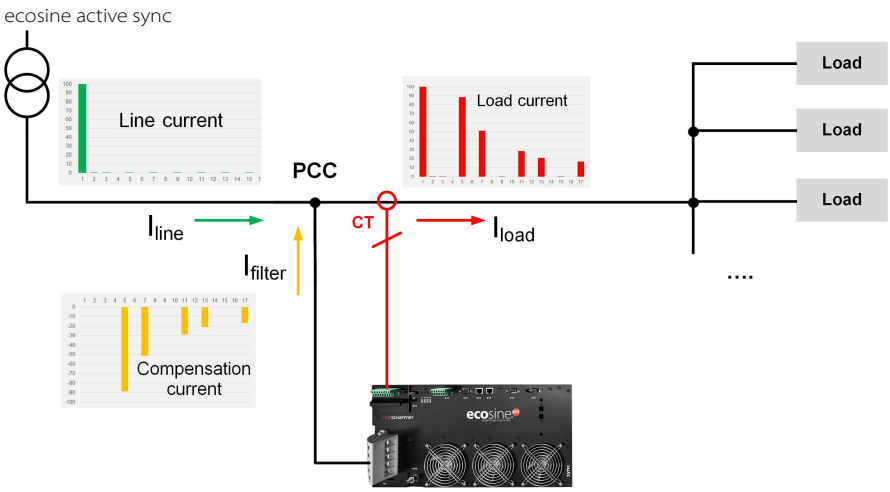
schaffner
shaping electrical power

Active Harmonic Filter ecosine active sync

- Most effective harmonic **mitigation up to the** 50th order, parameter setting for even and odd harmonics
- Compact active harmonic filter for 3-phase loads with and without neutral wire
- **<5% THID** achievable even on most complex mixed loads and @ changing load profiles
- New **modular design** with intelligent system approach - to offer **tailored** solutions for different applications and customers
- 3-Level IGBT inverter topology for reduced power losses
- Extended temperature range of modules **up to** 50°C
- Ultra-fast and dynamic reactive power compensation (inductive and capacitive)
- Load balancing and unloading of neutral wires
- Flicker compensation (if caused by reactive power)
- Compliance with IEEE 519, EN 61000-3-12 and other power quality standards
- User-friendly, easy to install and maintain

Typical electrical schematic



Approvals

RoHS CE

UL listed: pending

Features and benefits

Based on the broad knowledge and experience in terms of solutions and applications in power quality the Schaffner Group has developed a new generation of active harmonic filters. The new modular ecosine active sync series do present fitted and economical solutions for the most demanding harmonic mitigation tasks with any kind of non-linear load involved. Ecosine active sync filter series provides a solution concept which is modular, smaller and can be used as stand-alone modules or as system solution. Thus, Schaffner again provides active harmonic filters with an excellent performance in solving power quality problems while paying respect to customer needs and application demands.

Typical applications

- Building technology
- Automation industry
- Data and banking centers
- Elevators
- Cement industry
- HVAC installations
- Battery charges
- Oil and gas exploration
- Paper mills
- Ship propulsion
- Steel industry
- Tunnel ventilation
- UPS
- Water/wastewater treatment
- Welding equipment
- Wind turbines
- Machines and Automation

