FC-1T-1VDC user manual

The FC-1T-1VDC takes the hassle out of controlling equipment like ECM motors and variable frequency drives. It provides a 0 to 10 VDC signal output and includes a built-in disconnect relay, making it easy and effective to manage your equipment.

This FC-1T-1VDC can operate up to 10 devices simultaneously and is also ideal for expansion controls, modulating valves, and other equipment requiring a DC signal—all from one intuitive, easy-to-use unit.

How it works

The display shows real-time temperatures, signal output, programming options, and alarm codes. Indicator lights highlight which setting is being adjusted, and the control knob makes it simple to navigate and fine-tune settings.

Features

- Temperature-based control with extended range: −13 to 125°F (−25 to 51°C)
- Variable 0 to 10 V output
- Capacity for up to 10 devices
- Disconnect relay for start/stop signal
- Alarm relay (for external alarm system or siren)
- 3-second full-power-turn-on to minimize fan ice-up
- Status and programming LEDs
- Error code display
- Power-failure protection (will not lose settings)
- 6-foot temperature probe, extendable to 500 feet
- Rugged NEMA 4X enclosure (corrosion resistant, water resistant, and fire retardant)
- cCSAus approval
- 2-year limited warranty

Common applications

The FC-1T-1VDC has applications in **livestock**, **greenhouse**, and **light industrial** buildings. Ventilation systems that use three-phase motors often use a variable frequency drive (VFD). The FC-1T-1VDC can control VFDs with its 0 to 10 VDC output.

For applications that use single-phase, permanent split capacitor (PSC) motors, the FC-1T-1VDC can control the motors using a triac-based slave with DC input, such the Phason FanDRIVE.

The FC-1T-1VDC can also control electronically commutated motors (ECMs) using its 0 to 10 VDC output.

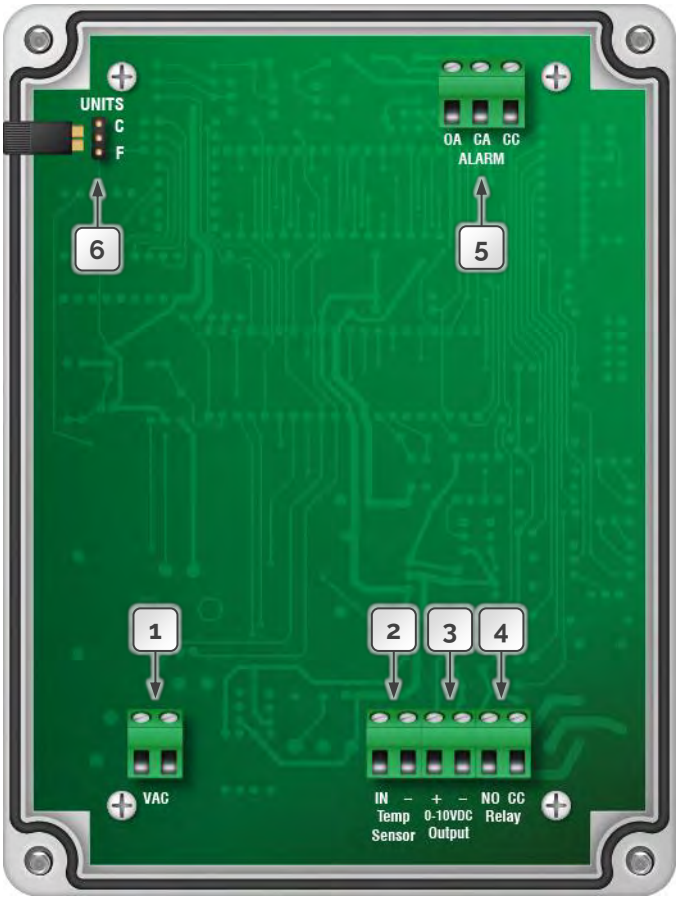
Installation

- ◇ Switch OFF the power at the source before connecting the incoming power wires.
- ◇ DO NOT switch on the power until you have finished all wiring and verified all equipment is properly connected and free of obstructions.

