

## **INTERMEDIATE DIGITAL THERMOSTAT PROGRAMMING**

**RParts Part Number 015-0001 o Carel Part Number IR32V0E**

The default mode for the Carel thermostat is mode 2, "reverse" mode, which is for heating applications. To use this thermostat for cooling a "direct" mode must be programmed; either mode 1 or mode 7 should be selected. Mode 1 is the standard cooling mode, with one set point and one differential. Mode 7 allows the use of two set points and two differentials when a connection is present between thermostat terminals 6 and 7. The connection can be made with a simple manually operated switch or by using a relay to make the connection when other events occur, such as when a charging source is available. The connection between terminals 6 and 7 is just a switched connection; no voltage is applied to either of these terminals.

The most common use of the additional set point is for short cycling of the holding plates when the engine is running. If the connection between thermostat terminals 6 and 7 is made through a relay that is energized when the engine is running, as through the ignition switch, then the plates will be cycled sooner. This can be used to advantage when motoring up to an anchorage. When the motor is running, the refrigeration system will be started earlier than normal, before the plate(s) are fully thawed. This allows the plate(s) to be "topped-up" while the batteries are being charged when the engine is running. This takes advantage of energy while it is being produced. Using this mode can reduce the refrigeration running time when the engine is off, or when charging sources are not available.

Glacier Bay offers this option in their refrigeration systems through what they call their "ECM" controller, which uses the more expensive Carel Model "W" thermostat that has two internal relays. The same function can be achieved with the less expensive Carel Model "V", programmed to mode 7, and using the "DIG IN" signal, which is available by connecting the thermostat terminals 6 and 7 together. The connection between terminals 6 and 7 is just a switched connection; no voltage is applied to either of these terminals.

## **SETTING THERMOSTAT MODE**

To make mode selections to the Carel Model "V" thermostat, the following procedure is used.

1. Hold down both **"PRG"** and **"SEL"** together for about 5 seconds until the display changes.
2. Use the arrow keys to change the display to **"22"**, then press **"SEL"**. (22 is a password).
3. The display should show **"C 0"**, if so press **"SEL"**. **"C 0"** is the mode parameter which we want to change.
4. Use the arrow keys to change the display to **"1"** or **"7"**. Either of these modes will enable the thermostat to be used for cooling.
5. Press **"SEL"**, then press **"PRG"**.

If at any time you get confused or do not see what you expect, just press **"SEL"**, then **"PRG"** and start over.

6. Turn off power so the display is dark. Wait a few seconds, then turn the power back on.

## **SETTING ADDITIONAL SETTINGS**

The following procedure is used to set the display unit to Centigrade or Fahrenheit.

1. Hold down both **"PRG"** and **"SEL"** together for about 5 seconds until the display changes.
2. Use the arrow keys to change the display to **"77"**, then press **"SEL"**. (77 is a password).
3. The display should show **"C 0"**, if so use the arrow keys to change the display to **"C18"** and press **"SEL"**.
4. Use the arrow keys to change the value to **"0"** if the degree is in Centigrade or **"1"** if the degree is in Fahrenheit.
5. Press **"SEL"** to enter the unit setting.
6. Press **"PRG"** to retain the unit setting.

The following procedure is used if an optional second box probe is installed.

1. Hold down both **"PRG"** and **"SEL"** together for about 5 seconds until the display changes.
2. Use the arrow keys to change the display to **"77"**, then press **"SEL"**. (77 is a password).
3. The display should show **"C 0"**, if so use the arrow keys to change the display to **"C13"** and press **"SEL"**.
4. Use the arrow keys to change the value to **"1"** if the optional second box probe is installed or **"0"** if the probe is not installed.
5. Press **"SEL"** to enter the probe setting.
6. Press **"PRG"** to retain the probe setting.

### **SETTING SET POINT & DIFFERENTIAL**

The following procedure is used to program the holding plate set point (**ST1, ST2**) and differential (**P1, P2**). The set point is the temperature at which the system will turn off, and the differential added to the set point will be the temperature at which the system will turn on.

1. Hold down **"SEL"** until **"ST1"** is displayed. **"ST1"** will flash when **"SEL"** is released.
2. Use the arrow keys to adjust the display until the temperature you want the system to shut off at is displayed. This should be a few degrees below the freezing point of the plate, usually about 22° F for refrigerator plates, and about -2° F for freezer plates.
3. Press **"SEL"** to enter the **"ST1"** setting.
4. If **"ST2"** is to be used, use the arrow key to show **"ST2"** on the display. Press **"SEL"** to display the current value; use the arrow keys to select the same value given to **"ST1"**. Press **"SEL"** to enter the **"ST2"** setting.
5. Press **"PRG"** to retain set point settings.

6. Hold down "**PRG**" for several seconds until "**P1**" is displayed. "**P1**" will flash when "**PRG**" is released.
7. Press "**SEL**", then use the arrow keys to display the number of degrees above the set point temperature you want the system to turn on at. For refrigerator plates, this should be about 8° to 10° F., and for freezer plates it should be about 10° to 14° F.
8. Press "**SEL**" to enter the "**P1**" setting.
9. If "**P2**" is to be used, use the arrow keys to change the display to "**P2**". Press "**SEL**" to display the current value; use the arrow keys to select a value of about one half of the value of "**P1**".
10. Press "**SEL**" to enter the "**P2**" setting.
11. Press "**PRG**" to retain the differential settings.

The system will come on at **ST1+P1** and will shut off at **ST1**. With the digital input switch closed the system will come on at **ST2+P2** and shut off at **ST2**.

**ST2** and **P2** will only work if the thermostat is programmed to use Mode 7 and the digital input switch is closed.

These settings are a starting point; they may be optimized by careful observation of system operation. Changing the values will change the run time and holdover time, at an optimum setting maximum holdover will be obtained with optimum run time. The values should be varied and records made of changes to determine the best settings for any individual system. This is time consuming and should be left to the vessel operator to experiment with to determine the best settings.