical configurations include ½" NPT female or Fastrax trackside junction box mounting.
- d. Optimal orientation of the omnidirectional precipitation sensor is vertical and level. (See Figure. 9)



Figure 9

- e. Limit cable runs between omnidirectional precipitation sensor and snow detection controller to 500' maximum or 1.25 ohms impedance, whichever is less.
 - f. Avoid routing cables in raceways containing conductors operating above 120 volts.
10. Mount the omnidirectional precipitation sensor(s) per your project specific BOM and acceptable practices. Common configurations include ½" NPT female mast mounted aerial and Fastrax trackside junction box ground mounted.


11. Route the omnidirectional precipitation sensor cable leads back to the snow detection controller in accordance with acceptable practices for your project. If cable extensions are required utilize project acceptable practices to increase the cable length. Limit cable runs to a maximum of 500' or 1.25 ohms, whichever is less. Avoid routing cables in raceways containing conductors operating above 120 volts.

12.  Terminate cables labeled "T" to TB2-1 & TB2-2. (See Figure. 10)

CAUTION



Figure 10

13.  Terminate cables labeled "S" to TB2-3 & TB2-4. (See Figure. 11)

CAUTION



Figure 11

C. OPERATION

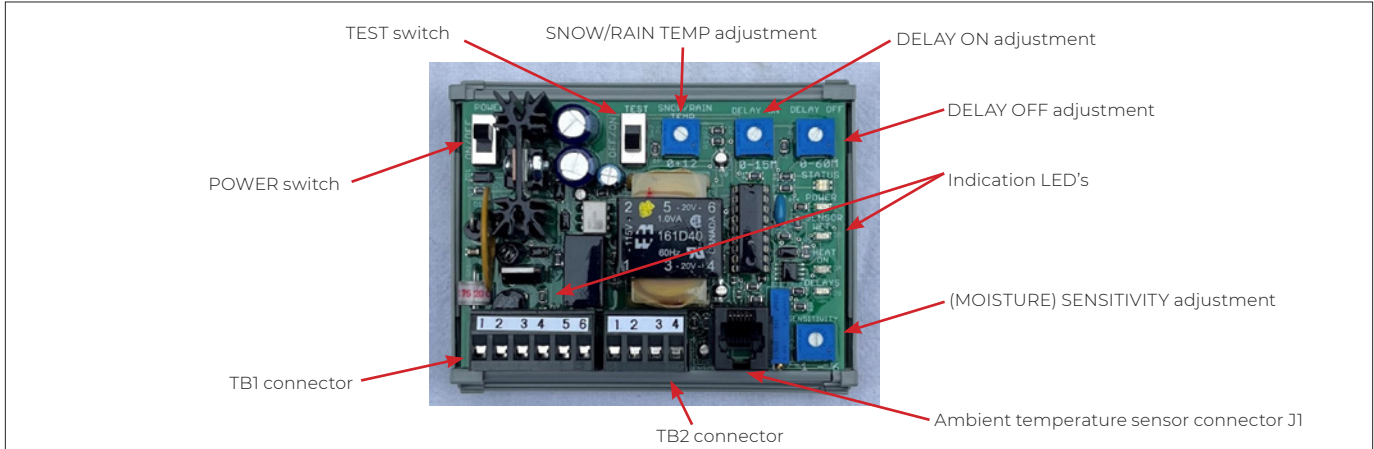


Figure 12

Indication LED's

LED Name	Description	State	Indication
STATUS	Processor status	Green with red pulse	Processor functioning normally
		Off	Processor failed
		Solid green Solid red	
POWER	Power supply	Green	Processor energized
SENSOR WET	Omnidirectional precipitation sensor	Red	Precipitation detected (Above sensitivity setpoint)
HEAT ON	Load status	Yellow	Load is energized
DELAYS	Delay time	Off with red pulse	Delay on
		Red with off pulse	Delay off
D10	Omnidirectional precipitation sensor heater	Yellow	Omnidirectional precipitation sensor heater on

