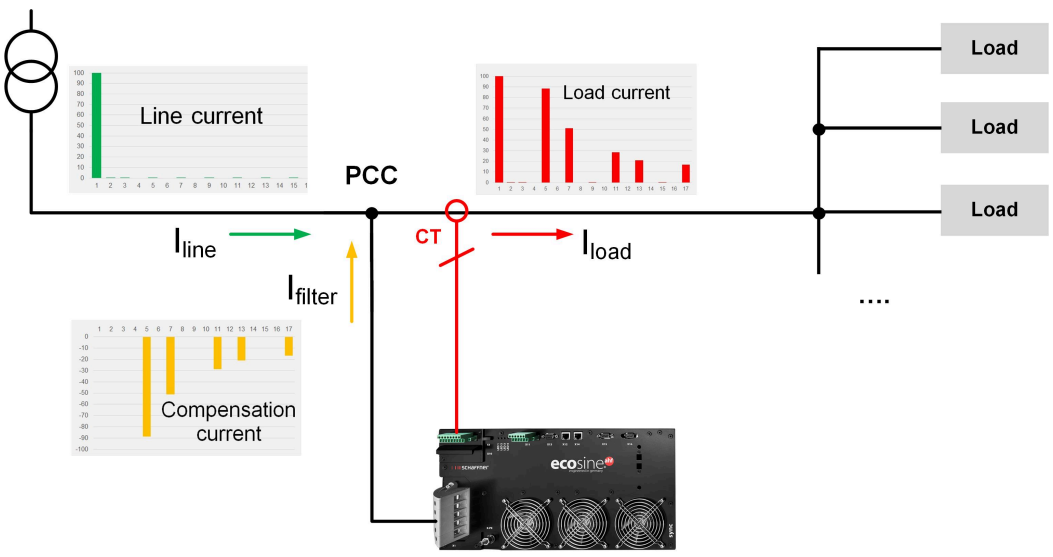
Active Harmonic Filter Ecosine Active Sync

- 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% THDi** achievable even on most complex mixed loads and changing load profiles
- New **modular design** with intelligent system approach offering **tailored** solutions for different applications and customers
- **NEW** - Monitor and control your ecosine active sync cabinet from the **7" color touchscreen HMI** with a modern UI
- 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 & Compliances

RoHS CE UKCA

cULus LISTED

Features and Benefits

Based on the broad knowledge and experience in terms of solutions and applications in power quality the Schaffner Group has developed active harmonic filters. The modular ecosine active sync series offers fitted and economical solutions for the most demanding harmonic mitigation challenges with any kind of non-linear load involved. Ecosine active sync filter series provides a solution concept which is modular, compact and can be used as stand-alone modules or as system solution. The optional sync module offers a smart load Management of the filter usage and allows redundancy which guarantees a smart power quality solution in the era of Industry 4.0. The new 7" color touchscreen HMI offers a state of the art user experience when interacting with ecosine active sync cabinet. Schaffner provides active harmonic filters with excellent performance in solving power quality problems focusing on customer needs and application demands for cleaner and smarter energy.

Typical Applications

- Building technology
- Automation industry
- Data 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: 380 VAC - 480 VAC ±10% 4-wire: 380 VAC - 415 VAC ±10%
Inverter topology	3-level NPC topology, IGBT
Switching frequency	16 kHz
Response time	<100 µs
Harmonic mitigation performance	Up to the 50th harmonic
Total harmonic current distortion THDi	<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
Color	NCS S9000-N matt
Mounting	Wall-mounting (book or flat) or 19"-rack mounting
Weight of a single unit	44 kg
Cooling type	Air cooling
Required air flow per module	270 m^3/h
Communication interface	Ethernet TCP/IP, Modbus RTU RS 485
Digital I/O	2 DI + 2 DO (programmable)
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 (optional 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, C-UL-US Listed
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 - 480 VAC ±10% 4-wire: 380 VAC - 415 VAC ±10%					
Inverter topology	3-level NPC topology, IGBT					
Switching frequency	16 kHz					
Response time	<100 µs					
Harmonic mitigation performance	Up to the 50th harmonic					
Total harmonic current distortion THDi	<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					
Color	RAL 7035					
Mounting	Floor mounting					
Cooling type	Air cooling					
Required air flow	270 m^3/h x nb of modules + 100 m^3/h					
Communication interface	Ethernet TCP/IP, Modbus RTU RS485					
Digital I/O	2 DI + 2 DO (programmable), more I/O with sync module					
Ambient temperature	0 …40°C full performance, up to 50°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, C-UL-US Listed**					
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					

