

Modulo Series: Air to Air Thermoelectric Coolers

**Modulo Series***Revised March 2023***Modulo-X and Modulo-R Air-to-Air Thermoelectric Cooling Systems**

Single, double and triple Modulo-X coolers.

The **Modulo-X** is a general purpose unit suitable for most applications.

The **Modulo-R** is optimised for deep refrigeration applications.

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Overview.

The **Modulo** thermoelectric coolers have been developed to service a wide range of thermal management applications using a common form-factor. They are intended for use in standard 12V, 24V, or 48V fixed-voltage applications or, if connected to the Peltech Optidrive® range of controllers, offer a wide and reversible heating / cooling capacity with controllable power usage. The coolers are available in single, double and triple width as a single unit. Front or rear mounting is via the side supports for the coolers. Electrical connections are on the hot side when used in cooling mode.

The following table summarises the main parameters of the Modulo-X coolers.

Parameter	Modulo-X Single	Modulo-X Double	Modulo-X Triple
Base unit size (mm)	253 (L) x 165 (W) x 229 (H)	253 (L) x 290 (W) x 229 (H)	253 (L) x 415 (W) x 229 (H)
Panel cutout (mm)	253 (L) x 135 (W)	253 (L) X 260 (W)	253 (L) X 385 (W)
Mass (kg)	4.8kg	9.3kg	14.3kg
Operating DC voltage	12, 24, Optidrive	24, 48, Optidrive	24, Optidrive
Integrated 10kΩ Thermistor ^{&}	Yes, 2	Yes, 2	Yes, 2
Cold side fan (mm)	120 x 38 (10W) Qty:1	120 x 38 (10W) Qty:2	120 x 38 (10W) Qty:3
Hot side fan (mm)	120 x 38 (19W) Qty:1	120 x 38 (19W) Qty:2	120 x 38 (19W) Qty:3
Cooling @ +20°C (W) ⁺	≥ 235W	≥ 430W	≥625W
Cooling @ +0°C (W) ⁺	≥ 150W	≥275W	≥400W
Minimum ΔT ⁺ (Cold side minimum)	≥ 40°C < -20°C	≥ 75°C < -40°C	≥ 45°C < -20°C
Peltier Element Operating current*	20A @ 12V DC 10A @ 24V DC	20A @ 24V DC 10A @ 48V DC	30A @ 24V DC
IP68 Option?	Yes	Yes	Yes
Heating @ T _{amb} =20°C	350W	700W	1KW

The following table summarises the main parameters of the Modulo-R cooler.

Parameter	Modulo-R Single
Base unit size (mm)	253 (L) x 165 (W) x 235 (H)
Panel cutout (mm)	251 (L) x 135 (W)
Mass (kg)	4.8kg
Operating DC voltage	12, Optidrive
Integrated 10kΩ Thermistor ^{&}	Yes, 2
Cold side fan (mm)	120 x 25 (5W) Qty:1
Hot side fan (mm)	120 x 38 (19W) Qty:1
Cooling @ +20°C (W) ⁺	≥ 205W
Cooling @ +0°C (W) ⁺	≥ 140W
Minimum ΔT ⁺ (Cold side minimum)	≥ 65°C < -35°C
Peltier Element Operating current*	39A @ 12V DC
IP68 Option?	Yes
Heating @ T _{amb} =20°C	400W

[&] Type NTC 10K ±1%, β=3380K ±1%

⁺ Measured with an ambient temperature of 41°C

* Operating current is approx. 20% higher for the first few seconds.

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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. If the unit is to be operated below 0°C for extended periods it is recommended the TCS thermoelectric de-humidifier unit is used in conjunction with the cooler to prevent excessive frost build up. Alternatively, the cooler controller should be programmed with a defrost cycle.

These units are designed for indoor use. Higher IP ratings are available upon request.

