Thermo-Electric-Products

Telemeter Electronic

- Thermal Management
- Industrial Components
- Test & Measurement
- RF & Microwaves
- Aviaton
- Engineering & Service

... we provide solutions!

Telemeter Electronic

About us

Telemeter Electronic is a certified sales and service-providing company with more than 50 years history of experience. We are focused on a personal and partnership-based-cooperation by our professionally competent market specialists.

What do we offer?

We offer a comprehensive range of electronic and mechatronic components, devices and systems, detailed knowledge about it and many years of experience in diverse applications. Long lasting partnerships with selected and specialized manufacturers and our own development department ensure that we elaborate the best solution together with you.

What makes us different?

Our philosophy is to accurately identify the needs of our customers to find the right solution. We support you with our extensive range and individual adaptations, additions and developments.

… we provide solutions!

What is Thermoelectric Module

Thermoelectric Module, also known as thermoelectric cooler, thermoelectric cooling chip, etc., is a solid-state device. Two effects of it is shown as below:

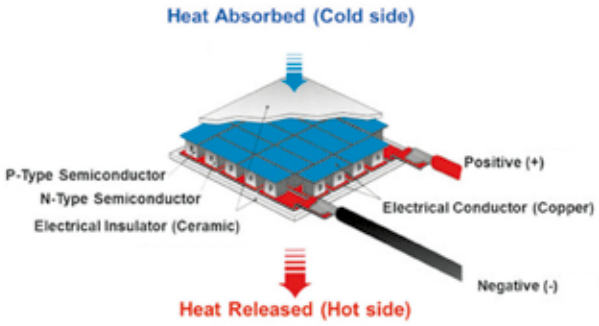
1) Generating electrical power from a temperature gradient, known as the Seebeck effect – TEG;
2) Or converting electrical energy into a temperature gradient, known as the Peltier effect – TEC.

Core Technology

A typical thermoelectric Module consists of two pieces ceramic substrates that serve as a housing and electrical insulation for P-type and N-type (typically Bismuth Telluride) elements between the substrates. Heat is absorbed at the cold junction by electrons as they pass from a low energy level in the P-type element, to a higher energy level in the N-type element. At the hot junction, energy is expelled to a thermal sink as electrons move from a high energy N element to a lower energy P element. A Module contains several P-N couples that are connected electrically in series and thermally in parallel.

When to use Thermoelectric Products

A) Ideal operating temperature is lower than the ambient temperature is desired (active cooling);
B) A small size cooling device is desired or tight space restricted;
C) Low maintenance cost and high solid state reliability is desired;
D) Localized or spot cooling is desired;
E) Precise temperature control, especially when the ambient temperature varies greatly is desired;
F) Low weight or portable cooling/heating is desired.



Selection & Cautions

How to select TE products?

When select TE products, the following steps are recommend:

1.Confirm the ambient temperature (Th);

2.Confirm the required temperature of the cooling space or objects (Tc);

3.Confirm the applications heat load power (Q, the heat need to be removed or lowered);

4.Determine the required cooling capacity (Qc, considering heat loss, it is recommended Qc = 1.5 * Q);

5.Find out TE products from the catalog, whose maximum heat pumping capacity (Qmax) matches with the Qc worked out by step #4 (±5W), and then refer to the expected current and voltage to pick out a suitable product. If the single product could not meet the requirement, you can also use series or parallel connect multiple products to get higher performance, the quantity = Qc / Qmax (Single products).

The above is a simple selection method, the actual simulation and testing are required to confirm the product on this basis. For more accurate calculation and design, please contact us, we will provide professional and perfect support to you.

Cautions

1.Take TEM gently and carefully to prevent falling or knocking, and avoid TEM damaged by impact;

2.Object surface contact TEM must be finely processed, thermal grease is required to be smeared evenly while assembling with contact surfaces to minimize thermal resistance. Never connect to power before heat sink installed onto the hot side, or the TEM may be damaged;

3.The heat on hot side must be dissipated promptly, otherwise, the temperature gets high will lower the cooling effect, and the TEM may be damaged. The maximum temperature of hot side must be lower than 90℃ for standard series TEM. The lower the temperature is, the better the cooling effect will be;

4.When fasten the TEM, pay attention to the pressure, which must not exceed 10kg/cm2. When assemble TEM with the heat sink and cold blocks, align the upper and lower holes, press heat sink, TEM and cold blocks with appropriate pressure, to avoid partial pressure crushing the ceramics. Screws should use washers and plastic insulating sleeve;

5.To improve reliability of TEM, actual input working voltage and current should be lower than the maximum voltage and current. During operation, the current will lower with the change of risen TEM temperature.

