

August 2015

**ECOsine® active Harmonic Filters**  
Operating and Installation Instructions (V6)

**SCHAFFNER**  
energy efficiency and reliability





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Other technical documentation of our products is also available in the download area of our website.

Valid for firmware version:

**From V02.08.19 on**

(For firmware version, see parameter P010)

Meaning of firmware version number:

**V XX.xx.xx** – hardware release, downwards incompatible

**V xx.XX.xx** – function version

**V xx.xx.XX** – small compatible changes

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# 1 General Safety Instructions

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## 1.1 Intended use

The ECOsine® active harmonic filter is used for active compensation of reactive power and harmonic content and for load balancing.

Please ensure that no compensation systems, which are not detuned, are connected to the same grid. Otherwise interactions between ECOsine® active and these compensation systems may occur.



**DANGER**

Dangerous voltage

**Risk of death due to short circuits and electric shock if the active filter is opened improperly. The discharge time of the intermediate circuit after disconnecting from the mains can be more than 5 minutes.**

All interventions involving opening the device cover or removing or installing the connection cable may only be performed by qualified personnel.



**WARNING**

High-frequency interferences

**In a residential environment, high-frequency interferences could occur, which necessitate interference suppression.**

### Note

Please note that there are additional manuals for some product variants. For the latest versions of these manuals go to [www.schaffner.com](http://www.schaffner.com)

It particularly applies to types FN3420-100/120-400-3-GL, please observe the special EMC-Filter Manual for these types (ECOsine EMC Filters for Applications with GL)

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## 1.2 Personnel qualification

Installation of the ECOsine® active filter, inspections for proper operation, and certain troubleshooting measures may only be performed by qualified personnel. All other measures may be performed by people who have read these instructions.

## 1.3 Environmental conditions / Exclusion of warranty

This document classifies groups of environmental parameters and their severities to which ECOsine® active harmonic filters are subjected when mounted for stationary use at weather protected locations under use conditions, including periods of erection work, down time, maintenance and repair. The lifetime of electronic equipment is depending on the environmental conditions they are exposed to. Especially in harsh environments lifetime is reduced due to the corrosiveness of the atmospheric environment. Generally corrosion in micro or power electronics depends on several variants such as the package type, materials involved, assembly processes, moisture, inorganic and organic contaminants, atmospheric pollutants, temperature, thermal stress and electrical bias. To increase the lifetime Schaffner provides all ECOsine® active filters with the ability to work within pollution degree 2 (PD2) and does use coated PCB's according to IEC61721-3-3. Schaffner standard PCB construction complies with class 3C2. Please carefully read the provided information and check if your application fulfills the required specifications as **Schaffner expressly points out that the manufacturer's warranty shall lapse with immediate effect if ECOsine® active harmonic filters are transported, stored, installed or operated outside their published specifications.**



### IMPORTANT!

ECOsine® active harmonic filters (AHF) listed below are IP20 or IP54 devices to be installed in an environment in compliance with the requirements named in this document.

All AHF must be installed in a clean, dry location, e.g. in sufficiently ventilated or air conditioned electric cabinets or closed electric rooms. Contaminants such as oils, liquids, corrosive vapors, abrasive debris, dust and aggressive gases must be kept out of the filter enclosure.

**WARNING: Conductive dust may cause damage to ECOsine® active harmonic filters. Ensure that installation site of AHF is free of conductive dust.**

<b>Products</b>	FN3420 series, 3-wire filters, models 30...300A FN3430 series, 4-wire filters, models 30...300A
<b>Overvoltage class (EN50178)</b>	ECOsine® active are designed according to EN 50178 overvoltage class III
<b>Storage environmental specifications (IEC 60721-3-1, EN50178)</b>	Climate conditions for storage class 1K3: <ul style="list-style-type: none"> <li>■ Temperature range: -25°C to +55°C</li> <li>■ Relative humidity: &lt; 95%, no condensation</li> <li>■ Atmospheric pressure: 70KPa to 106KPa</li> </ul>

**Transportation environmental specifications**  
(IEC 60721-3-2, EN50178)

Climate conditions for transport class 2K3:

- Temperature range: -25°C to +70°C
- Relative humidity: < 95%, no condensation
- Atmospheric pressure: 70KPa to 106KPa

**Operation environmental specifications**  
(IEC 60721-3-3, EN50178)

Climate conditions for operation class 3K3:

- Temperature range: 0°C to +40°C
- Relative humidity: < 95%, no condensation
- Atmospheric pressure: 70KPa to 106KPa

**Degree of pollution**  
(IEC 61010, EN50178)

Pollution conditions for operation class PD2

**Corrosive levels**  
(IEC 60721-3-3)Corrosive levels for storage, transport and operation Class 3C2<sup>(3)</sup>:

- Applies to locations with normal levels of contaminants, experienced in urban areas with industrial activities
- Levels:

Environmental parameter	Units <sup>(1)</sup>	Class 3C2 <sup>(2)</sup>	
		Mean value	Max value
Sea salt		Salt mist	
Sulphur dioxide	ppm cm <sup>3</sup> /m <sup>3</sup>	0.3 0.11	1.0 0.37
Hydrogen sulphide	ppm cm <sup>3</sup> /m <sup>3</sup>	0.1 0.071	0.5 0.36
Chlorine	ppm cm <sup>3</sup> /m <sup>3</sup>	0.1 0.034	0.3 0.1
Hydrogen chloride	ppm cm <sup>3</sup> /m <sup>3</sup>	0.1 0.066	0.5 0.33
Hydrogen fluoride	ppm cm <sup>3</sup> /m <sup>3</sup>	0.01 0.012	0.03 0.036
Ammonia	ppm cm <sup>3</sup> /m <sup>3</sup>	1.0 1.4	3.0 4.2
Ozone	ppm cm <sup>3</sup> /m <sup>3</sup>	0.05 0.025	0.1 0.05
Nitrogen oxides	ppm cm <sup>3</sup> /m <sup>3</sup>	0.5 0.26	1.0 0.52

<sup>(1)</sup> The values given in cm<sup>3</sup>/m<sup>3</sup> have been calculated from the values given in mg/m<sup>3</sup> and refer to a temperature of 20 °C and a pressure of 101,3 kPa. The table uses rounded values.

<sup>(2)</sup> Mean values are expected long-term values. Maximum values are limit or peak values, occurring over a period of time of not more than 30 min per day.

<sup>(3)</sup> IEC 60721-3-3 is only applied to the coated PCB covered areas and not the entire device. The unprotected areas, such as connections, terminations and exposed magnetics, may not survive these exposure levels over time.

## **2 Introduction**

## 2.1 Functions of the active filter

The ECOsine® active filter enables:

- Reduction of the current THD
- Reduction of the harmonic current content
- Compensation of reactive power and an improvement of the power factor  $\cos \varphi$ , inductive and capacitive
- Display of mains current and voltage
- Load balancing

## 2.2 Principle of operation

The ac mains current, which is drawn by a non-linear load, is measured by ECOsine® active either directly or indirectly via external current transformers. The harmonic content and reactive power components are detected and processed in a digital control structure. The active filter continually generates a compensating current that offsets the harmonic content and reactive current in the load, so the ac mains only has to provide the minimum fundamental in phase current.