Optidrive controllers

All Optidrive controllers have a fixed fan voltage output and a variable Peltier element voltage. The modulation voltage range of the controller is from 40% to 105% of rated output. An intuitive touch screen interface is used to control the various functions of the unit and this permits setpoint adjustment, On/Off control, Heating / Cooling etc. The controller can interface directly to the temperature sensors built into the Modulo® cooler or a separate 10KΩ NTC thermistors can be used.

When used with the Optidrive® controller, the Modulo series products are able to achieve a very high operating efficiency at part load due to the variable voltage used to power the Peltier elements in the cooler. The controller will automatically adjust the setting to maximise the Coefficient of Performance of the coolers powered by it.

The following table gives the recommended maximum number of coolers per controller:

Optidrive Controller	Max Fan Power	Modulo-X Single	Modulo-X Double	Modulo-X Triple	Modulo-R Single
750-12 (2 cooler connections) 750-24	100W	2	---	---	1
1000-12 (3 cooler connections) 1000-24	150W	3	---	---	2
2000-24 (6 cooler connections) 2000-48	200W	6	4	2	---
3000-24~ (8 cooler connections) 3000-48~	300W	8	5	3	---
		---	5	---	---

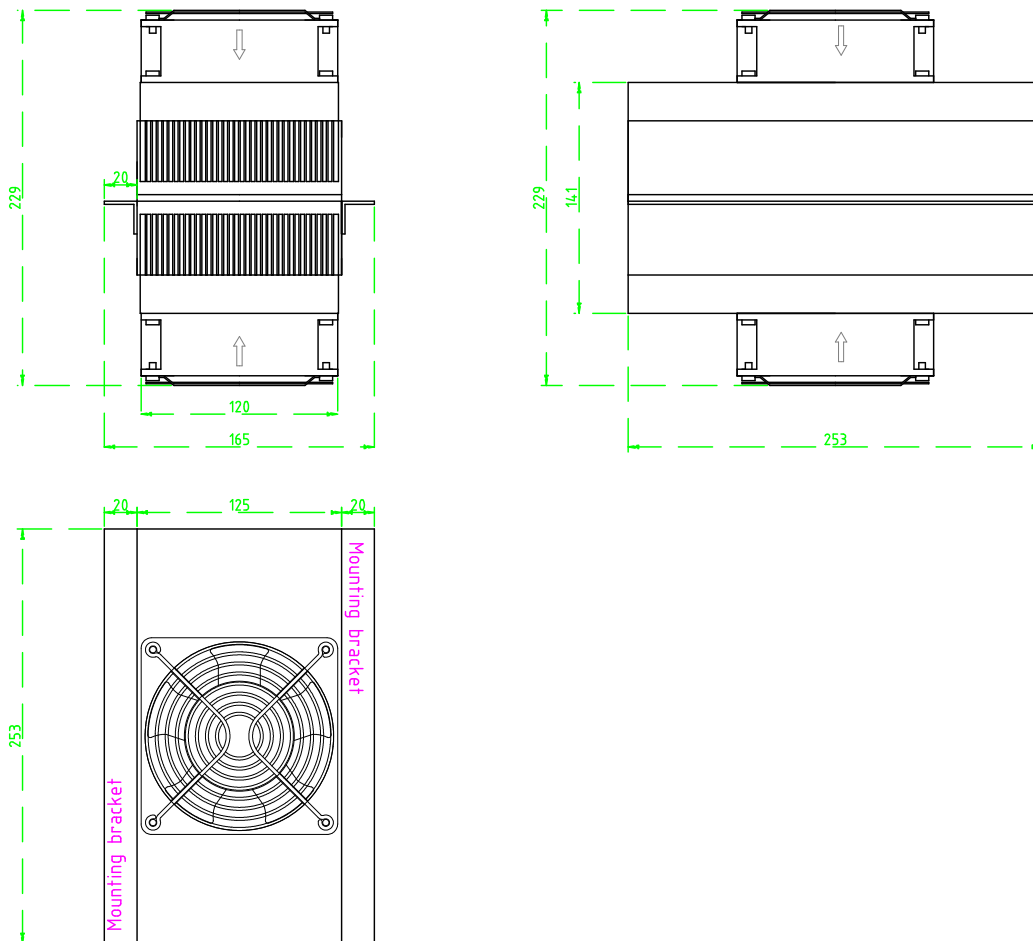
~ These controllers require a 16A or higher mains connection @ 230V.

