



R4L SERIES

Liquid Cooled Reactors

High Frequency

Selection Brochure | R4L Reactors

Superior Cooling Technology
Highest Power Density
Designed for High Frequency Applications



High Frequency Reactor

- Optimized for PMAC motor applications
- Fundamental frequencies up to 400 Hz
- Perfect for high frequency, high THD installations

Liquid Cooled Advantages

- Highest power density
- Lowest audible noise
- Sealed design for harsh conditions
- Thermally isolated from ambient

Half the size. Half the weight. 400 Hz.

R4L High Frequency Liquid Cooled Reactors are built for demanding high frequency applications. With permanent magnet motor applications specifically in mind, R4L reactors are designed to operate at frequencies that would easily overheat traditional reactors. The largest companies in the world rely on CTM technology, with more than 200,000 installed units in some of the harshest environments on the planet.

PRODUCT HIGHLIGHTS

Motor Protection

When installed at the output of a high frequency VFD, R4L reactors limit voltage spikes that can break down motor insulation.

PMAC Motor Optimized

Designed specifically with PMAC motor applications in mind, R4L high frequency reactors incorporate features to address concerns unique to these applications.

High Frequency

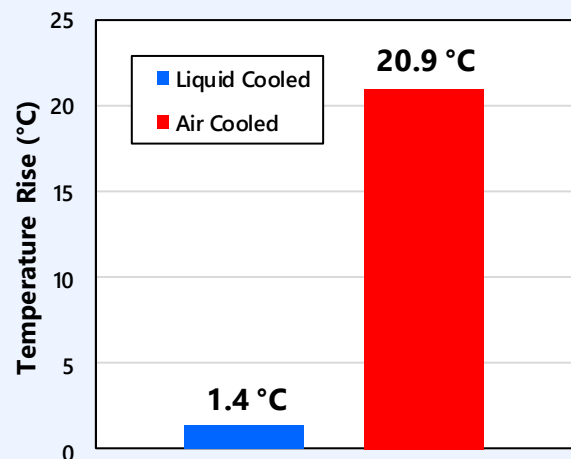
Thermally designed to withstand frequencies that would burn other inductors (up to 400 Hz), R4L reactors utilize advanced, proprietary materials to minimize heating and high current saturation.

Inductance for High Frequency

Since an inductor's impedance is directly proportional to frequency, high frequency applications often require lower inductances. R4L reactors offer 1.5%, 3%, 5%, and 7% impedances, calculated at 200 Hz and 480 V.

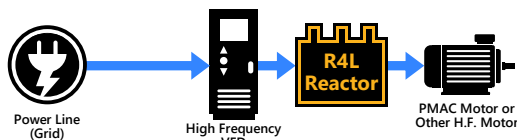
When combined with the RSL reactor product line (rated to 200 Hz), an extended range of impedance values are realized for high frequency applications.

Liquid Cooled vs. Air Cooled Cabinet Air Temperature Rise

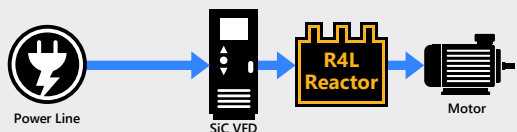


Due to superior heat removal technology, CTM Liquid Cooled products are thermally isolated from their surroundings. For further discussion, see [page 6](#).

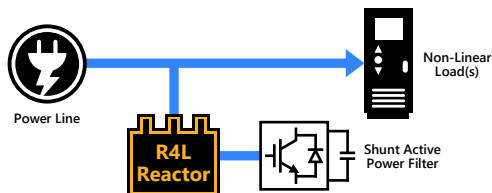
Reactor Applications



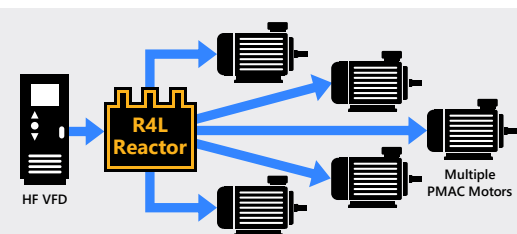
General Motor Protection, PMAC and Other H.F. Motors



High Switching Frequency Drive with SiC Components



Reactor for Active Power Filter (Harmonic Compensation)



Multiple Motors

LIQUID COOLED ADVANTAGES

Highest Power Density

Superior heat removal technology enables smaller magnetics, yielding the highest power density reactors available. Low surface temperatures eliminate clearance requirements, further increasing "effective" power density.

