

Surface Patrol™ Model 999J Owner's Manual



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Installation Instructions For The Control Products Road & Runway Surface & Ambient Temperature Monitoring System, Model 999J

General Information

The Model 999J Surface Temperature System requires 12 VDC power supplied with the correct polarity as noted on the back of the digital display above the terminal strip positions noted with (+) for positive and (-) for negative polarity. It is recommended the power be connected to one of the vehicle's ignition switched power lines. However, this is not required because the current draw for this system is in the 20 m.a. range and load is minimal.

NOTE: If you choose to power the unit through the cigarette lighter you may do so, but you will need a cigarette lighter converter. You will then need to cut and strip the wires. Then follow instructions above.

After installation of the unit, there is a final temperature calibration test and possible adjustment. You may wish to check calibration before installation. You may find it easier to do the calibration before the infrared housing is mounted to your vehicle. Power the sensor, following the directions above, either with a nine volt battery or an AC adapter that can be plugged in a wall outlet.

*NOTE: Allow the sensor to warm for 20 minutes before calibrating the unit. Additionally, calibrate the sensor only after the sensor has been in a relatively stable ambient temperature. For example, never calibrate the sensor in a heated garage or shed after being outside all night / day.

Installation Instructions:

I. Mounting the Infrared Sensor Head:

The sensor is an optical device. It must be pointed to the surface at a ninety degree angle. At (3) three feet, the circle diameter is approximately (1) one inch and at (6) six feet approximately (2) two inches. The physical mounting height or distance does not affect the accuracy of temperature readings. The sensor "sees" a circular target. The ambient (air) temperature sensor should be kept away from a heat source that could cause inaccurate readings, i.e. vehicle's exhaust.

A. Do not mount the unit directly over tire tracks, vehicular traffic lanes will read higher than adjacent road surfaces.

B. Recognize that the infrared signals received by the sensor are in the form of a conical shape, like an inverted flashlight. This requires the unit to be mounted so that it "sees" a clear view of the circular target.

C. Avoid hot engine surfaces, exhaust pipes and any obstruction between the sensor and the road surface.

D. The connecting cable is slightly over (18) eighteen feet in length, which limits the distance between the sensor head and the electronic display, which must be located inside the vehicle's cab. Longer cables are available.

E. The self-contained mounting bracket requires drilling holes for the appropriate mounting location chosen for your vehicle.

II. Digital Display:

The digital display is a dual LED (Light Emitting Diode) display powered by the vehicle battery. One display is for surface temperature and the other is for ambient air temperature.

Mounting options are numerous; the primary concern should be ready visibility for the driver.

The display is powered from the ignition switch (see attached diagram). A light wire, 20 or 22 gage is adequate. Less than 50 m.a. is required.

III. Ambient Sensor:

When mounting the ambient sensor the user should keep two things in mind. **The first is to mount the sensor so that there is good airflow. The second is that one should not mount the sensor so that there is a great deal of solar heat. Keep the sensor out of the sun. One example of a location that has low solar heat and good wind flow is the grill of the vehicle.** There is no user calibration available for the ambient sensor as there is with the surface sensor. However, calibration CAN be checked by soaking the ambient sensor in an ice bath. The sensor should read close to 32 degrees Fahrenheit or 0 degrees Centigrade.