6.The ripple factor of direct current power should not exceed 10%;

7.No matter working or being tested, instantly change of current direction must be forbidden (it could be done after more than 10 minutes). Otherwise, the TEM may probably be damaged;

8.Water or other liquid should be prevented from going inside of TEM.

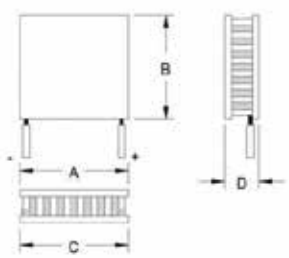
Application	Description
Telecom	Precise temperature tuning of laser diodes & pump lasers Temperature stabilization of optical networking components IR detectors Compressor-free cooling of cellular base stations
Medical / Analytical	Liquid chromatography equipment Thermal cycling for DNA replication by Polymerase Chain Reaction (PCR) & autosamplers Centrifuges Therapeutic appliances & medical lasers Gas Analyzers
Consumer products	Electric coolers Mini-fridge Wine/beer coolers Mosquito magnets
Industrial / Commercial	Industrial process & test equipment Beverage dispensing equipment & vending machines Enclosure cooling Commercial Printing Systems
Automotive	Seat heating Specialty air conditioning units
Power Generation	Generating electricity from waste heat Used in Mosquito trap
Semiconductor	Semiconductor processing equipment CPU coolers

Standard Module

It is cost-effective and suitable for the higher current and lager cooling requirements. Typical application includes experimental, scientific and biomedical instruments, laboratory equipment, industry and electrical equipment and consumables. The ambient temperature can arrive 100℃, long-term working temperature is recommended to be below 90℃.

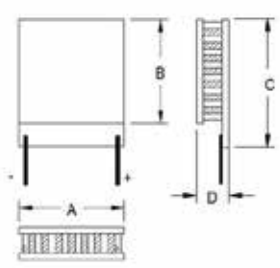
No.	I max (A)	Th=27°C			N	Dimensions (mm)		
		Q max (W)	V max (V)	ΔT max (°C)		A/C	B	D
1	2.1	1.0	0.9	68	7	6	6	3.4
2	2.1	2.4	2.1	68	17	9	9	3.4
3	2.1	4.4	3.8	68	31	12	12	3.4
4	2.1	9.0	7.6	68	63	12	25	3.4
5	2.1	10.1	8.6	68	71	18	18	3.4
6	2.1	18.1	15.4	68	127	25	25	3.4
7	2.5	1.2	0.9	68	7	8	8	4.0
8	2.5	2.9	2.1	68	17	12	12	4.0
9	2.5	5.3	3.8	68	31	15	15	4.0
10	2.5	10.6	7.6	68	63	15	30	4.0
11	2.5	12.0	8.6	68	71	23	23	4.0
12	2.5	21.4	15.4	68	127	30	30	4.0
13	3.0	1.4	0.9	68	7	8	8	3.6
14	3.0	3.4	2.1	68	17	12	12	3.6
15	3.0	6.3	3.8	68	31	15	15	3.6
16	3.0	12.7	7.6	68	63	15	30	3.6
17	3.0	14.4	8.6	68	71	23	23	3.6
18	3.0	25.7	15.4	68	127	30	30	3.6
19	3.9	1.8	0.9	68	7	8	8	3.2
20	3.9	4.5	2.1	68	17	12	12	3.2
21	3.9	8.2	3.8	68	31	15	15	3.2
22	3.9	16.6	7.6	68	63	15	30	3.2
23	3.9	18.7	8.6	68	71	23	23	3.2
24	3.9	33.4	15.4	68	127	30	30	3.2
25	3.9	2.9	1.3	69	11	10	15	4.7
26	3.9	4.5	2.1	69	17	15	15	4.7
27	3.9	8.2	3.8	69	31	20	20	4.7
28	3.9	9.2	4.2	69	35	15	30	4.7
29	3.9	18.7	8.6	69	71	30	30	4.7
30	3.9	33.4	15.4	69	127	40	40	4.7
31	6.0	4.4	1.3	69	11	10	15	3.8
32	6.0	6.9	2.1	69	17	15	15	3.8
33	6.0	12.5	3.8	69	31	20	20	3.8
34	6.0	14.2	4.2	69	35	15	30	3.8
35	6.0	28.7	8.6	69	71	30	30	3.8
36	6.0	51.4	15.4	69	127	40	40	3.8
37	8.5	6.0	1.3	69	11	10	15	3.3
38	8.5	9.2	2.1	69	17	15	15	3.3
39	8.5	16.8	3.8	69	31	20	20	3.3
40	8.5	19.0	4.2	69	35	15	30	3.3
41	8.5	38.5	8.6	69	71	30	30	3.3
42	8.5	72.0	15.4	69	127	40	40	3.3
43	9.0	77.1	15.4	71	127	62	62	5.6
44	14	120.0	15.4	71	127	62	62	4.6

