

RLL SERIES Liquid Cooled Line Reactors Cost-Optimized

Selection Brochure | RLL Line Reactors

Superior Cooling Technology Highest Power Density Lowest Cost Line Reactor



Line Reactor Applications

- Prevent Nuisance Tripping
- Protect Drive Electronics
- Reduce Harmonic Distortion

Liquid Cooled Advantages

- Highest Power Density
- Lowest Audible Noise
- Sealed Design for Harsh Conditions
- Thermal Isolation from Ambient

ctmmagnetics.com

Half the size. Half the weight. Stealth-level noise.

RLL Liquid Cooled Line Reactors are the ideal filtering solution for line side applications using bridge rectification. Install 3% impedance reactors for absorption of grid voltage spikes and to reduce 90% of nuisance tripping. Use a 5% reactor to protect against 99% of voltage spikes, and to protect the grid from drive induced harmonics. 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

Drive Protection

CTM line reactors absorb voltage spikes, voltage transients, and other power line disturbances, extending the life of motor drive electronics, bridge capacitors, and semiconductors.

Minimize Nuisance Tripping

AC voltage spikes lead to rapid rises in the DC Bus voltage, causing the inverter to shut-off due to over-voltage. Line reactors absorb voltage spikes, significantly reducing nuisance tripping.

Reduce Harmonic Distortion

6-pulse rectifiers are nonlinear loads that create significant harmonics; line reactors provide impedance to reduce harmonics, helping applications meet IEEE 519.

Protect Sensitive Equipment

Line reactors also provide protection for nearby equipment sensitive to harmonic distortion created by nonlinear loads.

Cost-Optimized Solution

RLL Line Reactors are optimized for line-side filtering applications with bridge rectifications.

Line Reactor Applications



Liquid Cooled vs. Air Cooled



Due to superior heat removal technology, CTM Liquid Cooled products are thermally isolated from their

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

RPL Reactors are environmentally sealed, creating an extremely rugged and reliable design ideal for use in the harsh environments.

Extremely Low Audible Noise

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

Performance Specifications

Impedance Levels *	3% and 5%				
Typical Applications	Line Reactors for Six-Pulse Bridge Rectifiers				
Voltage Range *	Up to 690 V				
Fundamental Frequency	50/60 Hz				
Current Range	3% Z: 360 - 1,440 A 5% Z: 240 - 1,440 A				
Overload Capability	150% rated current for 1 minut				
Maximum Coolant Temperature	50 °C (122 °F) (higher with de-rating)				
Approved Coolants	Drinking water Water-glycol mixture <i>For R134A, contact CTM</i>				
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	81% at 150% load 68% at 200% load 53% at 300% load				
Agency Recognitions					

* Impedance calculations assume 480 V and 60 Hz. Use formula below to calculate impedance at other conditions.

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

Loaded Inductance Curve



Current Waveform

Without Reactor

With 5% Reactor





Harmonic Reduction





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

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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 <u>ctmmagnetics.com/contact-us</u>, or call us directly at 480.967.9447.



Rated	Fst	3% Impedance				5% Impedance				
Current (A _{RMS})	Motor HP	Part Number ¹	Inductance	Power Loss ² (Watts)		Part Number ¹	Inductance	Power Loss ² (Watts)		
			(µн)	Liquid	Air		(µH)	Liquid	Air	
65	50	Use <u>RPL0065AB00</u>	355	320	10	Use <u>RPL0065AC00</u>	563	515	16	
80	60	Use <u>RPL0080AB00</u>	280	422	13	Use <u>RPL0080AC00</u>	266	547	17	
100	75	Use <u>RPL0100AB00</u>	223	477	15	Use <u>RPL0100AC00</u>	369	643	20	
130	100	Use <u>RPL0130AB00</u>	169	562	17	Use <u>RPL0130AC00</u>	285	824	25	
160	125	Use <u>RPL0160AB00</u>	139	629	19	Use <u>RPL0160AC00</u>	226	1059	33	
200	150	Use <u>RPL0200AB00</u>	111	754	23	Use <u>RPL0200AC00</u>	182	975	30	
240	200	Use <u>RPL0240AB00</u>	93	861	27	RLL0240AC00	154	1068	33	
300	250	Use <u>RPL0300AB00</u>	75	940	29	RLL0300AC00	121	1251	39	
360	300	RLL0360AB00	60	1094	34	RLL0360AC00	100	1211	37	
420	350	RLL0420AB00	52	1161	36	RLL0420AC00	88	1542	48	
480	400	RLL0480AB00	47	1310	41	RLL0480AC00	77	1630	50	
540	450	RLL0540AB00	41	1272	39	RLL0540AC00	68	1859	58	
600	500	RLL0600AB00	35	1254	39	RLL0600AC00	62	2142	66	
720	600	RLL0720AB00	29	1702	53	RLL0720AC00	49	2194	68	
840	700	RLL0840AB00	25	1886	58	RLL0840AC00	43	2575	80	
960	800	RLL0960AB00	22	2226	69	RLL0960AC00	38	2797	86	
1080	900	RLL1080AB00	21	2229	69	RLL1080AC00	32	3149	97	
1200	1000	RLL1200AB00	19	2622	81	RLL1200AC00	31	3178	98	
1320	1100	RLL1320AB00	16	2517	78	RLL1320AC00	28	3477	108	
1440	1200	RLL1440AB00	15	2849	88	RLL1440AC00	25	3736	116	

