

# Ecosine max, 400 VAC 60 Hz Economy Passive Harmonic Filters



- Demonstrate best cost-performance ratio
- Achieve 8% THDi for diode rectifier without Ldc, and 5% THDi for diode rectifier with 4% Ldc
- Best-in-class partial load performance
- Most compact open panel design for cabinet integration
- Reliable and robust
- Plug and play, ready to use



## Approvals & Compliances



## Features and benefits

Schaffner ecosine harmonic filters represent an economical solution to the challenge of load-applied harmonics mitigation in three-phase power systems. With a plug-and-play approach and more compact dimensions than comparable products, they can be quickly installed and easily commissioned. They increase the reliability and service life of electric installations, help utilize electric system capacity better, and are the key to meet Power Quality standards such as IEEE 519. Ecosine filters reshape your distorted current back to the desired sinusoidal waveform. Schaffner ecosine filters can be applied to virtually any kind of power electronics with front-end six-pulse rectifiers, 3-phase diode or thyristor bridges, where harmonic current distortion needs to be reduced to defined limits.

## Technical specifications

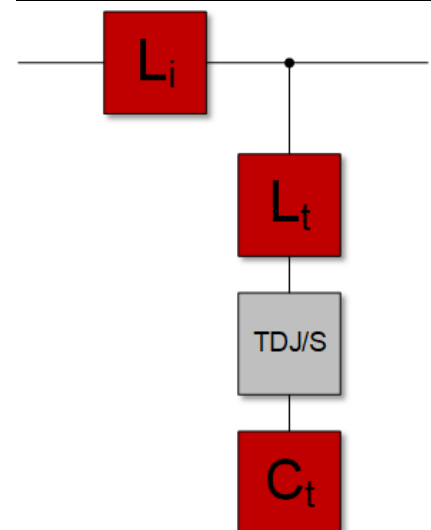
<b>Nominal operating voltage</b>	3 x 380 VAC to 415 VAC ±10%
<b>Operating frequency</b>	60 Hz ±1 Hz
<b>Nominal motor drive input power rating</b>	280 to 480 HP
<b>Total harmonic current distortion THDi*</b>	<8% @ rated power for drives without Ldc <5% @ rated power for drives equipped with 4% Ldc
<b>Efficiency</b>	>99% for rated voltage and power
<b>Overload capability</b>	1.6x rated current for 1 minute, once per hour
<b>SCCR**</b>	100 kA (UL approved)
<b>High potential test voltage</b>	P -> E 2520 VAC (1s)
<b>Overvoltage category</b>	OV III (IEC 60664-1)
<b>Earthing System</b>	TN, TT, IT
<b>Protection category</b>	IP 00
<b>Cooling</b>	External cooling***
<b>Ambient temperature range</b>	-25°C to +40°C fully operational +40°C to +70°C derated operation**** -25°C to +85°C transport and storage
<b>Design corresponding to</b>	Filter: UL 61800-5-1, EN 61800-5-1 Chokes: EN 60076-6
<b>Flammability corresponding to</b>	UL 94 V-0
<b>MTBF @ 40°C/400 V (Mil-HB-217F)</b>	>200,000 hours

\* System requirements: THDv <2%, line voltage unbalance <1%  
 Note: performance specifications in this brochure refer to six-pulse diode rectifiers.  
 SCR rectifier front-ends will produce different results, dependent upon the firing angle of the thyristors.  
 \*\* External UL-rated fuses required. Please consult the user manual.  
 \*\*\* Please check the inlet air flow required for cooling table further in this document and the user manual.  
 \*\*\*\*  $I_{derated} = I_{nominal} \cdot \sqrt{\frac{(T_{max} - T_{amb})}{(T_{max} - T_{nominal})}} = I_{nom} \cdot \sqrt{\frac{(70^\circ\text{C} - T_{amb})}{30^\circ\text{C}}}$

## Typical applications

- Equipment with front-end six-pulse rectifier
- Motor drives
- Factory automation equipment
- Water/wastewater treatment facilities
- Fan and pump applications
- HVAC installations
- Mission-critical processes
- DC fast chargers

## Typical electrical schematic



## Filter selection table with circuit breaker module

Filter	Rated load power @ 380 V/60 Hz		Motor drive input current* [Arms]	Rated filter input current [Arms]	Required Ldc for 5% THDi** [mH]	Typical power losses @ 40°C [W]	Circuit breaker rated current [A]	Weight		Terminal	Frame size
	[kw]	[HP]						[kg]	[lbs]		
FN3473-280-99-E0XXSXX	209	280	472	325	0.074	2085	200	220	485	Busbar	S08
FN3473-315-99-E0XXSXX	235	315	537	374	0.066	2145	200	245	540	Busbar	S08
FN3473-355-99-E0XXSXX	265	355	595	418	0.058	2382	250	270	595	Busbar	S08
FN3473-400-99-E0XXSXX	300	400	656	467	0.052	2223	250	295	650	Busbar	S08
FN3473-480-99-E0XXSXX	358	480	772	561	0.044	3057	300	360	794	Busbar	L08

\* Motor drive input current without harmonic filter.

