CTM magnetics®
the future of power quality
ISO 9001 CERTIFIED

S2F Series
Air Cooled Sine Wave Filters
High Frequency

Selection Brochure | S2F Sine Wave Filters

The World's First **High Power Sine Wave Filter** designed specifically for **High-Speed Motor Drives**

CTM Sine Wave Filters
The Future Starts Here

The emergence of permanent magnet (PM) motors has led to increased installation efficiencies across the board. However, PM motors typically require a high frequency, variable speed drive (VSD). With an-always on rotor magnetic field, PM motors are more susceptible to wear and damage caused by harmonic distortion. Traditional silicon-steel laminated inductors exhibit high losses at high frequencies, and, quite literally, cannot handle the heat. Compared to conventional technology, S2F High Frequency Sine Wave Filters offer…

- **INCREASED EFFICIENCY** with high frequency VSD systems
- Perfect for use with **PERMANENT MAGNET MOTORS**
- **BETTER MOTOR PROTECTION** for motor windings and bearings
- **EXTENDED MOTOR LIFE**
- **HALF THE SIZE & WEIGHT** for a smaller footprint and easier integration and installation
- **HIGH RELIABILITY** due to cooler, more efficient filter operation

Half the size. Half the weight. PM motor optimized.

Developed specifically for high frequency PMAC applications, CTM High Frequency Sine Wave Filters transform the output of high frequency Variable Speed Drives (VFDs or VSDs) from a Pulse-Width Modulated (PWM) square wave with voltage spikes and high frequency harmonics to a near perfect sinusoidal waveform. CTM's patented liquid cooled technology traps and removes 97% of the filter's heat in the highest power density solution available to the market. 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.

HIGH FREQUENCY ADVANTAGES

PMAC Motor Optimized

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

For example, H.F. inverters often output higher harmonics than at line frequency. To address this issue, these filters are attenuated to remove a larger percentage of drive harmonics.

High Frequency

Thermally designed to withstand frequencies that would burn other inductors, CTM H.F. filters utilize advanced, proprietary materials to minimize heating and high current saturation.

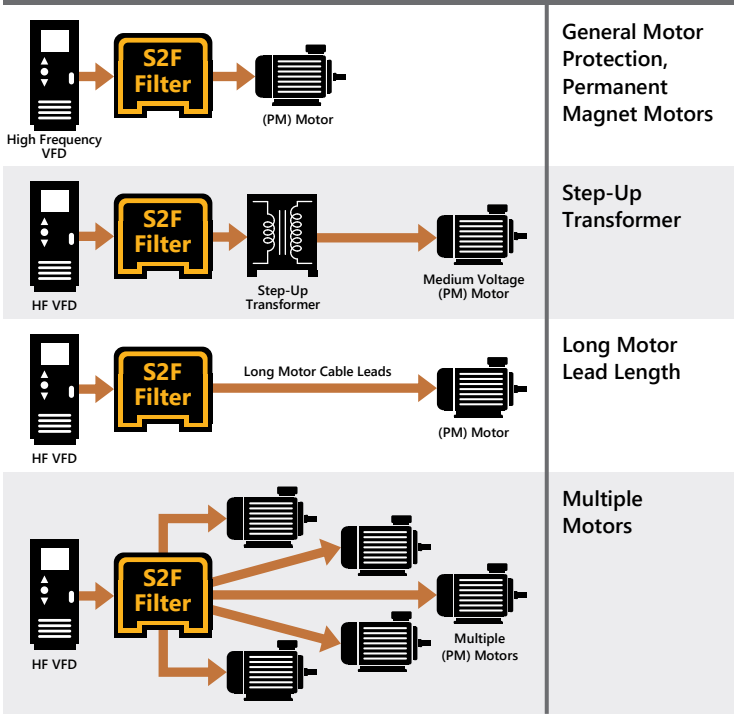
SiC Ready

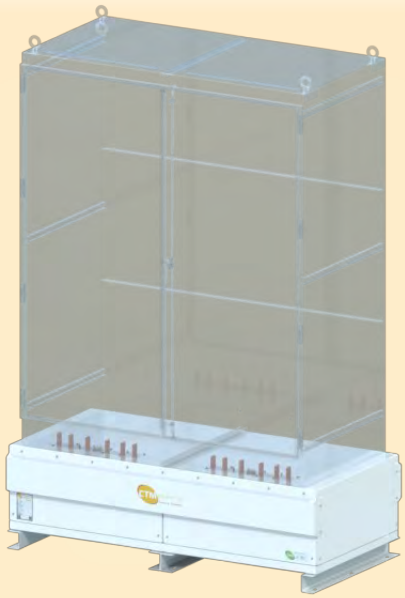
In addition to high fundamental frequencies, CTM H.F. filters are capable of handling the high harmonic frequencies enabled by silicon-carbide technology.

