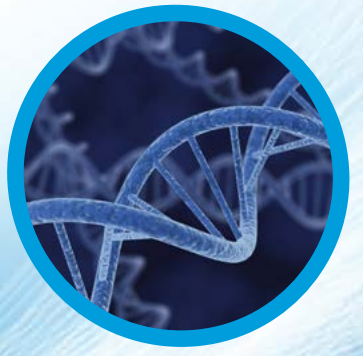
Laird™

Smart Technology. Delivered.

Thermoelectric Assemblies



About Laird

Laird designs and manufactures customized, performance-critical products for wireless and other advanced electronics applications.

Laird is a global technology company focused on providing components and solutions that protect electronic devices from electromagnetic interference and heat, and that enable connectivity through wireless applications and antenna systems.

Custom products are supplied to all sectors of the electronics industry including the handset, telecommunications, data transfer and information technology, automotive, aerospace, defense, consumer, medical, mining, railroad and industrial markets.

As an industry leader in high-performance and cost-effective Thermal Management Solutions, Laird provides the knowledge, innovation, and resources to ensure exceptional thermal performance and customer satisfaction for applications in many industries including:

- Clinical Diagnostics
- Medical Imaging
- Electronic Enclosure Cooling
- Photonics Laser Systems
- Telecommunications
- Analytical Instrumentation
- Semiconductor Fabrication
- Aerospace Defense
- Food & Beverage
- Automotive

Introduction

Thermoelectric Assemblies (TEAs) are compact units that control the temperature of a wide variety of applications, such as laser diode packages in active optics, lasers in medical and industrial instrumentation, electronic enclosures, sample storage chambers in medical diagnostics and analytical instruments and batteries in various automotive and telecom applications. TEAs serve a cooling capacity spectrum from approximately 10 to 400 Watts, and can cool by removing heat from control sources through convection, conduction, or liquid means.

Advantages

TEAs offer several advantages over other cooling technologies. For example, conventional fan trays do not cool to below ambient and require an air exchange with the outside environment. On the other hand, TEAs can cool to well below ambient and protect electronics inside enclosures from outside contaminants, and also limit moisture exposure from the outside environment. TEAs also offer precise temperature control and accuracies to within 0.01˚C are achievable under steady-state conditions.

TEAs have several advantages over conventional compressor-based systems:

- Compact size and lower weight than conventional compressor-based systems
- Mountable in any orientation and have lower noise and vibration
- Environmentally friendly, as TEAs do not use CFCs and are RoHS compliant
- Low to no field maintenance requirement, which lowers the total cost of ownership.

Engineers must now consider thermal management early in the product design process. Simple thermal management solutions, such as adding a fan or heat sink, are no longer typically viable to meet required performance and reliability specifications.

A standard TEA allows the designer to start with a basic set of building blocks that mate fans and TEMs to heat exchangers. Laird has conducted two decades worth of design and validation testing on various combinations of thermal components to optimize cooling power and efficiency at various heat loads. This results in engineers saving time with redesign and validation testing a TEA that has already been perfected by Laird.

Below is a summary of inherent benefits of initiating a thermal design with a standard TEA versus a custom solution:

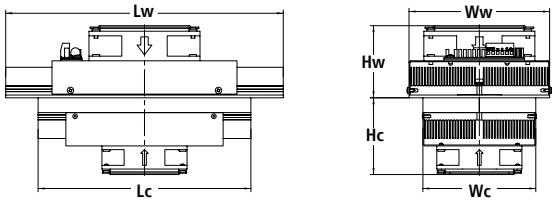
1. Reduce product development time by initiated product at TEA level vs TEM level.
2. Reduce costs by utilizing components that are already established in the supply chain.
3. Long term history of products in field provide reliable field data of robustness of products in operation.
4. Product enhancements are captured through market evolution.

Power Cool Series

The Power Cool Series offers the widest selection of cooling capacities ranging from 20 to 193 Watts. The TEAs use impingement flow to dissipate heat on the hot side. The cold side heat transfer mechanism can absorb heat using convection (heat sink and fan), conduction (cold plate), or liquid (heat exchanger) means. This product series is offered in 12 or 24 VDC configurations. For 100 Watt systems and higher, 48 VDC is available. The Power Cool Series is designed for indoor use in the medical, analytical, and industrial markets.

