CTM magnetics
Small. Quiet. Efficient. Reliable.

RPL Series
Liquid Cooled Reactors
Heavy-Duty

Selection Brochure | RPL Reactors

Superior Cooling Technology
Highest Power Density
Robust Load Side Solution

Reactor Applications

- Protect Drive Electronics (line)
- Reduce Harmonic Distortion (line)
- Protect Motor Insulation (load)
- Protect Long Motor Cables (load)

Liquid Cooled Advantages

- Highest Power Density
- Lowest Audible Noise
- Sealed Design for Harsh Conditions
- Thermally Isolated from Ambient

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

RPL Liquid Cooled Reactors are robust, heavy duty filtering solutions for demanding installations. Whether it be the line side of an active front end rectifier, the load side of a drive inverter, or anywhere in between, these heavy duty reactors will stand up in some of the most demanding applications. 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 (Line Side)
RPL Reactors absorb voltage spikes, voltage transients, and other power line disturbances, minimizing nuisance drive trips and reducing harmonic distortion. Perfect for 6-pulse bridge rectifiers, or as the grid or drive side inductor in an LCL filter for active front end rectification.

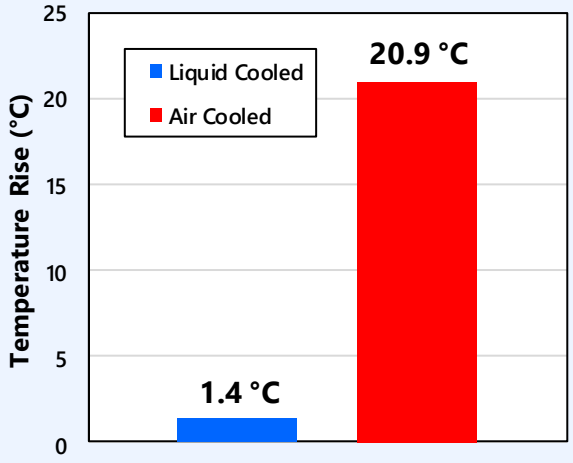
Reduce Harmonic Distortion (Line Side)
Rectifiers can create nonlinear loads and impose harmonic distortion on the grid; RPL Reactors provide impedance and filtering to reduce harmonics, helping applications meet IEEE 519.

Motor Protection (Load Side)
When installed at the output of a VFD or inverter, load reactors limit voltage spikes that can break down motor insulation.

Long Motor Lead Protection (Load Side)
When used as a load reactor, RPL Reactors allow worry free operation with motor lead lengths up to 300 feet.

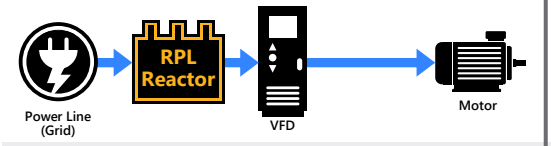
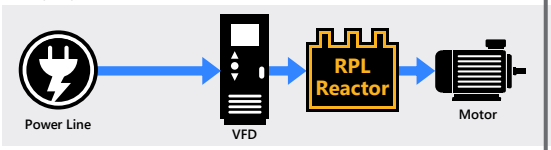
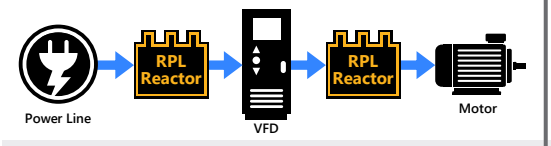
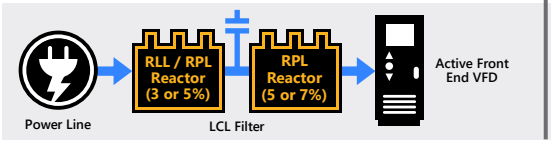
Heavy-Duty Solution
Compared to the RLL Line Reactors, RPL Reactors are intended for both line and load side reactor applications. They also perform well with active front end drives and operate at higher efficiencies.

