



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



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

**CTM Sine Wave Filters**  
*The Future Starts Here*

# Half the size. Half the weight. Twice the efficiency.

CTM Sine Wave Filters transform the output of Variable Frequency/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. 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.

## **INCREASE ...**

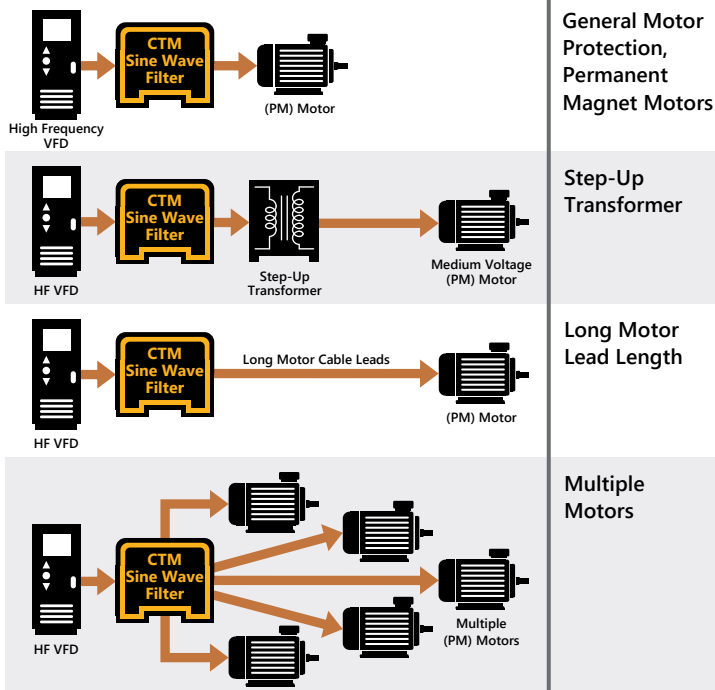
- **Motor Life:** Harmful square waves, voltage spikes, harmonic distortion, and common-mode noise are all filtered from the VFD output, reducing motor heating and wear, bearing currents (fluting) and stress, thereby extending motor longevity.
- **System Efficiency:** Since the motor receives a near-perfect sinusoidal waveform, almost all of the power it receives is converted in to useful work. Additionally, low insertion loss (less than 3.3%) maintains system efficiency.
- **Maximum Lead Length:** By filtering the carrier frequency from the voltage signal, motor lead lengths of 15,000 feet or more are possible.
- **Filter Reliability:** CTM filters maintain lower temperatures, increasing life and reliability.
- **Power Density:** Our exclusive NEMA 3R Pedestal Cabinet (displayed to the right) offers the highest power density available on the market.



**Pedestal Cabinet** option displayed above.

The **Pedestal Cabinet** integrates directly below your existing drive cabinet, maximizing power density and reducing system complexity.

## Filter Applications



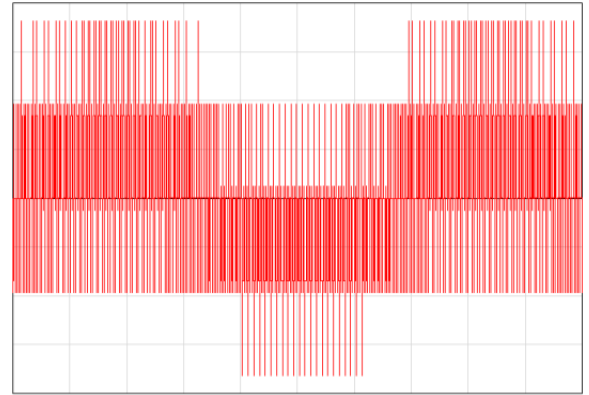
## **DECREASE ...**

- **Power Loss:** Due to a unique patented design and proprietary materials, S2F High Frequency Sine Wave Filters operate at higher efficiencies than conventional filter technology at high frequencies, decreasing power loss, minimizing dissipated heat, and reducing total cost of ownership.
- **Electric Fluting (Bearing Current):** Common-mode (bearing) current can have disastrous effects on motors, leading to electric fluting and premature bearing failure. CTM offers the only sine wave filters with built-in common-mode current mitigation.
- **Design Footprint:** At half the size and weight of laminated silicon-steel technology, CTM filters take up less space and are easier to integrate into existing systems.