Thermal Isolation

With up to 97% of heat removed through the coolant, liquid cooled reactors have negligible effects on cabinet air temperature. No climate control required.


Sealed Design for Harsh Environments

CTM inductors are environmentally sealed in potting, creating an extremely rugged and reliable design ideal for use in the harshest environments.

Extremely Low Audible Noise

Due to superior materials and geometric shapes, magnetostriction-induced noise is significantly lower in CTM filters. When combined with a sealed package, the result is a nearly silent solution.

PERFORMANCE SPECIFICATIONS

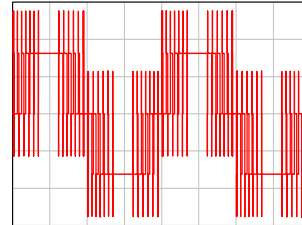
Impedance Levels *	1.5%, 3%, 5% and 7% (@ 200 Hz)
Typical Applications	High Frequency Load Reactors PM Motor Applications Shunt Active Filter Reactor SiC Switching Frequencies
Voltage Range *	Up to 690 V
Fundamental Frequency	Up to 400 HZ (higher with de-rating)
Maximum Switching Frequency	Up to 50 kHz
Current Range	130 - 1,200 A
Overload Capability	150% rated current for 1 minute
Maximum Coolant Temperature	50 °C (122 °F) (higher with de-rating)
Approved Coolants	Drinking water Water-glycol mixture For R134A, contact CTM
Plumbing Material Options	Aluminum (standard) Copper
Heat Removal	97% to Liquid Coolant 3% to Ambient Air
Maximum Ambient Temperature	65 °C (149 °F)
Maximum Altitude	No Limit
Inductance Curve	95% at 150% load 90% at 200% load 65% at 500% load
Agency Recognitions	 US LISTED

* Impedance calculations assume 480 V and 200 Hz. Use formula below to calculate impedance at other conditions.

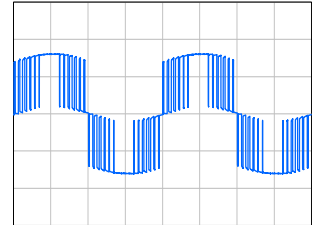
$$\% Z_{imp} = 2\pi\sqrt{3} \frac{I_{RMS} \cdot f_{Hz} \cdot L_{ind}}{V_{L-L}}$$

Inverter Output Voltage Waveform

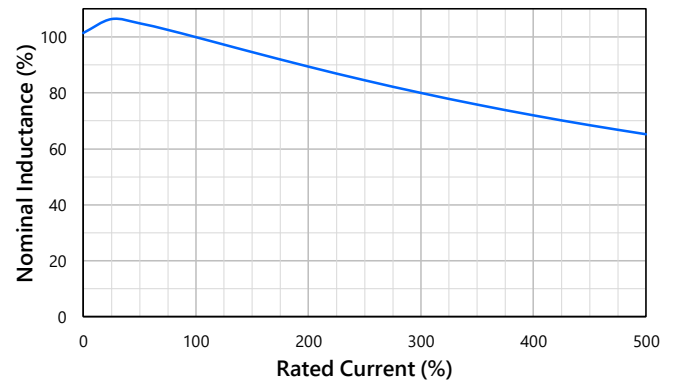
Without Reactor



With 5% Reactor



Loaded Inductance Curve



Note: Information is for reference only. Data subject to change without notice.

ELECTRICAL SPECIFICATIONS:

Size reactors based on the Full Load Amps (FLA) of the drive. The reactor current rating must be greater than or equal to the FLA. Order reactors by CTM Part Number online at ctmmagnetics.com/contact-us, or call us directly at 480.967.9447.