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, 60 Hz fundamental frequency with typical 6-pulse bridge rectifier harmonics, and 20 °C coolant.

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 Economical Solution enabled through efficient heat removal system
- Compact Form Factor fits easily into existing cabinets

Part Number System

RLL	. 07	20	<u>A</u> .	<u>B</u> 0	0 -	0	0	0
RLL SERIES								
Product Type <i>Line Reactor</i> Frequency <i>Line (50/60 Hz</i> Cooling Type <i>Liquid Coole</i>	or z) d							
Current Rating (Amps) ——		J						
Line Voltage								
A = 480 VAC (for impedance call	culatio	ns)						
Impedance								
B = 3%								
C = 5%								
Enclosure					1			
00 = Panel								
OPTIONS:								
Coolina System								
0 = Aluminum								
C = Copper								
Unspecified Options ——								

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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 <u>ctmmagnetics.com/contact-us</u>, or call us directly at 480.967.9447.



3% Impedance				5% Impedance					
Part Number	Size (in) (W x D x H)	Weight (lb)	Coolant Flow Rate ¹ (GPM)	Part Number Size (in) (W x D x H)		Weight (lb)	Coolant Flow Rate ¹ (GPM)		
Use <u>RPL0240AB00</u>	12.0 x 9.3 x 9.6	77	0.7	RLL0240AC00	12.0 x 9.3 x 9.6	77	0.9		
Use <u>RPL0300AB00</u>	12.0 x 9.3 x 9.6	78	0.8	RLL0300AC00	12.6 x 10.1 x 10.3	97	1.1		
RLL0360AB00	12.0 x 9.3 x 9.6	77	0.9	RLL0360AC00	12.6 x 10.1 x 10.3	101	1.0		
RLL0420AB00	12.0 x 9.3 x 9.6	79	1.0	RLL0420AC00	15.3 x 10.1 x 10.3	123	1.3		
RLL0480AB00	12.6 x 10.1 x 10.4	98	1.1	RLL0480AC00	15.3 x 10.1 x 10.3	125	1.4		
RLL0540AB00	12.6 x 10.1 x 10.3	101	1.1	RLL0540AC00	15.4 x 12.5 x 11.9	145	1.6		
RLL0600AB00	12.6 x 10.1 x 10.3	103	1.1	RLL0600AC00	17.0 x 11.3 x 11.7	175	1.8		
RLL0720AB00	15.3 x 10.1 x 10.3	125	1.5	RLL0720AC00	17.0 x 11.3 x 11.7	186	1.9		
RLL0840AB00	15.4 x 12.5 x 11.9	147	1.6	RLL0840AC00	16.4 x 14.0 x 13.3	205	2.2		
RLL0960AB00	17.0 x 11.3 x 11.7	186	1.8	RLL0960AC00	20.9 x 12.5 x 11.9	228	2.4		
RLL1080AB00	17.0 x 11.3 x 11.7	190	1.9	RLL1080AC00	17.6 x 15.5 x 15.1	281	2.7		
RLL1200AB00	16.4 x 14.0 x 13.3	208	2.2	RLL1200AC00	22.0 x 14.0 x 13.3	292	2.7		
RLL1320AB00	16.4 x 14.0 x 13.3	210	2.1	RLL1320AC00	22.0 x 14.0 x 13.3	301	3.0		
RLL1440AB00	17.6 x 15.5 x 15.1	283	2.4	RLL1440AC00	23.1 x 15.5 x 15.1	397	3.2		

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.

3%: 360-720, 960-1080A 3%: 840, 1200-1440 A 5%: 240-480, 600-720 A 5%: 540, 840-1440 A W D D

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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.

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 ≤5% THVD.
- **GridHawk HD** For applications where the voltage distortion is ≤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 ≤25% THVD, contact CTM for XD solutions.



Additional information is available online: ctmmagnetics.com

Contact us online at: ctmmagnetics.com/contact-us

Filter Operating Ranges



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.





Scan for CTM

Final product specifications subject to change

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