Air-to-Air Systems (AA)

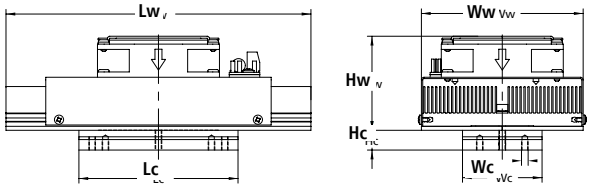
Air-to-Air Assemblies offer dependable, compact performance by cooling objects via convection. Heat is absorbed and dissipated by heat exchangers equipped with fans and ducted shrouds. Specifications apply to ambient temperature of 32°C and nominal voltage with tolerances ±10%.



PART NO.	COOLING POWER (W)	NOMINAL VOLTAGE (V)	CURRENT (A)	WEIGHT (kg)	DIMENSIONS (mm)					
					Lw	Lc	Ww	Wc	Hw	Hc
AA-019-12-22-00-00	20	12	2.3	0.3	80	60	62	40	57	48
AA-024-12-22-00-00	24	12	2.4	0.6	100	80	82	62	60	62
AA-024-24-22-00-00	24	24	1.5	0.6	100	80	82	62	60	62
AA-034-12-22-00-00	33	12	3.5	0.9	120	100	102	82	60	64
AA-040-12-22-00-00	41	12	6.3	1.8	160	120	122	102	68	79
AA-040-24-22-00-00	39	24	2.6	1.8	160	120	122	102	68	78
AA-060-12-22-00-00	58	12	6.2	2.5	230	180	122	102	68	78
AA-060-24-22-00-00	58	24	3.1	2.5	230	180	122	102	68	78
AA-070-24-22-00-00	71	24	3.8	2.5	230	180	122	102	68	84
AA-100-24-22-00-00	102	24	5.6	4.0	300	230	152	122	75	86
AA-150-24-22-00-00	143	24	7.9	4.1	300	250	153	152	80	86
AA-200-24-22-00-00	195	24	11.3	7.0	400	350	153	152	85	93
AA-200-48-22-00-00	195	48	5.7	7.0	400	350	153	152	85	93

Direct-to-Air Systems (DA)

Direct-to-Air Assemblies offer dependable, compact performance by cooling objects via conduction. Heat is absorbed through a cold plate, pumping the heat through the TEM and dissipating it into the air through a heat sink equipped with fan and shroud. Specifications apply to an ambient temperature of 32°C and nominal voltage with tolerances ±10%.

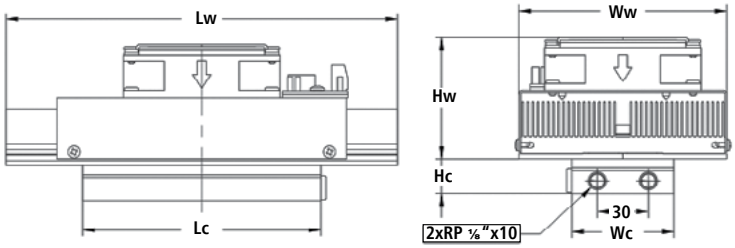


PART NO.	COOLING POWER (W)	NOMINAL VOLTAGE (V)	CURRENT (A)	WEIGHT (kg)	DIMENSIONS (mm)					
					Lw	Lc	Ww	Wc	Hw	Hc
DA-014-12-02-00-00	12	12	1.8	0.2	60	50	40	30	44	11
DA-024-12-02-00-00	24	12	2.4	0.3	80	60	60	40	56	14
DA-034-12-02-00-00	34	12	2.6	0.5	100	60	80	40	59	14
DA-034-24-02-00-00	34	24	1.9	0.5	100	60	80	40	59	14
DA-044-12-02-00-00	42	12	3.8	0.6	120	60	100	40	60	14
DA-044-24-02-00-00	44	24	2.2	0.6	120	60	100	40	60	14
DA-045-12-02-00-00	48	12	6.1	1.2	160	60	122	60	71	15
DA-045-24-02-00-00	45	24	2.5	1.2	160	60	122	60	71	15
DA-075-12-02-00-00	71	12	7.2	1.7	230	120	122	60	71	15
DA-075-24-02-00-00	71	24	3.7	1.7	230	120	122	60	71	15
DA-115-24-02-00-00	113	24	5.8	2.9	300	220	152	60	78	16
DA-135-24-02-00-00	135	24	6.9	2.9	300	220	152	60	78	16
DA-160-24-02-00-00	160	24	7.4	3.5	300	180	152	130	84	16