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Mechanical Drawings

Modulo-X Single

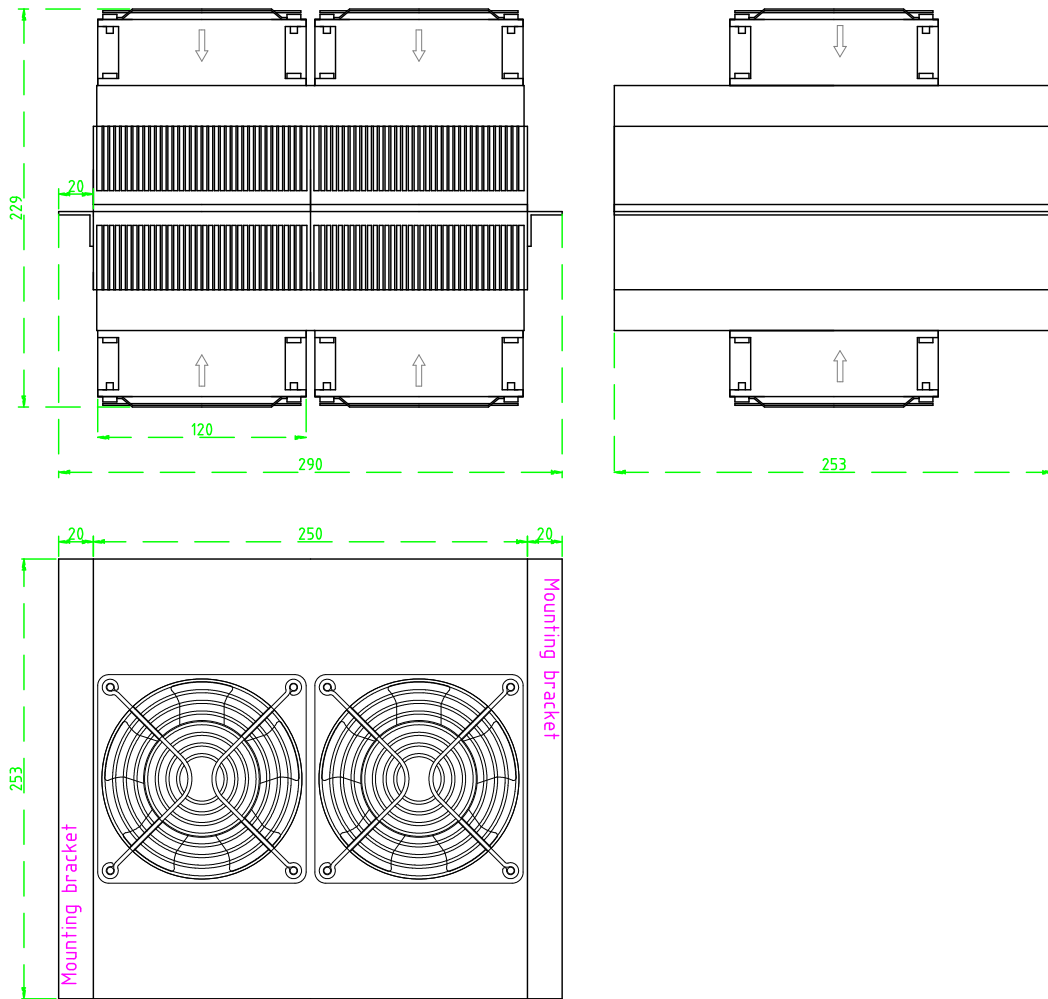
All dimensions are in mm.