Figure 13

1. Standard Configuration

- a. Ensure the POWER switch is ON and the TEST switch is OFF.
- b. Adjust SNOW/RAIN TEMP to desired setpoint temperature. Minimum and maximum range is 32°F to 54°F (0°C to 12°C). The default setting is 39°F (4°C). Precipitation detected when the ambient temperature is below setpoint temperature is considered snow or ice.
- c. Adjust DELAY ON to desired setpoint time. Minimum and maximum range is 0 to 15 minutes. The default setting is 0 minutes. When SNOW/RAIN TEMP and (moisture) SENSITIVITY setpoints are satisfied continuously for the DELAY ON time the load is energized. If at any time during the delay period either of the setpoints are not satisfied the delay period is reset
- d. Adjust DELAY OFF to desired setpoint time. Minimum and maximum range is 0 to 60 minutes. The default value is 0 minutes. When SNOW/RAIN TEMP and (moisture) SENSITIVITY setpoints are no longer satisfied the load remains energized for the DELAY OFF period and is then de-energized. If at any time during the DELAY OFF period both setpoints are satisfied the delay period is reset.
- e. Adjust (moisture) SENSITIVITY to desired setpoint. Minimum and maximum range is 1 to 6. The default value is 3. 1 is the least sensitive and 6 is the most sensitive. For example, when set at 1 the omnidirectional precipitation sensor will be very wet before indicating precipitation.

2. Alternative Configurations

- a. Setting the TEST switch to ON simulates a wet sensor and will force the WET SENSOR LED to illuminate red and the wet sensor logic in the snow detection controller to go "true". This force can be used to make ArcticSense function as a thermostat. All other settings remain as described in Standard configuration.
- b. Unplugging the ambient temperature sensor simulates 30°F (-1°C) and forces the temperature setpoint logic in the snow detection controller to go "true". This force can be used to make ArcticSense function as a moisture sensor. All other settings remain as described in Standard configuration.

D. MAINTENANCE AND TROUBLESHOOTING

A quick function test and omnidirectional precipitation sensor cleaning should be performed as needed, and annually, as part of winter preparedness.

Note:

- Setting the TEST switch to ON simulates a wet sensor and will force the WET SENSOR LED illuminated red and the wet sensor logic in the snow detection controller to go “true”.
- Unplugging the ambient temperature sensor simulates 30°F (-1°C) and forces the temperature setpoint logic in the snow detection controller to go “true”.
- The snow detection controller does not output power to the omnidirectional precipitation sensor heater (TB2-1 & TB2-2) in ambient conditions warmer than 50°F (10°C). Output to the omnidirectional precipitation sensor heater is indicated by LED D10 illuminated yellow.
- The snow detection controller refresh rate for the ambient temperature sensor is approximately 60 seconds. Any changes, or forces, to the ambient temperature sensor require at least 1 minute to be reflected in the logic of the snow detection controller.

1. Clean omnidirectional precipitation sensor top sensing grid and horizontal louvres with electrical contact cleaner and a non-metallic stiff bristle brush. (See Figure. 14)



Figure 14

2. Quick function test. NOTE: The ambient temperature must be above 45°F (7°C) and the omnidirectional precipitation sensor must be dry to perform the quick function test. Proceed to component troubleshooting section(s) D.3 through D.5 if the quick function test fails.

- a. Set the snow detection controller to the following setpoints:
 - POWER switch ON
 - TEST switch OFF
 - SNOW/RAIN TEMP: fully CCW to 0
 - DELAY ON: fully CCW to 0
 - DELAY OFF: fully CCW to 0
 - SENSITIVITY: 12 o'clock to 3
- b. Confirm the following LED indications:
 - STATUS: illuminated green with red pulse
 - POWER: illuminated green
 - SENSOR WET: off
 - HEAT ON: off
 - DELAYS: off

- c. Fully saturate the omnidirectional precipitation sensor with water and confirm the SENSOR WET LED is illuminated red and the HEAT ON LED remains off.
- d. Set SNOW/RAIN TEMP fully CW to 12.
- e. Disconnect the ambient temperature sensor and wait at least 60 seconds
- f. Confirm the HEAT ON LED is illuminated yellow.
- g. Reconnect the ambient temperature sensor and see Operating section for returning the snow detection controller to operational mode.


