

FC-series: Thermoelectric Coolers

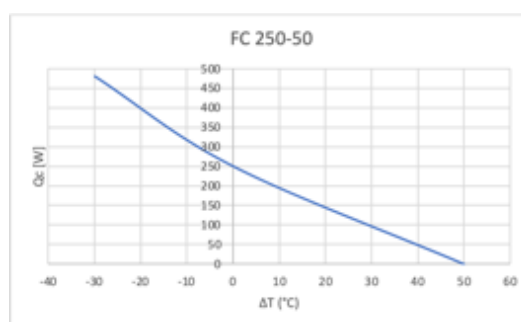


FC Series

Revised December 2020

FC-250-50

250W Air-to-Fluid Thermoelectric Cooling System



Quick Description

The FC-250-50 is an air-to-fluid thermoelectric cooler with integrated fan in the 'cold side'. The unit is formed around a 280mm x 200mm x 36mm dense fin aluminium heatsink extrusion. The cold side has two 120mm x 25mm fan blowing air at the fins. On the opposite side, the high performance Peltier modules are held on the extrusion by fluid cooled heat exchanger plates. The rear face of the extrusion is covered with a 3mm thick layer of closed-cell neoprene. The unit has a cooling capacity of 250W and a $\Delta T(\text{max})$ of 50°C. In heater mode, the unit has a heating power of 480W.

Heat Rejection

Heat rejection from the unit is via a radiator system which can be selected from the TCS website. The FC-250-50 uses a cold and hot fluid port on the selected manifold. Pipes are 8mm diameter. The primary advantages of the use of fluid cooling loops are:

1. The heat dissipation radiator can be physically located some distance from the actual cooler unit. This is particularly advantageous when multiple independently-controlled coolers are to be operated in a single installation.
2. Multiple coolers can use a single heat rejection radiator. Often the total cooling power is not required in multiple enclosures simultaneously. The ability to use several coolers with a single heat rejection system allows a more economic design at the system level. TCS radiator system

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are available with up to 10 ports on each of the cold-and hot-side connections, in addition, a number of options such as air bleed screws, pressure gauges and filling points are available.

3. Higher ΔT . The use of fluid cooling on the “hot” side of the TEC dramatically lowers the thermal resistance of the system. This in turn yields a higher maximum temperature difference between the cold- and hot-sides, giving a more capable cooling system.
4. Higher Q_c . The radiator system is able to reject in excess of 1kW with a temperature rise of only a few °C.
5. If the system is to be used bi-directionally, *i.e.*, as a heater or cooler unit to maintain a constant temperature over widely-varying ambient temperature, the TECs can operate as very efficient heater for the temperature-controlled volume over the range -20°C to +60°C.

Notes:

1. The fans and the Peltier modules are electrically isolated from the extrusion.
2. The cooler can be used as a heater by polarity reversal of the Peltier module current.
3. The minimum “hot” side temperature of the cooler depends on the freezing point of the coolant fluid in use. The “cold” side should not be operated at a temperature below -20°C as this will shorten the fan’s life. Similarly, the “cold” side should not exceed 60°C.
4. The given flow rate for the ‘Heat Rejection’ loop is 6.5 Litres per minute.