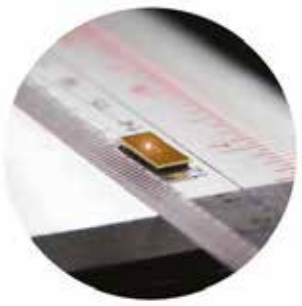
Imax: Maximum input Current (A); Qmax: Maximum heat pumping capacity (W);
Vmax: Maximum input Voltage (V); ΔTmax: Maximum Temperature difference (°C);
Th: Temperature of the TEM hot side during operation (°C);
N: Number of Thermocouples (P and N type pairs);

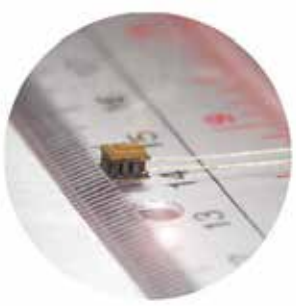


It is suitable for various cooling and heat applications where only a limited area and a small amount of cooling or heat are involved. Typical applications are laser diode cooling, infrared systems, electro-optics and electronic equipment and other low wattage applications.

No.	I max (A)	Th=27°C			N	Dimensions (mm)			
		Q max (W)	V max (V)	ΔT max (°C)		A	B	C	D
1	0.8	0.97	2.1	67	18	4.9	4.9	6.5	2.4
2	0.8	1.72	3.8	67	32	6.5	6.5	8.1	2.4
3	0.8	3.56	7.9	67	66	9.8	8.9	11.4	2.4
4	1.2	0.57	0.8	67	7	4	4	4	2.7
5	1.2	1.38	2.0	67	17	6.6	6.6	6.6	2.7
6	1.2	1.46	2.1	67	18	6.0	6.2	7.2	2.7
7	1.2	1.97	2.7	67	24	6.6	8.8	10.8	2.5
8	1.2	2.43	3.6	67	30	6.2	10.3	12.3	2.3
9	1.2	2.51	3.7	67	31	8.8	8.8	8.8	2.7
10	1.2	2.51	3.7	67	31	8.8	8.8	11.0	2.7
11	1.2	5.34	7.8	67	65	13.2	12.1	13.2	2.7
12	1.2	5.59	8.2	67	68	13.2	13.2	13.2	2.7
13	1.5	0.71	0.8	67	7	4.0	4.0	4.0	2.4
14	1.5	1.72	2.0	67	17	6.6	6.6	6.6	2.4
15	1.5	1.82	2.1	67	18	6.0	6.2	7.2	2.4
16	1.5	2.42	2.7	67	24	6.6	8.8	10.8	2.2
17	1.5	3.03	3.6	67	30	6.2	10.3	12.3	2.1
18	1.5	3.13	3.7	67	31	8.1	8.1	8.1	2.4
19	1.5	3.13	3.7	67	31	8.8	8.8	8.8	2.4
20	1.5	3.13	3.7	67	31	8.8	8.8	11.0	2.4
21	1.5	6.57	7.8	67	65	13.2	12.1	13.2	2.4
22	1.5	6.87	8.2	67	68	13.2	13.2	13.2	2.4
23	2.0	0.95	0.8	67	7	4.0	4.0	4.0	2.2
24	2.0	2.30	2.0	67	17	6.6	6.6	6.6	2.2
25	2.0	2.43	2.1	67	18	6.0	6.2	7.2	2.2
26	2.0	3.32	2.7	67	24	6.6	8.8	10.8	2.0
27	2.0	4.04	3.6	67	30	6.2	10.3	12.3	1.8
28	2.0	4.18	3.7	67	31	8.1	8.1	8.1	2.2
29	2.0	4.18	3.7	67	31	8.8	8.8	8.8	2.2
30	2.0	4.18	3.7	67	31	8.8	8.8	11.0	2.2
31	2.0	8.76	7.8	67	65	13.2	12.1	13.2	2.2
32	2.0	9.16	8.2	67	68	13.2	13.2	13.2	2.2



