

# Ecosine Max, 60 Hz Passive Harmonic Filters



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



## Approvals



UL pending

## 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

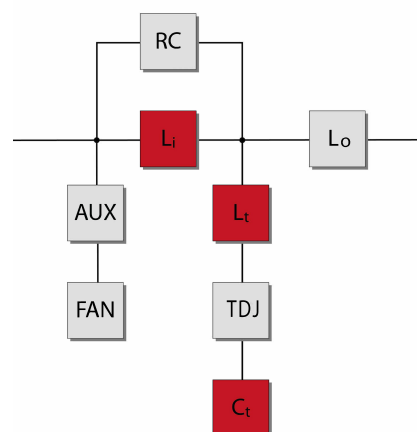
|  |   |
|--|---|
| <b>Nominal operating voltage</b>               | 3 x 440 VAC to 480 VAC ±10%   |
| <b>Operating frequency</b>                     | 60 Hz ±1 Hz   |
| <b>Nominal motor drive input power rating</b>  | 350 to 600 HP   |
| <b>Total harmonic current distortion THID*</b> | <5% @ rated power for drives without Ldc<br>~3.5% @ rated power for drives equipped with 4% Ldc                 |
| <b>Efficiency</b>                              | >99% for rated voltage and power  |
| <b>High potential test voltage</b>             | P -> E 2520 VAC (1s)  |
| <b>Protection category</b>                     | IP 00   |
| <b>Cooling</b>                                 | External cooling**  |
| <b>Overload capability</b>                     | 1.6x rated current for 1 minute, once per hour  |
| <b>Ambient temperature range</b>               | -25°C to +45°C fully operational<br>+45°C to +70°C derated operation***<br>-25°C to +85°C transport and storage |
| <b>Flammability corresponding to</b>           | UL 94 V-2   |
| <b>Design corresponding to</b>                 | Filter: UL 61800-5-1, EN 61800-5-1<br>Chokes: EN 60076-6  |
| <b>Earthing System</b>                         | TN, TT, IT  |
| <b>MTBF @ 45°C/415 V (Mil-HB-217F)</b>         | >200,000 hours  |
| <b>Overvoltage category</b>                    | OV III (IEC 60664-1)  |

\* System requirements: THVD <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.  
\*\* Please check the inlet air flow required for cooling table on page 6 of this document.  
\*\*\*  $I_{derated} = I_{nominal} \cdot \sqrt{\frac{(T_{max}-T_{amb})}{(T_{max}-T_{nominal})}} = I_{nom} \cdot \sqrt{\frac{(70^{\circ}C-T_{amb})}{25^{\circ}C}}$

## 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 @ 480 V/60 Hz |      | Motor drive input current*<br>[Arms] | Rated filter input current<br>[Arms] | Typical losses @ 45°C<br>[W] | Circuit breaker rated current<br>[A] | Weight |       | Terminal | Frame size |
|------------------------|--------------------------------|------|--------------------------------------|--------------------------------------|------------------------------|--------------------------------------|--------|-------|----------|------------|
|                        | [kW]                           | [HP] |                                      |                                      |                              |                                      | [kg]   | [lbs] |          |            |
| FN 3482-350-99-E0XXSXX | 260                            | 350  | 472                                  | 327                                  | 2832                         | 200                                  | 245    | 540   | Busbar   | S10        |
| FN 3482-400-99-E0XXSXX | 300                            | 400  | 537                                  | 375                                  | 3200                         | 200                                  | 270    | 595   | Busbar   | S10        |
| FN 3482-450-99-E0XXSXX | 335                            | 450  | 595                                  | 420                                  | 3451                         | 250                                  | 295    | 650   | Busbar   | S10        |
| FN 3482-500-99-E0XXSXX | 370                            | 500  | 656                                  | 469                                  | 3404                         | 250                                  | 320    | 705   | Busbar   | S12        |
| FN 3482-600-99-E0XXSXX | 450                            | 600  | 773                                  | 563                                  | 4173                         | 300                                  | 385    | 849   | Busbar   | L10        |

\* Motor drive input current without harmonic filter.

## Filter selection table with trap disconnect jumper

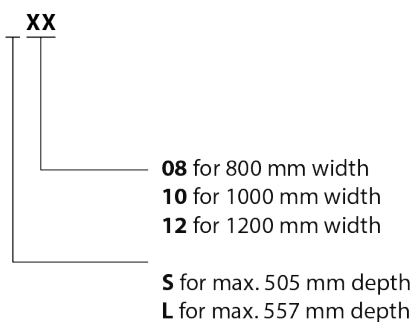
| Filter                 | Rated load power @ 480 V/60 Hz |      | Motor drive input current*<br>[Arms] | Rated filter input current<br>[Arms] | Typical power losses @ 45°C<br>[W] | Weight |       | Terminal | Frame size |
|------------------------|--------------------------------|------|--------------------------------------|--------------------------------------|------------------------------------|--------|-------|----------|------------|
|                        | [kW]                           | [HP] |                                      |                                      |                                    | [kg]   | [lbs] |          |            |
| FN 3482-350-99-E0XXJXX | 260                            | 350  | 472                                  | 327                                  | 2832                               | 245    | 540   | Busbar   | S10        |
| FN 3482-400-99-E0XXJXX | 300                            | 400  | 537                                  | 375                                  | 3200                               | 270    | 595   | Busbar   | S10        |
| FN 3482-450-99-E0XXJXX | 335                            | 450  | 595                                  | 420                                  | 3451                               | 295    | 650   | Busbar   | S10        |
| FN 3482-500-99-E0XXJXX | 370                            | 500  | 656                                  | 467                                  | 3404                               | 320    | 705   | Busbar   | S12        |
| FN 3482-600-99-E0XXJXX | 450                            | 600  | 773                                  | 563                                  | 4173                               | 385    | 849   | Busbar   | L10        |

\* Motor drive input current without harmonic filter.