Thermal Performance

Operating Parameters: FC-250-50

Q_c [W]*^	250	0
dT*^	0	50
TEC V [V]	12/24/48	12/24/48
TEC P [W]	450	450

**Measured at ambient temperature of 30°C*

^ Both Q_c (max) and dT (max) increase above $T(amb) = 30^\circ C$

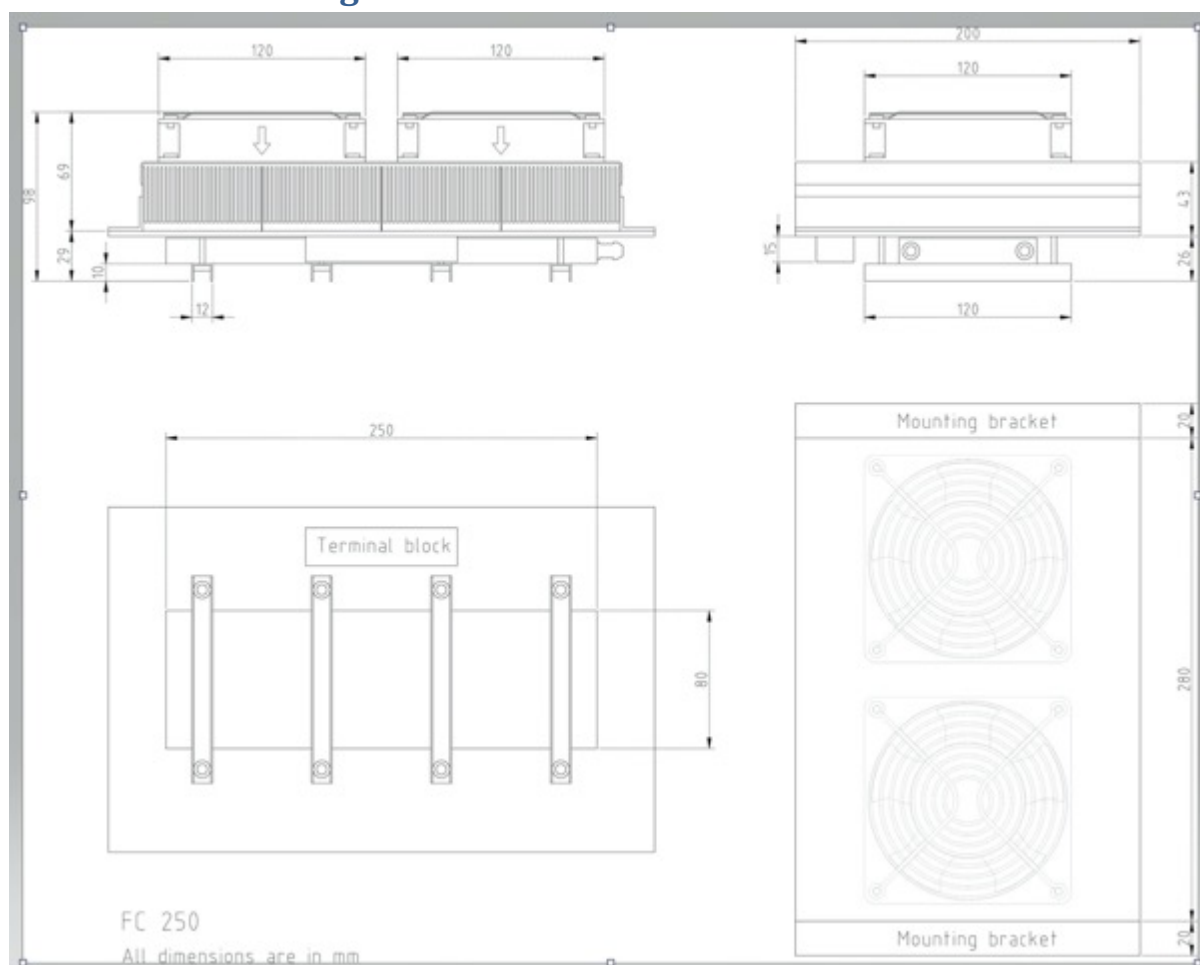
Note: This unit is designed for indoor use. Higher IP ratings are available upon request.

Cold Side Fan

- For voltage and power ratings see above table. The fan voltages can be configured as per the requirements of the customer.
- The cold side fan is configured to be separately controllable. $\Delta T(max)$ is measured with the fan switched off.
- NOTE: Providing there is no condensate build-up on the cold side extrusion the unit can be operated in any orientation. If there is a possibility of condensate forming then the unit should be mounted in such a way that condensate cannot fall on to the cold-side fan.