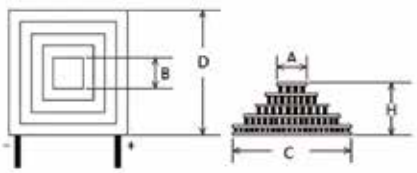




Multi-stage Module

Designed for higher ΔT, it can achieve significant higher ΔT than single stage module, the maximum ΔT can achieve 131℃. It is suitable for applications where a small or medium cooling capacity but higher ΔT is required. Typical applications include IR-detectors, CCD arrays and electro-optics. These items are also available with different configurations in cascade designs to meet a range of deep cooling applications.

No.	I max (A)	Th=27°C			Dimensions (mm)				
		Q max (W)	V max (V)	ΔT max (°C)	A	B	C	D	H
1	1.45	0.42	0.84	86	3.2	3.2	3.9	3.9	3.8
2	1.40	1.03	1.96	83	4.1	4.1	6.1	6.1	4.2
3	0.65	1.19	7.96	92	4.9	4.9	9.8	9.8	4.2
4	2.00	0.41	0.80	91	3.5	3.5	8.0	8.0	7.4
5	2.10	3.11	3.80	81	11.5	11.5	15.0	15.0	6.6
6	4.00	6.04	3.80	81	15.0	15.0	20.0	20.0	7.2
7	4.30	12.65	8.60	85	20.0	20.0	30.0	30.0	7.2
8	2.80	16.05	15.50	83	30.0	30.0	30.0	30.0	6.5
9	6.00	34.51	15.50	83	40.0	40.0	40.0	40.0	7.5
10	1.30	0.30	1.94	110	2.5	2.5	6.6	6.6	5.2
11	1.30	0.60	3.40	109	4.1	4.4	8.8	8.8	5.8
12	1.80	6.48	15.40	96	15.0	15.0	30.0	30.0	9.5
13	3.50	12.58	15.40	96	20.0	20.0	40.0	40.0	10.4
14	1.30	2.87	14.60	107	11.5	11.5	30.0	30.0	14.0
15	3.10	6.84	14.60	107	15.0	15.0	40.0	40.0	13.8
16	1.60	1.74	14.50	118	8.0	8.0	30.0	30.0	15.4
17	3.00	3.37	14.50	118	10.0	10.0	40.0	40.0	16.9
18	1.50	0.63	14.50	131	3.5	3.5	30.0	30.0	18.3
19	3.00	1.22	14.50	131	5.0	5.0	40.0	40.0	20.1

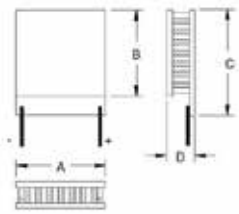




•High Performance Module:

Larger hot side ceramic brings extra dissipation capacity, higher cooling efficiency and longer working time. It is suitable for experimental instruments, chillers, PCR cyclers and analyzers, etc.

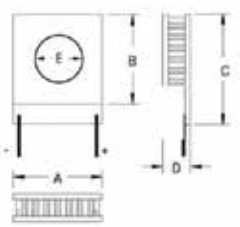
No.	I max (A)	Th=27°C			Dimensions (mm)			
		Q max (W)	V max (V)	ΔT max (°C)	A	B	C	D
1	3.9	35.0	16.4	72	30	30	34	3.6
2	3.9	37.0	15.4	72	40	40	44	4.8
3	6.0	55.0	15.4	72	40	40	44	3.9
4	5.0	62.3	20.0	72	40	40	44	3.6
5	6.7	83.9	20.0	72	40	40	44	3.3
6	8.5	77.0	15.4	72	40	40	44	3.3
7	12.0	165.0	24.0	72	40	40	44	3.1
8	6.0	113.0	29.8	72	55	55	55	4.3

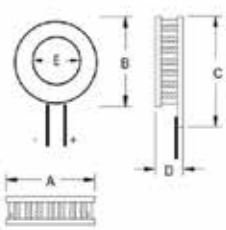


•Center Hole and Annual Module:

Center hole for transmission of light, wires, probes or other hardware through the TEM. It is suitable for industrial, electrical equipment, laboratory and optical-electronics.