3.



CAUTION

Troubleshooting the snow detection controller. Replace the snow detection controller if the following tests fail.

- a. Set the snow detection controller to the following setpoints:
 - POWER: OFF
 - TEST: OFF
 - SNOW/RAIN TEMP: 12 o'clock to 6
 - DELAY ON: fully CCW to 0
 - DELAY OFF: fully CCW to 0
 - SENSITIVITY: 12 o'clock to 3
- b. De-energize load power connected to TB1-5 & TB1-6.
- c. Remove TB2 and ambient temperature sensor connectors from snow detection controller
- d. Turn POWER switch ON.
- e. Turn TEST switch ON and confirm SENSOR WET LED is illuminated red
- f. Wait at least 60 seconds.
- g. On snow detection controller confirm voltage between TB2-1 & TB2-2 is 24 VAC. LED D10 should also be illuminated yellow.
- h. On snow detection controller confirm voltage between TB2-3 & TB2-4 is 7.5 to 10 VAC.
- i. Confirm HEAT ON LED is illuminated yellow and there's continuity between TB1-5 & TB1-6. NOTE: Depending on the load connected to TB1-5 & TB1-6 it may be necessary to de-terminate the load to perform continuity test.
- j. Turn TEST switch OFF.
- k. Confirm HEAT ON LED is off and there's no continuity between TB1-5 and TB1-6.

4.  Troubleshooting the omnidirectional precipitation sensor. Replace the omnidirectional precipitation sensor if the following tests fail.

- a. Turn POWER switch OFF
- b. Remove TB2 from snow detection controller
- c. On the removed TB2 connector confirm the resistance between TB2-1 & TB2-2 is consistent with the below approximate values. (See Figure 15). Note the below values are approximations. X-axis values pertain to the internal temperature of the omnidirectional precipitation sensor, and not necessarily the ambient temperature.