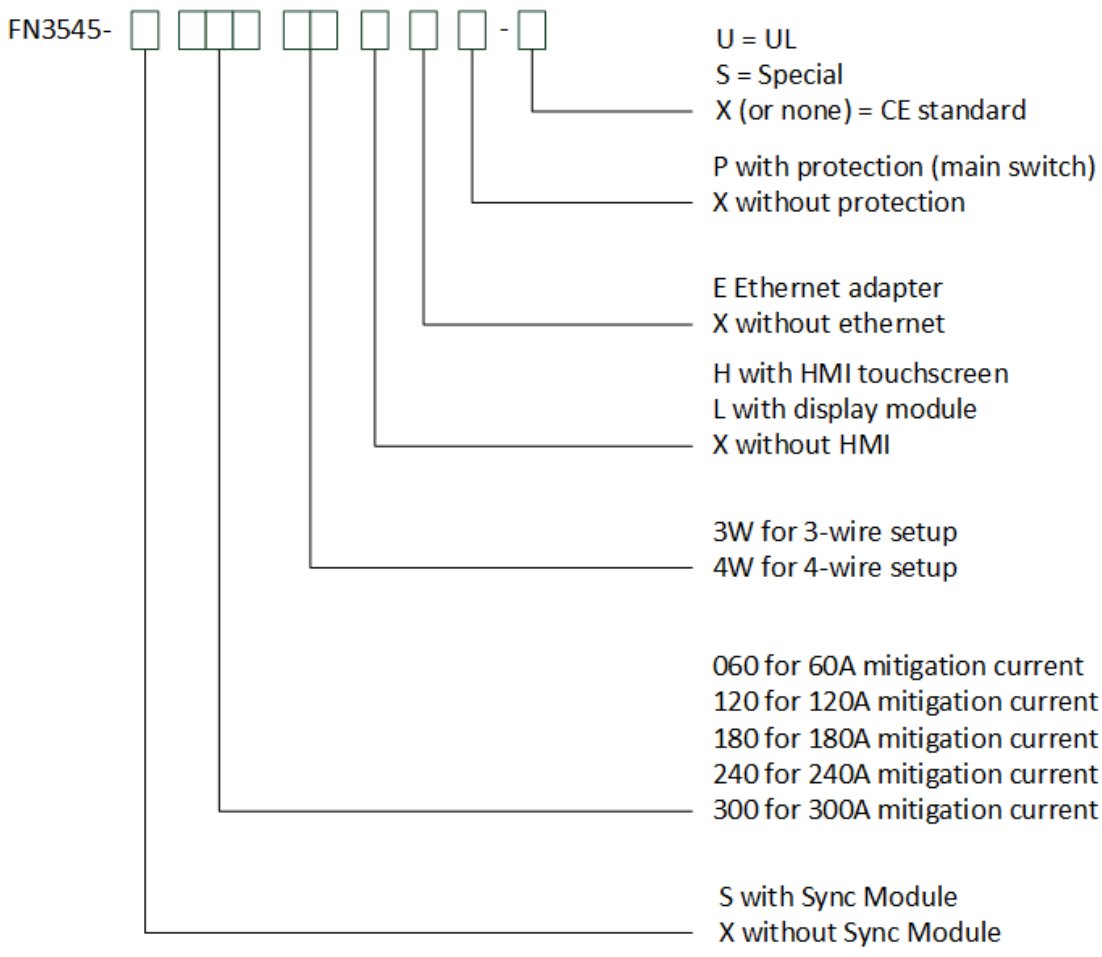
* Parameters of cabinet configuration without power modules

** UL cabinet version available as special option

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 120A, 380-480 VAC, 4-wire
CTM	CT module
SYNC300A	Sync module for ecosine active sync with CT module - connecting up to 5 power modules
SYNC300X	Sync module for ecosine active sync without CT module (slave) - connecting up to 5 power modules
AHF HMI 7"	HMI color touch screen 7" for AHF
Display	Display module
Patch Cable Set	Patch cable set sync module
KITIP21	Ecosine active sync IP 21 cover kit
Ethernet Adapter	Ethernet adapter kit to connect ecosine active sync to an ethernet network