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Mechanical Drawings

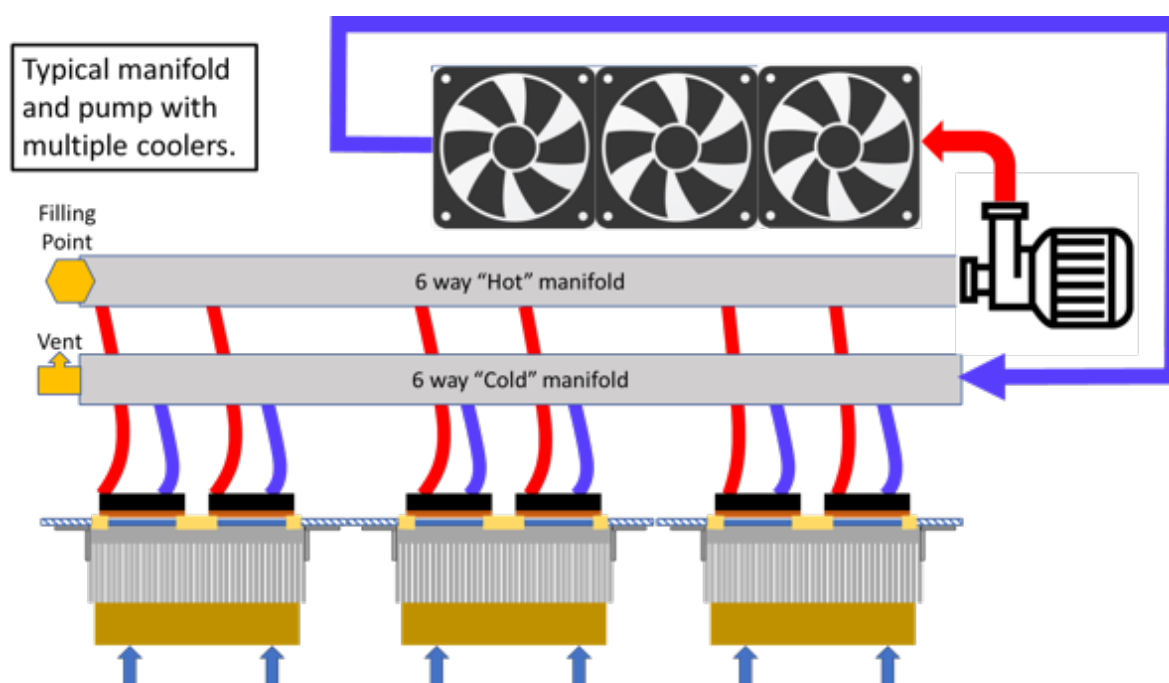
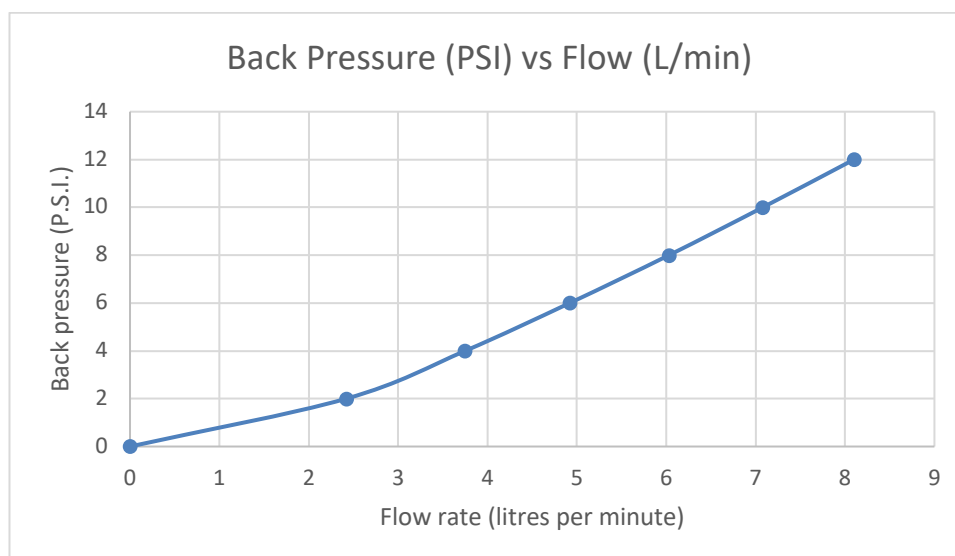


Notes:

1. All wiring will be from the TEC fluid block side.
2. TCS FC-250-50 Cooler mounted in chassis using 8 x 4.0mm self-tapping screws.

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Back pressure vs flow rate for fluid loop



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This TCS product is not authorised for use as critical component in life support devices.

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