

# Active Harmonic Filter Ecosine Active Sync

- Most effective **harmonic mitigation up to the 50<sup>th</sup> order**, parameter setting for even and odd harmonics

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- Top entry cables for easier installation in the most demanding applications

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- Optional switch disconnector protection

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- Active harmonic filter cabinet for 3-phase loads with and without neutral wire

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- **<5% THDi** achievable even on most complex mixed loads and changing load profiles

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- Compatible with applications starting from **200 V to 415 V (4-wire) / 480 V (3-wire)**

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- Monitor and control your ecosine active sync cabinet from the **7" color touchscreen HMI** with a modern UI

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- 3-Level IGBT inverter topology for reduced power losses

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- Ultra-fast and dynamic reactive power compensation (inductive and capacitive)

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- Load balancing and unloading of neutral wires

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- Compliance with IEEE 519, EN 61000-3-12 and other power quality standards

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- User-friendly, easy to install and maintain



## Approvals & Compliances



## 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 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 cabinet L offers more possibilities, like top entry cables and optional switch disconnector in order to achieve the most cost optimized solutions for your applications. This cabinet comes in addition to the Ecosine Active Sync modular system and the compact Ecosine Active Sync cabinet which offer the most compact footprint and advanced IP protection level. 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 7" color touchscreen HMI offers a state of the art user experience when interacting with Ecosine Active Sync system. 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

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- Automation industry

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- Data centers

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- Elevators

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- Cement industry

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- HVAC installations

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- Battery charges

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- Oil and gas exploration

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- Paper mills

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- Ship propulsion

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- Steel industry

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- Tunnel ventilation

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- UPS

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- Water/wastewater treatment

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- Welding equipment

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- Wind turbines

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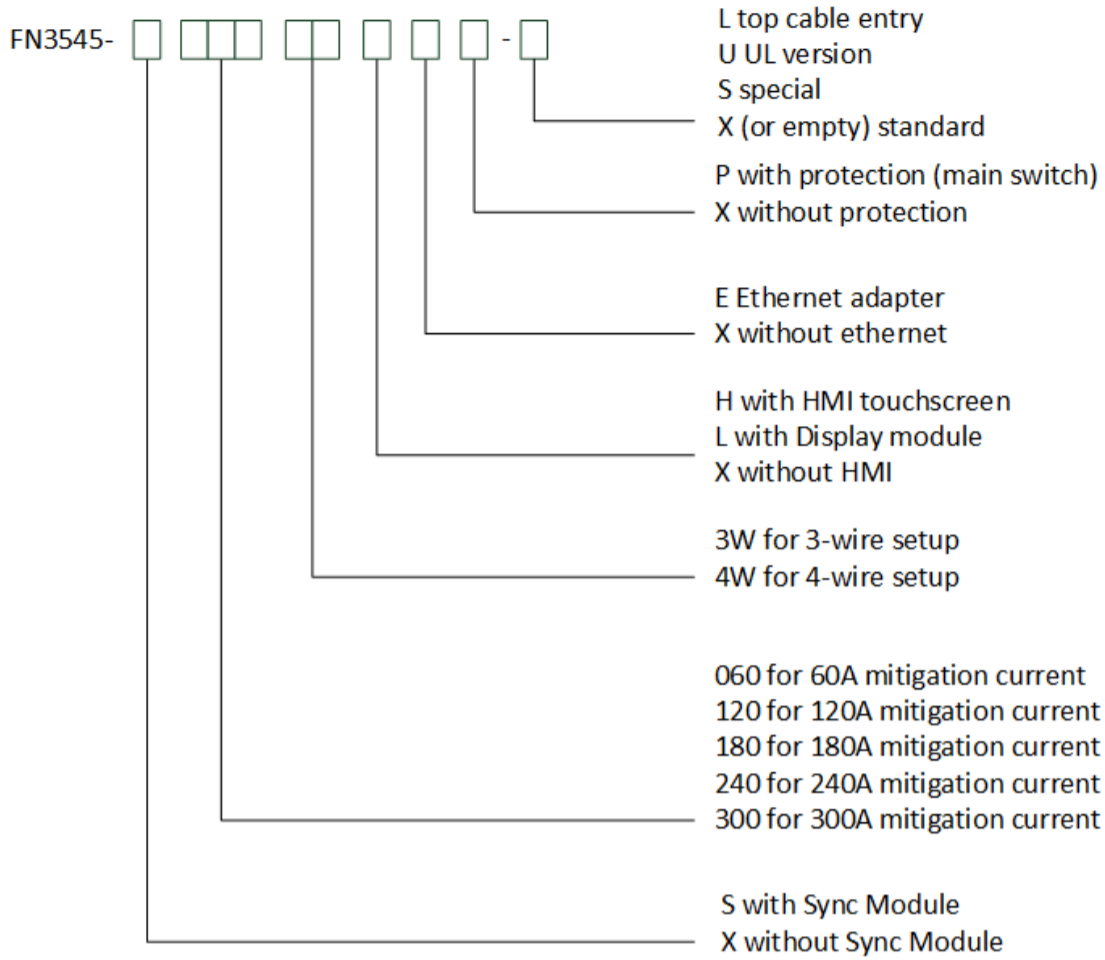
- Machines and Automation