IV. Final Calibration & Test:

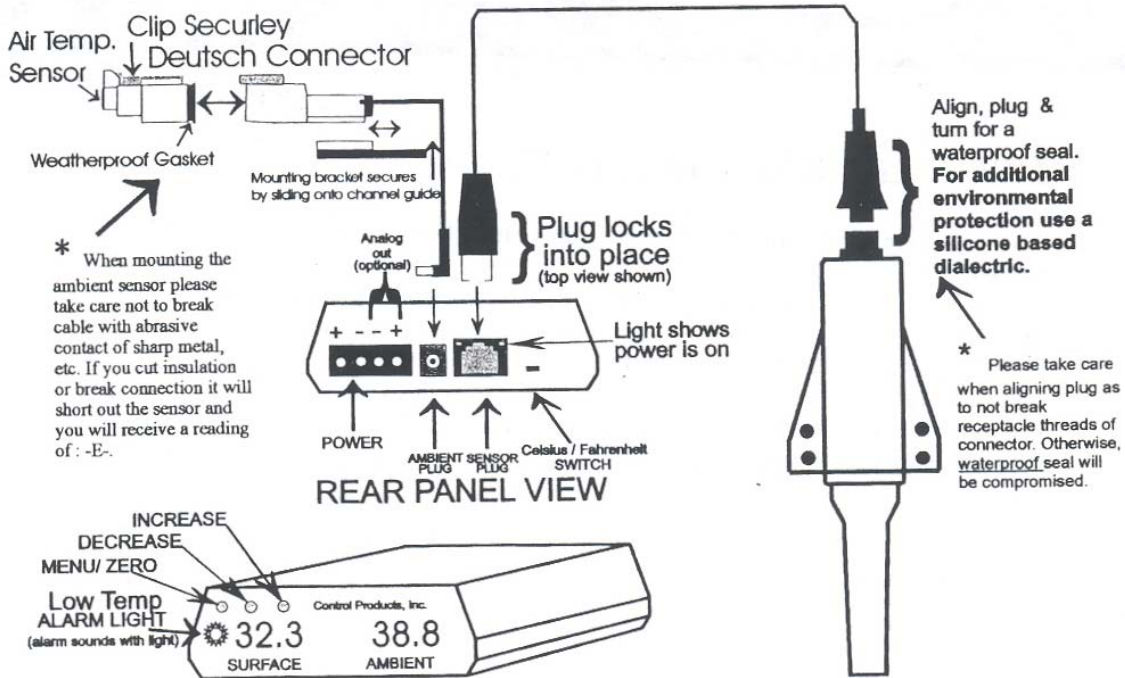
The primary use of this temperature monitoring system is to identify temperatures at the point of freezing. Therefore, final check out should confirm operation at this temperature. Recommended procedure is to fill a cup with chopped ice, then fill with cold water. After a few minutes this will provide a surface temperature of approximately 32 degrees Fahrenheit when the cup is placed directly at the end of the sensor cone. If the digital meter is not reading 32 degrees Fahrenheit at this time, make an adjustment as described in the attached diagram. **This calibration check should be done on a regular basis. We recommend once a month. Additionally, we recommend that the lens is cleaned every time you check calibration. For a more accurate calibration test, clean the lens before you calibrate to ice.**

NOTE: The sensor can sometimes take up to 10 minutes to read accurately after initially being powered. Usually the inaccuracy is so minimal that the user will rarely notice.

Additional Installation Hints:

- **Use dielectric grease on all external cable connections and pins to protect against corrosion**
- Never weld on a vehicle with electronic equipment installed and powered
- Disconnect the negative battery terminal when wiring electronic devices
- Unpack all parts and check packing list for completeness
- Untie and layout all cables supplied to ensure proper lengths
- Route cables so that they will not be damaged or abused
- When routing cables through metal openings, always use grommets to prevent cable damage

999J I.R. Temperature Sensor Calibration & Operation



Display Pushbuttons

There are three momentary contact pushbuttons located on the front of the 999J display. These pushbuttons are recessed and are accessed through small holes in the display lens. Pressing any pushbutton will briefly sound the meters beeper to confirm the operation. These buttons are designated, from left to right, as **MENU / ZERO**, **DEC** and **INC**.

Menu / Zero: Performs multiple functions.

Calibration: If the sensor is pointed at an "ice bath" press and release **MENU / ZERO** to calibrate. It will only allow one to calibrate the sensor if it is within a given range (± 5 F at 32 F). You will know that you are looking at ice when you hear the alarm sound. Once pointed at ice and the **Menu / Zero** button has been pressed and released, the left-most digits will flash. Keep the sensor pointed at ice for 6 or 7 seconds until the left-most digits quit flashing. The sensor is now calibrated to ice or 32 F. Again, if the sensor is not pointing at ice the calibration function will NOT work.

If the **Menu / Zero** pushbutton is pressed and held for a couple of seconds, you will enter *menu mode* operation. In this mode, the left-most digits display a label indicating which feature has been selected. The right-most digits display the value being modified. In this mode the other two buttons increase and decrease the modifiable (right-most) value. To toggle to the other menu options simply push the **Menu / Zero** button until you reach the desired menu option. If you press and hold the **Menu / Zero** button for two seconds again the display reverts to normal operation (reading ambient and surface temperatures).