Electrical ratings and installation requirements

Input	○ 120/230 VAC, 50/60 Hz	**Disconnect relay**	○ 5A at 250 VAC; 5A at 30 VDC, resistive load ○ 2A at 250 VAC; 2A at 30 VDC, inductive load
Signal output	○ 0 to 10 VDC, 2K Ω load	**Alarm relay**	○ 0.4 A at 125 VAC; 2 A at 30 VDC, resistive load ○ 0.2 A at 125 VAC; 1 A at 30 VDC, inductive load
Cable length	○ Maximum 350 ft. (107 m).	**Wire gauge**	○ Minimum 22 AWG.

Installing the FC-1T-1VDC



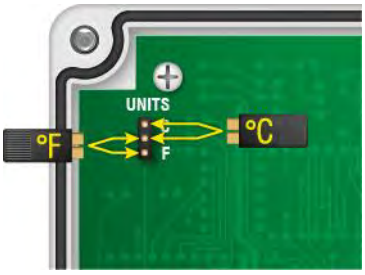
1	**Power terminal:** connect the incoming power (120/230 VAC, 50/60 Hz) to this terminal.
2	**Temperature terminal:** connect the temperature probe to this terminal.
3	**0 to 10 terminal:** connect variable frequency drives, modulating valves, or other equipment that requires a 0 to 10 VDC input signal.
4	**Disconnect terminal:** if the equipment connected to **#3** requires a disconnect switch, connected to this terminal.
5	**Alarm terminal:** connect an external alarm system or alarm siren to this terminal.
6	**Temperature selector:** place the jumper on the top two pins for Celsius, or on the bottom two pins for Fahrenheit.

Mount the FC-1T-1VDC

1. Loosen the screws from the front cover and then lift it off.
2. Mount the enclosure to a wall using the four screws provided with the control. Insert the screws into the holes in the mounting tabs at the top and bottom of the enclosure and then tighten.

Select the temperature unit

The FC-1T-1VDC can operate in either degrees Fahrenheit (°F) or Celsius (°C). The default is Fahrenheit.



Locate the **UNITS** pins in the top-left corner of the circuit board.

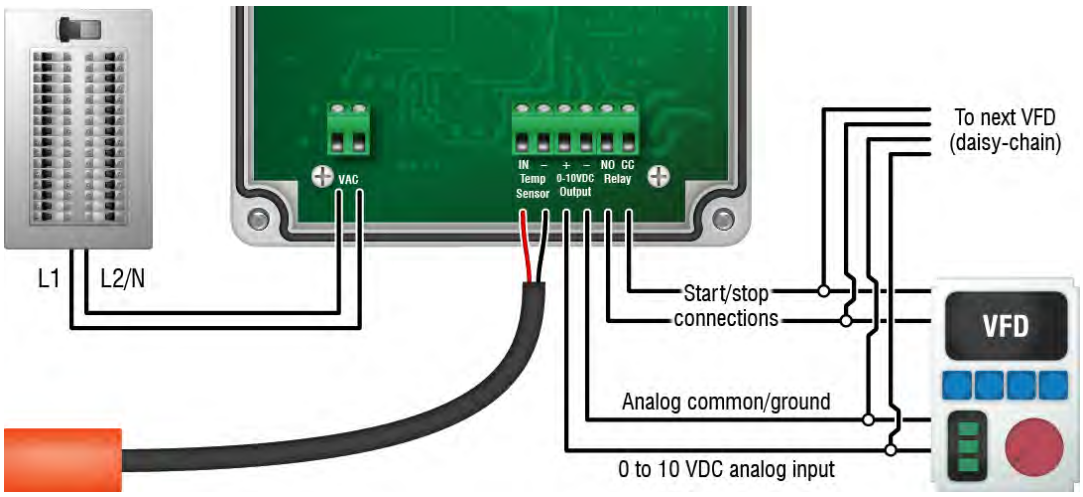
- For Celsius, place the jumper on the top two pins.
- For Fahrenheit, place the jumper on the bottom two pins.

Connect equipment

The FC-1T-1VDC has a 0 to 10 VDC signal output and disconnect relay for controlling variable frequency drives, modulating valves, or other equipment requiring a 0 to 10 V DC signal.

The disconnect relay is not for controlling fans, heaters, or other equipment. When the 0 to 10 VDC signal output is at 0, the relay sends a stop signal (closes the disconnect relay) to the equipment you are controlling with the variable output.

You can connect up to 10 devices (variable frequency drives, modulating valves, or similar equipment) to a single FC-1T-1VDC. Connect the equipment as shown below.