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 Drive Protection from Voltage Spikes and Transients
	Plant / Grid Protection from Harmonic Distortion
	General Motor Protection as Load (Output) Reactor
	Combined Protection for Motor, Drive, and Grid
	Superior Line-Side Filtering provided by LCL Filter

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.

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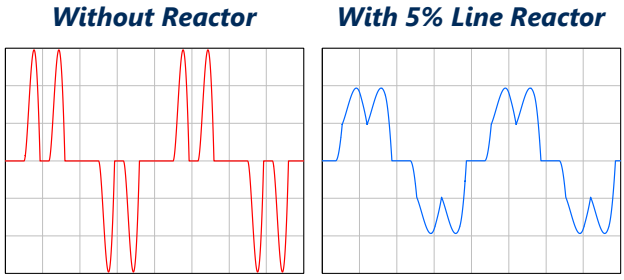
Performance Specifications

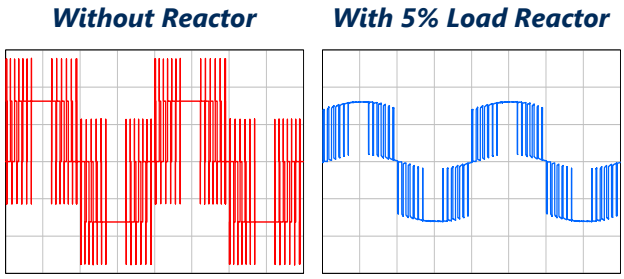
Impedance Levels *	3%, 5%, and 7%
Typical Applications	Line Reactors (bridge rectifiers) Line Reactors (active front ends) Load Reactors Other Heavy Duty Applications
Voltage Range *	Up to 690 V
Fundamental Frequency	6 - 70 Hz
Maximum Switching Frequency	Up to 20 kHz *Above 8 kHz, contact CTM for application verification*
Current Range	65 - 1,440 A
Overload Capability	200% 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	65 °C (149 °F)
Maximum Altitude	No Limit
Inductance Curve	85% at 150% load 74% at 200% load 60% at 300% load
Agency Recognitions	c UL us LISTED