\*\* FN 3473 filters can be applied for drives with and without Ldc. 8% THDi (@ rated power) is achieved when FN 3473 is applied to drives without Ldc, while 5% THDi (@ rated power) is achieved when there is a 4% Ldc present in the drive.

## Filter selection table with trap disconnect jumper

Filter	Rated load power @380 V/60 Hz		Motor drive input current* [Arms]	Rated filter input current [Arms]	Required Ldc for 5% THDi** [mH]	Typical power losses @ 40°C [W]	Weight		Terminal	Frame size
	[kw]	[HP]					[kg]	[lbs]		
FN3473-280-99-E0XXJXX	209	280	472	325	0.074	2085	220	485	Busbar	S08
FN3473-315-99-E0XXJXX	235	315	537	374	0.066	2145	245	540	Busbar	S08
FN3473-355-99-E0XXJXX	265	355	595	418	0.058	2382	270	595	Busbar	S08
FN3473-400-99-E0XXJXX	300	400	656	467	0.052	2223	295	650	Busbar	S08
FN3473-480-99-E0XXJXX	358	480	772	561	0.044	3057	360	794	Busbar	L08

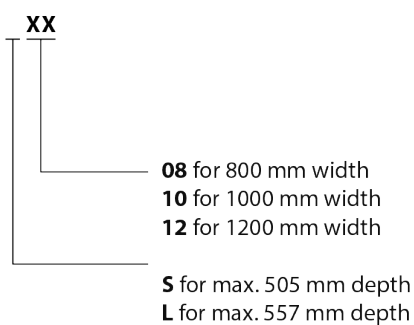
\* Motor drive input current without harmonic filter.

\*\* FN 3473 filters can be applied for drives with and without Ldc. 8% THDi (@ rated power) is achieved when FN 3473 is applied to drives without Ldc, while 5% THDi (@ rated power) is achieved when there is a 4% Ldc present in the drive.

## Earth terminals

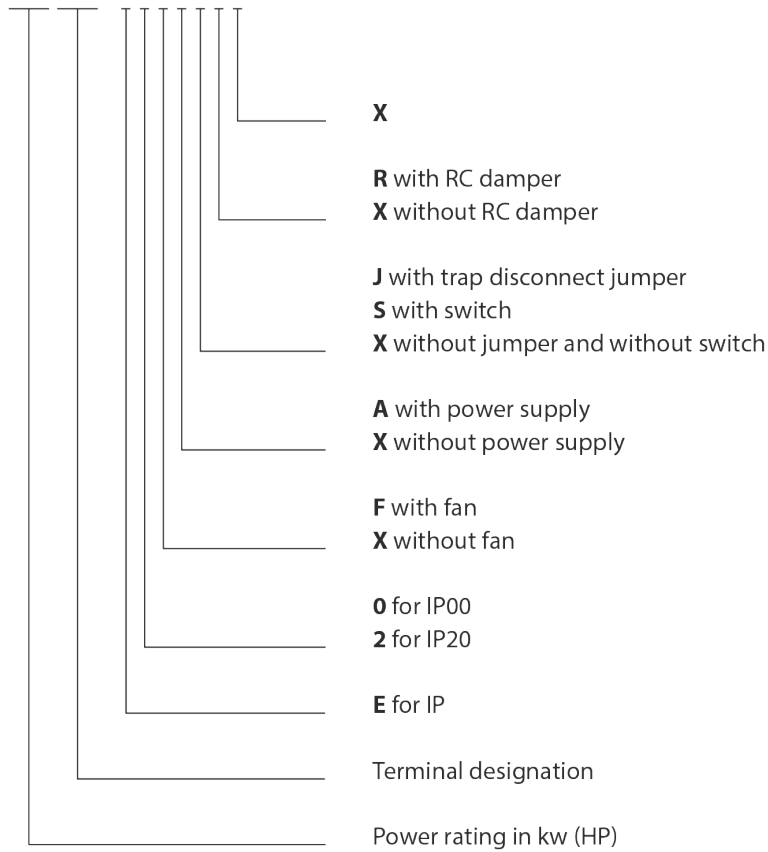
Earth (PE)	Screw thread	Screw torque value	
		[Nm]	[lbs.in]
S08-L12	M12	20-25	177-221