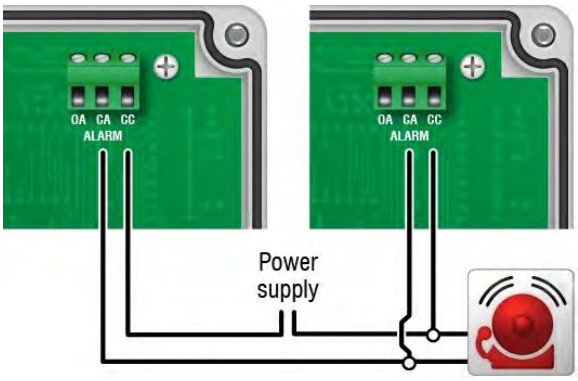
Replace damaged probes as soon as possible. If there is no probe present or working properly, the FC-1T-1VDC displays either Pd or P5 and the 0 to 10 V output operates at 20%.

Connect an alarm system

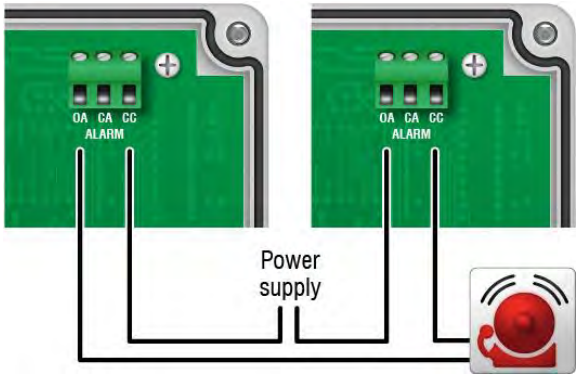
An alarm system can be a siren, an alarm panel, or an auto-dialer. See your alarm siren's installation guide for installation instructions and information about the type of system, **normally open** or **normally closed**.

- If you are connecting the alarm system to a network of controls and your system uses a **normally open** connection (closes on alarm), connect the system as shown in the normally open diagram. Join all the common (**CC**) connections together and all the closed-on-alarm (**CA**) connections together. The FC-1T-1VDC alarm relays must be in parallel with each other so any control can trigger the alarm system when an alarm condition occurs.
- If you are connecting the alarm system to a network of controls and your system uses a **normally closed** connection (opens on alarm), connect the system as shown in the normally closed diagram. Join the alarm relays in a continuous loop. The FC-1T-1VDC alarm relays must be in series with each other so any control can trigger the alarm system when an alarm condition occurs.

Normally closed system (open on alarm)



Normally open system (closed on alarm)