Ecosine Active Sync Cabinet Versions And Options



Ecosine Active Sync Cabinet Version Selection Tables

Cabinet selection with Sync module

Designation	Voltage	Sync module	Mitigation current	3-/4-wire setup	Power module	User interface	Protection (main switch)	Certification
FN3545-S0603WHXP	380-480 VAC	Yes	60	3W	1x FN3530	HMI 7"	Yes	CE
FN3545-S0604WHXP	380-415 VAC	Yes	60	4W	1x FN3540	HMI 7"	Yes	CE
FN3545-S1203WHXP	380-480 VAC	Yes	120	3W	2x FN3530	HMI 7"	Yes	CE
FN3545-S1204WHXP	380-415 VAC	Yes	120	4W	2x FN3540	HMI 7"	Yes	CE
FN3545-S1803WHXP	380-480 VAC	Yes	180	3W	3x FN3530	HMI 7"	Yes	CE
FN3545-S1804WHXP	380-415 VAC	Yes	180	4W	3x FN3540	HMI 7"	Yes	CE
FN3545-S2403WHXP	380-480 VAC	Yes	240	3W	4x FN3530	HMI 7"	Yes	CE
FN3545-S2404WHXP	380-415 VAC	Yes	240	4W	4x FN3540	HMI 7"	Yes	CE
FN3545-S3003WHXP	380-480 VAC	Yes	300	3W	5x FN3530	HMI 7"	Yes	CE
FN3545-S3004WHXP	380-415 VAC	Yes	300	4W	5x FN3540	HMI 7"	Yes	CE
FN3545-S0603WLXP	380-480 VAC	Yes	60	3W	1x FN3530	Display	Yes	CE
FN3545-S0604WLXP	380-415 VAC	Yes	60	4W	1x FN3540	Display	Yes	CE
FN3545-S1203WLXP	380-480 VAC	Yes	120	3W	2x FN3530	Display	Yes	CE
FN3545-S1204WLXP	380-415 VAC	Yes	120	4W	2x FN3540	Display	Yes	CE
FN3545-S1803WLXP	380-480 VAC	Yes	180	3W	3x FN3530	Display	Yes	CE
FN3545-S1804WLXP	380-415 VAC	Yes	180	4W	3x FN3540	Display	Yes	CE
FN3545-S2403WLXP	380-480 VAC	Yes	240	3W	4x FN3530	Display	Yes	CE
FN3545-S2404WLXP	380-415 VAC	Yes	240	4W	4x FN3540	Display	Yes	CE
FN3545-S3003WLXP	380-480 VAC	Yes	300	3W	5x FN3530	Display	Yes	CE
FN3545-S3004WLXP	380-415 VAC	Yes	300	4W	5x FN3540	Display	Yes	CE
FN3545-S0603WXXP	380-480 VAC	Yes	60	3W	1x FN3530	None	Yes	CE
FN3545-S0604WXXP	380-415 VAC	Yes	60	4W	1x FN3540	None	Yes	CE
FN3545-S1203WXXP	380-480 VAC	Yes	120	3W	2x FN3530	None	Yes	CE
FN3545-S1204WXXP	380-415 VAC	Yes	120	4W	2x FN3540	None	Yes	CE
FN3545-S1803WXXP	380-480 VAC	Yes	180	3W	3x FN3530	None	Yes	CE
FN3545-S1804WXXP	380-415 VAC	Yes	180	4W	3x FN3540	None	Yes	CE
FN3545-S2403WXXP	380-480 VAC	Yes	240	3W	4x FN3530	None	Yes	CE
FN3545-S2404WXXP	380-415 VAC	Yes	240	4W	4x FN3540	None	Yes	CE
FN3545-S3003WXXP	380-480 VAC	Yes	300	3W	5x FN3530	None	Yes	CE
FN3545-S3004WXXP	380-415 VAC	Yes	300	4W	5x FN3540	None	Yes	CE
FN3545-S0603WHXP-U	380-480 VAC	Yes	60	3W	1x FN3530	HMI 7"	Yes	UL
FN3545-S0604WHXP-U	380-415 VAC	Yes	60	4W	1x FN3540	HMI 7"	Yes	UL
FN3545-S1203WHXP-U	380-480 VAC	Yes	120	3W	2x FN3530	HMI 7"	Yes	UL
FN3545-S1204WHXP-U	380-415 VAC	Yes	120	4W	2x FN3540	HMI 7"	Yes	UL
FN3545-S1803WHXP-U	380-480 VAC	Yes	180	3W	3x FN3530	HMI 7"	Yes	UL
FN3545-S1804WHXP-U	380-415 VAC	Yes	180	4W	3x FN3540	HMI 7"	Yes	UL
FN3545-S2403WHXP-U	380-480 VAC	Yes	240	3W	4x FN3530	HMI 7"	Yes	UL
FN3545-S2404WHXP-U	380-415 VAC	Yes	240	4W	4x FN3540	HMI 7"	Yes	UL
FN3545-S3003WHXP-U	380-480 VAC	Yes	300	3W	5x FN3530	HMI 7"	Yes	UL
FN3545-S3004WHXP-U	380-415 VAC	Yes	300	4W	5x FN3540	HMI 7"	Yes	UL
FN3545-S0603WLXP-U	380-480 VAC	Yes	60	3W	1x FN3530	Display	Yes	UL
FN3545-S0604WLXP-U	380-415 VAC	Yes	60	4W	1x FN3540	Display	Yes	UL
FN3545-S1203WLXP-U	380-480 VAC	Yes	120	3W	2x FN3530	Display	Yes	UL
FN3545-S1204WLXP-U	380-415 VAC	Yes	120	4W	2x FN3540	Display	Yes	UL
FN3545-S1803WLXP-U	380-480 VAC	Yes	180	3W	3x FN3530	Display	Yes	UL
FN3545-S1804WLXP-U	380-415 VAC	Yes	180	4W	3x FN3540	Display	Yes	UL
FN3545-S2403WLXP-U	380-480 VAC	Yes	240	3W	4x FN3530	Display	Yes	UL
FN3545-S2404WLXP-U	380-415 VAC	Yes	240	4W	4x FN3540	Display	Yes	UL
FN3545-S3003WLXP-U	380-480 VAC	Yes	300	3W	5x FN3530	Display	Yes	UL
FN3545-S3004WLXP-U	380-415 VAC	Yes	300	4W	5x FN3540	Display	Yes	UL