RoHS

Power Cool Series
Liquid-to-Air Systems (LA)

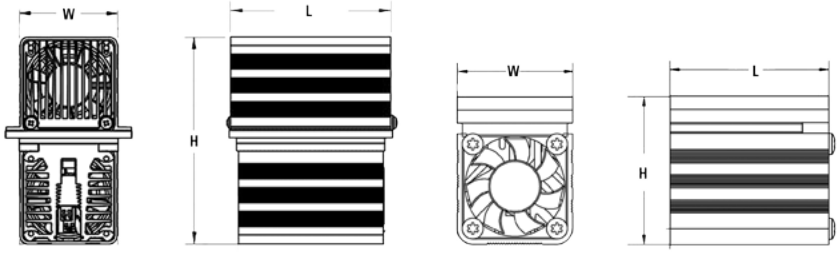
Liquid-to-Air Assemblies cool or heat liquids that flow through a heat exchanger. The liquid heat exchanger is designed for a re-circulating system, absorbs heat and pumps it through the TEM, where it dissipates into the outside environment through an air heat exchanger. Specifications apply to an ambient temperature of 32°C and nominal voltage with tolerances ±10%.



PART NO.	COOLING POWER (W)	NOMINAL VOLTAGE (V)	CURRENT (A)	WEIGHT (kg)	DIMENSIONS (mm)					
					Lw	Lc	Ww	Wc	Hw	Hc
LA-024-12-02-00-00	24	12	2.4	0.4	80	80	60	60	64	15
LA-024-24-02-00-00	24	24	2.0	0.4	80	80	60	60	64	15
LA-045-12-02-00-00	43	12	4.1	1.3	160	100	122	60	71	20
LA-045-24-02-00-00	47	24	2.8	1.3	160	100	122	60	71	20
LA-075-24-02-00-00	71	24	3.7	1.8	230	140	122	60	71	20
LA-115-24-02-00-00	113	24	5.8	3.0	300	240	152	60	78	20
LA-160-24-02-00-00	160	24	7.4	3.5	300	200	152	136	84	20

Tunnel Series

The Tunnel Series TEAs are designed with a patented, high-performance cross flow technology that maximizes heat transfer when pulling air through a heat exchanger. The number of airflow paths required to operate is reduced when compared to traditional impingement flow TEAs. This product series is offered in 12 or 24 volt configurations and can cool by either convection or conduction means.

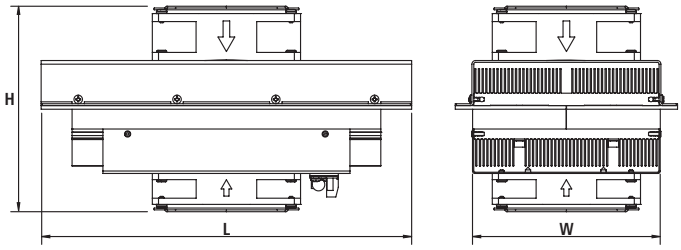


Air-to-Air **Direct-to-Air**

PART NO.	COOLING POWER (W)	NOMINAL VOLTAGE (V)	CURRENT (A)	DIMENSIONS (mm)		
				Height	Length	Width
AA-027-12-22-00-00	28	12	3.1	138	107	68
AA-035-24-22-00-00	33	24	2.2	138	180	68
DA-011-05-02-00-00	11	5	2.2	56	60	44
DA-020-12-02-00-00	19	12	2.7	82	99	65
DA-025-12-02-00-00	25	12	2.5	82	99	65
DA-025-24-02-00-00	25	24	1.6	82	99	65
DA-033-12-02-00-00	32	12	3.1	82	99	66
DA-039-12-02-00-00	40	12	3.9	82	180	65