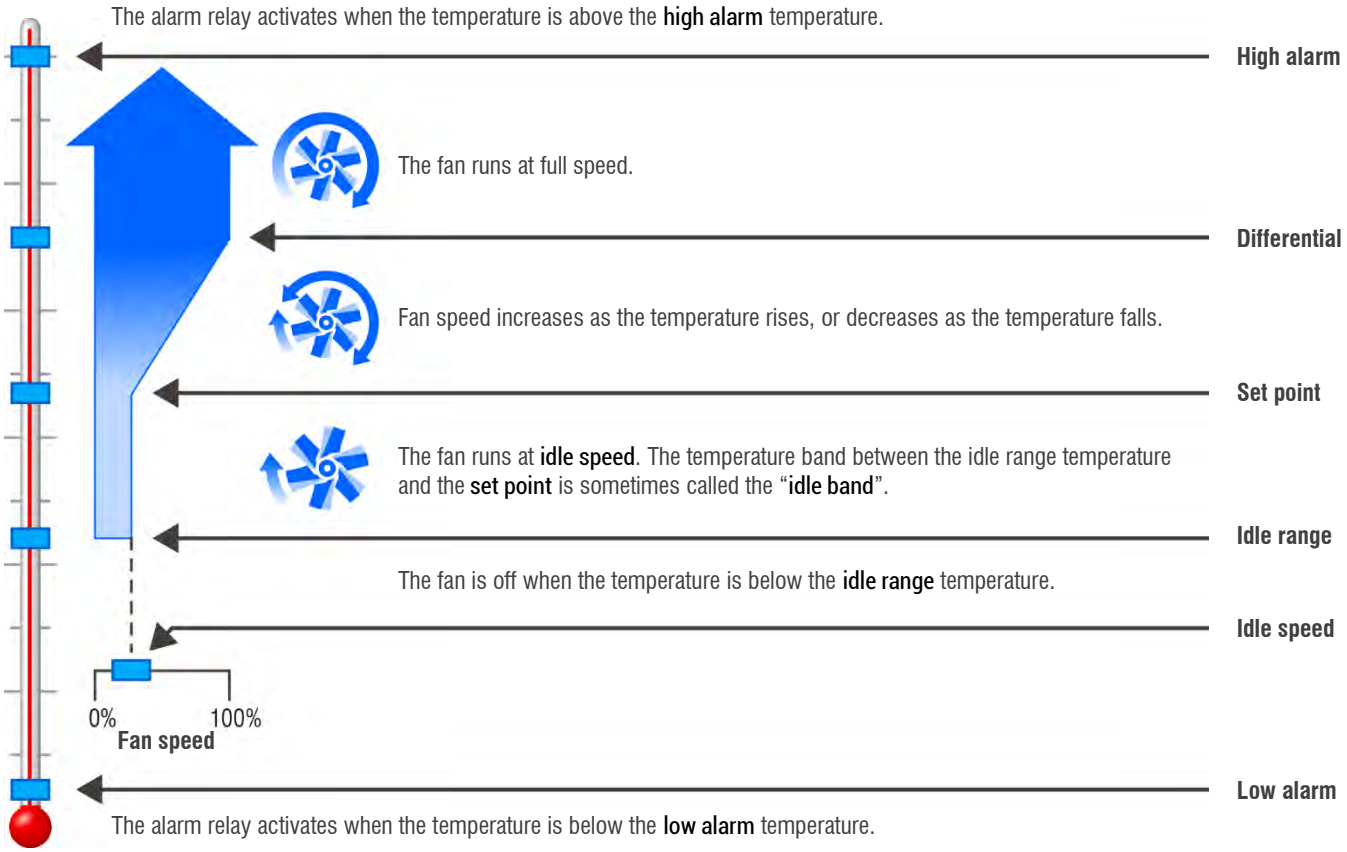
Program the FC-1T-1VDC

NOTE If you are connecting a variable frequency drive (VFD) that has a programmable startup ramp and you want to take advantage of the deicing feature (3-second full-power-turn-on), set the ramp duration as short as possible, preferably less than 0.1 sec.

How the FC-1T-1VDC operates

- When the temperature is below the **idle range**, the fan (in other words, DC output) is off.
- When the temperature is below the **low alarm**, the alarm relay activates, the **Alarm** LED lights up, and the display flashes between the temperature and Lo.
- When the temperature reaches the **idle range**, the fan runs at the **idle speed**. The fan continues to run at the **idle speed** until the temperature rises to the **set point**.

- When the temperature is between the **set point** and **differential**, fan speed increases or decreases proportionally with the temperature.
- When the temperature is at or above the **differential**, the fan runs at full speed.
- When the temperature is above the **high alarm**, the alarm relay activates, the **Alarm** LED lights up, and the display flashes between the temperature and `H i`.



To program the control

1. Press the encoder knob until `PAr` displays.
2. Turn the knob clockwise until the LED for the setting you want to program is lit.
3. Press the knob to select the setting.s
   The control enters edit mode and the LED for the setting flashes.
4. Turn the knob clockwise to increase, or counterclockwise to decrease the value.
5. Press the knob to save the setting and leave edit mode.
   The display shows `PAr`.
6. Repeat steps 2 to 5 for each setting you want to program.
7. When finished, press the knob to return to the temperature display.

Manual mode

Manual mode allows you to override the automatic settings. Manual mode is useful for testing equipment or other special situations.

1. Press the encoder knob until PAr displays.
2. Turn the knob clockwise until the LED for Alarm is lit.
3. Press the knob.
   The control enters manual mode and the LED for Alarm flashes.
4. Turn the knob clockwise to increase, or counterclockwise to decrease the output.
5. Press the knob to leave manual mode.
   The display shows PAr .
6. Press the knob to return to the temperature display.

Factory defaults

Setting	Default	Range/options
Stage 1 idle speed (%)	20	0 to 100 %
Stage 1 idle range (°F/°C)	80.0	-13 to 125°F (-25 to 51°C)
Stage 1 set point (°F/°C)	85.0	-13 to 125°F (-25 to 51°C)
Stage 1 differential (°F/°C)	86.5	-13 to 125°F (-25 to 51°C)
High temperature alarm (°F/°C)	95.0	Low temp alarm to 125°F (51°C)
Low temperature alarm (°F/°C)	80.0	-13°F (-25°C) to high temp alarm

Troubleshooting

When there is an alarm condition, the Alarm LED flashes, an error code displays, and the alarm relay activates. When the condition goes away, the alarm relay deactivates and the Alarm LED switches off, but the message continues to display until acknowledged by pressing the knob.