No.	I max (A)	Th=27°C			N	Dimensions (mm)				
		Q max (W)	V max (V)	ΔT max (°C)		A	B	C	D	E
1	3.0	19.3	11.5	67	95	30	30	30	3.6	14.5
2	3.0	25.3	15.2	67	125	30	30	30	3.6	3.6
3	3.9	25.1	11.5	67	95	30	30	30	3.2	14.5
4	3.9	32.9	15.2	67	125	30	30	30	3.2	3.6
5	3.9	32.9	15.2	68	125	40	40	40	4.7	4.7
6	6.0	50.7	15.2	68	125	40	40	40	3.8	4.7
7	8.5	67.7	15.2	68	125	40	40	40	3.3	4.7





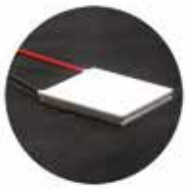
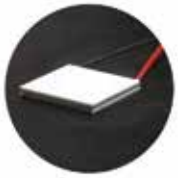
High Temperature Module & Power Generator Module

•High Temperature Module:

Maximum ambient temperature up to 250℃, long-term working temperature is recommended to be below 200℃. It has super cycling capacity and is suitable for extra high temperature, or power generator from waste heat.

No.	I max (A)	Th=27°C			N	Dimensions (mm)			
		Q max (W)	V max (V)	ΔT max (°C)		A	B	C	D
1	2.8	24.0	14.40	68	127	30	30	34	3.2
2	3.9	33.0	14.40	68	127	30	30	34	3.2
3	3.7	18.0	8.10	68	71	30	30	34	4.1
4	3.7	32.0	14.40	68	127	40	40	44	4.1
5	6.0	29.0	8.10	68	71	30	30	34	3.8
6	6.0	51.0	14.40	68	127	40	40	44	3.6
7	8.5	39.0	8.10	68	71	30	30	34	3.3
8	8.5	72.0	14.40	68	127	40	40	44	3.3
9	9.6	20.0	3.55	68	31	25	25	29	4.9
10	14.0	29.3	3.75	68	31	25	25	29	4.5



•Power Generator Module:

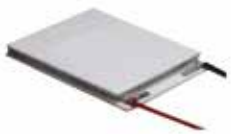
Using the theory of Seebeck Effect, it can generate power from temperature difference. It is suitable for detector instruments, various environments where hard to get or unsuitable for electrical power, and the excess or waste heat recycling fields.

No.	Tc=30°C, Th=200°C						Dimensions (mm)			
	Voc (V)	V Load (V)	I Load (A)	R in (Ω)	R Load (Ω)	W Load (W)	A	B	C	D
1	8.54	4.27	0.54	7.9	7.9	2.3	30	30	34	3.6
2	8.54	4.27	0.67	6.4	6.4	2.8	30	30	34	3.2
3	8.54	4.27	0.92	4.6	4.6	3.9	30	30	34	3.2
4	4.78	2.39	0.89	2.7	2.7	2.1	30	30	34	4.1
5	8.54	4.27	0.89	4.8	4.8	3.8	40	40	44	4.1
6	4.78	2.39	1.42	1.7	1.7	3.4	30	30	34	3.8
7	8.54	4.27	1.42	3.0	3.0	6.0	40	40	44	3.6
8	4.78	2.39	2.00	1.2	1.2	4.8	30	30	34	3.3
9	8.54	4.27	2.00	2.1	2.1	8.5	40	40	44	3.3
10	2.08	1.04	2.32	0.4	0.4	2.4	25	25	29	4.9

Tc – TEM cold side temperature at 30℃
Th – TEM hot side temperature at 200℃
Voc – Open circuit voltage (V)
V Load – Output voltage, corresponded to matched load (V)
I Load – Output current, corresponded to matched load (A)
R in – Module internal resistance at 115 °C (Ohm)
R Load – Output resistance, corresponded to matched load (Ohm)
W Load – Output power, corresponded matched load (W)
Cold side thermal resistance = 0°C/W

Due to the contact resistance of the surface roughness, surface contact area, contact pressure and other factors are very complex, and mostly are nonlinear factors.Therefore, the actual use of the generating performance should be lower than the above list.