## Technical Specifications Of Ecosine Active Sync Cabinet L Version

|   |  |         |         |         |         |         |
|---|--|---------|---------|---------|---------|---------|
| <b>Number of phases (system input)</b>            | 3-phase 3-wire or 3-phase 4-wire   |         |         |         |         |         |
| <b>Mains frequency</b>                            | 50/60Hz ±3 Hz  |         |         |         |         |         |
| <b>Mains voltage</b>                              | 3-wire: 200 VAC - 480 VAC -5%/+10%<br>4-wire: 200 VAC - 415 VAC -5%/+10%   |         |         |         |         |         |
| <b>Inverter topology</b>                          | 3-level NPC topology, IGBT   |         |         |         |         |         |
| <b>Switching frequency</b>                        | 16 kHz   |         |         |         |         |         |
| <b>Response time</b>                              | <100 µs  |         |         |         |         |         |
| <b>Harmonic mitigation performance</b>            | Up to the 50th harmonic  |         |         |         |         |         |
| <b>Total harmonic current distortion THDi</b>     | <5%  |         |         |         |         |         |
| <b>Power factor correction</b>                    | cos φ = -0.7 ... 1 ... 0.7<br>(inductive and capacitive compensation)  |         |         |         |         |         |
| <b>Dimensions cabinet</b>                         | 809±5 mm × 606±5 mm × 1978±5 mm (w × d × h)  |         |         |         |         |         |
| <b>Number of Modules</b>                          | 0*   | 1       | 2       | 3       | 4       | 5       |
| <b>Rated phase mitigation current</b>             | 0 A  | 60 A    | 120 A   | 180 A   | 240 A   | 300 A   |
| <b>Rated neutral conductor mitigation current</b> | 0 A  | 180 A   | 360 A   | 540 A   | 720 A   | 900 A   |
| <b>Overload capability (for 10 ms)</b>            | 0 A  | 150 A   | 300 A   | 450 A   | 600 A   | 750 A   |
| <b>Weight</b>                                     | TBD kg   | TBD kg  | TBD kg  | TBD kg  | TBD kg  | TBD kg  |
| <b>Power losses full mitigation performance</b>   | 200 W  | <1300 W | <2400 W | <3500 W | <4600 W | <5700 W |
| <b>Power losses typical operation</b>             | 200 W  | <1170 W | <2100 W | <3100 W | <4000 W | <5000 W |
| <b>Current transformer placement</b>              | Mains side or load side  |         |         |         |         |         |
| <b>Current transformer ratio</b>                  | xx:5 A or xx:1 A   |         |         |         |         |         |
| <b>Color</b>                                      | TBD  |         |         |         |         |         |
| <b>Mounting</b>                                   | Floor mounting   |         |         |         |         |         |
| <b>Cooling type</b>                               | Air cooling  |         |         |         |         |         |
| <b>Required air flow</b>                          | 270 m³/h × nb of modules + 100 m³/h  |         |         |         |         |         |
| <b>Communication interface</b>                    | Ethernet TCP/IP, Modbus RTU RS485  |         |         |         |         |         |
| <b>Digital I/O</b>                                | 2 DI + 2 DO (programmable), more I/O with sync module  |         |         |         |         |         |
| <b>Ambient temperature</b>                        | 0 ... 40°C full performance, up to 50°C with derating of 3% per Kelvin   |         |         |         |         |         |
| <b>Protection class</b>                           | IP 41  |         |         |         |         |         |
| <b>Noise level</b>                                | TBC <75 dB A (depending on load situation)   |         |         |         |         |         |
| <b>Self-protection</b>                            | Yes  |         |         |         |         |         |
| <b>Overheat protection</b>                        | Yes  |         |         |         |         |         |
| <b>Overvoltage and undervoltage protection</b>    | Yes  |         |         |         |         |         |
| <b>Earthing system</b>                            | TT, TN-C, TN-S, TN-C-S, IT, corner grounded delta  |         |         |         |         |         |
| <b>Altitude</b>                                   | <1000 m without derating; Up to 4000m with derating 1% / 100m  |         |         |         |         |         |
| <b>Ambient conditions</b>                         | Pollution degree 2<br>Relative humidity <95% non-condensing, 3K3<br>Temperature: Storage 55°C, 1K3, 1K4, Transportation -25°C to 75°C, 2K3 |         |         |         |         |         |
| <b>Approval</b>                                   | CE, RoHS   |         |         |         |         |         |
| <b>Design standards</b>                           | IEC 61000-4-2, 4-3, 4-4, 4-5, 4-6<br>EN 61000-3-11, 3-12<br>EN 61000-6-2, 6-4<br>EN 55011<br>EN 62477-1                                    |         |         |         |         |         |