INCREASE BUTTON: This button, while in menu mode, increases the current modifiable (right-most digit) value. Increasing past the maximum value "wraps around" to the minimum value. This button "auto-repeats" if pressed and held.

DECREASE BUTTON: This button, while in menu mode, decreases the current modifiable (right-most digit) value. Decreasing below the minimum value for a variable "wraps around" to the maximum value.

MENU VARIABLES:

While in menu mode, a number of options can be viewed and modified.

Alarm

This variable allows you to use the default setting (visual and audible alarm). The display will show:

ALr 03

However, the user can also turn the alarm completely off (ALr 00) or turn the visual alarm on and the audible alarm off (ALr 02) and finally turn the audible alarm on and the visual alarm off (ALr 01).

Offset

This variable lets you manually change the temperature probe's field calibration instead of using the automatic zero calibration described above.

oFF 0.0

Where the right-most digits show the probe's current offset. The maximum range of this variable is +/- 6 degrees. This variable is always in degrees Fahrenheit regardless of the setting of the C / F selection switch. Increments are 1/4 degree F increments.

LED Brightness (low)

This variable sets the "dim" display brightness level. This brightness is used when the meter is in low ambient light conditions. The range of this variable is 0 (dimpest) to 15 (brightest). The display will show:

LLo 01

LED Brightness (high)

This variable sets the "high" display brightness level. This brightness is used when the meter is in high ambient light conditions. The range of this variable is 0 (dimkest) to 15 (brightest). The default display will show:

Lhi 15

Analog Output Range (low)

=> This variable is only meaningful if the optional isolated analog output module is installed.

This variable defines the temperature, in degrees Fahrenheit, that will result in the analog output being set to its minimum value. The default display is:

Alo -40

This indicates that a temperature of -40 F will produce an analog output of 4 mA (or 1.00 V). The range variable is from -50 F to 999F.

Analog Output Range (high)

=> This variable is only meaningful if the optional isolated analog output module is installed.

This variable defines the temperature, in degrees Fahrenheit, that will result in the analog output being set to its maximum value. The default display is:

Ahi 140

This indicates that a temperature of +140 F will produce an analog output of 20 mA (or 5 V). Note that the minimum and maximum values also define the hard limits of the output. In other words, with a maximum Analog Output Range of 140 F set, all temperatures greater than or equal to this maximum value will produce that maximum analog output.

Special Operations Mode

=> This variable is only relevant if the display is equipped with the optional serial output module.

This variable sets the operational mode of the meter. For all normal operations, this should be set to 0. The default display is:

OP 0

Contact the factory for special operational modes.

Serial Baud Rate

=> This variable is only relevant if the display is equipped with the optional serial output module.

This variable sets the optional serial communications module's baud rate. The first 2 digits of the baud rate are shown on the display. The default display is:

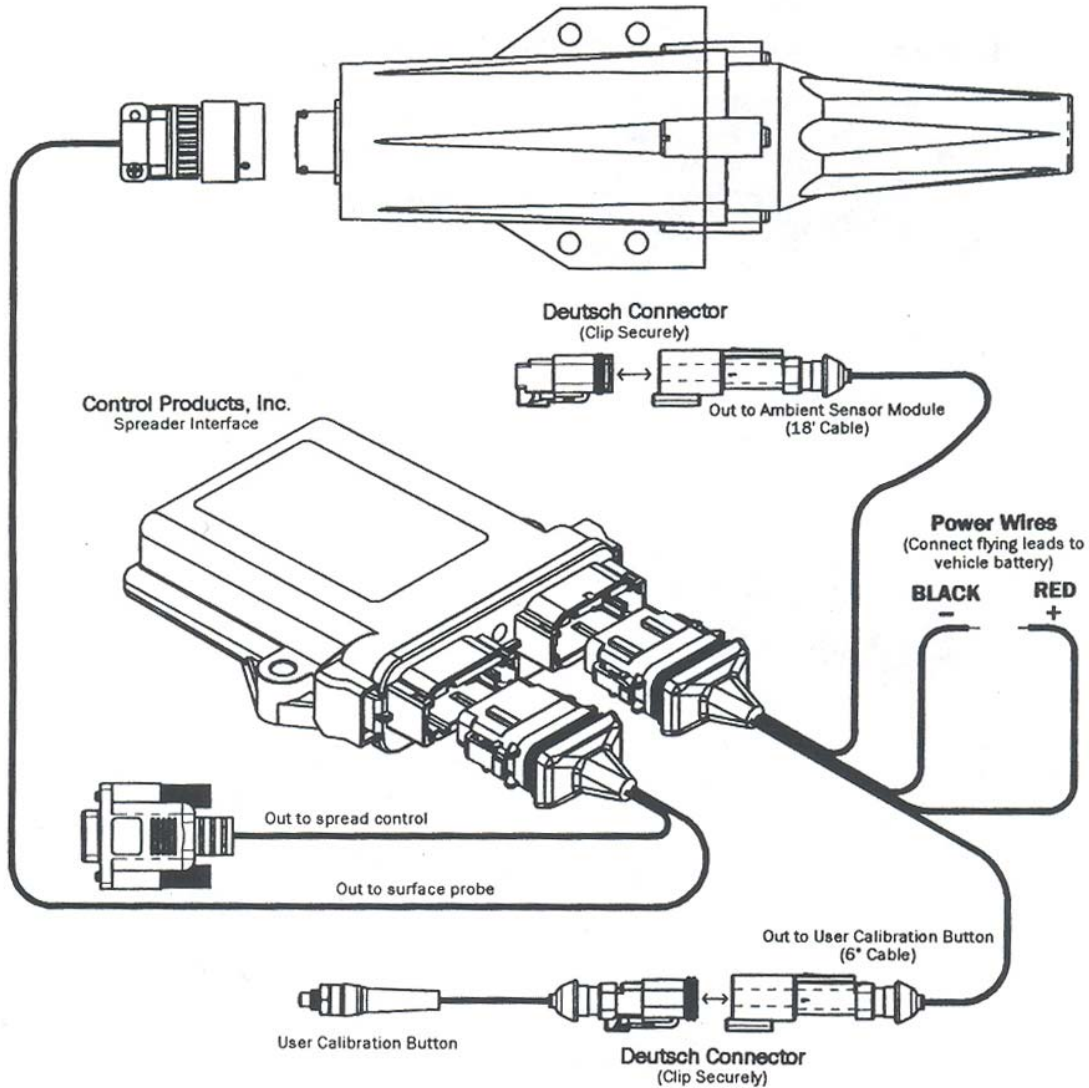
bd 96

The baud rate can be selected from **9600**, **4800**, **2400**, and **1200** baud.

INTERNAL PUSHBUTTON

There is a single pushbutton inside the 999J display that is used for calibration purposes. **This is intended for a factory test and not normal operations, so the display mode does *not* time out as the menu selections do. Avoid pushing this button.**

Surface Patrol Spreader Control Interface Wiring Diagram

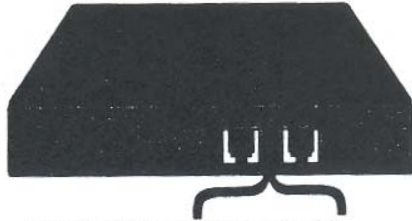


Installation hints:

- All component wires have only one appropriate plug-in location on the spreader interface box.
- The user calibration button should be located in plain sight and should be easy for the operator to locate.