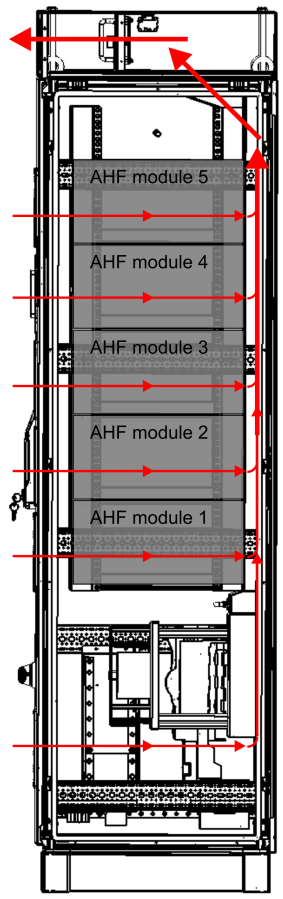
Cabinet selection without Sync module

Designation	Voltage	Sync module	Mitigation current	3-/4-wire setup	Power module	User interface	Protection (main switch)	Certification
FN3545-X0603WLXP	380-480 VAC	No	60	3W	1x FN3531	Display	Yes	CE
FN3545-X0604WLXP	380-415 VAC	No	60	4W	1x FN3541	Display	Yes	CE
FN3545-X1203WLXP	380-480 VAC	No	120	3W	2x FN3531	Display	Yes	CE
FN3545-X1204WLXP	380-415 VAC	No	120	4W	2x FN3541	Display	Yes	CE
FN3545-X0603WXXP	380-480 VAC	No	60	3W	1x FN3531	None	Yes	CE
FN3545-X0604WXXP	380-415 VAC	No	60	4W	1x FN3541	None	Yes	CE
FN3545-X1203WXXP	380-480 VAC	No	120	3W	2x FN3531	None	Yes	CE
FN3545-X1204WXXP	380-415 VAC	No	120	4W	2x FN3541	None	Yes	CE

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 Options

Designation	Description
Cabinet 380-480 VAC IP54 3W	IP 54 Cabinet 600 x 600 x 2328 3-wire (w/o modules) 480 V
Cabinet 380-415 VAC IP54 4W	IP 54 Cabinet 600 x 600 x 2328 4-wire (w/o modules) 415 V
Plinth panel 100	Cabinet plinth panel 100 mm
Plinth panel 200	Cabinet plinth panel 200 mm

Technical Specification For Sync Module

Input voltage	22,0...27,0 VDC
Nominal current	<1 A
Dimensions	440 mm x 200 mm x 87 mm (w x d x h)
Weight	3.0 kg
Protection class	IP 20 (optional IP 21)
Digital I/O	3 DI, 2 DO, 4 DI/O (programmable) 2 relays NO/NC - 2 relays NO with common COM (250 VAC/3A)
Ambient conditions	Pollution degree 2 Relative humiditiy < 95%, non-condensing, 3K3 Temperature: storage 55°C, 1K3, 1K4, transportation -25°C to 75°C, 2K3
Approval	CE, RoHS

