

COOLSHIRT

Chiller Control System

Operating Manual





Operating the Display:

1. **Power button:** Press power button to start the system.
2. **Control on indicator:** This light indicates when the unit is on or off.
3. **Heat indicator:** When the set point is set to 76°F/24°C or greater, the control will be in heat mode and the heat indicator will be illuminated.
4. **°F / °C:** Fahrenheit / Celsius selection button: When the control is on, this button changes the system units.
5. **Cool indicator:** When the set point is set for 75°F/23°C or less, the control will be in cooling mode and the cool indicator will be illuminated.
6. **Digital display:** The digital display shows process temperature, set point, faults, and program parameters as required.
7. **Down button:** The first press of this button when the control is on displays the set point for 5 seconds. The second press of the button while the set point temperature is displayed will lower the set point. This button is also used in conjunction with the up button to silence faults.
8. **Up button:** The first press of this button when the control is on displays the set point for 5 seconds. The second press of the button while the set point temperature is displayed raises the set point. This button is also used in conjunction with the down button to silence faults.

Basic Operation:

User Instructions:

1. °F Press the Power button on the display on the front of the unit to power the unit on.
2. The temperature displayed will be the current temperature of the fluid in the system.
3. Press the UP or Down button once to see the set point temperature. (Default out of the box is 60°F)
4. Adjust the set point temperature to desired temperature.

NOTE: It is recommended to pre-cool or pre-heat the system to desired temperature before putting a load on the system. It takes about 7 minutes to raise the temperature 10°F in Heat Mode, and about 16 minutes to lower the temperature 20°F in Cool Mode.

Heat Mode:

When the set point is set for 76°F/24°C or above the control will be in heat mode. The compressor and fan are disabled and the electric heater is cycled to maintain set point.

Cool Mode:

When the set point is set for 75°F/23°C or lower, the control will be in the cool mode. The compressor and fan are always operating and the heater is cycled to maintain the set point temperature. If there is a heater fault, then the compressor and fan will cycle to maintain the set point temperature. Immediately after AC power-up or after a compressor shutdown, the compressor will not be allowed to restart for 2 minutes. The fan will stay on for one minute after the compressor turns off.

Operating Sequence:

Push the Power button to turn on the unit and start the sequence of operation. The float switch on the tank must make in order to start the sequence. If float switch is not made, it means the tank does not have enough fluid to operate safely. The entire unit is shut down and the buzzer will buzz every 15 seconds. "LO" will show on the display. If tank has enough fluid (float switch makes), then pump-1 will start. Pump-1 pumps the process fluid from the tank reservoir, through an evaporator and back into the tank. After 15 seconds from starting pump-1, the flow switch must make. The flow switch makes sure fluid is flowing through the evaporator and to keep the system from freezing. If the flow switch does not make, then the entire chiller is shut down (all components disabled) and the buzzer will buzz every 5 seconds. "FLO" would show on the display. If the flow switch makes, then the unit can operate in either Heat or Cool mode. Once the process temperature is within 10 °F of the set point temperature, pump-2 will start. Pump-2 pumps the process fluid from the tank reservoir through the quick disconnects and Coolshirt vest.

Changing Set Point:

Press the up or down button to view the process set point. Press the up or down button a second time while the process temperature is shown to change the value between 45°F and 110°F.

Faults:

The buzzer will sound for 1 second at the intervals listed below when a fault occurs.

Display Shows	Fault	Buzzer Interval
LO	Low level switch open	15 seconds.
FLO	Flow switch is open	5 seconds.
Lot	Low temperature warning	10 seconds.
Hit	High temperature warning	10 seconds.
HF	Heater Failure	5 minutes
SEn	Sensor Failure	3 seconds

LO:

The low level (tank float) switch was open for >250mS during operation. The system will not start if the low level switch is open.

FLO:

The flow switch was open for >250mS during operation. All operations will stop including pump-1. Once the problem is corrected the power button will need to be pressed twice to resume operation. This fault is ignored for the first 15 seconds of pump operation to allow the switch to close.

Lot:

The process temperature has dropped below 40°F. The compressor and pump-2 are disabled but pump-1, fan, and heater remain in operation. The fault will automatically clear if the process temperature rises to 55°F or above and the compressor and pump-2 will be re-enabled.

Hit:

The process temperature has exceeded 115°F. The heater and pump-2 are disabled but pump-1, fan, and compressor remain in operation. The fault will automatically clear once the process temperature cools to 90°F or lower and the heater and pump-2 will be re-enabled.

HF:

The heater has activated and no current was measured for > 2 seconds. The heater is disabled but pump-1, fan, and compressor will continue to operate. If this failure happens in cooling mode, the compressor will cycle on at 5°F below set point and off at set point to maintain the process temperature.