Technical specifications of ecosine active sync power module

Number of phases (system input)	3-phase 3-wire or 3-phase 4-wire
Mains frequency	50/60 Hz ±3 Hz
Mains voltage	3-wire: 38 VAC ±15%-480 VAC ±10% 4-wire: 380 VAC ±15%-415 VAC ±10%
Inverter topology	3-level NPC topology, IGBT
Switching frequency	16 kHz
Response time	300 µs
Harmonic mitigation performance	Up to the 50^{th} harmonic
Total harmonic current distortion THID	<5%
Power factor correction	cos φ = -0.7 … 1 … 0.7 (inductive and capacitive compensation)
Dimensions of a single unit	440 mm × 420 mm × 222mm (w × d × h)
Rated phase mitigation current	60 A
Rated neutral conductor mitigation current	180 A
Overload capability (Amp for 10 ms)	150 A
Current transformer placement	Mains side or load side
Current transformer ratio	xx:5 A or xx:1 A
Mounting	Wall-mounting (book or flat mounting)
Weight of a single unit	44 kg
Cooling type	Air cooling
Communication interface	Ethernet TCP/IP, Modbus RTU RS 485
Digital I/O	2 DI + 2 DO
Ambient temperature of power modules	0 …50°C full performance, up to 55°C with derating of 3% per kelvin
Power Losses	<1100 W under full mitigation performance (<2.6%) <970 W in typical operation (<2.3%)
Protection class	IP 20/IP 21
Noise level	<56 to 63 dB A (depending on load situation)
Self-protection	Yes
Overheat protection	Yes
Overvoltage and undervoltage protection	Yes
Recommended fuse protection	100A, e.g. gL or gG
Earthing system	TT, TN-C, TN-S, TN-C-S, IT, corner grounded delta
Altitude	<1000 m without derating; Up to 4000 m with derating 1% / 100m
Ambient conditions	Pollution degree 2 Relative humidity <95% non-condensing, 3K3 Temperature: Storage 55°C, 1K3, 1K4, Transportation -25°C to 75°C, 2K3
Approval	CE, RoHS, UL (pending)
Design standards	IEC 61000-4-2, 4-4, 4-5, 4-6 EN 61000-3-11, 3-12 EN 61000-6-2 EN 55011 EN 62477-1 EN 61800-3

Technical specifications of ecosine active sync cabinet version

Number of phases (system input)	3-phase 3-wire or 3-phase 4-wire					
Mains frequency	50/60Hz ±3 Hz					
Mains voltage	3-wire: 380 VAC ±15%-480 VAC ±10% 4-wire: 380 VAC ±15%-415 VAC ±10%					
Inverter topology	3-level NPC topology, IGBT					
Switching frequency	16 kHz					
Response time	300 µs					
Harmonic mitigation performance	Up to the 50th harmonic					
Total harmonic current distortion THID	<5%					
Power factor correction	cos φ = -0.7 … 1 … 0.7 (inductive and capacitive compensation)					
Dimensions cabinet	600 mm × 600 mm × 2328 mm (w × d × h)					
Number of Modules	0*	1	2	3	4	5
Rated phase mitigation current	0 A	60 A	120 A	180 A	240 A	300 A
Rated neutral conductor mitigation current	0 A	180 A	360 A	540 A	720 A	900 A
Overload capability (for 10 ms)	0 A	150 A	300 A	450 A	600 A	750 A
Weight	180 kg	224 kg	268 kg	312 kg	356 kg	400 kg
Power Losses full mitigation performance	200 W	<1300 W	<2400 W	<3500 W	<4600 W	<5700 W
Power Losses typical operation	200 W	<1170 W	<2100 W	<3100 W	<4000 W	<5000 W
Current transformer placement	Mains side or load side					
Current transformer ratio	xx:5 A or xx:1 A					
Mounting	Floor mounting					
Cooling type	Air cooling					
Communication interface	Ethernet TCP/IP, Modbus RTU RS485					
Digital I/O	2 DI + 2 DO					
Ambient temperature	0 …40°C full performance, up to 55°C with derating of 3% per kelvin					
Protection class	IP 54					
Noise level	<75 dB A (depending on load situation)					
Self-protection	Yes					
Overheat protection	Yes					
Overvoltage and undervoltage protection	Yes					
Earthing system	TT, TN-C, TN-S, TN-C-S, IT, corner grounded delta					
Altitude	<1000 m without derating; Up to 4000m with derating 1% / 100m					
Ambient conditions	Pollution degree 2 Relative humidity <95% non-condensing, 3K3 Temperature: Storage 55°C, 1K3, 1K4, Transportation -25°C to 75°C, 2K3					
Approval	CE, RoHS, UL (pending)					
Design standards	IEC 61000-4-2, 4-4, 4-5, 4-6 EN 61000-3-11, 3-12 EN 61000-6-2 EN 55011 EN 62477-1 EN 61800-3					