Power Loss

Due to its unique patented design and proprietary materials, CTM filters operate at higher efficiencies than conventional filters, decreasing power loss and minimizing dissipated heat.

Filter Applications





Pedestal Cabinet *option displayed above.*

*The **NEMA 3R Pedestal Cabinet** integrates directly below your existing drive cabinet, maximizing power density and reducing system complexity. Contact CTM for additional pedestal cabinet information.*

SINE WAVE FILTER HIGHLIGHTS

Motor Protection

Harmful square waves, voltage spikes, and harmonic distortion are all filtered from the inverter output, reducing motor heating, wear, and winding stress, providing critical motor protection.

Maximum Motor Lead Length

By filtering the PWM waveform to a near perfect sinusoidal waveform, CTM sine wave filters minimize dV/dt, allowing for longer motor lead lengths (up to 15,000 feet in certain applications).

Motor Longevity

By reducing motor ripple current, CTM sine wave filters reduce motor heat, noise and vibration, thereby extending motor life. Additionally ripple current reduction eliminates torque ripple.

Filter Reliability

CTM Filters maintain lower temperatures, increasing life and reliability.

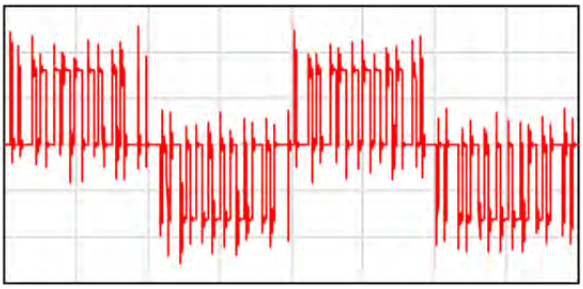
info@ctmmagnetics.com
480.967.9447

Performance Specifications

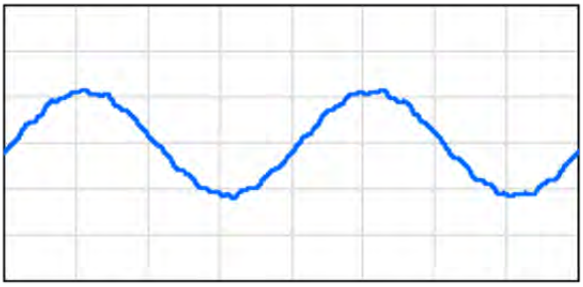
Harmonic Voltage Distortion	<5% @ 5 kHz
Voltage Range	Up to 500 V
Fundamental Frequency	Up to 200 Hz (higher with de-rating) - *For line freq. applications, see SWF Series Sine Wave Filters*
Switching Frequency	5 - 20 kHz *Above 20 kHz, contact CTM for application verification*
Current Range	130 - 1,200 A
Overload Capability	150% rated current for 1 minute
Maximum Ambient Temperature	50 °C (122 °F) (higher with de-rating)
Motor Cable Length	Up to 15,000 feet
Enclosure Options	• **Open Panel** • **Stand-Alone Cabinet** (NEMA 3R) • **Pedestal Cabinet** (NEMA 3R) - *Contact CTM directly for pedestal inquiries*
Agency Recognitions	c UL us 1446

Motor Voltage Waveform

Without Filter

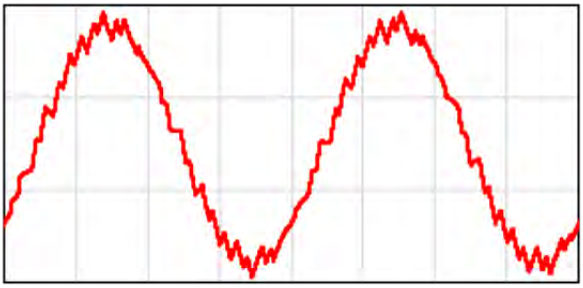


With CTM Filter

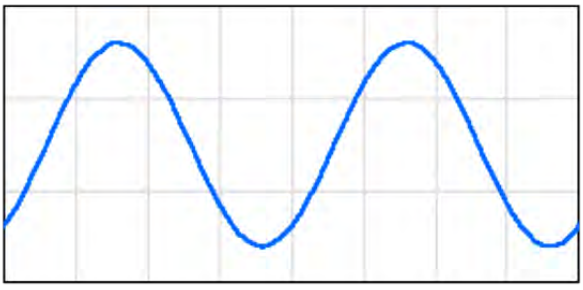


Motor Current Waveform

Without Filter



With CTM Filter



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

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Selection Tables:
Open Panels