SEn:

Temperature sensor has failed and process temperature control is not possible. System will automatically restart when the problem is repaired.

Silencing the fault buzzer:

The buzzer sounded during faults may be silenced for one hour by simultaneously pressing the up and down buttons. During this silence period, the display will continue to periodically display the associated fault mnemonic.

Electronic Specifications

General:

Temperature sensor accuracy	2°F at 77°F
Line voltage	85 to 250VAC
Frequency	50 or 60 Hz
Maximum board input current	20 Amps
Minimum operating temperature	0°F (-18°C)
Maximum operating temperature	180°F (82°C)
Maximum RH conditions (Board and display) condensing	95 % Non-

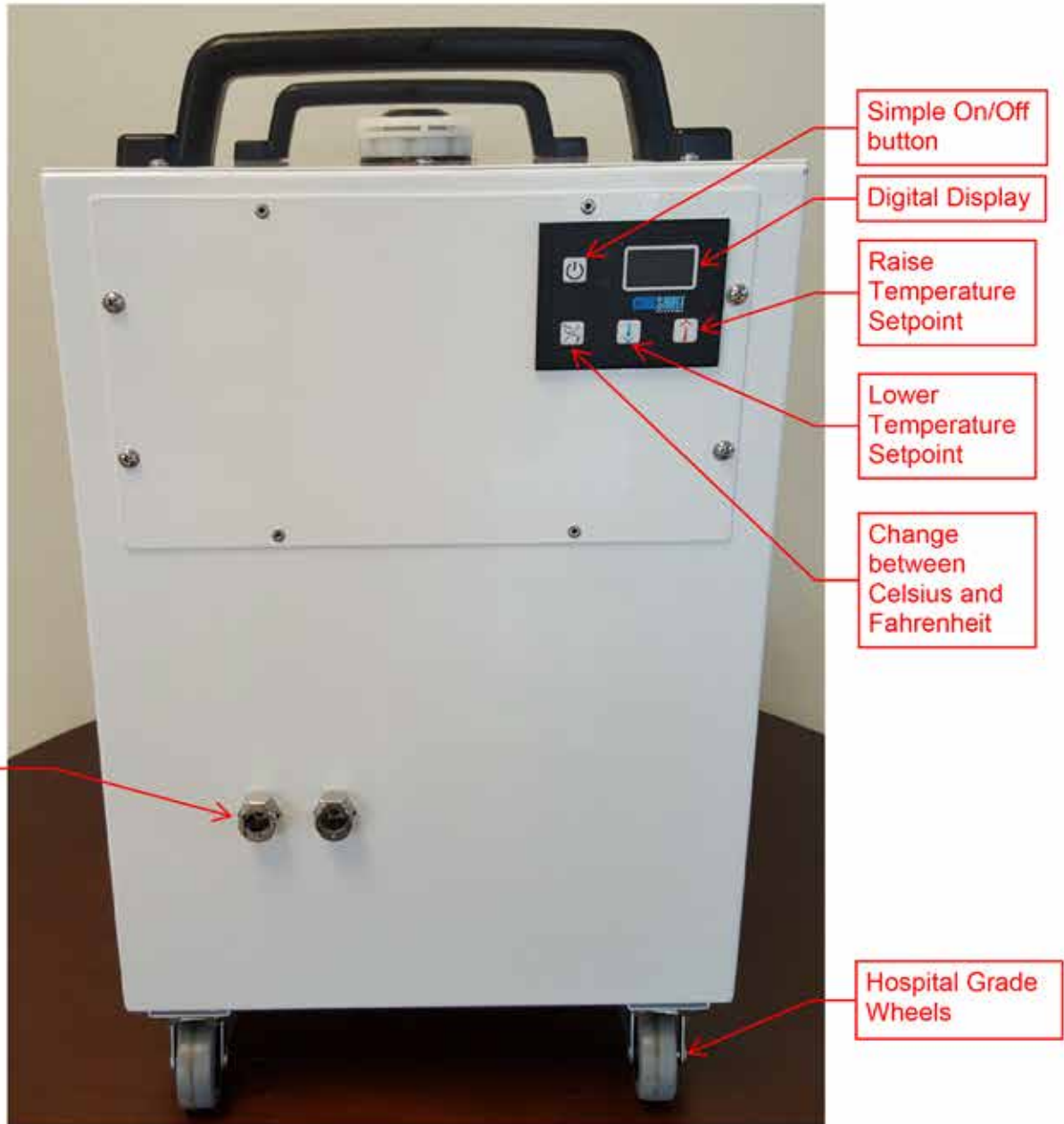
Output Fuses

Fan	4x20mm, 250VAC, 0.5 Amps
Pump 1	4x20mm, 250VAC, 1.6 Amps
Pump 2	4x20mm, 250VAC, 2.5 Amps
Compressor	4x20mm, 250VAC, 5.0 Amps (slow blow type)
Heater	4x20mm, 250VAC, 5.0 Amps

Inputs

Flow Switch
Tank Float Switch
Temperature Sensor

Dry contact type switch only. Make with flow.
Dry contact type switch only. Make when tank is full.
Thermistor type with software selectable beta.