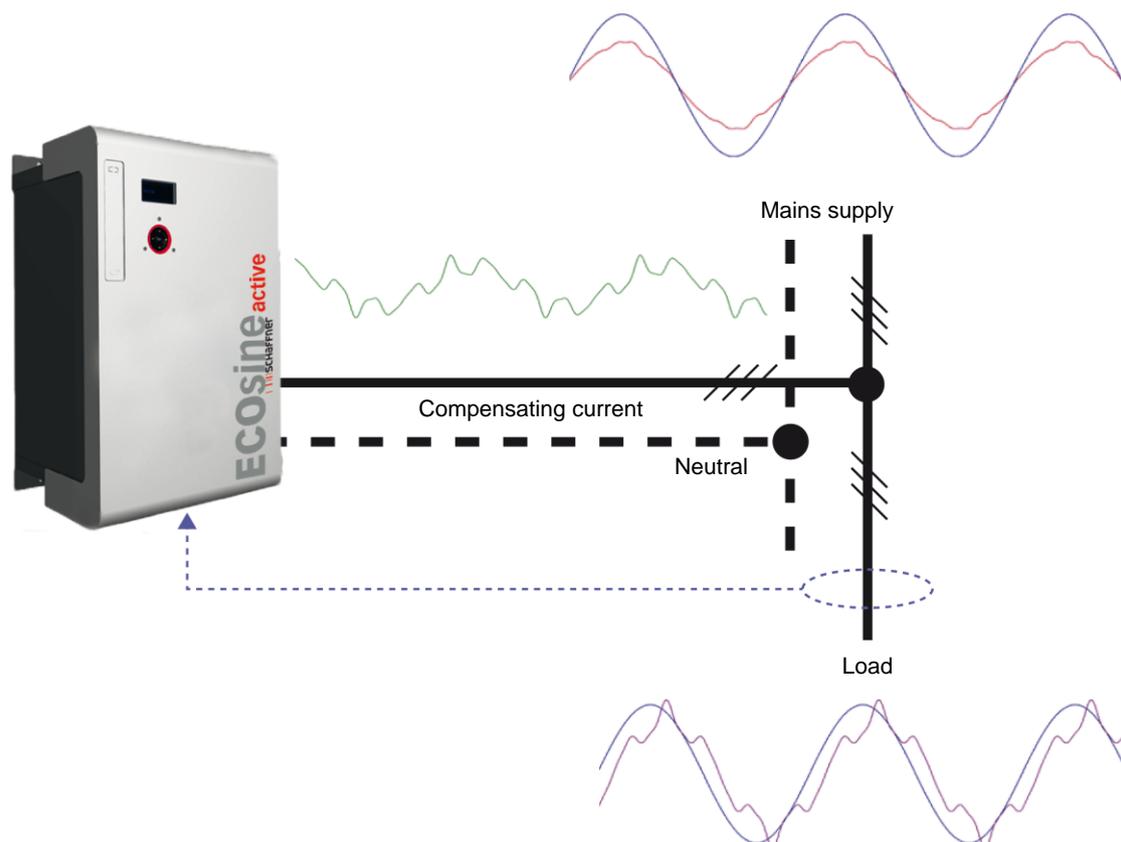


Fig. 1: Principle of operation of the ECOsine® active filter

The active filter instantly adapts to all changes in the load and the systems harmonic content spectrum, in order to be able to optimally respond at any time.