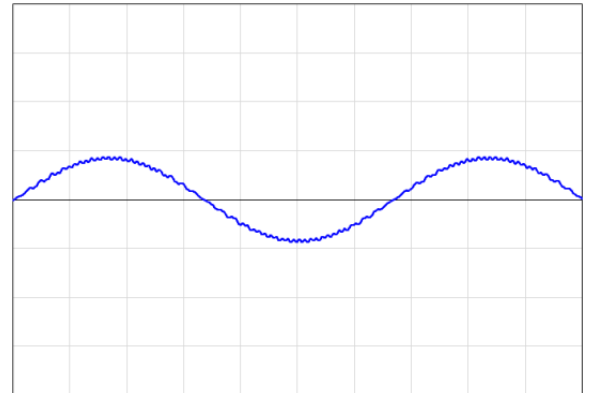
## PERFORMANCE SPECIFICATIONS

Nominal Operating Voltage	480 V
Motor Frequency	0 - 200 Hz <i>- For 6-90 Hz applications, see <a href="#">SWF Series Sine Wave Filters</a></i>
Switching Frequency	5 - 20 kHz
Current Range	130 - 1,680 A
Estimated Motor HP Range	100 - 1,400 HP (Induction Motor) 130 - 1,680 HP (Synch. Motor)
Overload Capability	150% rated current for 1 minute
Maximum Ambient Temperature	50°C (122°F) (higher with de-rating)
Harmonic Voltage Distortion	<1.5% with 12% THD input
Insertion Loss (Voltage Drop)	<3.3% @ 200 Hz
Motor Cable Length	15,000 ft or more
Enclosure Options	<ul style="list-style-type: none"> <li>• <b>Open Panel</b></li> <li>• <b>Stand-Alone Cabinet (NEMA 3R)</b></li> <li>• <b>Pedestal Cabinet (NEMA 3R)</b> <i>- Maintains NEMA 4 VSD rating</i></li> </ul>
Agency Recognitions	

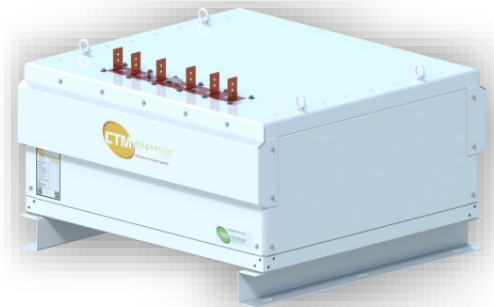
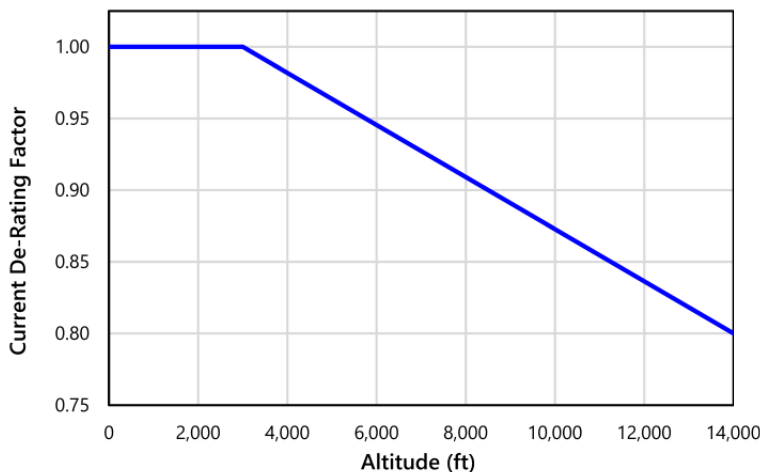
### Without CTM Sine Wave Filter (Pulse-Width Modulated Signal)



### With CTM Sine Wave Filter ("Cleaned" Sinusoidal Waveform)



## Altitude De-Rating Curve



**Pedestal Cabinet** option displayed above (without drive)

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

# SELECTION TABLES:

## Open Panels

Size filters based on the Full Load Amps (FLA) of the motor. The filter current rating must be less than or equal to the FLA. Order filters by [CTM Part Number](#) online at [ctmmagnetics.com/contact-us](http://ctmmagnetics.com/contact-us), or call us directly at [480.967.9447](tel:480.967.9447).