*parameters of cabinet only configuration

Ecosine active sync power module versions and options

Designation	Description
FN 3530	Power Module 60A, 380-480 VAC, 3-wire
FN 3531	Power Module 60A, 380-480 VAC, 3-wire with CT Module
FN 3540	Power Module 60A, 380-415 VAC, 4-wire
FN 3541	Power Module 60A, 380-415 VAC, 4-wire with CT Module
FN 3532	DPP Double Power Pack 120A, 380-480 VAC, 3-wire
FN 3542	DPP Double Power Pack 120 A, 380-415 VAC, 4-wire
CTM	CT Module
LCD	Display Module
Patch Cable Set	Patch cable set sync module
KITIP21 400V	Ecosine active sync IP 21 cover KIT

Ecosine active sync cabinet versions and options

FN 3545-□□□□□□□□

- P with protection (main switch)
- X (future option)
- L with LCD module
  X without LCD module
- 3 W for 3-wire setup
  4 W for 4-wire setup
- 060 for 60 A mitigation current
  120 for 120 A mitigation current
  180 for 180 A mitigation current
  240 for 240 A mitigation current
  300 for 300 A mitigation current
- S with sync module (option for future version)
  X without sync module

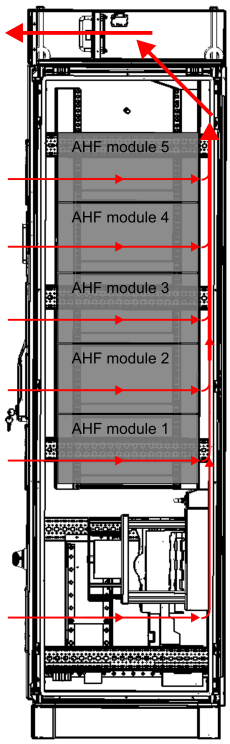
Ecosine active sync cabinet version selection table

Designation	Voltage	Sync Module	Mitigation Current	3-/4-wire Setup	Power Module	LCD	Protection (Main Switch)
FN 3545-X0603WXXP	380-480 VAC	No	60 A	3-wire	1 x FN 3531	No	Yes
FN 3545-X0603WLXP	380-480 VAC	No	60 A	3-wire	1 x FN 3531	Yes	Yes
FN 3545-X0604WXXP	380-415 VAC	No	60 A	4-wire	1 x FN 3541	No	Yes
FN 3545-X0604WLXP	380-415 VAC	No	60 A	4-wire	1 x FN 3541	Yes	Yes
FN 3545-X1203WXXP	380-480 VAC	No	120 A	3-wire	2 x FN 3531	No	Yes
FN 3545-X1203WLXP	380-480 VAC	No	120 A	3-wire	2 x FN 3531	Yes	Yes
FN 3545-X1204WXXP	380-415 VAC	No	120 A	4-wire	2 x FN 3541	No	Yes
FN 3545-X1204WLXP	380-415 VAC	No	120 A	4-wire	2 x FN 3541	Yes	Yes
FN 3545-X1803WXXP	380-480 VAC	No	180 A	3-wire	3 x FN 3531	No	Yes
FN 3545-X1803WLXP	380-480 VAC	No	180 A	3-wire	3 x FN 3531	Yes	Yes
FN 3545-X1804WXXP	380-415 VAC	No	180 A	4-wire	3 x FN 3541	No	Yes
FN 3545-X1804WLXP	380-415 VAC	No	180 A	4-wire	3 x FN 3541	Yes	Yes
FN 3545-X2403WXXP	380-480 VAC	No	240 A	3-wire	4 x FN 3531	No	Yes
FN 3545-X2403WLXP	380-480 VAC	No	240 A	3-wire	4 x FN 3531	Yes	Yes
FN 3545-X2404WXXP	380-415 VAC	No	240 A	4-wire	4 x FN 3541	No	Yes
FN 3545-X2404WLXP	380-415 VAC	No	240 A	4-wire	4 x FN 3541	Yes	Yes
FN 3545-X3003WXXP	380-480 VAC	No	300 A	3-wire	5 x FN 3531	No	Yes
FN 3545-X3003WLXP	380-480 VAC	No	300 A	3-wire	5 x FN 3531	Yes	Yes
FN 3545-X3004WXXP	380-415 VAC	No	300 A	4-wire	5 x FN 3541	No	Yes
FN 3545-X3004WLXP	380-415 VAC	No	300 A	4-wire	5 x FN 3541	Yes	Yes