Outdoor Cooler Series

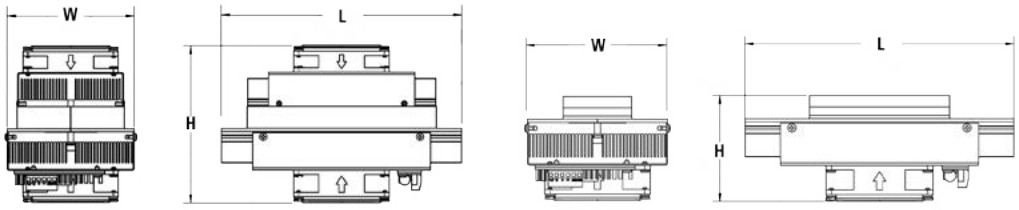
The Outdoor Cooler Series is designed for outdoor use to control the temperature of electronic cabinets. The product series has been designed to pass harsh environmental demands such as earthquake resistance, salt fog, wind-driven rain, high temperature exposure and dust. The cooling capacity ranges from 100 to 250 Watts. This product series is offered in 24 and 48 VDC configurations and is designed for outdoor use in the telecom and industrial markets. As a standard option products are also sold with bi-polar thermostatic control to heat and cool to specific temperature set points.



PART NO.	COOLING POWER (W)	NOMINAL VOLTAGE (VDC)	CURRENT (A)	TEMPERATURE REGULATION	DIMENSIONS (mm)		
					Height	Length	Width
AA-100-24-44-00-XX	102	24	5.6	Open Loop	180	300	122
AA-100-48-44-00-XX	102	48	2.8	Open Loop	180	300	122
AA-150-24-44-00-XX	143	24	7.9	Open Loop	180	300	152
AA-150-48-44-00-XX	143	48	3.9	Open Loop	180	300	152
AA-150-24-44-LE-XX	143	24	7.9	Cooling > 35°C, Heating < 5°C	180	300	152
AA-150-48-44-LE-XX	143	48	3.9	Cooling > 35°C, Heating < 5°C	180	300	152
AA-150-24-44-LK-XX	143	24	7.9	Cooling > 25°C, Heating < 10°C	180	300	152
AA-150-48-44-LK-XX	143	48	3.9	Cooling > 25°C, Heating < 10°C	180	300	152
AA-200-24-44-00-XX	193	24	11.3	Open Loop	183	400	153
AA-200-48-44-00-XX	193	48	5.6	Open Loop	183	400	153
AA-200-24-44-LE-XX	193	24	11.3	Cooling > 35°C, Heating < 5°C	183	400	153
AA-200-48-44-LE-XX	193	48	5.6	Cooling > 35°C, Heating < 5°C	183	400	153
AA-200-24-44-LK-XX	193	24	11.3	Cooling > 25°C, Heating < 10°C	183	400	153
AA-200-48-44-LK-XX	193	48	5.6	Cooling > 25°C, Heating < 10°C	183	400	153
AA-250-24-44-00-XX	244	24	12.1	Open Loop	204	400	153
AA-250-48-44-00-XX	244	48	6.1	Open Loop	204	400	153

Cascade Series

The Cascade Series is a TEA that is specifically designed to reach colder temperatures than standard TEA product offerings. The TEMs are custom designed multistage cascades that achieve a high cooling capacity (Qc) at high temperature differentials (ΔT). The cold side mechanism can transfer heat using convective (sink and fan) or conductive (cold plate) means. This product series is offered in 12 or 24 volt configurations and is designed for indoor use in lab instruments.