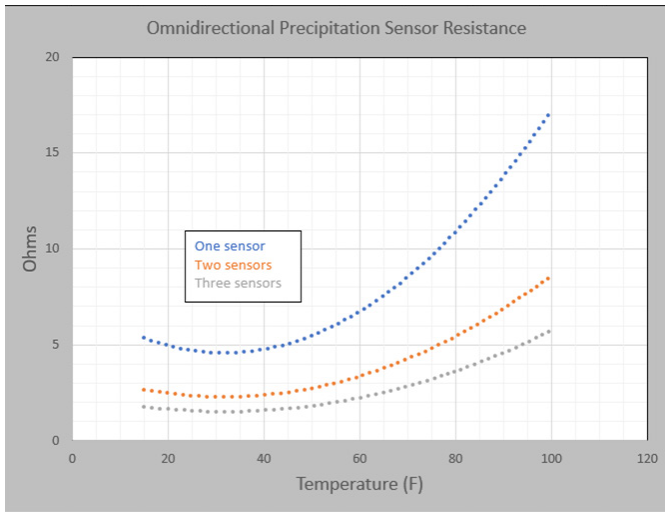



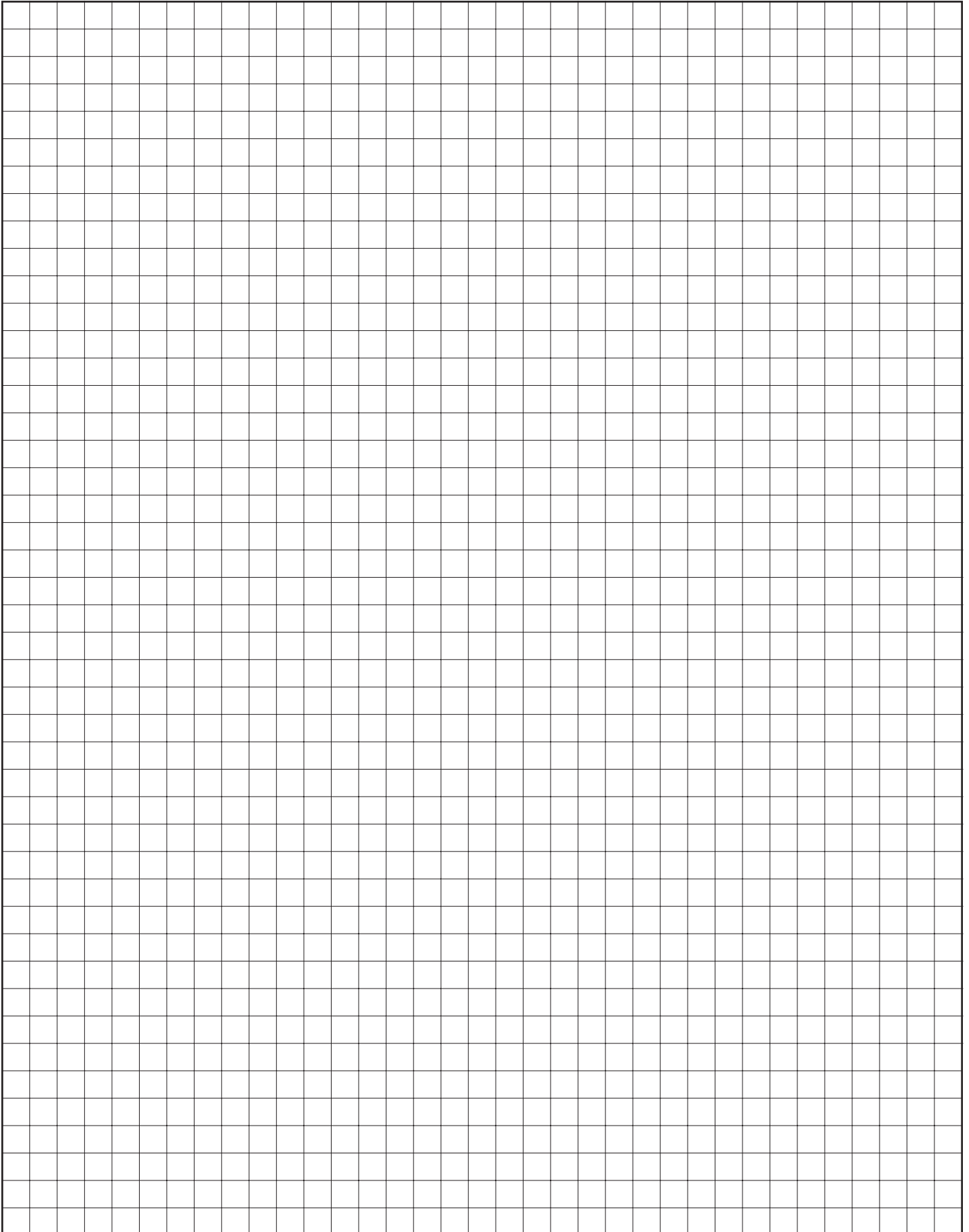
Figure 15

- d. On the removed TB2 connector confirm the resistance between TB2-1 & TB2-3 and TB2-1 & TB2-4 is OL.
- e. On the removed TB2 connector, and with a dry omnidirectional precipitation sensor, confirm the resistance between TB2-3 & TB2-4 is greater than one megaohm. Note the approximate value
- f. On the removed TB2 connector, and with a saturated omnidirectional precipitation sensor, confirm the resistance between TB2-3 & TB2-4 is trending down from the value obtained in step D.4.e.