When there is a probe damage or short condition, the control operates at 20%.

If you are having a problem using the FC-1T-1VDC, check if the problem is described in the following table, and then follow the directions for correcting the problem.

Alarm code/problem	Possible cause	Possible solution
 High temperature alarm	○ Ambient temperature is too high ○ High temperature alarm setting is too low	○ Increase ventilation/cooling. ○ Increase the high temperature alarm setting. For more information, read **Program the FC-1T-1VDC** on page 4.
 Low temperature alarm	○ Ambient temperature is too low ○ Low temperature alarm setting is too high	○ Decrease ventilation/cooling, increase heating. ○ Decrease the low temperature alarm setting. For more information, read **Program the FC-1T-1VDC** on page 4.
 Probe damage alarm	○ The temperature probe is damaged, missing, or the connecting wire is broken. The temperature probe circuit is open.	○ Check the wire between the control and the probe. Wire damage can cause the alarm. ○ Replace or reconnect the temperature probe. The control should recover automatically.
 Probe short alarm	○ The temperature probe is damaged. The temperature probe circuit is closed.	○ Check the wire between the control and the probe. Wire damage can cause the alarm. ○ Replace the temperature probe. The control should recover automatically.
○ Power supply components blown out, burn marks on boards and components ○ Motors and fans slow down or stop	○ Power surge, brownout, or power outage	○ Avoid the problem in future by providing proper voltage and surge protection for the control.
○ No power/display	○ A circuit breaker at service panel is off or tripped.	○ Reset the circuit breaker.
	○ Incorrect incoming power wiring	○ Correct the wiring.
○ Display showing unusually high or low temperature	○ The probe is not a Phason probe.	○ Remove the probe and then install a Phason probe.
	○ The extension cable connected to the temperature probe is providing a poor connection	○ Check the extension cable connection and re-solder it if necessary.
	○ Damaged probe	○ Replace the temperature probe.
○ Variable fan runs at maximum	○ Incorrect wiring	○ Correct the wiring. For more information, read **Connect equipment** on page 3.
	○ **Idle speed** is too high	○ Decrease the **idle speed** setting. For more information, read **Program the FC-1T-1VDC** on page 4.

Alarm code/problem	Possible cause	Possible solution
○ Variable fan not running	○ Incorrect wiring	○ Correct the wiring. For more information, read **Connect equipment** on page 3.
	○ **Idle speed** setting is too low	○ Increase the **idle speed** setting. For more information, read **Program the FC-1T-1VDC** on page 4.
	○ **Idle range** temperature setting is too high	○ Decrease the **idle range** temperature setting. For more information, read **Program the FC-1T-1VDC** on page 4.
	○ Temperature **set point** is above room temperature	○ Adjust the **set point** to the desired temperature. For more information, read **Program the FC-1T-1VDC** on page 4.
	○ No power to the fan	○ Switch on the power.
	○ Faulty fan	○ Replace the equipment.
	○ Circuit breaker open	○ Reset the breaker.

Service and technical support

Your dealer will be happy to answer all technical questions that will help you use the FC-1T-1VDC. Before contacting them, check the following:

- Read this manual for information about the feature with which you are having trouble.
- If you are having a problem using the FC-1T-1VDC, look in **Troubleshooting** on page 6.
- and follow the directions for correcting the problem.
- If you still have a problem with the FC-1T-1VDC, collect the following information:
  - The serial number
  - Any messages displayed by the FC-1T-1VDC
  - A description of the problem is
  - A description of what you were doing before the problem occurred

◇ Phason controls are designed and manufactured to provide reliable performance, but they are not guaranteed to be 100 percent free of defects. Even reliable products can experience occasional failures and the user should recognize this possibility.

◇ If Phason products are used in a life-support ventilation system where failure could result in loss or injury, the user should provide adequate back up ventilation, supplementary natural ventilation, or an independent failure-alarm system. The user's lack of such precautions acknowledges their willingness to accept the risk of such loss or injury.