\* Parameters of cabinet configuration without power modules

## Ecosine Active Sync Cabinet Versions And Options



Not all combination of options are available, please consult Schaffner sales or your local representative.

## Ecosine Active Sync Cabinet L Version Selection Tables

### Cabinet selection master cabinet with Sync module

| Designation        | Voltage     | Sync module | Mitigation current | 3-/4-wire setup | Power module | User interface | Protection (main switch) | Certification |
|--------------------|-------------|-------------|--------------------|-----------------|--------------|----------------|--------------------------|---------------|
| FN3545-S1203WHXX-L | 200-480 VAC | Yes         | 120                | 3W              | 2xFN3530     | HMI 7"         | No                       | CE            |
| FN3545-S1204WHXX-L | 200-415 VAC | Yes         | 120                | 4W              | 2xFN3540     | HMI 7"         | No                       | CE            |
| FN3545-S1803WHXX-L | 200-480 VAC | Yes         | 180                | 3W              | 3xFN3530     | HMI 7"         | No                       | CE            |
| FN3545-S1804WHXX-L | 200-415 VAC | Yes         | 180                | 4W              | 3xFN3540     | HMI 7"         | No                       | CE            |
| FN3545-S2403WHXX-L | 200-480 VAC | Yes         | 240                | 3W              | 4xFN3530     | HMI 7"         | No                       | CE            |
| FN3545-S2404WHXX-L | 200-415 VAC | Yes         | 240                | 4W              | 4xFN3540     | HMI 7"         | No                       | CE            |
| FN3545-S3003WHXX-L | 200-480 VAC | Yes         | 300                | 3W              | 5xFN3530     | HMI 7"         | No                       | CE            |
| FN3545-S3004WHXX-L | 200-415 VAC | Yes         | 300                | 4W              | 5xFN3540     | HMI 7"         | No                       | CE            |
| FN3545-S1203WHXP-L | 200-480 VAC | Yes         | 120                | 3W              | 2xFN3530     | HMI 7"         | Yes                      | CE            |
| FN3545-S1204WHXP-L | 200-415 VAC | Yes         | 120                | 4W              | 2xFN3540     | HMI 7"         | Yes                      | CE            |
| FN3545-S1803WHXP-L | 200-480 VAC | Yes         | 180                | 3W              | 3xFN3530     | HMI 7"         | Yes                      | CE            |
| FN3545-S1804WHXP-L | 200-415 VAC | Yes         | 180                | 4W              | 3xFN3540     | HMI 7"         | Yes                      | CE            |
| FN3545-S2403WHXP-L | 200-480 VAC | Yes         | 240                | 3W              | 4xFN3530     | HMI 7"         | Yes                      | CE            |
| FN3545-S2404WHXP-L | 200-415 VAC | Yes         | 240                | 4W              | 4xFN3540     | HMI 7"         | Yes                      | CE            |
| FN3545-S3003WHXP-L | 200-480 VAC | Yes         | 300                | 3W              | 5xFN3530     | HMI 7"         | Yes                      | CE            |
| FN3545-S3004WHXP-L | 200-415 VAC | Yes         | 300                | 4W              | 5xFN3540     | HMI 7"         | Yes                      | CE            |