Rated Current (A _{RMS})	Inductance (µH)	Part Number ¹	Power Loss ² (Watts)		Rated Current (A _{RMS})	Inductance (µH)	Part Number ¹	Power Loss ² (Watts)		Rated Current (A _{RMS})	Inductance (µH)	Part Number ¹	Power Loss ² (Watts)	
			Liq.	Air				Liq.	Air				Liq.	Air
65	51	R4L0065HA00	111	3	240	13.6	R4L0240HA00	303	9	600	5.6	R4L0600HA00	646	20
	103	R4L0065HB00	169	5		29	R4L0240HB00	495	15		11.4	R4L0600HB00	931	29
	170	R4L0065HC00	242	7		45	R4L0240HC00	693	21		19.1	R4L0600HC00	1315	41
	240	R4L0065HD00	311	10		65	R4L0240HD00	794	25		27	R4L0600HD00	1647	51
80	43	R4L0080HA00	131	4	300	10.6	R4L0300HA00	370	11	720	4.6	R4L0720HA00	716	22
	83	R4L0080HB00	210	6		22	R4L0300HB00	594	18		9.6	R4L0720HB00	1132	35
	140	R4L0080HC00	303	9		39	R4L0300HC00	873	27		16.6	R4L0720HC00	1371	42
	194	R4L0080HD00	375	12		53	R4L0300HD00	1053	33		20	R4L0720HD00	1644	51
100	35	R4L0100HA00	169	5	360	9.2	R4L0360HA00	390	12	840	3.7	R4L0840HA00	809	25
	68	R4L0100HB00	265	8		18.0	R4L0360HB00	617	19		9.0	R4L0840HB00	1237	38
	111	R4L0100HC00	378	12		30	R4L0360HC00	838	26		13.6	R4L0840HC00	1737	54
	153	R4L0100HD00	471	15		44	R4L0360HD00	1138	35		17.1	R4L0840HD00	2057	64
130	26	R4L0130HA00	180	6	420	7.9	R4L0420HA00	454	14	960	3.7	R4L0960HA00	960	30
	51	R4L0130HB00	285	9		16.1	R4L0420HB00	742	23		6.4	R4L0960HB00	1254	39
	85	R4L0130HC00	399	12		26	R4L0420HC00	1010	31		12.0	R4L0960HC00	1679	52
	121	R4L0130HD00	518	16		36	R4L0420HD00	1257	39		16.1	R4L0960HD00	2005	62
160	22	R4L0160HA00	212	7	480	6.7	R4L0480HA00	509	16	1080	3.1	R4L1080HA00	1010	31
	42	R4L0160HB00	346	11		14.2	R4L0480HB00	861	27		6.3	R4L1080HB00	1435	44
	69	R4L0160HC00	489	15		23	R4L0480HC00	1176	36		9.7	R4L1080HC00	2095	65
	98	R4L0160HD00	634	20		31	R4L0480HD00	1365	42		14.3	R4L1080HD00	2363	73
200	16.4	R4L0200HA00	236	7	540	6.6	R4L0540HA00	611	19	1200	2.5	R4L1200HA00	1109	34
	31	R4L0200HB00	378	12		11.5	R4L0540HB00	972	30		4.9	R4L1200HB00	1464	45
	55	R4L0200HC00	565	17		20	R4L0540HC00	1213	38		9.3	R4L1200HC00	2121	66
	78	R4L0200HD00	733	23		31	R4L0540HD00	1283	40		11.6	R4L1200HD00	2447	76

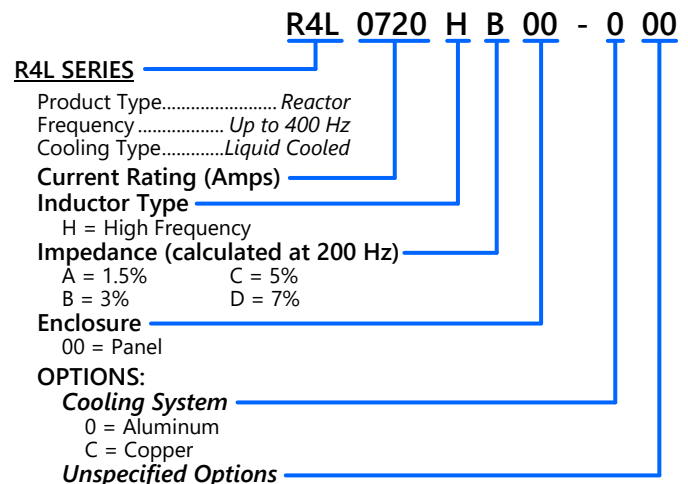
¹ Use part number table (bottom right) to select options. Unspecified options will be assumed to carry the default "-000" option number.

² Loss calculations performed at rated current, 200 Hz fundamental frequency with 5 kHz switching frequency, and 20 °C coolant. THID is 18.4%.