•Air to Air System:

Field: Cool or heat objects in containers

Description: Heat is absorbed and dissipated by heat exchangers equipped with fans. Simply cut a hole, plug in the assembly and connect it to a power source. It is designed for dependable, compact requirement.

Appilication: Cooling electronics cabinets, analytical instruments, commercial refrigeration and food or medicine transportation boxes.

No.	Pc Max (W)	Current (A)	Voltage (V)	Fan Position	Input Power (W)	COP	Ambient (℃)	Weight (Kg)	Dimension L X W X H (mm)
1	41	6.3	12	Hot & Cold sides	76	0.54	-10 ~ 52	1.8	160 X 122 X 147
2	41	3.2	24		77	0.53		1.8	160 X 122 X 147
3	68	7.6	12		91	0.75		2.5	230 X 122 X 147
4	68	3.8	24		91	0.75		2.5	230 X 122 X 147
5	95	6.5	24		156	0.61		4.1	300 X 152 X 166
6	95	3.3	48		158	0.60		4.1	300 X 152 X 166
7	143	9.8	24		235	0.61		5.0	300 X 153 X 176
8	143	4.9	48		235	0.61		5.0	300 X 153 X 176
9	198	10.8	24		259	0.76		7.3	400 X 181 X 198
10	198	7.3	48		350	0.57		7.3	400 X 181 X 198




•Plate to Air System:

Field:

1) Objects directly on the cold plate, or objects on an additional cold plate of your own design;
2) Enclosures by attaching a thermal conductive container to the cold plate;
3) Liquids by attaching a thermal conductive tank or liquid heat sink to the cold plate.

Description: The heat is absorbed by the cold plate, pumped through the TE modules and then dissipated to the air by an air heat sink. It delivers compact and reliable cooling.

Appilication: Cooling electrical devices, analytical instruments, lasers and commercial refrigeration.

No.	Pc Max (W)	Current (A)	Voltage (V)	Fan Position	Input Power (W)	COP	Ambient (℃)	Weight (Kg)	Dimension L X W X H (mm)
1	24	2.4	12	Hot side	29	0.83	-10 ~ 52	0.3	80 X 62 X 69
2	43	6.5	12		78	0.55		1.2	160 X 122 X 83
3	43	3.2	24		77	0.56		1.2	160 X 122 X 83
4	72	7.6	12		91	0.79		1.7	230 X 122 X 83
5	72	3.8	24		91	0.79		1.7	230 X 122 X 83
6	113	6.5	24		156	0.72		2.9	300 X 152 X 100
7	113	3.3	48		158	0.71		2.9	300 X 152 X 100
8	158	9.5	24		228	0.69		3.5	300 X 152 X 113
9	158	4.8	48		230	0.69		3.5	300 X 152 X 113




Plate to Liquid System & Liquid to Air System

•Plate to Liquid System:

Field: Cool or heat either objects attached directly to the cold plate, or enclosures by attaching a thermal conductive container to the cold plate.

Description: Heat is dissipated to a liquid on the warm side. The liquid circuit is normally of a circulating type with a pump and a Liquid-to-Air heat exchanger removing the heat into the ambient air. By using an efficient heat exchanger and one or more Plate to Liquid Assemblies a very powerful yet compact system is created. Our standard assemblies are optimized for high cooling capacity and efficiency rather than maximum ΔT.

Appilication: Temperature cycling of electronic components, laser cooling and analytical instruments.

No.	Pc Max (W)	Current (A)	Voltage (V)	Fan Position	Input Power (W)	COP	Ambient (℃)	Weight (Kg)	Dimension L X W X H (mm)
1	60	4.2	12	-	50	1.19	-10 ~ 63	0.4	100 X 60 X 36
2	120	8.4	12		101	1.19		0.7	140 X 60 X 36
3	120	4.2	24		101	1.19		0.7	140 X 60 X 36
4	210	8.1	24		194	1.08		1.3	240 X 60 X 36
5	210	4.1	48		197	1.07		1.3	240 X 60 X 36



•Liquid to Air System:

Field: Cool or heat liquids or gases flowing through the heat sink.