Minimapping Operational Diagram

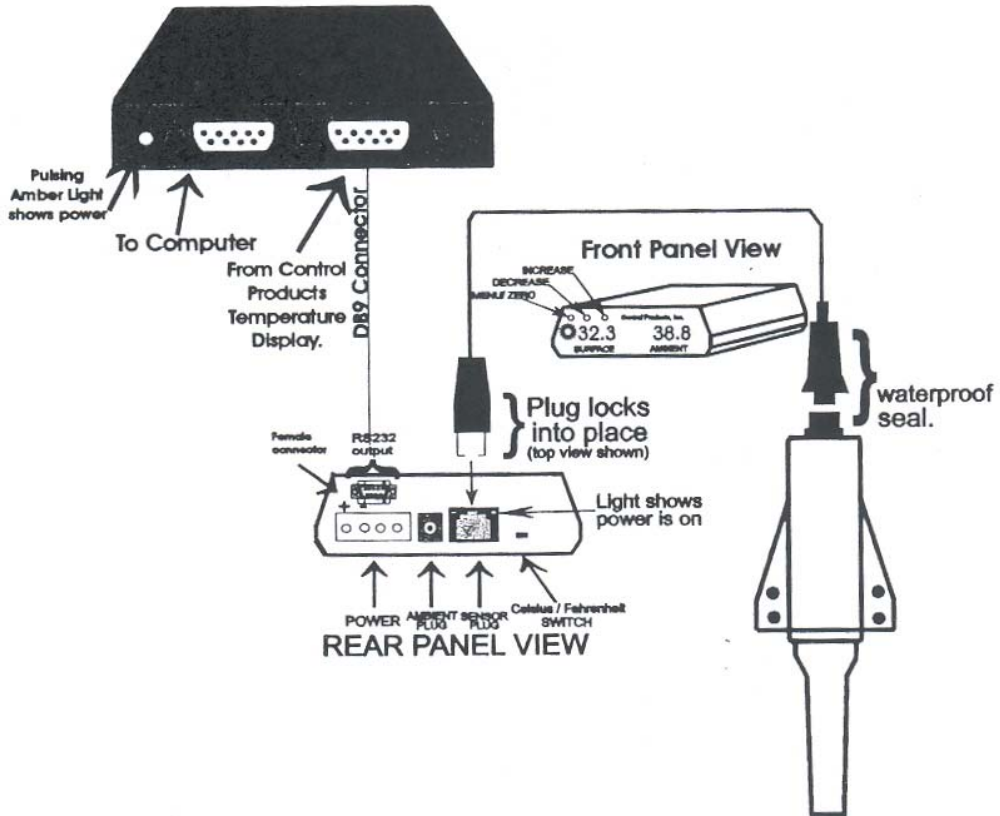
DMI and Temperature Interface Box



Reverse Panel View

+Connections are interchangeable and allow for:
 #1 Power
 #2 Interface with Distance Measuring Instrument (DMI) through the power interface on the DMI unit.
 -Please refer to the DMI instructional manual for more information

NOTE: Two hand-set cables are provided.
 One cable has a yellow and black lead exposed.
 Yellow = +12VDC
 Black = ground



Surface Patrol (999J) Trouble Shooting Techniques

❖ My SURFACE sensor is reading inaccurately:

- First take protective cone OFF by unscrewing captive screws.
- Clean lens with NON-abrasive material.
- If sensor is still reading inaccurately (within +/- 6 F (~ +/- 3 Centigrade) of ice) then you must do a "User Calibration":
 - In order to do a user calibration you must:
 - Make an "ice bath" by mixing water with ice and allowing it to acclimate for ~ 3 minutes.
 - Point sensor at ice bath and push calibration button (as described in instruction manual) ONCE.
 - The sensor will then blink for ~ 7 seconds and automatically calibrate to 32 F (0 C).
- If sensor inaccuracy is outside the ~ +/- 6 F (~ +/- 3 Centigrade) range and / or will not accept the "User Calibration" the sensor must be sent back to the manufacturer for calibration. On most occasions a "User Calibration" WILL suffice.

❖ How often should I check accuracy?

- CPI recommends that a regular calibration check be performed.
 - When you are doing normal vehicle maintenance (oil / oil filter change) check calibration of sensor.
 - Like anything on your vehicle, the life and accuracy of the sensor depends on how well you maintain the system.

❖ My AMBIENT sensor is not outputting any data:

- Make sure sensor is plugged into back of display.
- If sensor is plugged in and still does not output any data make sure the sensor is plugged into the wiring harness (new Deutsch connector system as described in instructions).
- If sensor still will not output any data then the sensor needs to be replaced and you should contact the manufacturer.

❖ My SURFACE sensor is not outputting any data:

- Make sure sensor is plugged into back of display.
- If sensor still does not output any data make sure that the wiring harness (refer to instruction set) is plugged into connector on probe.
- Inspect connection between wiring harness and surface probe.
 - If there are broken pins or excessive corrosion, the sensor must be returned to manufacturer.
 - If not make sure to apply **dielectric silicon** (as described in instruction set) so that no corrosion occurs.
 - An inspection of this connector should be made once every SIX months.