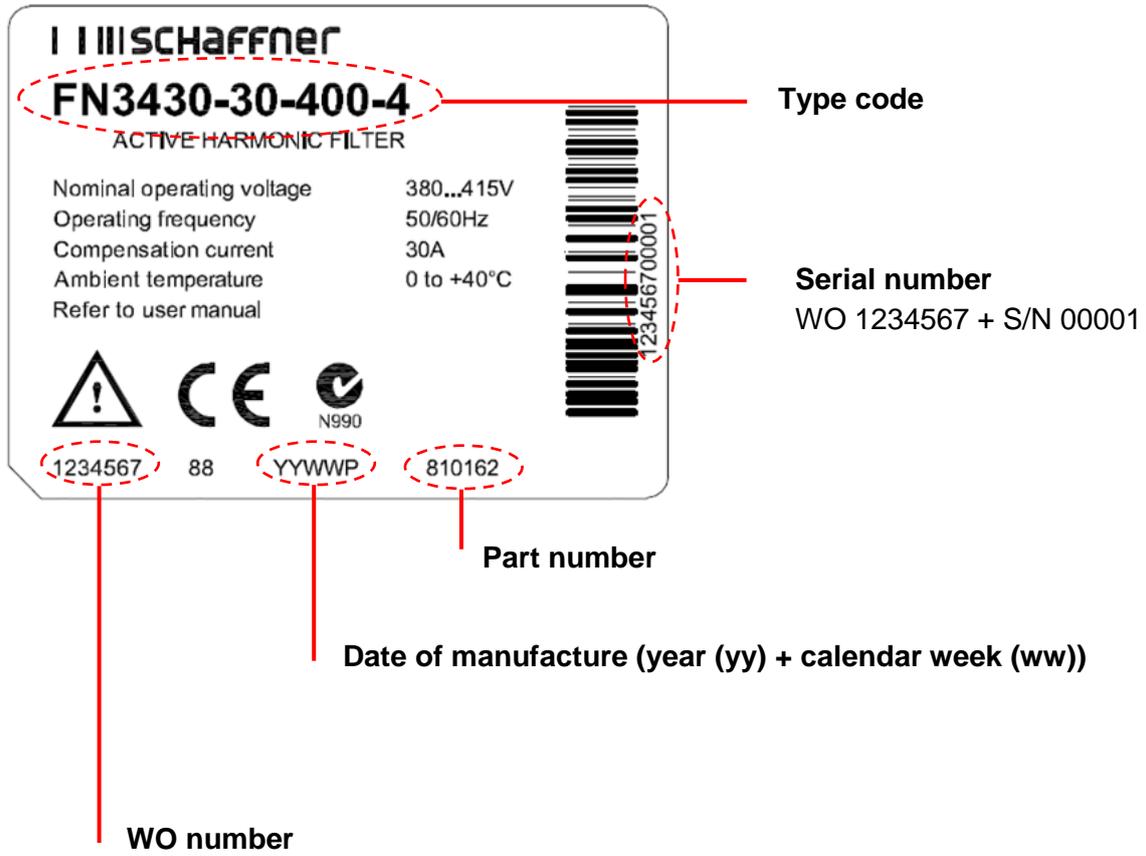
## 2.3 About these instructions

The following symbols, terms and designations are used in these operating and installation instructions:

	Description
<b>NOTICE</b>	Notice Follow these instructions to avoid damages to the unit.
 <b>CAUTION</b>	Caution Follow these instructions to avoid damages to the unit or injuries of personnel.
 <b>WARNING</b>	Warning Follow these instructions to avoid situations which may cause severe or deadly injuries.
 <b>DANGER</b>	Danger Follow these instructions to avoid situations which may cause severe or deadly injuries.
 <b>DANGER</b>	Dangerous voltage Follow these instructions to avoid situations which cause severe or deadly injuries due to dangerous electrical voltage.
<b>NOTE</b> <b>Note text</b>	Note Please observe these notes..
⇒ <b>1.</b> <b>2.</b>	Operation steps Complete the operation described (multiple steps are numbered, arrow indicates a single step).

Table 1: Use of symbols, terms, and designations

## 2.4 Type plate



---

## 2.5 Type code

The type designations of all ECOsine® active have the following structure:  
FN34TT-AAA-VVV-W-CC

<b>Variable</b>	<b>Description</b>
TT	Type: 20 – 3-wire device 30 – 4-wire device
AAA	Rated current
VVV	Rated voltage
W	Number of compensated conductors
CC	Certificates and variants (optional)

Table 2: Type code

# 3 Installation and Electrical Connection



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Dangerous Voltage

**Risk of death due to short circuits and electric shock if grounding is missing or by contact with liquids.**

- ⇒ Make absolutely sure that the filter is grounded.
- ⇒ Do not set up the filter near liquids.
- ⇒ Do not expose the filter to excessive humidity.
- ⇒ Remove or open the covers/doors only if the power is switched off.

---

**NOTICE**

Insufficient Ventilation

**Insufficient ventilation or inadequate heat dissipation can cause overheating and damage the unit.**

- ⇒ Do not cover the ventilation grilles.
  - ⇒ If installed in a switch cabinet, make sure that the thermal energy is removed (see Technical data in chapter 7).
-

### 3.1 Transport requirements ECOsine® active FN34xx-200/250/300-xxx-x

Please note the following transport requirements when transporting the device by crane:

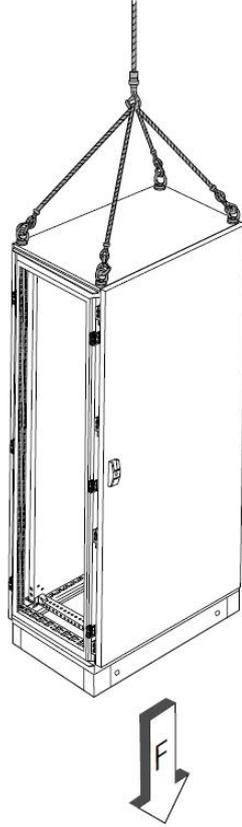


Fig. 2: Cable transport scheme

Designation	Value	Note
Weight F	min. 5300 N	Use suitable crane and cables, consider the additional packaging weight.

Cable angle	min. 60°
-------------	----------

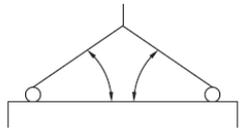


Table 3: Transport requirements

## 3.2 Commissioning after longer storage

Active harmonic filters (AHF) contain – like frequency inverters – capacitors in the DC link. After longer storage without connection to the grid the DC link capacitors must be formed. Please observe the following instructions and contact Schaffner service if necessary. The storage time is calculated from the date of manufacture and not when the AHF was supplied. The week of manufacture is coded on the type plate. To keep formation during longer storage please follow the instruction:

Cycle	Procedure	Note
Min. every year	Connect AHF to grid	In this case the AHF will keep its formation for min. 2 hours

Table 4: Preventative formation in case of longer storage:

If this preventative formation has not been made, when putting the AHF into operation after proceed longer storage proceed as follows:

Storage time	Procedure
< 1 year	No additional action required
1-2 years	Connect AHF to grid min. 1 hour before operating Afterwards AHF is ready for operation
2-3 years	Using a regulated power supply – supply the AHF as follows <ul style="list-style-type: none"> <li>■ 30 minutes with 25% of rated voltage</li> <li>■ 30 minutes with 50% of rated voltage</li> <li>■ 30 minutes with 75% of rated voltage</li> <li>■ 30 minutes with 100% of rated voltage</li> </ul> Afterwards AHF is ready for operation.
> 3 years	Using a regulated power supply – supply the AHF as follows <ul style="list-style-type: none"> <li>■ 2 hours with 25% of rated voltage</li> <li>■ 2 hours with 50% of rated voltage</li> <li>■ 2 hours with 75% of rated voltage</li> <li>■ 2 hours with 100% of rated voltage</li> </ul> Afterwards AHF is ready for operation.

Table 5: Formation instructions for DC link capacitors

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## 3.3 Cooling circuit (ECOsine® active FN34xx-200/250/300-xxx-x)

Please observe the following installation instructions:

**Integrated cooling circuit with heat exchanger LNKS-8**  
(See chapter 3.3.1)

**Collecting tray with drain-tube**  
(See chapter 3.3.3)

**Interior air cooling SK3305.xxx**  
(See chapter 3.3.4)

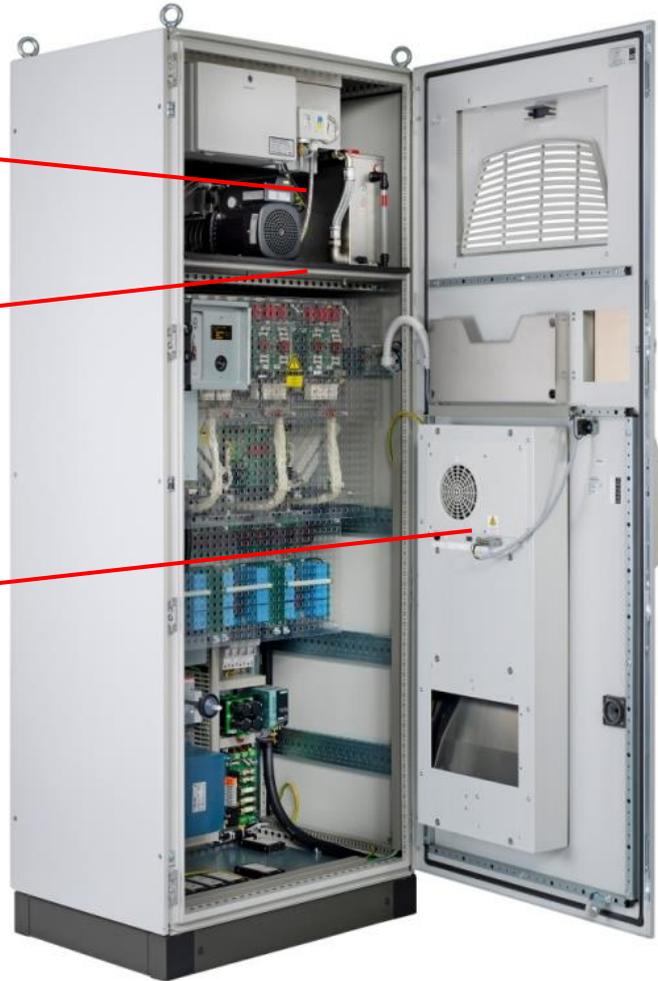


Fig. 3: Cooling equipment (ECOsine® active FN34xx-200/250/300-xxx-x)

### 3.3.1 Integrated cooling circuit with heat exchanger LNKS-8

These instructions describe water cooled systems from production week 14/2013 (for explanation of the type plate data, see chapter 2.4).

All ECOsine® active FN34xx-200/250/300-xxx-x devices are equipped with an internal, open cooling circuit. The cooling system consists of coolant tank, pump, water/air heat exchanger as well as display and monitoring equipment for pressure and temperature. The filling pressure in switched-off state (device is de-energized) is 0 bar (no initial pressure). The coolant can be refilled if required.



#### Refill cooling liquid carefully!

If any refill of cooling liquid is needed please use only water according to the hydrological data listed in the description (located in the document bag in front door)

Carefully perform the refill using the tank inlet on the top of the cabinet. Disconnect the cabinet from supply voltage before doing that.

The device monitors the operating pressure. If the pressure is too low, the filter is not released for operation and **Fault 9 "Liquid Cooling"** is displayed in the status line of the monitor. The pressure on the manometer (Fig. 4, ①) can be checked when the switch cabinet door is open.

Information on commissioning can be found in chapter 4.5

- ① Manometer
- ② Control unit
- ③ Pressure monitoring
- ④ Water/air heat exchanger
- ⑤ Filling level indication
- ⑥ Pump
- ⑦ Tank
- ⑧ Drain valve + tube
- ⑨ Filler cap