Rated Current (A <sub>RMS</sub> )	Est. Motor HP <sup>1</sup>		Power Loss <sup>2</sup> (Watts)	OPEN PANEL		
	Induction Motors	Synchronous Motors		Part Number <sup>3</sup>	Size (in) (H X W X D)	Weight (lbs)
130	100	130	540	S2F0130A00	24.0 X 24.0 X 15.3	132
160	125	160	720	S2F0160A00	24.0 X 24.0 X 15.3	145
200	150	200	594	S2F0200A00	24.0 X 24.0 X 15.3	140
240	200	240	780	S2F0240A00	24.0 X 24.0 X 15.3	165
300	250	300	816	S2F0300A00	24.9 X 25.0 X 16.8	178
360	300	360	1,047	S2F0360A00	24.9 X 25.0 X 16.8	210
420	350	420	1,038	S2F0420A00	24.9 X 25.0 X 16.8	214
480	400	480	1,260	S2F0480A00	24.9 X 25.0 X 16.8	231
540	450	540	1,260	S2F0540A00	24.9 X 25.0 X 16.8	235
600	500	600	1,386	S2F0600A00	26.9 X 27.0 X 18.0	282
720	600	720	1,341	S2F0720A00	26.9 X 27.0 X 18.0	427
840	700	840	1,923	S2F0840A00	28.9 X 29.0 X 19.4	462

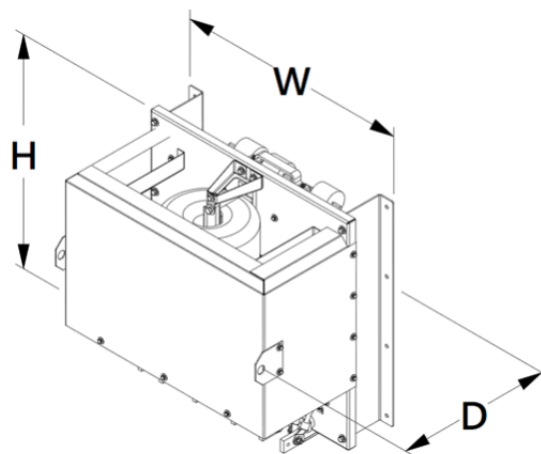
<sup>1</sup> Motor HP estimated based on typical conditions. Actual HP will vary with application. Size filter based on motor FLA.

<sup>2</sup> Based on 200 Hz output frequency and 12% THD at the minimum switching frequency.

<sup>3</sup> Use [Part Number System \(page 7\)](#) 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



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



## SELECTION TABLES: Stand-Alone Cabinets, NEMA 3R



Size filters based on the Full Load Amps (FLA) of the motor. The filter current rating must be less than or equal to the FLA. Order filters by [CTM Part Number](#) online at [ctmmagnetics.com/contact-us](http://ctmmagnetics.com/contact-us), or call us directly at [480.967.9447](tel:480.967.9447).

Rated Current (A <sub>RMS</sub> )	Est. Motor HP <sup>1</sup>		Power Loss <sup>2</sup> (Watts)	STAND-ALONE CABINET		
	Induction Motors	PM Motors		Part Number <sup>3</sup>	Size (in) (H X W X D)	Weight (lbs)
130	100	130	540	S2F0130AS3	43.3 X 29.0 X 28.7	246
160	125	160	720	S2F0160AS3	43.3 X 29.0 X 28.7	258
200	150	200	594	S2F0200AS3	43.3 X 29.0 X 28.7	254
240	200	240	780	S2F0240AS3	43.3 X 29.0 X 28.7	279
300	250	300	816	S2F0300AS3	43.3 X 29.0 X 28.7	292
360	300	360	1,047	S2F0360AS3	43.3 X 29.0 X 28.7	324
420	350	420	1,038	S2F0420AS3	43.3 X 29.0 X 28.7	328
480	400	480	1,260	S2F0480AS3	43.3 X 29.0 X 28.7	345
540	450	540	1,260	S2F0540AS3	43.3 X 29.0 X 28.7	349
600	500	600	1,386	S2F0600AS3	43.3 X 29.0 X 28.7	396
720	600	720	1,341	S2F0720AS3	43.3 X 29.0 X 28.7	541
840	700	840	1,923	S2F0840AS3	43.3 X 29.0 X 28.7	576
960	800	960	2,520	S2F0960AS3	51.3 X 61.3 X 34.6	978
1,080	900	1,080	2,520	S2F1080AS3	51.3 X 61.3 X 34.6	985
1,200	1,000	1,200	2,772	S2F1200AS3	51.3 X 61.3 X 34.6	1,079
1,440	1,200	1,440	2,682	S2F1440AS3	51.3 X 61.3 X 34.6	1,370
1,680	1,400	1,680	3,846	S2F1680AS3	51.3 X 61.3 X 34.6	1,445

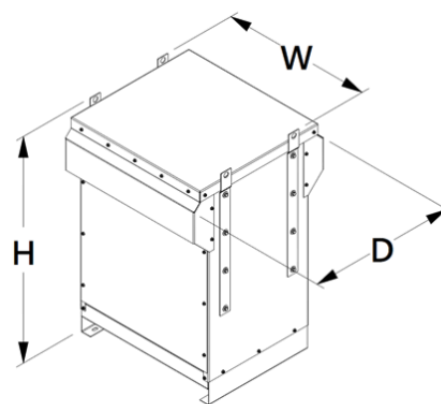
<sup>1</sup> Motor HP estimated based on typical conditions. Actual HP will vary with application. Size filter based on motor FLA.