### Extension cabinet selection

| Designation        | Voltage     | Sync module | Mitigation current | 3-/4-wire setup | Power module | User interface | Protection (main switch) | Certification |
|--------------------|-------------|-------------|--------------------|-----------------|--------------|----------------|--------------------------|---------------|
| FN3545-S1803WXXX-L | 200-480 VAC | Yes         | 180                | 3W              | 3xFN3530     | None           | No                       | CE            |
| FN3545-S1804WXXX-L | 200-415 VAC | Yes         | 180                | 4W              | 3xFN3540     | None           | No                       | CE            |
| FN3545-S2403WXXX-L | 200-480 VAC | Yes         | 240                | 3W              | 4xFN3530     | None           | No                       | CE            |
| FN3545-S2404WXXX-L | 200-415 VAC | Yes         | 240                | 4W              | 4xFN3540     | None           | No                       | CE            |
| FN3545-S3003WXXX-L | 200-480 VAC | Yes         | 300                | 3W              | 5xFN3530     | None           | No                       | CE            |
| FN3545-S3004WXXX-L | 200-415 VAC | Yes         | 300                | 4W              | 5xFN3540     | None           | No                       | CE            |
| FN3545-S1803WXXP-L | 200-480 VAC | Yes         | 180                | 3W              | 3xFN3530     | None           | Yes                      | CE            |
| FN3545-S1804WXXP-L | 200-415 VAC | Yes         | 180                | 4W              | 3xFN3540     | None           | Yes                      | CE            |
| FN3545-S2403WXXP-L | 200-480 VAC | Yes         | 240                | 3W              | 4xFN3530     | None           | Yes                      | CE            |
| FN3545-S2404WXXP-L | 200-415 VAC | Yes         | 240                | 4W              | 4xFN3540     | None           | Yes                      | CE            |
| FN3545-S3003WXXP-L | 200-480 VAC | Yes         | 300                | 3W              | 5xFN3530     | None           | Yes                      | CE            |
| FN3545-S3004WXXP-L | 200-415 VAC | Yes         | 300                | 4W              | 5xFN3540     | None           | Yes                      | CE            |

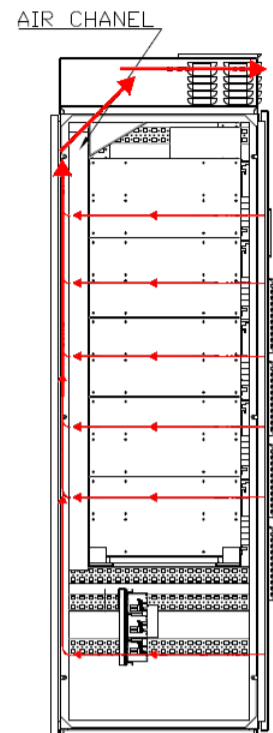
### Cabinet selection without Sync module

| Designation        | Voltage     | Sync module | Mitigation current | 3-/4-wire setup | Power module           | User interface | Protection (main switch) | Certification |
|--------------------|-------------|-------------|--------------------|-----------------|------------------------|----------------|--------------------------|---------------|
| FN3545-X0603WHXX-L | 200-480 VAC | No          | 60                 | 3W              | 1xFN3531               | HMI 7"         | No                       | CE            |
| FN3545-X0604WHXX-L | 200-415 VAC | No          | 60                 | 4W              | 1xFN3541               | HMI 7"         | No                       | CE            |
| FN3545-X1203WHXX-L | 200-480 VAC | No          | 120                | 3W              | 1xFN3531 +<br>1xFN3530 | HMI 7"         | No                       | CE            |
| FN3545-X1204WHXX-L | 200-415 VAC | No          | 120                | 4W              | 1xFN3541 +<br>1xFN3540 | HMI 7"         | No                       | CE            |
| FN3545-X0603WHXP-L | 200-480 VAC | No          | 60                 | 3W              | 1xFN3531               | HMI 7"         | Yes                      | CE            |
| FN3545-X0604WHXP-L | 200-415 VAC | No          | 60                 | 4W              | 1xFN3541               | HMI 7"         | Yes                      | CE            |
| FN3545-X1203WHXP-L | 200-480 VAC | No          | 120                | 3W              | 1xFN3531 +<br>1xFN3530 | HMI 7"         | Yes                      | CE            |
| FN3545-X1204WHXP-L | 200-415 VAC | No          | 120                | 4W              | 1xFN3541 +<br>1xFN3540 | HMI 7"         | Yes                      | CE            |