Front view of cabinet with SYNC300A

Ecosine Active Sync - HMI And Display Module

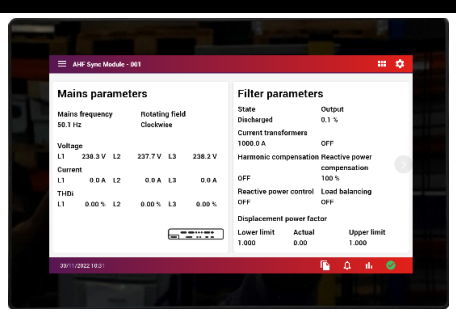
HMI 7" touchscreen

Ecosine active sync harmonic filters can be commissioned via the HMI touch screen. It furthermore can be used to change and monitor all filter parameters and measured values of the three-phase network, plot measurement in an oscilloscope style view and save/restore parameter sets of the complete system.

Display Module

The Display Module is a convenient solution to monitor the measured values of the three-phase network and to change the filter parameters directly front a power module. The Display Module is Plug'n'Play and can be hot swapped between any Power Module, whether it is single Power Module and Double Power Pack. It can be plugged on 3 sides of the Power Module to adapt to any moutning position.

HMI 7"



Display 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 – IP 20

- 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 – IP 20

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

Sync module SYNC300A – master communication module – IP 20

- Flexible installation with current transformers on mains or load side; one simple CT connection point for all modules
- Intelligent load and energy management
- Simple and modular installation (wall-mount or rack-mount); recommended for 180 A and more
- Easy filter scalability and extension of mitigation current beyond 300 A; one sync module can connect and coordinate up to 5 power modules (5x60 A) in parallel; higher mitigation current rates are possible by paralleling the sync modules, e.g. for 480 A active harmonic filter, 2 sync modules and 8 power modules are required
- Available as part of the ecosine active sync cabinet (see selection table on page 5) or as an option for later upgrade

Ecosine active sync – 60 A – IP 54

- 1 ecosine active sync power module
- 1 HMI
- 1 sync module SYNC300A (option)

Ecosine active sync – 120 A – IP 54

- 2 ecosine active sync power modules
- 1 HMI
- 1 sync module SYNC300A (option)