Cooling specification of ecosine active sync cabinet

Parameter	Values
Protection category	IP 54
Default color	RAL 7035
Required air flow per module	270 m^3/h
Maximum air flow per cabinet	1400 m^3/h
Air flow through fuse section	100 m^3/h
Area - air inlet per module	Min. 450 cm^2
Area - air duct channel behind power modules	Min. 370 cm^2
Max. length of air duct channel behind power modules	Max. 1200 mm
Min. space in air duct channel behind modules	Min. 70 mm
Area - air duct channel in the roof	Min. 900 cm^2
Max. length of air duct channel in the roof	Max. 800 mm
Distance air inlet filter rear to front of power module	Min. 45 mm

Side view into cabinet with direction of air flow



Ecosine active sync cabinet only versions and options

Designation	Description
Cabinet 400 V IP 54 3W	IP 54 Cabinet 600 x 600 x 2265 3-wire (w/o modules) 480 V
Cabinet 400 V IP 54 4W	IP 54 Cabinet 600 x 600 x 2265 4-wire (w/o modules) 415 V
Plinth panel 100	Cabinet plinth panel 100 mm
Plinth panel 200	Cabinet plinth panel 200 mm

Ecosine active sync - Display Module LCD

Function

The display module is used to monitor the measured values of the three-phase network and to change the filter parameters. One display module fits for all power modules and can be used in any of the system setups, whether it is single power module, Double Power Pack or cabinet version.

Picture of LCD Module

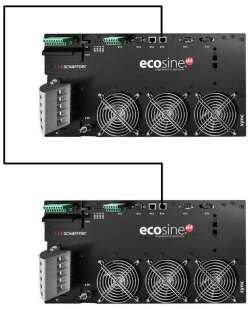
Mounting types

Ecosine active sync - modular system approach

The intelligent and modular system approach of ecosine active sync series offers tailored and most efficient filter system solutions:

Ecosine active sync – 60 A wall – IP20

- 1 ecosine active sync power module incl. CT module
- 1 display module
- Wall-mount (book or flat mounting possible) or Rack-mount (inside slide-in-technology cabinet)



Ecosine active sync double power pack (DPP) – 120 A – IP20

- 2 ecosine active sync power modules
- 1 CT module
- 1 High Speed Bus patch cable
- 1 display module
- Master-Slave architecture
- Wall-mount (book or flat mounting possible) or Rack-mount (inside slide-in-technology cabinet)