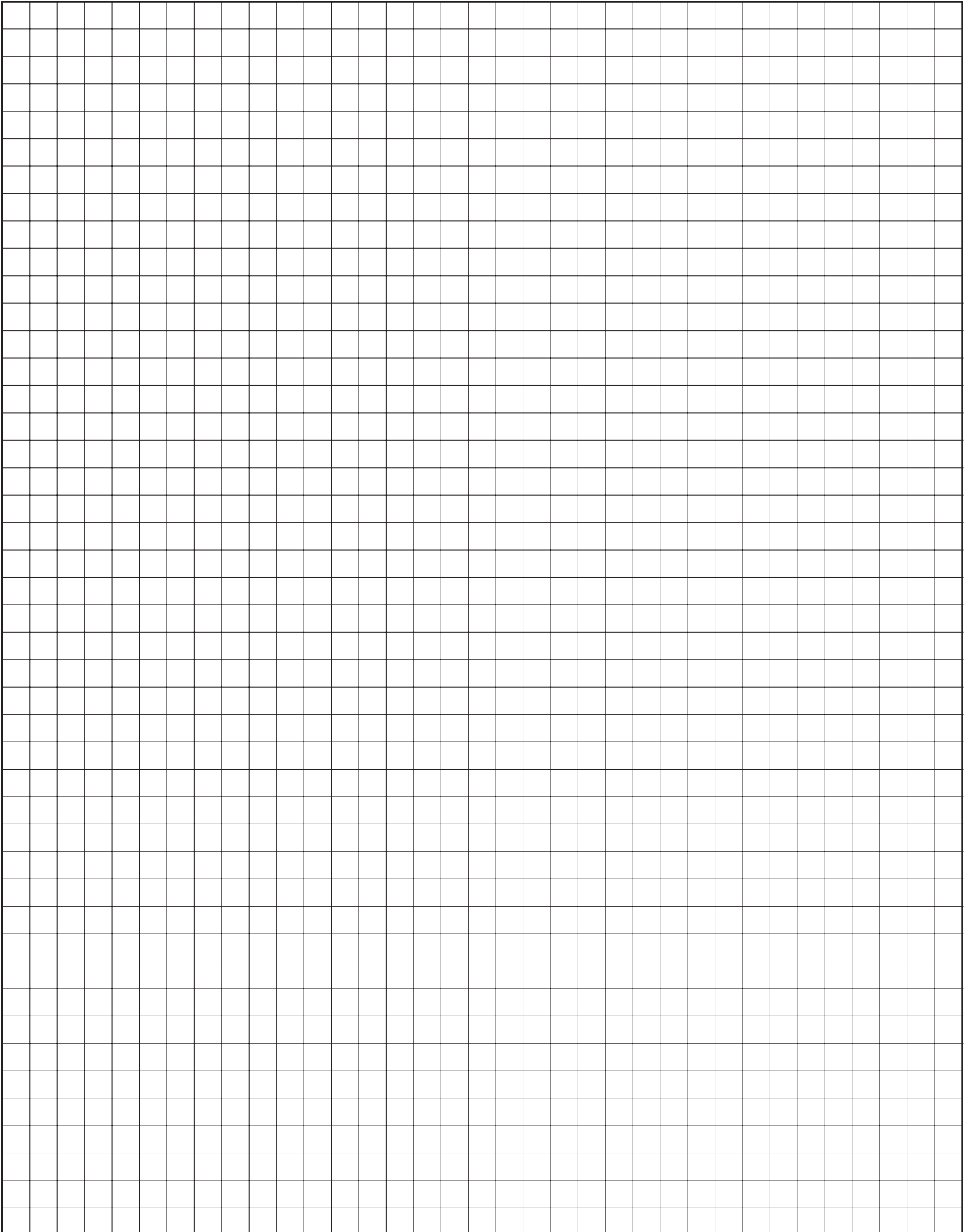
5.  Troubleshooting the ambient temperature sensor. The ambient temperature must be above 45°F (7°C) to perform the ambient temperature sensor troubleshooting. Replace the ambient temperature sensor if the following tests fail.