With extremely compact designs and superior thermal management, CTM liquid cooled products offer advanced cooling in a reliable and economical package.

- **Highest Power Density** available, especially when considering total design envelope and clearances
- **Extremely Low Audible Noise**
- **Minimal Heat Rejection to Ambient Air** with up to 97% of heat removed directly by coolant
- **No Clearance Requirements** between components due to heat isolation
- **Reliable and Efficient Solution** enabled through advanced heat removal system
- **Compact Form Factor** fits easily into existing cabinets

Part Number System



Note: Information is for reference only. Data subject to change without notice.

MECHANICAL SPECIFICATIONS:

Size reactors based on the Full Load Amps (FLA) of the drive. The reactor current rating must be greater than or equal to the FLA. Order reactors by CTM Part Number online at ctmmagnetics.com/contact-us, or call us directly at 480.967.9447.

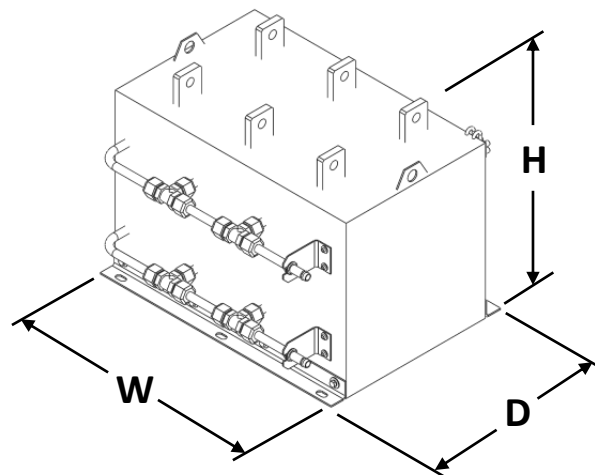
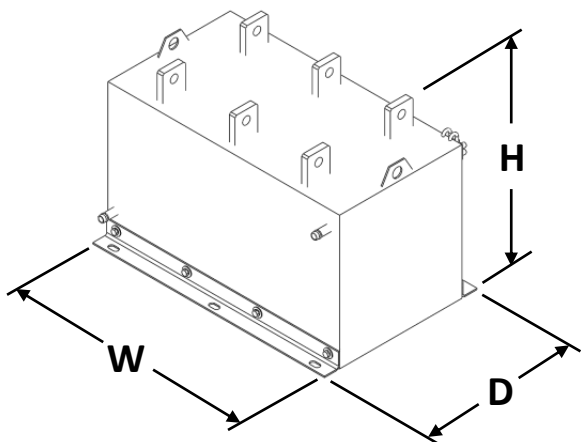