<sup>2</sup> Based on 200 Hz output frequency and 12% THD at the minimum switching frequency.

<sup>3</sup> Use [Part Number System \(page 7\)](#) 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
- **Up to 1,680 Amps** with largest cabinet



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

# SELECTION TABLES:

## Pedestal Cabinets, NEMA 3R

Size filters based on the Full Load Amps (FLA) of the motor. The filter current rating must be less than or equal to the FLA. Order filters by [CTM Part Number](#) online at [ctmmagnetics.com/contact-us](http://ctmmagnetics.com/contact-us), or call us directly at [480.967.9447](tel:480.967.9447).



Rated Current (A <sub>RMS</sub> )	Est. Motor HP <sup>1</sup>		Power Loss <sup>2</sup> (Watts)	PEDESTAL CABINET		
	Induction Motors	PM Motors		Part Number <sup>3</sup>	Size (in) (H X W X D)	Weight (lbs)
130	100	130	540	S2F0130AP3	17.9 X 25.1 X 28.1	255
160	125	160	720	S2F0160AP3	17.9 X 25.1 X 28.1	267
200	150	200	594	S2F0200AP3	17.9 X 25.1 X 28.1	263
240	200	240	780	S2F0240AP3	17.9 X 25.1 X 28.1	288
300	250	300	816	S2F0300AP3	22.4 X 40.6 X 38.5	419
360	300	360	1,047	S2F0360AP3	22.4 X 40.6 X 38.5	451
420	350	420	1,038	S2F0420AP3	22.4 X 40.6 X 38.5	455
480	400	480	1,260	S2F0480AP3	22.4 X 40.6 X 38.5	473
540	450	540	1,260	S2F0540AP3	22.4 X 40.6 X 38.5	476
600	500	600	1,386	S2F0600AP3	22.4 X 40.6 X 38.5	527
720	600	720	1,341	S2F0720AP3	22.4 X 40.6 X 38.5	541
840	700	840	1,923	S2F0840AP3	23.4 X 54.8 X 38.5	674
960	800	960	2,520	S2F0960AP3	23.4 X 54.8 X 38.5	801
1,080	900	1,080	2,520	S2F1080AP3	23.4 X 54.8 X 38.5	809
1,200	1,000	1,200	2,772	S2F1200AP3	23.4 X 54.8 X 38.5	903
1,440	1,200	1,440	2,682	S2F1440AP3	23.4 X 54.8 X 38.5	931
1,680	1,400	1,680	3,846	S2F1680AP3	23.4 X 78.8 X 38.5	1,216

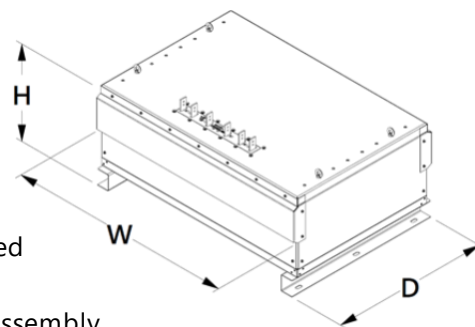
<sup>1</sup> Motor HP estimated based on typical conditions. Actual HP will vary with application. Size filter based on motor FLA.

<sup>2</sup> Based on 200 Hz output frequency and 12% THD at the minimum switching frequency.

<sup>3</sup> Use [Part Number System \(page 7\)](#) to select options. Unspecified options will be assumed to carry the default "-0000" option number.

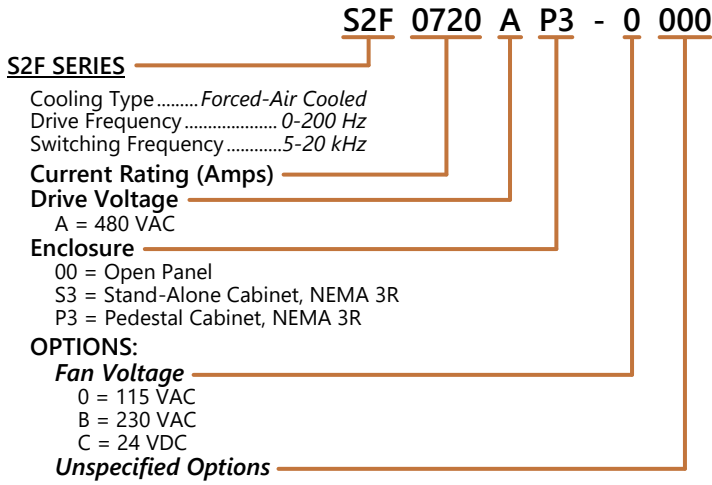
**By integrating a sine wave filter Pedestal Cabinet with a variable speed drive (VSD) cabinet, CTM has simplified the entire motor control system.**