## Frame size designation



Product selector

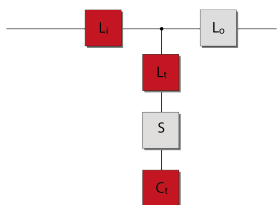
FN 34nn-xxx-yyy-



Filter configurations

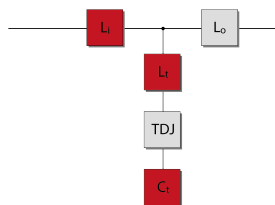
E0XXSXX

- For rectifiers without DC-link choke
- Filters contain trap disconnect switch

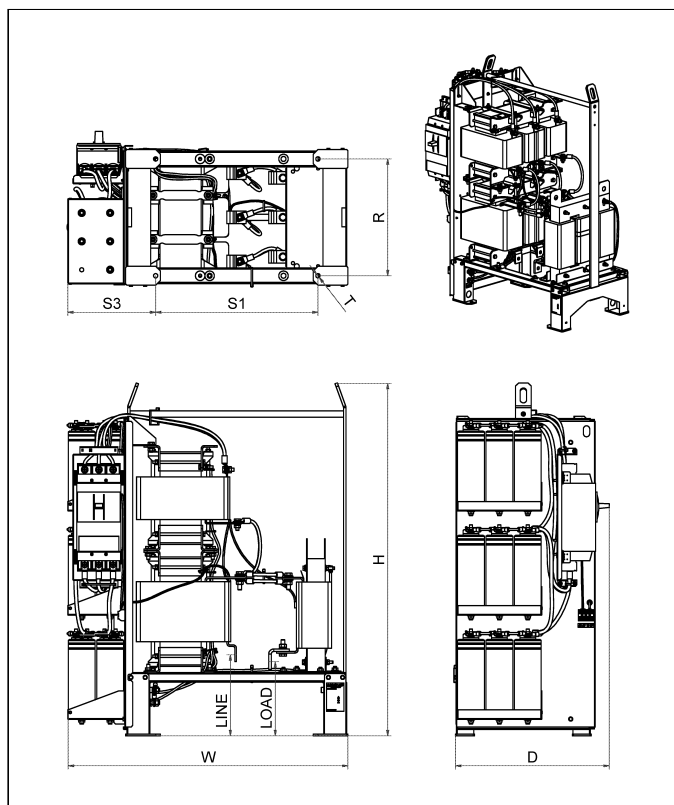


E0XXJXX

- For rectifiers without DC-link choke
- Filters contain trap disconnect jumper



## Mechanical data of IP 00 enclosure



## Dimensions in mm

Frame size*	W	D	H	R	S1	S2	S3	T	LINE	LOAD	Recommended cabinet size WxDxH
<b>S08</b>	max. 650	max. 505	1120	380	330	230	490	13.5	255 ± 10	470 ± 30	800x600x2000
<b>S10</b>	890	max. 505	1120	370	514	n/a	280	13.5	255 ± 10	240 ± 30	1000x600x2000
<b>S12</b>	1060	max. 505	1120	370	684	n/a	280	13.5	255 ± 10	230 ± 10	1200x600x2000
<b>L08</b>	max. 680	557	1320	458	320	225	485	13.5	290 ± 10	540 ± 30	800x600x2000
<b>L10</b>	890	max. 557	1320	455	504	n/a	285	13.5	290 ± 10	230 ± 10	1000x600x2000
<b>L12</b>	1060	max. 557	1320	455	674	n/a	285	13.5	290 ± 10	220 ± 10	1200x600x2000

\* General tolerance: ISO 2768-v

## Dimensions in inches

Frame size*	W	D	H	R	S1	S2	S3	T	LINE	LOAD	Recommended cabinet size WxDxH
<b>S08</b>	max. 25.6	max. 19.88	44.09	14.96	12.99	9.06	19.29	0.53	10.04 ± 0.039	18.5 ± 1.18	31.5x23.6x78.7
<b>S10</b>	35.04	max. 19.88	44.09	14.57	20.24	n/a	11.02	0.53	10.04 ± 0.039	9.45 ± 1.18	39.4x23.6x78.7
<b>S12</b>	41.73	max. 19.88	44.09	14.57	26.93	n/a	11.02	0.53	10.04 ± 0.039	9.06 ± 0.39	47.2x23.6x78.7
<b>L08</b>	max. 26.8	21.93	51.97	18.03	12.60	8.86	19.09	0.53	11.42 ± 0.039	21.26 ± 1.18	31.5x23.6x78.7
<b>L10</b>	35.04	max. 21.93	51.97	17.91	19.84	n/a	11.22	0.53	11.42 ± 0.039	9.06 ± 0.39	39.4x23.6x78.7
<b>L12</b>	41.73	max. 21.93	51.97	17.91	26.54	n/a	11.22	0.53	11.42 ± 0.039	8.66 ± 0.39	47.2x23.6x78.8

\* General tolerance: ISO 2768-v

## Inlet air flow required for cooling

Frame size	Min air volume*	
	[m <sup>3</sup> /h]	CFM [ft <sup>3</sup> /min]
<b>S08, L08</b>	1069	629
<b>S10, L10</b>	1069	629
<b>S12, L12</b>	1069	629

\* Complete cooling requirement, including air inlet placement, must be followed. Please consult the user manual.



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