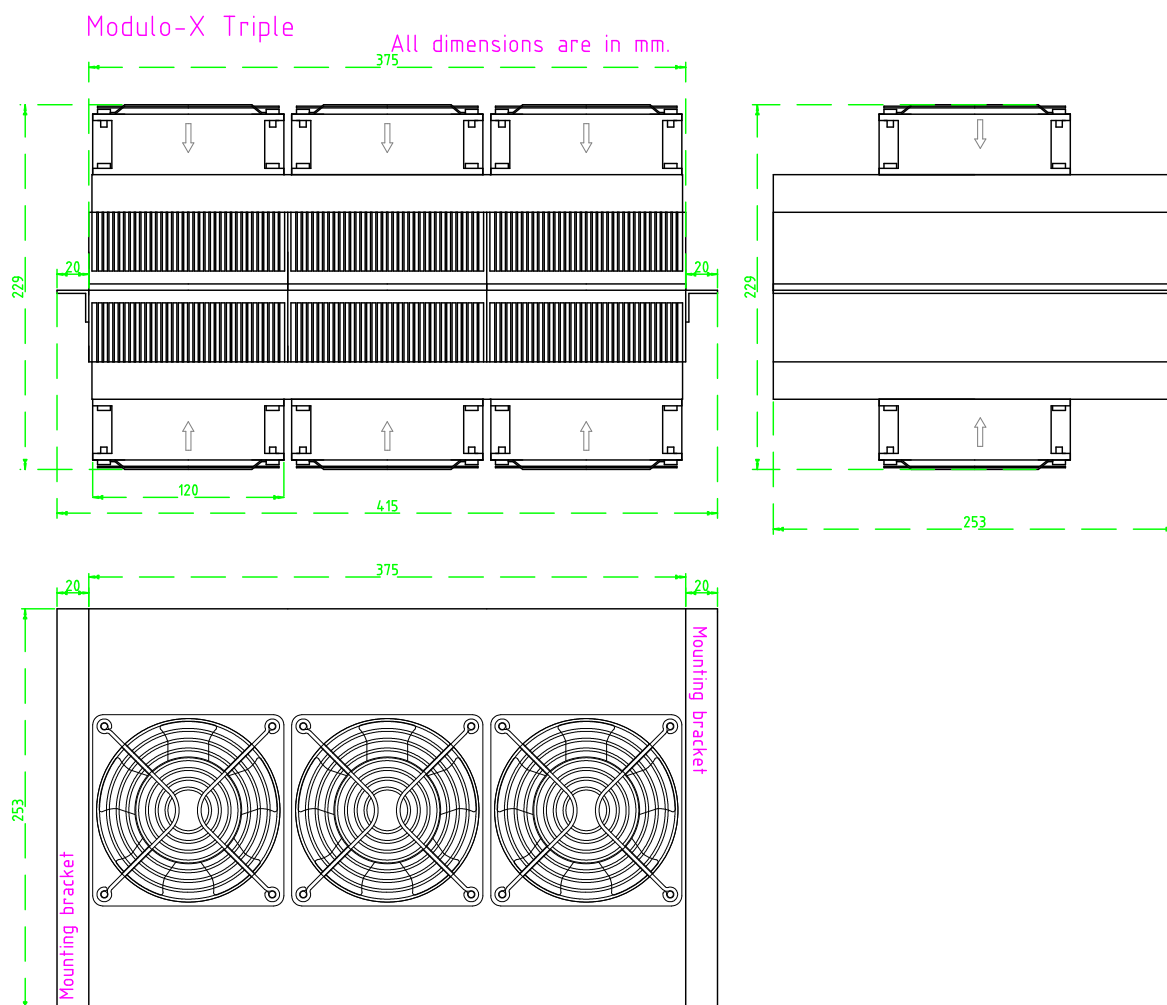
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Modulo-X Double

All dimensions are in mm.



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

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