## Cooling Specification Of Ecosine Active Sync Cabinet

| Parameter   | Values                   |
|---|--------------------------|
| Protection category                                     | IP 41                    |
| Default color   | RAL 7035                 |
| Required air flow per module                            | 270 m <sup>3</sup> /h    |
| Maximum air flow per cabinet                            | 1400 m <sup>3</sup> /h   |
| Air flow through fuse section                           | 100 m <sup>3</sup> /h    |
| Area - air inlet per module                             | Min. 450 cm <sup>2</sup> |
| Area - air duct channel behind power modules            | Min. 370 cm <sup>2</sup> |
| 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 <sup>2</sup> |
| 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



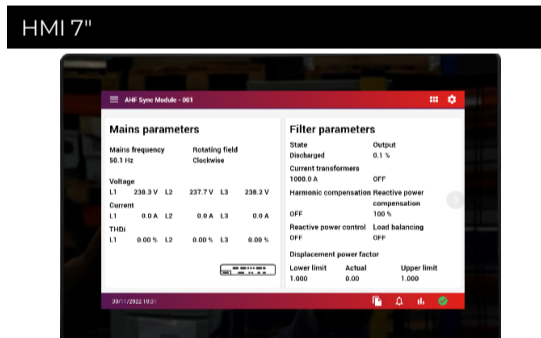
## Technical Specification For Sync Module