Ecosine active sync – 60 A – IP54

- 1 ecosine active sync power module incl. CT module
- 1 display module

Ecosine active sync – 120 A – IP54

- 2 ecosine active sync power module incl. CT module
- 1 display module

Ecosine active sync – 180 A – IP54

- 3 ecosine active sync power module incl. CT module
- 1 display module

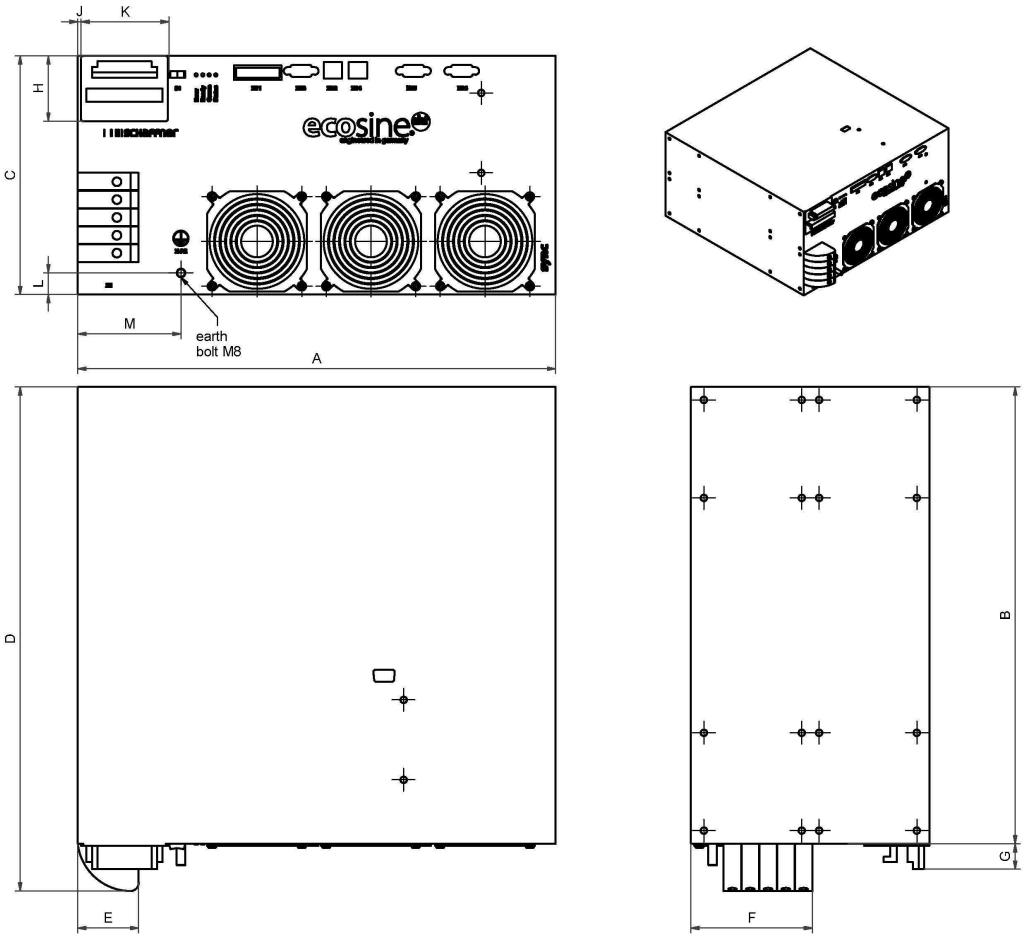
Ecosine active sync – 240 A – IP54

- 4 ecosine active sync power module incl. CT module
- 1 display module

Ecosine active sync – 300 A – IP54