Part Number	Size (in) (W x D x H)	Weight (lb)	Flow Rate ¹ (GPM)	Part Number	Size (in) (W x D x H)	Weight (lb)	Flow Rate ¹ (GPM)	Part Number	Size (in) (W x D x H)	Weight (lb)	Flow Rate ¹ (GPM)
R4L0065HA00	7.0 x 7.7 x 8.0	27	0.1	R4L0240HA00	9.7 x 9.3 x 9.6	57	0.3	R4L0600HA00	9.7 x 9.3 x 9.6	60	0.7
R4L0065HB00	7.0 x 7.7 x 8.0	27	0.2	R4L0240HB00	9.7 x 9.3 x 9.6	58	0.5	R4L0600HB00	12.0 x 9.3 x 9.6	77	1.1
R4L0065HC00	7.0 x 7.7 x 8.0	28	0.3	R4L0240HC00	9.7 x 9.3 x 9.6	59	0.8	R4L0600HC00	15.3 x 10.1 x 10.3	118	1.6
R4L0065HD00	9.7 x 9.3 x 9.6	56	0.3	R4L0240HD00	12.0 x 9.3 x 9.6	75	0.9	R4L0600HD00	17.0 x 11.3 x 11.7	173	2.0
R4L0080HA00	7.0 x 7.7 x 8.0	27	0.1	R4L0300HA00	9.7 x 9.3 x 9.6	57	0.4	R4L0720HA00	9.7 x 9.3 x 9.6	61	0.8
R4L0080HB00	7.0 x 7.7 x 8.0	27	0.2	R4L0300HB00	9.7 x 9.3 x 9.6	58	0.6	R4L0720HB00	12.6 x 10.1 x 10.3	96	1.3
R4L0080HC00	9.7 x 9.3 x 9.6	56	0.3	R4L0300HC00	12.0 x 9.3 x 9.6	74	1.0	R4L0720HC00	17.0 x 11.3 x 11.7	172	1.7
R4L0080HD00	9.7 x 9.3 x 9.6	56	0.4	R4L0300HD00	12.6 x 10.1 x 10.3	93	1.2	R4L0720HD00	17.0 x 11.3 x 11.7	177	2.1
R4L0100HA00	7.0 x 7.7 x 8.0	27	0.2	R4L0360HA00	9.7 x 9.3 x 9.6	58	0.4	R4L0840HA00	10.4 x 10.1 x 10.3	78	0.9
R4L0100HB00	7.0 x 7.7 x 8.0	28	0.3	R4L0360HB00	9.7 x 9.3 x 9.6	59	0.7	R4L0840HB00	15.3 x 10.1 x 10.3	119	1.5
R4L0100HC00	9.7 x 9.3 x 9.6	56	0.4	R4L0360HC00	12.0 x 9.3 x 9.6	75	1.0	R4L0840HC00	17.0 x 11.3 x 11.7	175	2.1
R4L0100HD00	9.7 x 9.3 x 9.6	57	0.5	R4L0360HD00	15.3 x 10.1 x 10.3	115	1.4	R4L0840HD00	20.9 x 12.5 x 11.9	200	2.7
R4L0130HA00	7.0 x 7.7 x 8.0	28	0.2	R4L0420HA00	9.7 x 9.3 x 9.6	58	0.5	R4L0960HA00	10.4 x 10.1 x 10.3	80	1.1
R4L0130HB00	9.7 x 9.3 x 9.6	56	0.3	R4L0420HB00	10.4 x 10.1 x 10.3	75	0.8	R4L0960HB00	15.3 x 10.1 x 10.3	119	1.5
R4L0130HC00	9.7 x 9.3 x 9.6	57	0.4	R4L0420HC00	12.6 x 10.1 x 10.3	93	1.2	R4L0960HC00	20.9 x 12.5 x 11.9	200	2.1
R4L0130HD00	9.7 x 9.3 x 9.6	58	0.6	R4L0420HD00	15.3 x 10.1 x 10.3	116	1.5	R4L0960HD00	22.0 x 14.0 x 13.3	269	2.7
R4L0160HA00	7.0 x 7.7 x 8.0	28	0.2	R4L0480HA00	9.7 x 9.3 x 9.6	59	0.5	R4L1080HA00	12.0 x 9.3 x 9.6	79	1.1
R4L0160HB00	9.7 x 9.3 x 9.6	56	0.4	R4L0480HB00	10.4 x 10.1 x 10.3	76	1.0	R4L1080HB00	15.3 x 10.1 x 10.3	123	1.7
R4L0160HC00	9.7 x 9.3 x 9.6	57	0.5	R4L0480HC00	12.6 x 10.1 x 10.3	95	1.4	R4L1080HC00	20.9 x 12.5 x 11.9	201	2.7
R4L0160HD00	9.7 x 9.3 x 9.6	58	0.7	R4L0480HD00	15.3 x 10.1 x 10.3	119	1.7	R4L1080HD00	22.0 x 14.0 x 13.3	278	3.0
R4L0200HA00	7.0 x 7.7 x 8.0	28	0.2	R4L0540HA00	9.7 x 9.3 x 9.6	59	0.7	R4L1200HA00	10.4 x 10.1 x 10.3	83	1.2
R4L0200HB00	9.7 x 9.3 x 9.6	57	0.4	R4L0540HB00	12.0 x 9.3 x 9.6	75	1.1	R4L1200HB00	15.3 x 10.1 x 10.3	123	1.8
R4L0200HC00	9.7 x 9.3 x 9.6	58	0.6	R4L0540HC00	15.3 x 10.1 x 10.3	116	1.4	R4L1200HC00	22.0 x 14.0 x 13.3	277	2.7
R4L0200HD00	12.0 x 9.3 x 9.6	73	0.9	R4L0540HD00	17.0 x 11.3 x 11.7	171	1.6	R4L1200HD00	22.0 x 14.0 x 13.3	279	3.3

¹ Recommended minimum flow rates. Customer must verify flow rate for each application. Contact CTM for operation at lower flow rates, pressure drop, or for use of R134A.