Size filters based on the Full Load Amps (FLA) of the drive. The filter current rating must be greater than or equal to the FLA. Order filters 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 [1]	Power Losses (Watts) [2]	OPEN PANEL		
			Part Number [3]	Size (in) (H x W x D)	Weight (lbs)
130	*100*	450	**S2F0130A00**	22.8 x 24.0 x 15.6	130
160	*125*	510	**S2F0160A00**	22.8 x 24.0 x 15.6	131
200	*150*	636	**S2F0200A00**	22.8 x 24.0 x 15.6	133
240	*200*	675	**S2F0240A00**	22.8 x 24.0 x 15.6	146
300	*250*	741	**S2F0300A00**	22.8 x 24.0 x 15.6	152
360	*300*	984	**S2F0360A00**	23.8 x 24.9 x 17.1	194
420	*350*	1116	**S2F0420A00**	23.8 x 24.9 x 17.1	201
480	*400*	1176	**S2F0480A00**	23.8 x 24.9 x 17.1	203
540	*450*	1272	**S2F0540A00**	23.8 x 24.9 x 17.1	220
600	*500*	1356	**S2F0600A00**	25.8 x 27.0 x 18.1	259
720	*600*	1437	**S2F0720A00**	25.8 x 27.0 x 18.1	284
840	*700*	1806	**S2F0840A00**	27.8 x 29.0 x 19.4	340
960	*800*	2040	**S2F0960A00**	27.8 x 29.0 x 19.4	344
1080	*900*	2178	**S2F1080A00**	27.8 x 29.0 x 19.4	348
1200	*1000*	2406	**S2F1200A00**	27.8 x 29.0 x 19.4	346

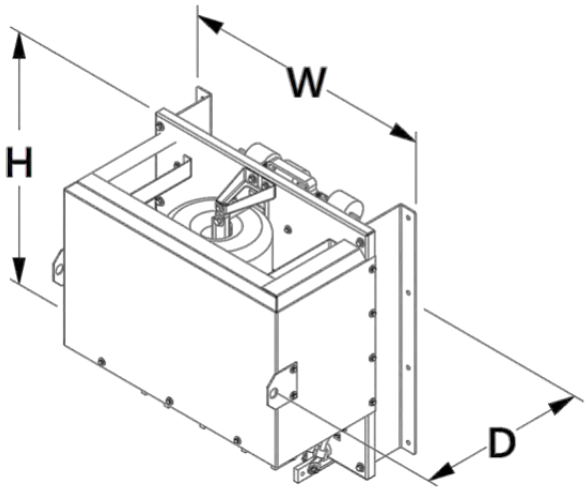
[1] Motor HP estimated based on typical conditions. Actual HP will vary with application. Size filter based on drive FLA.

[2] Loss calculations performed at rated current, 200 Hz with 5 kHz switching frequency, and 20 °C ambient. THD-i is 18.4%.

[3] Use Part Number System (page 6) to select options. Unspecified options will be assumed to carry the default "-0000" option number.

With a compact design, CTM Open Panels easily integrate within an AC drive enclosure, or can be designed into a new product.

- **Compact Form Factor** for design into existing cabinets
- **Lowest Cost Solution** with no additional enclosure requirements
- **Highest Power Density** when compared to other enclosure solutions



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Selection Tables: Cabinets, NEMA 3R

Size filters based on the Full Load Amps (FLA) of the drive. The filter current rating must be greater than or equal to the FLA. Order filters 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 [1]	STAND-ALONE CABINET			PEDESTAL CABINET
		Part Number [2]	Size (in) (H x W x D)	Weight (lbs)	
130	*100*	S2F0130AS3	48.0 x 26.2 x 31.4	331	
160	*125*	S2F0160AS3	48.0 x 26.2 x 31.4	333	
200	*150*	S2F0200AS3	48.0 x 26.2 x 31.4	335	
240	*200*	S2F0240AS3	48.0 x 26.2 x 31.4	347	
300	*250*	S2F0300AS3	48.0 x 26.2 x 31.4	354	
360	*300*	S2F0360AS3	48.0 x 26.2 x 31.4	395	
420	*350*	S2F0420AS3	48.0 x 26.2 x 31.4	402	
480	*400*	S2F0480AS3	48.0 x 26.2 x 31.4	404	
540	*450*	S2F0540AS3	48.0 x 26.2 x 31.4	420	
600	*500*	S2F0600AS3	54.5 x 30.2 x 35.4	498	
720	*600*	S2F0720AS3	54.5 x 30.2 x 35.4	524	
840	*700*	S2F0840AS3	54.5 x 30.2 x 35.4	578	
960	*800*	S2F0960AS3	54.5 x 30.2 x 35.4	582	
1080	*900*	S2F1080AS3	54.5 x 30.2 x 35.4	586	
1200	*1000*	S2F1200AS3	54.5 x 30.2 x 35.4	584	