- 5 ecosine active sync power module incl. CT module
- 1 display module

Mechanical data of power module

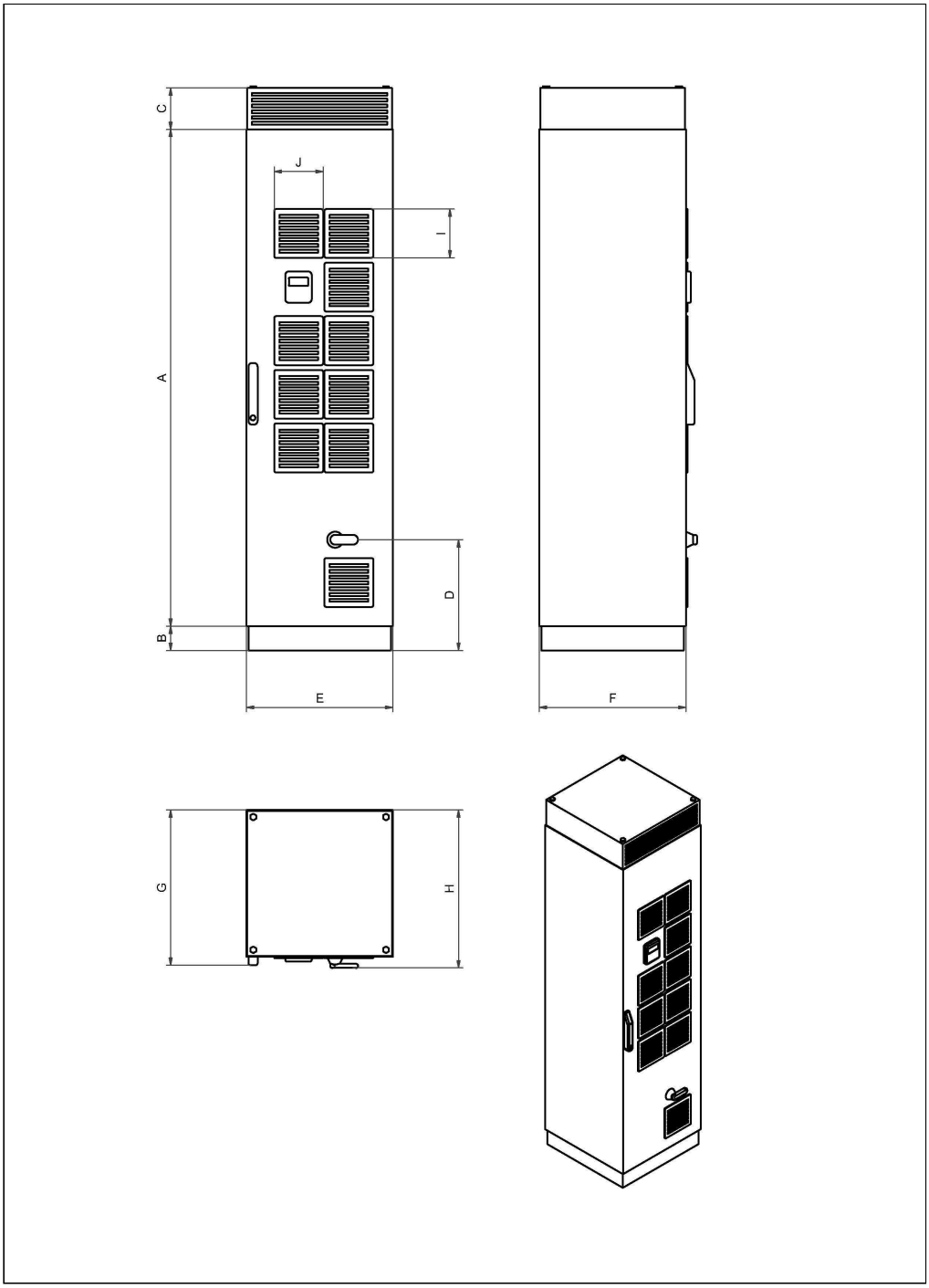


Dimensions

	Size	
	[mm]	[in]
A	440	17.32
B	420	16.54
C	219.5*	8.64
D	463.5	18.25
E	56	2.20
F	112	4.41
G	23.5	0.93
H	60	2.36
J	3	0.12
K	80	3.15
L	20	0.79
M	95	3.74

* Module height: 5 rack units

Mechanical data of cabinet



Dimensions

	Size	
	[mm]	[in]
A	2057	81
B	100	3.94
C	171.2	6.74
D	458.3	18.04
E	606.7	23.9
F	608	23.9
G	642.5	25.3
H	653.7	25.7

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