- **Single, Integrated Product** for easy shipping and field installation
- **Maximized Power Density** by minimizing design footprint
- **Reduced System Complexity** by minimizing external power connections and auxiliary cabinets
- **Compatible with NEMA 4 Drive Cabinet** through a sealed gland plate. Sealed interface maintains drive cabinet's existing protection rating.
- **Single Supply Chain** delivering tested sine wave filter cabinet to final VSD assembly
- **NEMA 3R** protection rating



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

## Part Numbering System



## Stand-Alone Cabinets



130-840 A

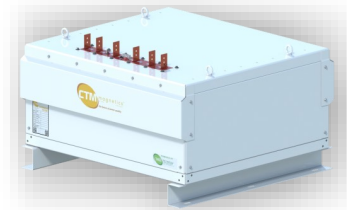


960-1,680 A

## Pedestal Cabinets



130-300 A



360-720 A



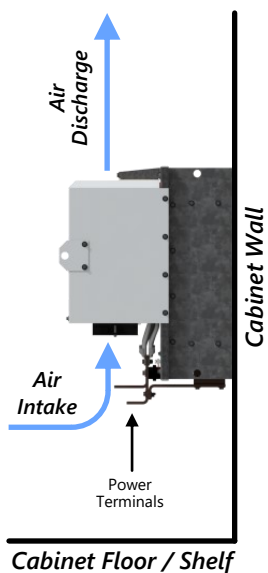
840-1,440 A



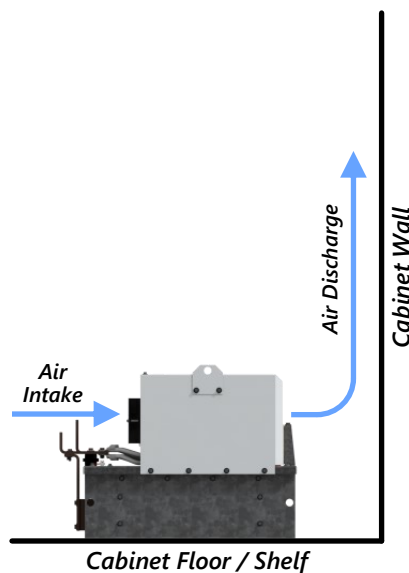
1,680 A

## Panel Mounting Arrangements

### Vertical Mount



### Chassis Mount



Note: Figures are for reference only.

# CTM High Frequency Transformers

Medium voltage motors require a step-up transformer to increase the low voltage signal provided by the drive to medium voltages required for proper motor operation.

Until now, high frequency transformers were not readily available, requiring custom designs and long lead times.

“Until now, high frequency transformers were not readily available, requiring custom designs and long lead times.”

To meet this market void, CTM offers step-up transformers designed specifically for high frequency applications. These high frequency

transformers are specifically designed to be complementary to S2F High Frequency Sine Wave Filters, guaranteeing compatibility between components.

With current ratings from 130 A to 1,680 A or higher, CTM offers step-up transformers from 480 V to medium voltages (typically 2,300 V or 4,160 V).

“CTM offers step-up transformers designed specifically for high frequency applications.”

For order inquiries or additional information about CTM High Frequency Transformers, contact us online at [ctmmagnetics.com/contact-us](http://ctmmagnetics.com/contact-us) or call us directly at [480.967.9447](tel:480.967.9447).

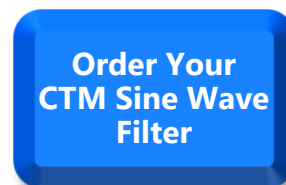


Additional information is available online from the following sources:

[S2F High Frequency Sine Wave Filters](#)  
[SWF Line Frequency Sine Wave Filters](#) (for 6-90 Hz applications)  
[ctmmagnetics.com](http://ctmmagnetics.com)

Contact us online at:

[ctmmagnetics.com/contact-us](http://ctmmagnetics.com/contact-us)



Scan for CTM Contact Information:



Final product specifications subject to change