Description: The liquid heat sink is designed for a recycling system. The heat is absorbed by the liquid heat sink, pumped through the TE modules, and then dissipated to the air by an air heat sink.

Appilication: Cooling of tissue or other areas of the body in laser or microwave thermal therapy; Cooling or heating in capillary electrophoresis; Cooling of power lasers and other sensitive electronics.

No.	Pc Max (W)	Current (A)	Voltage (V)	Fan Position	Input Power (W)	COP	Ambient (℃)	Weight (Kg)	Dimension L X W X H (mm)
1	43	6.5	12	Hot side	78	0.55	-10 ~ 52	1.3	160 X 122 X 91
2	43	3.2	24		77	0.56		1.3	160 X 122 X 91
3	72	7.6	12		91	0.79		1.8	230 X 122 X 91
4	72	3.8	24		91	0.79		1.8	230 X 122 X 91
5	113	6.5	24		156	0.72		3.0	300 X 152 X 108
6	113	3.3	48		158	0.71		3.0	300 X 152 X 108
7	158	9.5	24		228	0.69		3.5	300 X 152 X 108
8	158	4.8	48		230	0.69		3.5	300 X 152 X 108




Field: Cool or heat liquids or gases passing through the heat sink.

Description: Heat is dissipated to a liquid on the warm side. The liquid circuit is normally of circulating type with a pump and a Liquid-to-Air heat exchanger to remove the heat into the ambient air. By using an efficient heat exchanger and one or more LL assemblies, a powerful yet compact system is created.

Appilication: Medical and analytical equipment, cooling or heating of process fluids

No.	Pc Max (W)	Current (A)	Voltage (V)	Fan Position	Input Power (W)	COP	Ambient (℃)	Weight (Kg)	Dimension L X W X H (mm)
1	60	4.2	12	-	50	1.19	-10 ~ 63	0.5	100 X 60 X 44
2	120	8.4	12		101	1.19		0.8	140 X 60 X 44
3	120	4.2	24		101	1.19		0.8	140 X 60 X 44
4	210	8.1	24		194	1.08		1.4	240 X 60 X 44
5	210	4.1	48		197	1.07		1.4	240 X 60 X 44

TEM Selection Form

1. Applied Industry :

□Industrial □Medical □Photoelectron □Telecom □Consumer Others_____

2. Applied Products : _____

3. The ambient temperature(Th) : _____℃

4. The required temperature of the cooling space or objects(Tc) : _____℃

5. TEM dimensions : length_____ Width:_____ Height_____ mm

6. TEM Moisture Protection Options (standard is sealed by white RTV silicone) :

□No seal □White RTV silicone □Translucent silicone □Black epoxy □Others

7. TEM Wires Options (Standard Wire is 150mm) :

□No Wires □150mm □Other specific requirement : _____

8. Ceramic External Substrate Surface Options(Standard one is the bare ceramic surface):

□Bare Ceramic Surface

□Metallized Surface

□Gold □Nickel □Cooper

□Hold side metallization □Cold side metallization □Both sides metallization.

□Pre-tinning Options

□Others_____

9. Ceramic Materials Options :

□Aluminum Oxide □Aluminum Nitride

10. TEM Thickness Tolerance Options :

□±0.2mm □±0.1mm □±0.05mm □±0.025mm □±0.015mm

11. TEM Flatness Tolerance Options :

□±0.2mm □±0.1mm □±0.05mm □±0.025mm □±0.013mm

12. Heat Load Power(Q , refers to the heat need to be removed or lowered) : _____W

13. Other requirements :

Notes

Telemeter Electronic

Germany

Telemeter Electronic GmbH
Joseph-Gaensler-Straße 10
86609 Donauwoerth
Phone +4990670693-0
Fax +4990670693-50
info@telemeter.de
www.telemeter.info

Switzerland

Telemeter Electronic GmbH
Romanshornerstrasse 117
8280 Kreuzlingen
Phone +41716992020
Fax +41716992024
info@telemeter.ch
www.telemeter.info

Czech Republic

Telemeter Electronic s.r.o.
České Vrbné 2364
370 11 České Budějovice
Phone +420385310637
info@telemeter.cz
www.telemeter.info