Ecosine active sync – 180 A – IP 54

- 3 ecosine active sync power modules
- 1 HMI
- 1 sync module SYNC300A

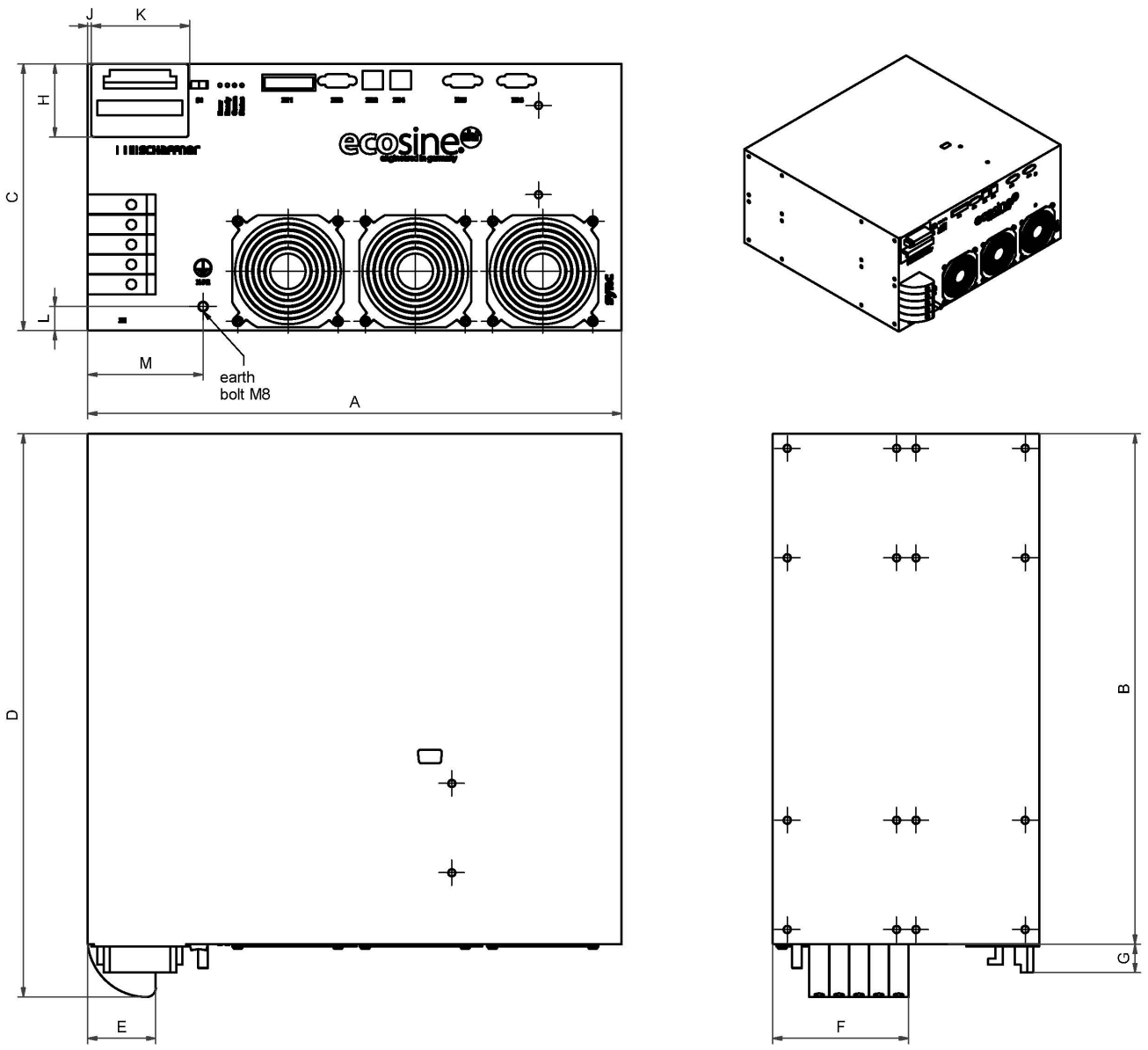
Ecosine active sync – 240 A – IP 54

- 4 ecosine active sync power modules
- 1 HMI
- 1 sync module SYNC300A

Ecosine active sync – 300 A – IP 54

- 5 ecosine active sync power modules
- 1 HMI