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

Bridge Rectifier Input Current Waveform

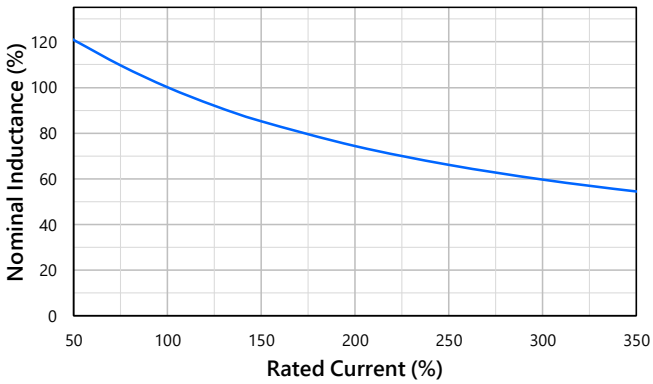


Inverter Output Voltage Waveform



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

Loaded Inductance Curve



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

Rated Current (A_{RMS})	Est. Motor HP	3% Impedance				5% Impedance				7% Impedance			
		Part Number [1]	Inductance (µH)	Power Loss [2] (Watts)		Part Number [1]	Inductance (µH)	Power Loss [2] (Watts)		Part Number [1]	Inductance (µH)	Power Loss [2] (Watts)	
				Liq.	*Air*			*Liq.*	*Air*			*Liq.*	*Air*
65	50	RPL0065AB00	355	320	10	RPL0065AC00	563	515	16	RPL0065AD00	798	626	19
80	60	RPL0080AB00	280	422	13	RPL0080AC00	466	547	17	RPL0080AD00	635	690	21
100	75	RPL0100AB00	223	477	15	RPL0100AC00	369	643	20	RPL0100AD00	515	885	27
130	100	RPL0130AB00	169	562	17	RPL0130AC00	285	824	25	RPL0130AD00	392	1051	32
160	125	RPL0160AB00	139	629	19	RPL0160AC00	226	1059	33	RPL0160AD00	317	1173	36
200	150	RPL0200AB00	111	754	23	RPL0200AC00	182	975	30	RPL0200AD00	259	1446	45
240	200	RPL0240AB00	93	861	27	RPL0240AC00	156	1179	36	RPL0240AD00	219	1470	45
300	250	RPL0300AB00	75	940	29	RPL0300AC00	126	1507	47	RPL0300AD00	171	1827	57
360	300	RPL0360AB00	63	1196	37	RPL0360AC00	103	1720	53	RPL0360AD00	141	1956	60
420	350	RPL0420AB00	50	1243	38	RPL0420AC00	84	1816	56	RPL0420AD00	125	2348	73
480	400	RPL0480AB00	44	1464	45	RPL0480AC00	78	1988	61	RPL0480AD00	104	2572	80
540	450	RPL0540AB00	40	1586	49	RPL0540AC00	67	2276	70	RPL0540AD00	93	2587	80
600	500	RPL0600AB00	38	1784	55	RPL0600AC00	60	2398	74	RPL0600AD00	84	2584	80
720	600	RPL0720AB00	33	2133	66	RPL0720AC00	54	2933	91	RPL0720AD00	68	2730	84
840	700	RPL0840AB00	28	2252	70	RPL0840AC00	45	3224	100	RPL0840AD00	61	3003	93
960	800	RPL0960AB00	23	2389	74	RPL0960AC00	38	3632	112	RPL0960AD00	53	3250	101
1080	900	RPL1080AB00	20	2732	85	RPL1080AC00	32	3815	118	RPL1080AD00	46	3521	109
1200	1000	RPL1200AB00	17.4	2855	88	RPL1200AC00	30	3000	93	RPL1200AD00	41	4106	127
1320	1100	RPL1320AB00	17.9	2724	84	RPL1320AC00	27	3291	102	RPL1320AD00	36	4094	127
1440	1200	RPL1440AB00	15.1	2718	84	RPL1440AC00	24	3530	109	RPL1440AD00	32	3902	121

[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 2 kHz switching frequency, and 20 °C coolant. THID is 14.7%.

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

RPL 0720 A B 00 - 0 00

RPL SERIES
Product Type..... *Reactor*
Frequency ..... *Line (50/60 Hz)*
Cooling Type..... *Liquid Cooled*

Current Rating (Amps)

Line Voltage
A = 480 VAC *(for impedance calculations)*

Impedance
B = 3%
C = 5%
D = 7%

Enclosure
00 = Panel

OPTIONS:

Cooling System
0 = Aluminum
C = Copper

Unspecified Options

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Mechanical Specifications:

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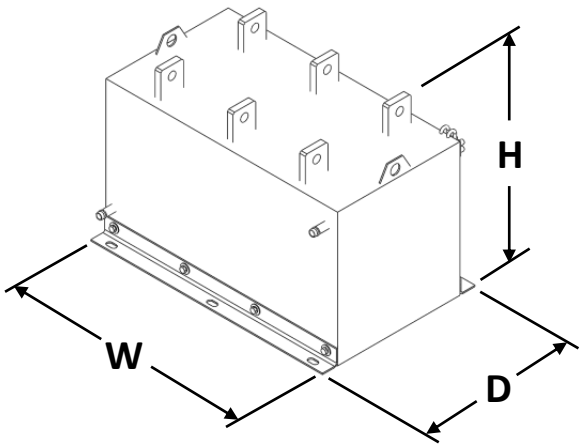
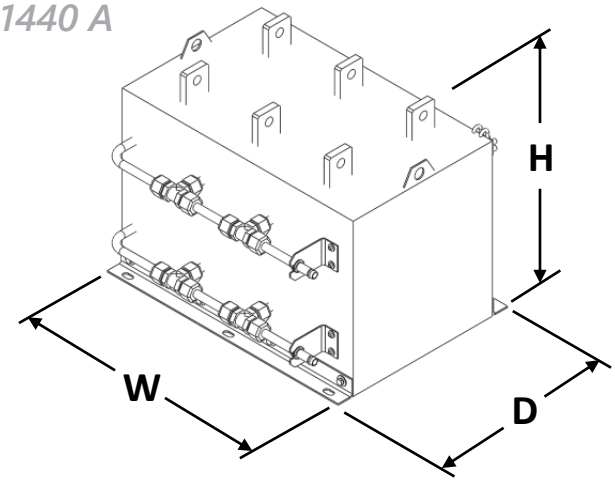
3% Impedance				5% Impedance				7% Impedance			
Part Number	Size (in) (W x D x H)	Weight (lb)	Coolant Flow Rate[1] (GPM)	Part Number	Size (in) (W x D x H)	Weight (lb)	Coolant Flow Rate[1] (GPM)	Part Number	Size (in) (W x D x H)	Weight (lb)	Coolant Flow Rate[1] (GPM)
RPL0065AB00	7.0 x 7.7 x 8.0	29	0.3	RPL0065AC00	7.0 x 7.7 x 8.0	29	0.4	RPL0065AD00	9.7 x 9.3 x 9.6	59	0.5
RPL0080AB00	7.0 x 7.7 x 8.0	29	0.4	RPL0080AC00	9.7 x 9.3 x 9.6	59	0.5	RPL0080AD00	9.7 x 9.3 x 9.6	60	0.6
RPL0100AB00	7.0 x 7.7 x 8.0	29	0.4	RPL0100AC00	9.7 x 9.3 x 9.6	60	0.5	RPL0100AD00	12.0 x 9.3 x 9.6	76	0.7
RPL0130AB00	9.7 x 9.3 x 9.6	59	0.5	RPL0130AC00	12.0 x 9.3 x 9.6	75	0.7	RPL0130AD00	12.0 x 9.3 x 9.6	77	0.9
RPL0160AB00	9.7 x 9.3 x 9.6	60	0.5	RPL0160AC00	12.0 x 9.3 x 9.6	77	0.8	RPL0160AD00	12.6 x 10.1 x 10.3	97	1.0
RPL0200AB00	9.7 x 9.3 x 9.6	61	0.6	RPL0200AC00	12.0 x 9.3 x 9.6	79	0.8	RPL0200AD00	15.3 x 10.1 x 10.3	121	1.2
RPL0240AB00	12.0 x 9.3 x 9.6	77	0.7	RPL0240AC00	12.6 x 10.1 x 10.3	99	1.0	RPL0240AD00	15.3 x 10.1 x 10.3	123	1.2
RPL0300AB00	12.0 x 9.3 x 9.6	78	0.8	RPL0300AC00	15.3 x 10.1 x 10.3	123	1.3	RPL0300AD00	17.0 x 11.3 x 11.7	171	1.5
RPL0360AB00	12.6 x 10.1 x 10.3	98	1.0	RPL0360AC00	17.0 x 11.3 x 11.7	170	1.5	RPL0360AD00	17.0 x 11.3 x 11.7	183	1.6
RPL0420AB00	12.6 x 10.1 x 10.3	99	1.0	RPL0420AC00	17.0 x 11.3 x 11.7	172	1.5	RPL0420AD00	20.9 x 12.5 x 11.9	207	2.0
RPL0480AB00	15.3 x 10.1 x 10.3	123	1.2	RPL0480AC00	17.0 x 11.3 x 11.7	182	1.7	RPL0480AD00	20.9 x 12.5 x 11.9	207	2.2
RPL0540AB00	15.3 x 10.1 x 10.3	121	1.3	RPL0540AC00	16.4 x 14.0 x 13.3	199	1.9	RPL0540AD00	20.9 x 12.5 x 11.9	206	2.2
RPL0600AB00	17.0 x 11.3 x 11.7	172	1.5	RPL0600AC00	20.9 x 12.5 x 11.9	207	2.0	RPL0600AD00	20.9 x 12.5 x 11.9	206	2.3
RPL0720AB00	17.0 x 11.3 x 11.7	181	1.8	RPL0720AC00	22.0 x 14.0 x 13.3	279	2.5	RPL0720AD00	22.0 x 14.0 x 13.3	276	2.4
RPL0840AB00	16.4 x 14.0 x 13.3	202	1.9	RPL0840AC00	22.0 x 14.0 x 13.3	290	2.7	RPL0840AD00	22.0 x 14.0 x 13.3	282	2.6
RPL0960AB00	20.9 x 12.5 x 11.9	210	2.0	RPL0960AC00	23.1 x 15.5 x 15.1	388	3.0	RPL0960AD00	22.0 x 14.0 x 13.3	293	2.8
RPL1080AB00	17.6 x 15.5 x 15.1	277	2.3	RPL1080AC00	23.1 x 15.5 x 15.1	389	3.2	RPL1080AD00	23.1 x 15.5 x 15.1	379	3.1
RPL1200AB00	17.6 x 15.5 x 15.1	279	2.4	RPL1200AC00	22.0 x 14.0 x 13.3	292	2.6	RPL1200AD00	23.1 x 15.5 x 15.1	393	3.3
RPL1320AB00	20.9 x 12.5 x 11.9	212	2.4	RPL1320AC00	23.1 x 15.5 x 15.1	379	2.9	RPL1320AD00	23.1 x 15.5 x 15.1	400	3.2
RPL1440AB00	20.9 x 12.5 x 11.9	219	2.4	RPL1440AC00	23.1 x 15.5 x 15.1	395	3.1	RPL1440AD00	23.1 x 15.5 x 15.1	404	3.4