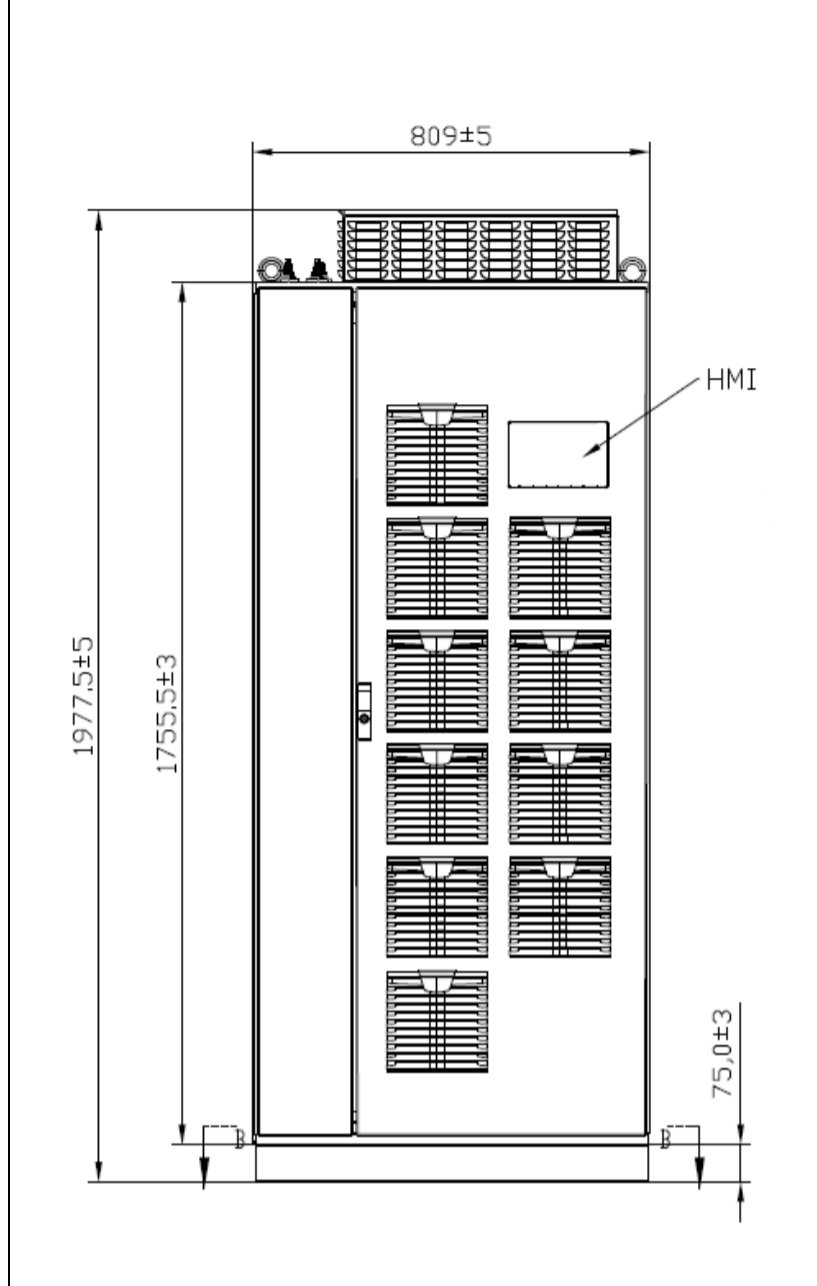
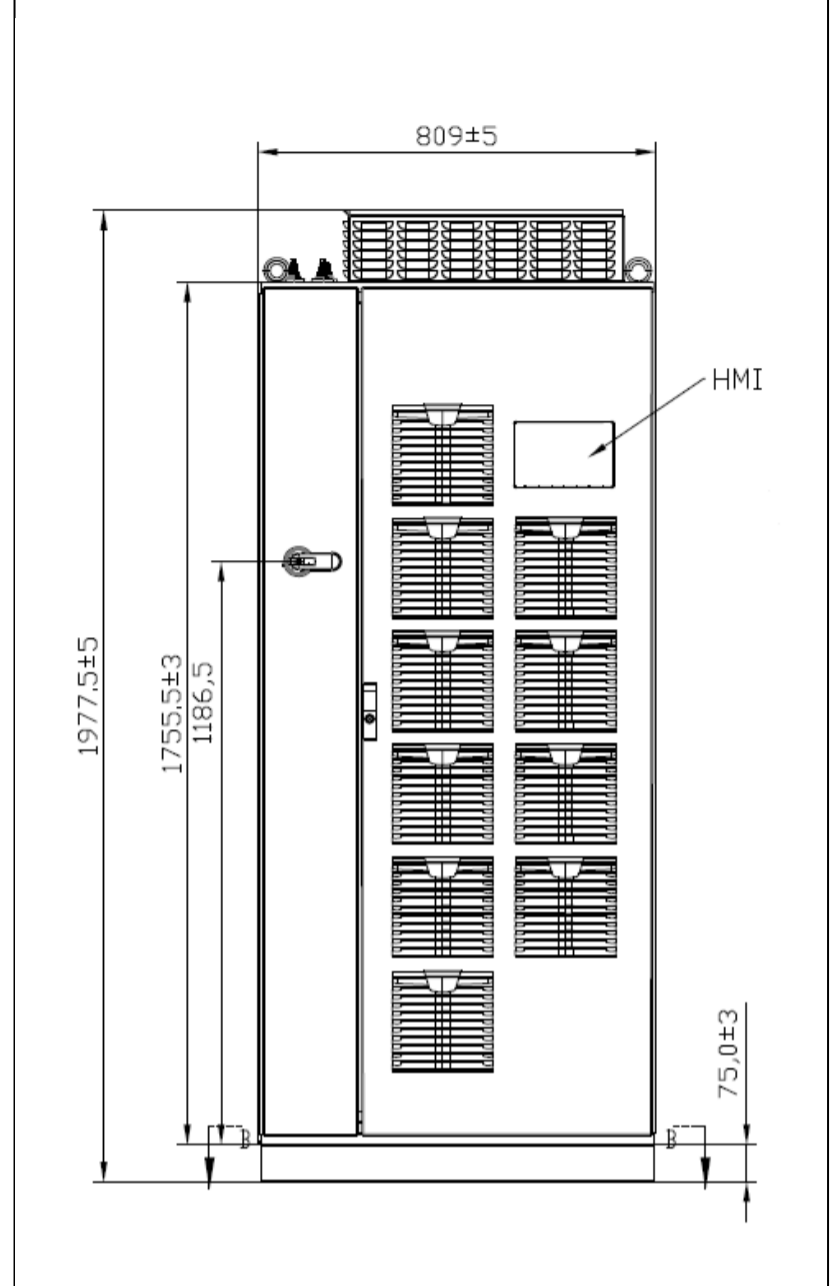
|                    |  |
|--------------------|--|
| Input voltage      | 22,0...27,0 VDC  |
| Nominal current    | <1 A   |
| Dimensions         | 440 mm x 200 mm x 87 mm (w x d x h)  |
| Weight             | 3.0 kg   |
| Protection class   | IP 20 (optional IP 21)   |
| Digital I/O        | 3 DI,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

## Ecosine Active Sync - HMI

### 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.



**Cabinet Without Switch Protection (X-L)****Cabinet L With Switch Protection (P-L)**

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