Contact CTM for Additional Information and Order Inquiries

[1] *Motor HP estimated based on typical conditions. Actual HP will vary with application. Size filter based on drive FLA.*

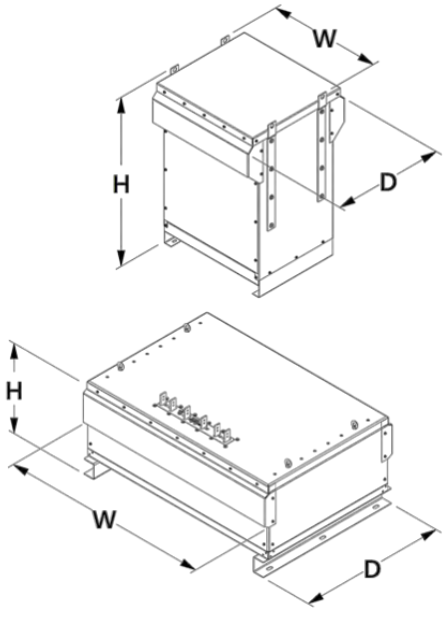
[2] *Use Part Number System (page 6) to select options. Unspecified options will be assumed to carry the default "-0000" option number.*

CTM Stand-Alone Cabinets provide drop in place solutions with environmental protection.

- **NEMA 3R** rating provides protection from the elements, including rain, snow, and dust
- **Drop In Place Solution** allows easy integration into existing motor control systems

By integrating a sine wave filter Pedestal Cabinet with a variable speed drive (VSD) cabinet, CTM has simplified the entire motor control system.

- **Single, Integrated Product** for easy shipping and field installation
- **Maximized Power Density** by minimizing design footprint
- **Maintain Existing VSD Protection Rating** with a sealed, NEMA 4 compatible gland plate.



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Part Numbering System

S2F 0720 A S3 - 0 000

S2F SERIES

Product Type ..... *Sine Wave Filter*
Frequency ..... *Up to 200 Hz*
Cooling Type ..... *Forced-Air Cooled*

Current Rating (Amps)

Drive Voltage
A = 480 VAC

Enclosure
00 = Open Panel
S3 = Stand-Alone Cabinet, NEMA 3R
P3 = Pedestal Cabinet, NEMA 3R

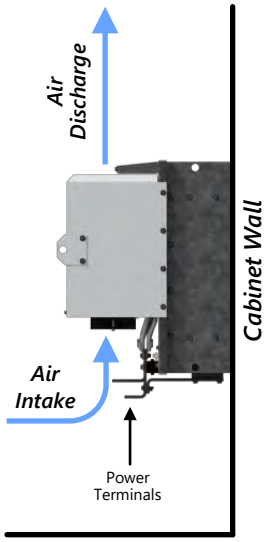
OPTIONS:

Fan Voltage
0 = 115 VAC
B = 230 VAC
C = 24 VDC

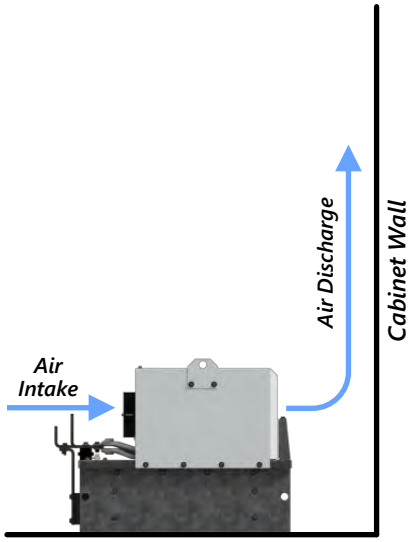
Unspecified Options

Panel Mount Arrangements

Vertical Mount



Chassis Mount



Cabinet Solutions

Stand-Alone

Pedestal (samples)

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the future of power quality

Order Your High Frequency Sine Wave Filter

Scan for CTM Contact Information:

Additional information is available online from the following sources:

S4L High Freq. Liquid Cooled Sine Wave Filters *(for up to 400 Hz, liquid cooled)*
SWF Line Frequency Sine Wave Filters *(line frequency, high performance filters)*
R4L High Freq. Liquid Cooled Reactors *(for up to 400 Hz, liquid cooled)*
ctmmagnetics.com

Contact us online at:

ctmmagnetics.com/contact-us

Final product specifications subject to change

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