## Earth terminals

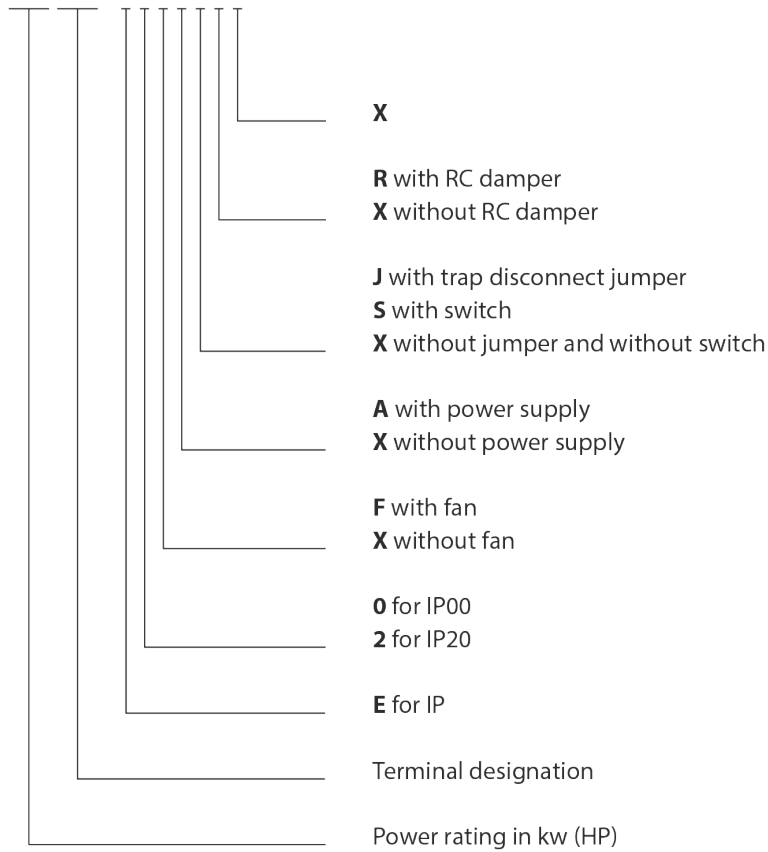
| Earth (PE) | Screw thread | Screw torque value |          |
|------------|--------------|--------------------|----------|
|            |              | [Nm]               | [lbs.in] |
| S08-L12    | M12          | 20-25              | 177-221  |

## Frame size designation



Product selector

FN 34nn-xxx-yyy-



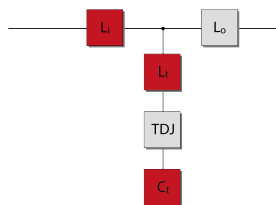
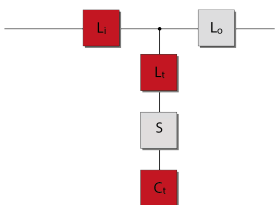
Filter configurations

E0XXSXX

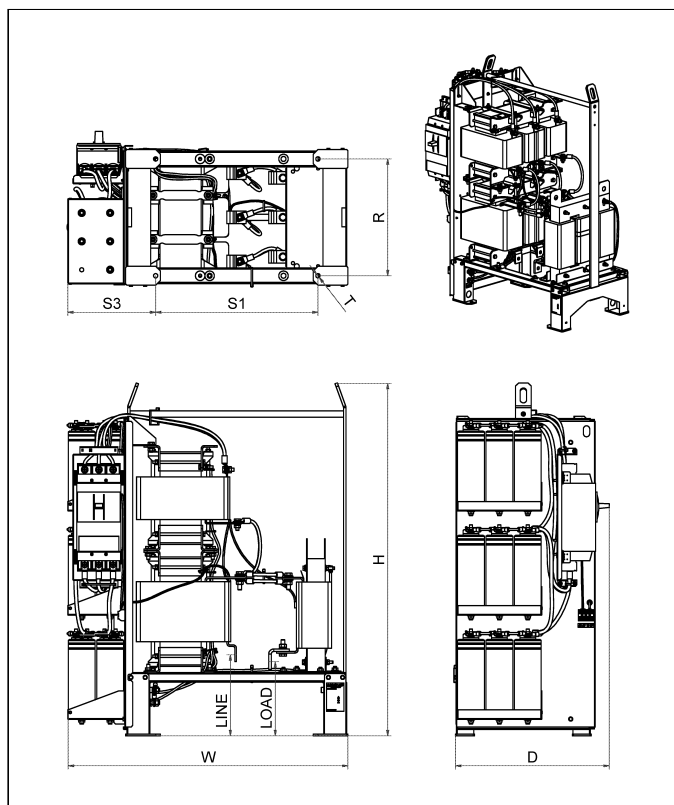
- For rectifiers without DC-link choke
- Filters contain trap disconnect switch

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> | 1050                | 618                        |
| <b>S10, L10</b> | 1050                | 618                        |
| <b>S12, L12</b> | 1050                | 618                        |

\* External air flow required for filter configurations without embedded ventilation.  
Recommended installation on top of cabinet.



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