- 1 sync module SYNC300A

Mechanical Data Of Power Module

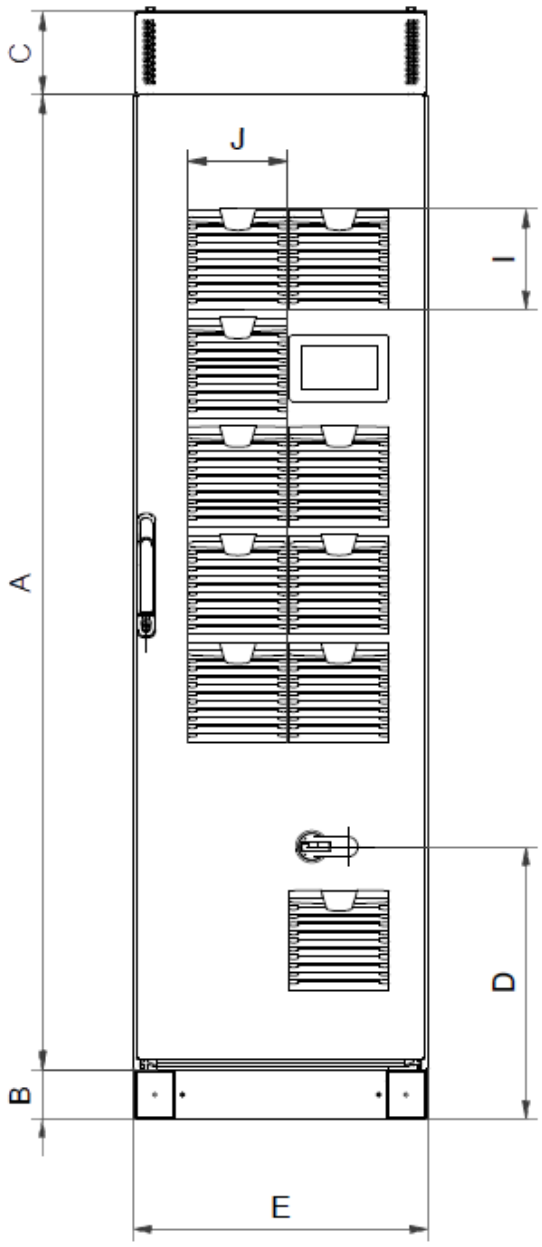


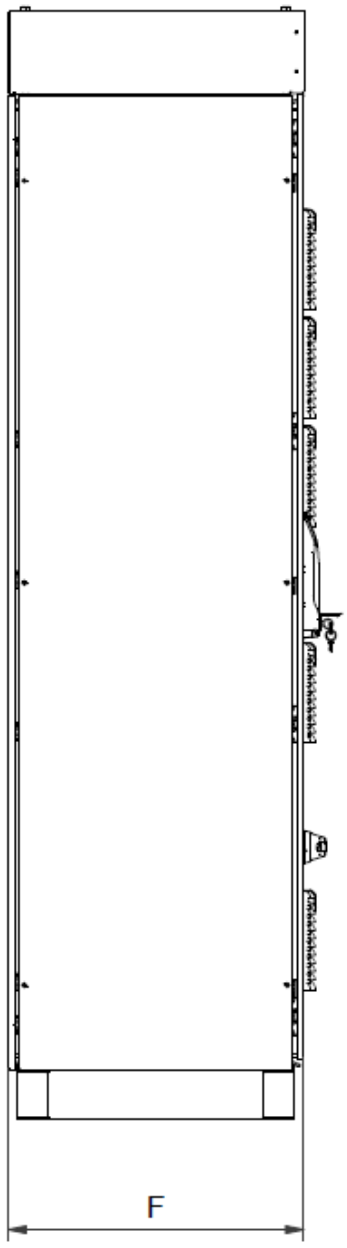
Dimensions

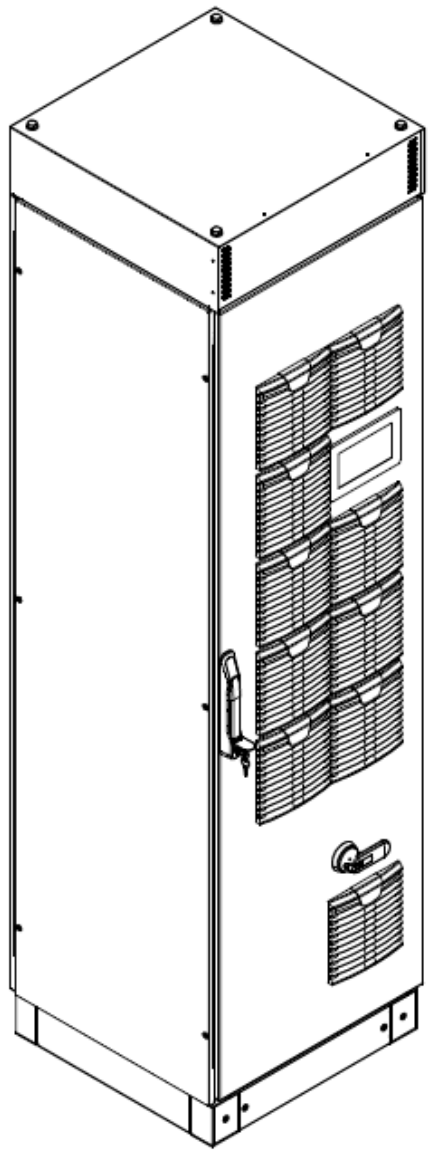
	Size	
	[mm]	**[in]**
A	440	17.32
B	420	16.54
C	219.5*	8.64
D	463.5	18.25
E	56	2.20
F	112	4.41
G	23.5	0.93
H	60	2.36
J	3	0.12
K	80	3.15
L	20	0.79
M	95	3.74