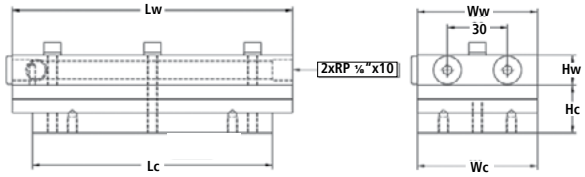


Air-to-Air **Direct-to-Air**

PART NO.	COOLING POWER	NOMINAL VOLTAGE (V)	CURRENT (A)	DIMENSIONS (mm)		
				Height	Length	Width
AAC-050-24-22-00-00	49	24	4.7	152	230	122
DAC-035-12-02-00-00	31	12	4.8	91	160	122
DAC-060-24-02-00-00	58	24	4.6	91	230	122

Direct-to-Liquid Systems (DL)

Direct-to-Liquid Assemblies cool or heat objects attached directly to the cold plate. Heat is dissipated into a liquid heat exchanger on the hot side. The liquid circuit is normally a re-circulating type that requires a pump and additional liquid heat exchanger that dissipates heat into the ambient environment. Specifications apply to the warm side liquid temperature of 32°C and nominal voltage with tolerances ±10%.



PART NO.	COOLING POWER (W)	NOMINAL VOLTAGE (V)	CURRENT (A)	WEIGHT (kg)	DIMENSIONS (mm)					
					Lw	Lc	Ww	Wc	Hw	Hc
DL-060-12-00-00	59	12	4.2	0.4	100	60	60	60	15	24
DL-120-24-00-00	122	24	4.2	0.7	140	120	60	60	15	24
DL-210-24-00-00	207	24	8.1	1.3	240	120	60	60	15	24

Temperature Controllers

Laird offers three types of controllers to drive TEAs. The Q Series is designed for single directional thermostatic control. The PR Series is designed for PID control and comes with GUI to make adjustments on the fly. Bi-polar thermostatic controllers are available, but sold with Outdoor Cooler Series units only.

PART NO.	DESCRIPTION	REGULATION TYPE	TEMP RANGE (°C)	ACCURACY (°C)	INPUT VOLTAGE	MAX OUTPUT CURRENT	ALARM OUTPUTS
PR-59	Programmable PID Controller	PWM	Sensor Dependent	Sensor Dependent	11-30VDC	< 15A	Yes
QC-50	Single Directional Thermostatic	ON/OFF	Cool >5°C Off <2 °C	±1.0°C	11-58VDC	< 16A	Yes
QE-50	Single Directional Thermostatic	ON/OFF	Cool >35°C Off <32 °C	±1.0°C	11-58VDC	< 16A	Yes

MRC Series Recirculating Thermoelectric Chillers

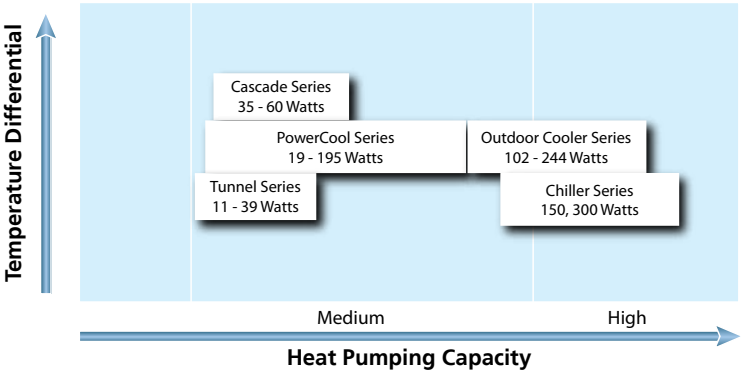
MRC Chillers are self contained re-circulating chillers that offer dependable, compact performance by controlling the temperature of a coolant in a liquid circuit. The coolant is re-circulated using a pump with high mean time between failures (MTBF). Heat from the coolant is absorbed by a heat exchanger and dissipated through high density heat sinks equipped with brand name fans. The TEMs are custom designed to achieve long life operation. The unit is regulated with an easy-to-use digital temperature controller and is housed inside an aesthetic sheet metal casing.