- a. With the ambient temperature sensor connected set the snow detection controller to the following setpoints:
 - POWER switch ON
 - TEST switch ON
 - SNOW/RAIN TEMP: fully CCW to 0
 - DELAY ON: fully CCW to 0
 - DELAY OFF: fully CCW to 0
 - SENSITIVITY: 12 o'clock to 3
- b. Confirm the following LED indications:
 - STATUS: illuminated green with red pulse
 - POWER: illuminated green
 - SENSOR WET: illuminated red
 - HEAT ON: off
 - DELAYS: off
- c. Set SNOW/RAIN TEMP fully CW to 12.
- d. Disconnect the ambient temperature sensor and wait at least 60 seconds.
- e. Confirm HEAT ON LED is illuminated yellow.

NOTES



NOTES





PLEASE ADHERE TO INSTRUCTIONS IN THIS MANUAL
Failure to do so may be dangerous and may void certain provisions of your warranty.

For further assistance, please call 1.855.244.3128

WARRANTY: Under normal use the Company warrants to the purchaser that defects in material or workmanship will be repaired or replaced without charge (from date of shipment) for a period of:

- 84 months - SwitchBlade® Heaters
- 60 months - DC Heaters
- 36 months - DC Control Panels
- 36 months - HELLFIRE Heaters, FEB Heaters
- 12 months - All other Fastrax® Products

Any claim for warranty must be reported to the sales office where the product was purchased for authorized repair or replacement within the contract terms.

Subject to State or Provincial law to the contrary, the Company will not be responsible for any expense for installation, removal from service, transportation, or damages of any type whatsoever, including damages arising from lack of use, business interruptions, or incidental or consequential damages.

The Company cannot anticipate or control the conditions of product usage and therefore accepts no responsibility for the safe application and suitability of its products when used alone or in combination with other products. Tests for the safe application and suitability of the products are the sole responsibility of the user.

This warranty will be void if, in the judgment of the Company, the damage, failure or defect is the result of:

- Vibration, radiation, erosion, corrosion, process contamination, abnormal process conditions, temperature and pressures, unusual surges or pulsation, fouling, ordinary wear and tear, lack of maintenance, incorrectly applied utilities such as voltage, air, gas, water, and others or any combination of the aforementioned causes not specifically allowed for in the design conditions
- Or, any act or omission by the Purchaser, its agents, servants or independent contractors which for greater certainty, but not so as to limit the generality of the foregoing, includes physical, chemical or mechanical abuse, accident, improper installation of the product, improper storage and handling of the product, improper application or the misalignment of parts.

No warranty applies to paint finishes except for manufacturing defects apparent within 30 days from the date of installation.

The Company neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with the product(s).

The Purchaser agrees that all warranty work required after the initial commissioning of the product will be provided only if the Company has been paid by the Purchaser in full accordance with the terms and conditions of the contract.

The Purchaser agrees that the Company makes no warranty or guarantee, express, implied or statutory, (including any warranty of merchantability or warranty of fitness for a particular purpose) written or oral, of the Article or incidental labour, except as is expressed or contained in the agreement herein.

LIABILITY: Technical data contained in the catalog or on the website is subject to change without notice. The Company reserves the right to make dimensional and other design changes as required. The Purchaser acknowledges the Company shall not be obligated to modify those articles manufactured before the formulation of the changes in design or improvements of the products by the Company.

The Company shall not be liable to compensate or indemnify the Purchaser, end user or any other party against any actions, claims, liabilities, injury, loss, loss of use, loss of business, damages, indirect or consequential damages, demands, penalties, fines, expenses (including legal expenses), costs, obligations and causes of action of any kind arising wholly or partly from negligence or omission of the user or the misuse, incorrect application, unsafe application, incorrect storage and handling, incorrect installation, lack of maintenance, improper maintenance or improper operation of products furnished by the Company.

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