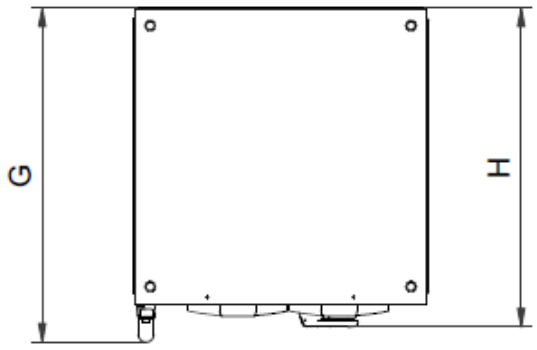
* Module height: 5 rack units

Mechanical Data Of Cabinet





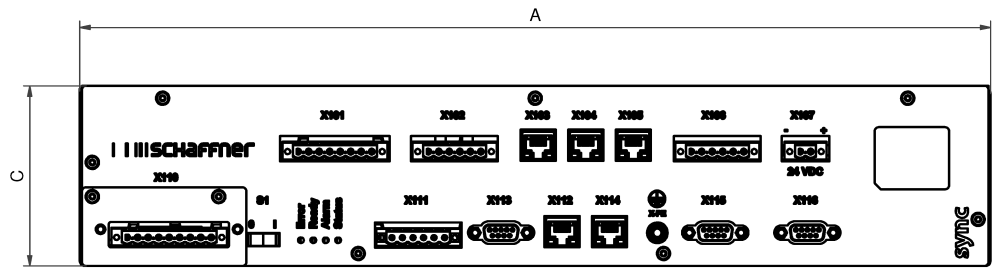


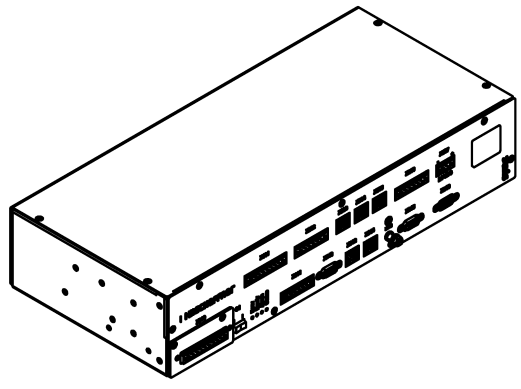


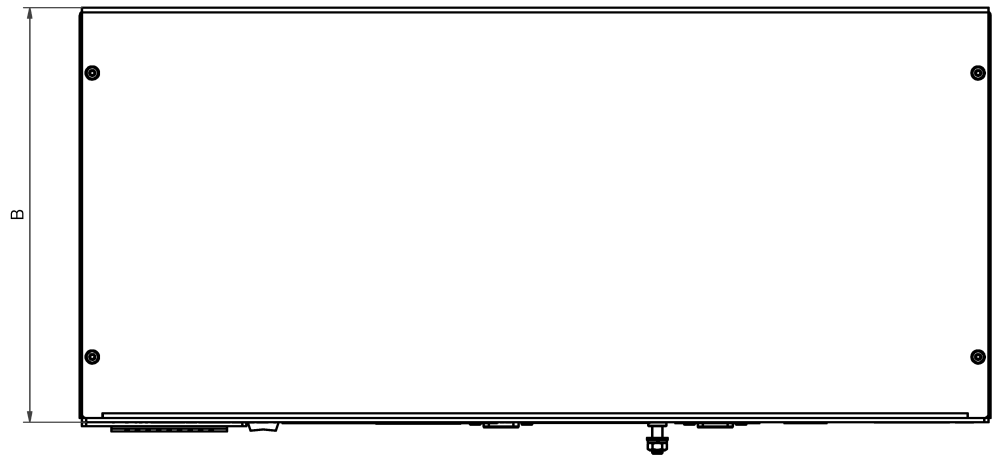
Dimensions

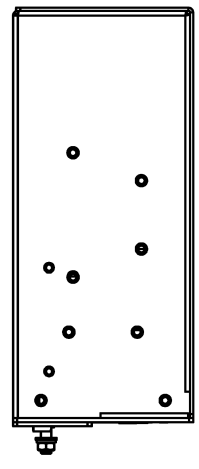
	Size	
	[mm]	**[in]**
A	2057	81
B	100	3.94
C	171.2	6.74
D	458.3	18.04
E	606.7	23.9
F	608	23.9
G	642.5	25.3
H	653.7	25.7
I	204	8.03
J	205	8.07

Mechanical Data Of Sync Module









Dimensions

	Size [mm]	[in]
A	440	17.32
B	200	7.88
C	87	3.43

Headquarters, Global Innovation and Development

Switzerland
Schaffner Group
Industrie Nord
Nordstrasse 11e
4542
Luterbach
+41 32 681 66 26
info@schaffner.com

Sales and Application Centers

Switzerland
Schaffner EMV AG
Industrie Nord
Nordstrasse 11e
4542
Luterbach
+41 32 681 66 26
switzerlandsales@schaffner.com

China
Schaffner EMC Ltd. Shanghai
T20-3 C No 565 Chuangye Road Pudong district
201201
Shanghai
+86 2138139500
cschina@schaffner.com

Singapore
Schaffner EMC Pte Ltd.
Blk 3015A Ubi Road 1 #05-09 Kampong Ubi Industrial Estate
408705
Singapore
+65 63773283
singaporesales@schaffner.com

To find your local partner within Schaffner‘s global network schaffner.com