MODEL	COOLING CAPACITY (dT=12°C)	FLOW RATE (@ 4 bar)	HEATING OPTION	WEIGHT (kg)	HEIGHT (in)	WIDTH (in)	DEPTH (in)
MRC 150,DH2,DVA	151 watts 515 Btu/hr	2.9 lpm	No	10.9	12.2	7.8	15.2
MRC 300,DH2,DVA	299 watts 1020 Btu/hr	3.3 lpm	No	13.6	15.4	8.4	13.3
MRC 150,DH2,HT, DVA	151 watts 515 Btu/hr	2.9 lpm	Yes	10.9	12.2	7.8	15.2
MRC 300,DH2,HT, DVA	299 watts 1020 Btu/hr	3.3 lpm	Yes	13.6	15.4	8.4	13.3

TEA Portfolio

Laird offers the widest selection of TEAs on the market. Products are designed and manufactured to strict process control standards and pass/fail criteria, assuring that our customers receive the best possible TEAs. Our standard product portfolio includes an extensive array of thermal management solutions that cover a wide range of cooling capacities with compact form factors and high coefficient of performance. Standard operating voltages are 12 and 24 VDC, and on some models 48 VDC. The standard product offering includes heat transfer mechanisms designed to absorb and dissipate heat by convection, conduction, or through liquid heat exchangers. All products are manufactured in an ISO 9001:2008 certified facility and are designed to meet the cooling needs of many thermal management applications in the medical, analytical, industrial and telecom markets.

There are five distinct TEA product families that were designed for a specific cooling capacity range, temperature differential range or tight space constraint. The diagram to the right is a perceptual map of a cooling spectrum that can be used to guide designers to a particular product family that will have the desired attributes that the application requires.



Thermoelectric Applications

Thermoelectric Assemblies are used in a wide range of applications to stabilize the temperature of sensitive electronic components or to cool devices and compartments below ambient.

Telecommunications

Cooling below ambient is necessary to extend life of batteries in wireless base stations. Temperature stabilization is required to maintain peak performance of laser diodes.

- Telecom Enclosures
- Battery Backup Systems
- High Powered Laser Diodes

Medical

Temperature stabilization is required to obtain a high image resolution. Cooling reagent chambers below ambient is critical to extend life of reagents and keep replacement costs down. Rapid thermal cycling is crucial to speed up DNA amplification.

- Medical Imaging
- Clinical Diagnostics
- Medical Lasers
- Analytical Instrumentation
- PCR

Industrial & Instrumentation

Temperature stabilization is critical to maintain industrial lasers at peak performance and allows high end printing systems to produce high quality prints at high run rates.

- High Powered Projectors
- Kiosks
- Metrology Instrumentation
- Digital Color Printing Systems
- Industrial Laser Systems

Food & Beverage

Temperature control is crucial to keep food fresh and beverages cold.

- Beverage Coolers
- Small Refrigerators
- Portable Food Containers
- Coffee Makers
- Juice Dispensers
- Vending Machines

Customization

Since there are so many unique attributes that need to be ascertained for each application, often a customized TEA will yield a more optimal thermal solution. Laird offers strong engineering services with a global presence that supports onsite concept generation, thermal modeling, thermal design and rapid prototyping. We also offer validation test services to meet unique compliance standards for each industry, such as Telcordia, MIL-STDs or unique standards specific to a medical, automotive or industrial account. Minimum order quantity (MOQ) applies for all custom TEA designs and validation testing. Contact Laird today to support your customization needs.

On Sight Concept Generation

Mechanical Design Support

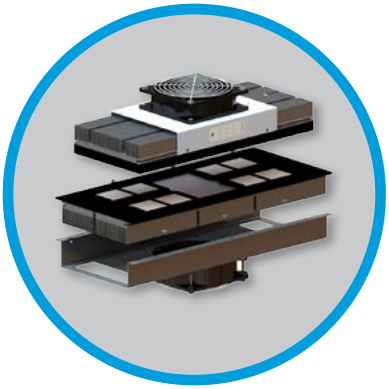
Thermal Modeling Analysis

Temperature Control Design

Prototype Development

Validation Testing

Regional Manufacturing Capabilities



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