High limit switch will disconnect power to heater if fluid temperature reaches unsafe high level

Float switch makes sure tank has enough fluid for safe operation

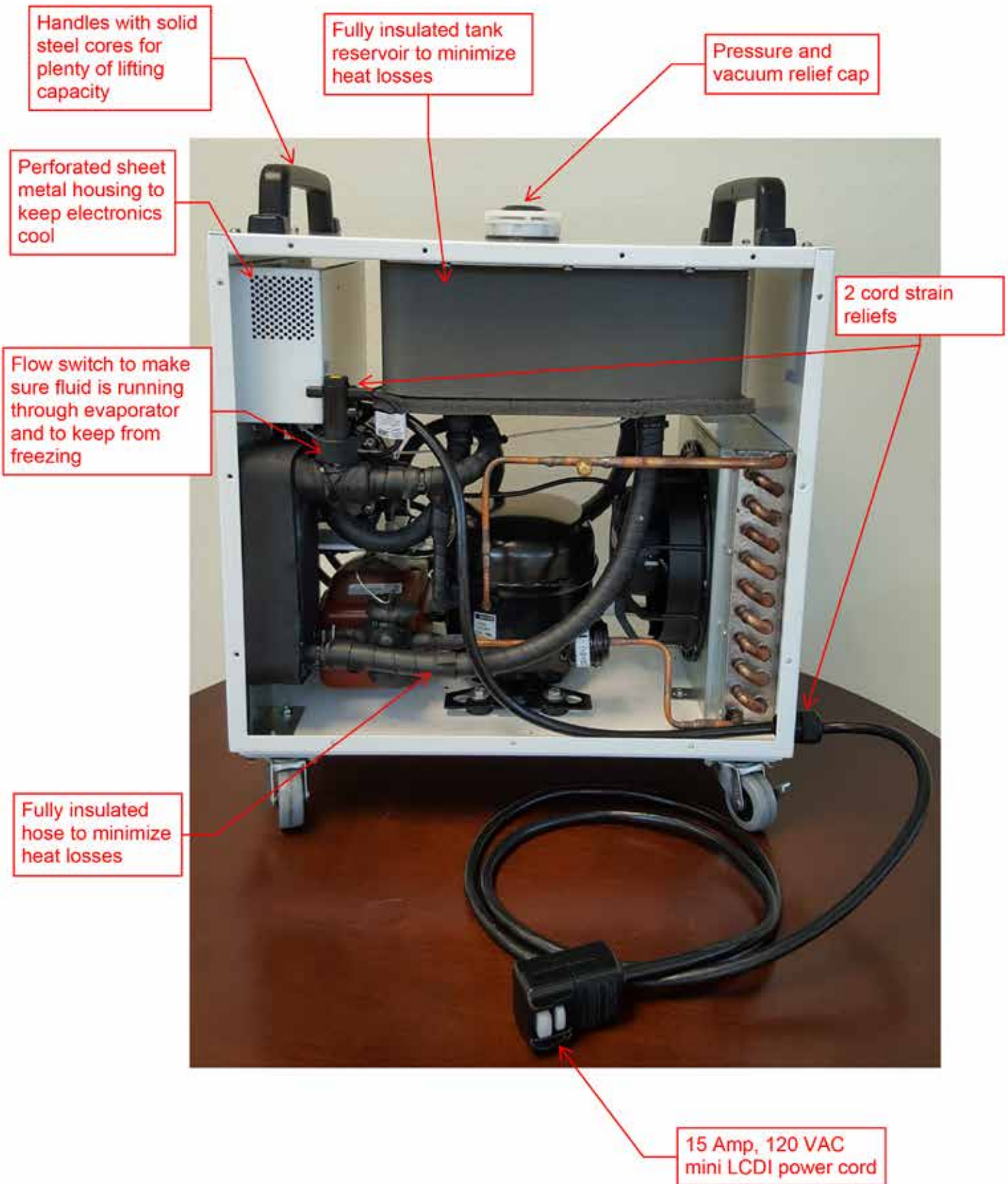
500 W Heater

Primary pump to pump fluid through evaporator and into tank

Ultra quiet condenser fan

Secondary pump to pump cold or hot fluid to Coolshirt Vest







Air filter. Slides right into place for easy replacements.