All models, excluding:
 R4L1080HD00
 R4L1200HD00

R4L1080HD00
 R4L1200HD00



Note: Information is for reference only. Data subject to change without notice.

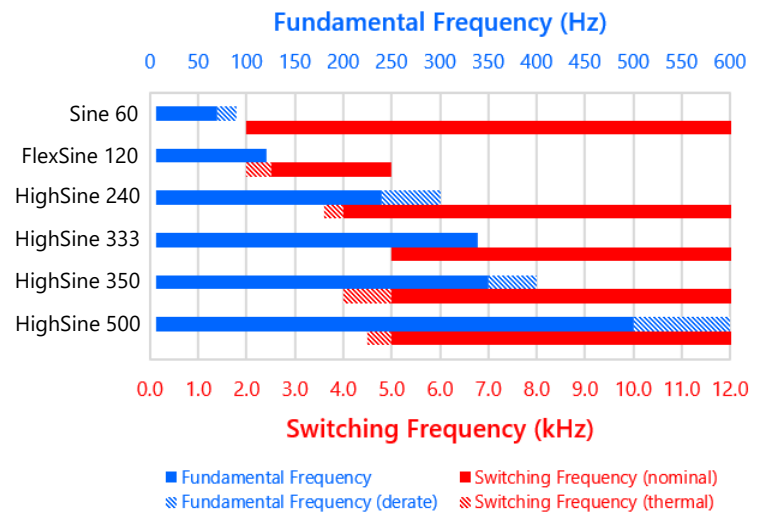
THE IDEAL FILTER FOR EVERY APPLICATION

SINE WAVE FILTERS

CTM Magnetics offers a broad portfolio of sine wave filters to meet all your motor filtering needs.

- **Sine 60** - The optimal choice for 60 Hz motor protection. Designed for up to 70 Hz fundamental and 2+ kHz switching frequency.
- **FlexSine 120** - For both induction and PM motor applications. Designed for up to 120 Hz fundamental and 2.5+ kHz switching frequency. Contact CTM for operating unit above 120 Hz.
- **HighSine 240** - Perfect for high-speed, PM motor applications (240 Hz). Designed for up to 240 Hz fundamental and 4+ kHz switching frequency.
- **HighSine 333** - Perfect for high-speed, PM motor applications (333 Hz). Designed for up to 333 Hz fundamental and 5+ kHz switching frequency.
- **HighSine 350** - Perfect for high-speed, PM motor applications (350 Hz). Designed for up to 350 Hz fundamental and 5+ kHz switching frequency.
- **HighSine 500** - Perfect for high-speed, PM motor applications (500 Hz). Designed for up to 500 Hz fundamental and 5+ kHz switching frequency.

Filter Operating Ranges



GRIDHAWK® FILTERS

CTM Magnetics offers cutting edge GridHawk Harmonic filters to meet all your front end needs. CTM also provides a 5 year capacitor warranty on all GridHawk products.

- **GridHawk** - The optimal choice for grid protection. Designed to handle input voltage distortion of $\leq 5\%$ THVD.
- **GridHawk HD** - For applications where the voltage distortion is $\leq 15\%$ THVD, GridHawk HD is your choice for grid protection. GridHawk HD beats any other passive harmonic filter, AFE (Active front end), or 18 pulse drive available on the market. Where everyone else fails, we succeed.
- **GridHawk XD** - For applications where the voltage distortion is $\leq 25\%$ THVD, contact CTM for XD solutions.

LIQUID COOLED REACTORS

CTM Magnetics offers unique liquid cooled reactors for both line and load side applications. CTM Liquid cooled reactors offer the highest power density, lowest audible noise, are environmentally sealed, and thermally isolated from ambient.

- **RLL** - The optimal choice for standard line side protection.
- **RPL** - For line and load side protection. Designed to handle higher drive produced harmonics.
- **RSL** - Specifically designed for silicon carbide switching applications.
- **R4L** - Designed for high frequency applications up to 400 Hz.

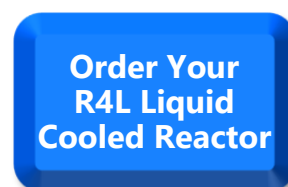


Additional information is available online:

ctmmagnetics.com

Contact us online at:

ctmmagnetics.com/contact-us



Scan for CTM
Contact Information:



Final product specifications subject to change