[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.*

3%: 65-720 A
5%: 65-480 A



3%: 840-1440 A
5%: 540-1440 A
7%: 420-1440 A



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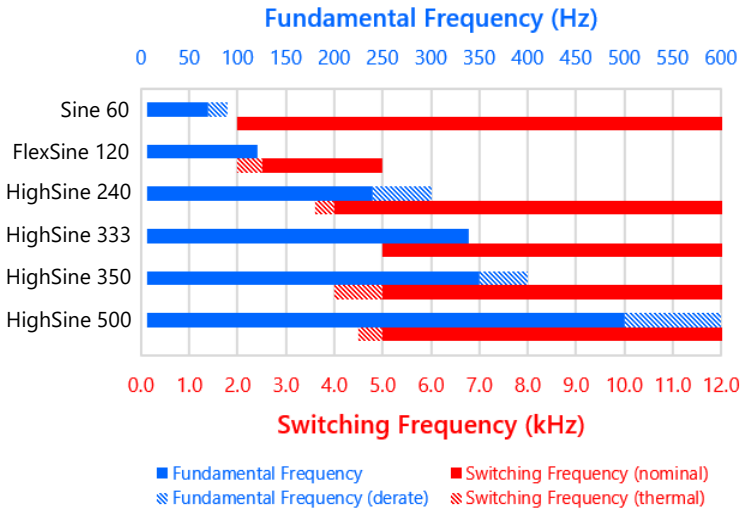
The Ideal Filter for Every Application

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.

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 ≤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.

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.

CTM magnetics
Small. Quiet. Efficient. Reliable.

Additional information is available online:
ctmmagnetics.com

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

Order Your RPL Liquid Cooled Reactor

Scan for CTM Contact Information:

Final product specifications subject to change

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