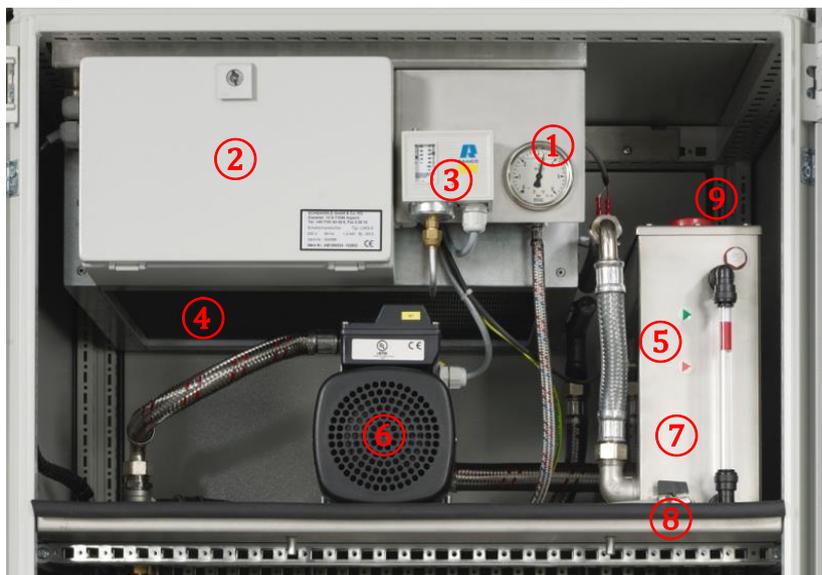


Fig. 4: Cooling system – main components

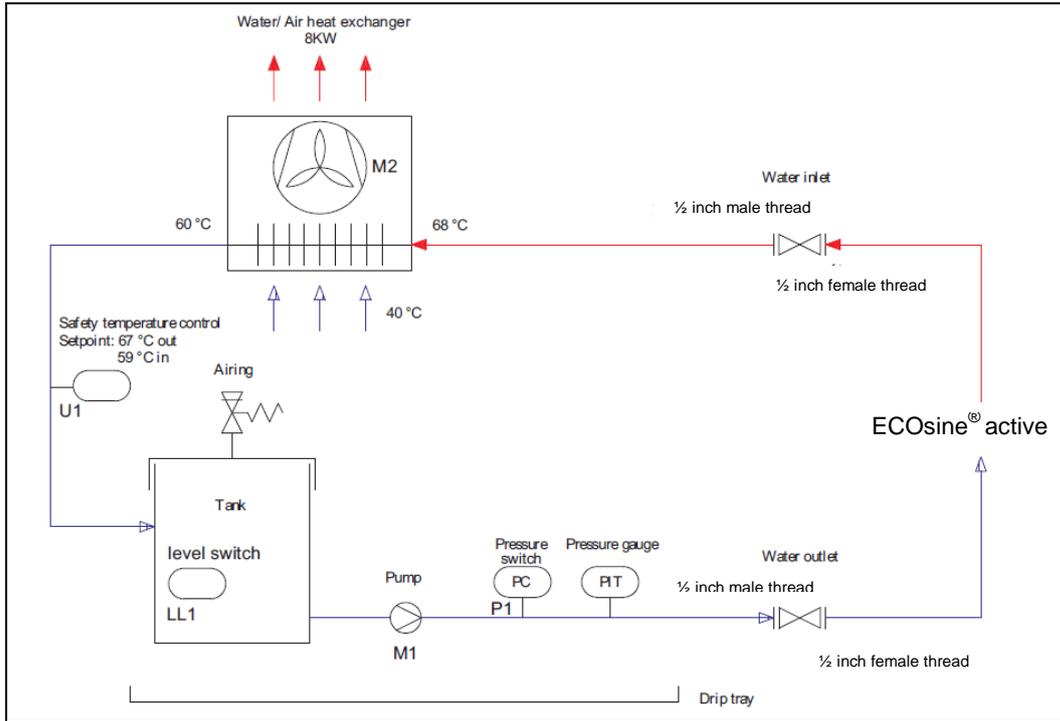


Fig. 5: Cooling system – hydraulic plan

**Description**

**Value / Note**

Coolant	Water-glycol mixture
Coolant manufacturer	Clariant
Coolant additive	Antifrogen N
Mixture ratio (water/coolant additive)	70/30
Coolant quantity	12 liters
Primary pressure	0 bar (in the switched off, de-energized condition)
Operating pressure	2.5 – 5.5 bar (depending on device type and mains frequency 50/60Hz)

Table 6: Technical data of cooling system

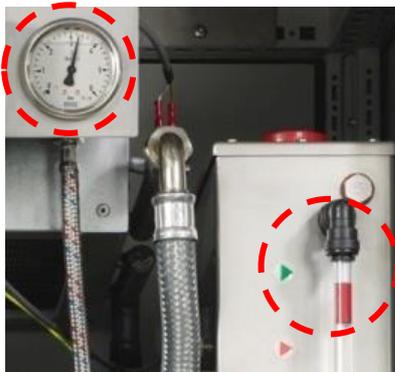


Fig. 6: Pressure and filling level indication of the cooling circuit

## 3.3.2 Information on commissioning the cooling system

### 400/480V ECOsine® active

Cooling system control unit in switch cabinet (Fig. 4, ②)

Please check the connection of the auxiliary supply and adjust it if required! Please do not operate the device using different voltage/frequency combinations.

- 400V/ 50Hz mains bridge between 7 and 8
- 480V/ 60Hz mains bridge between 8 and 9

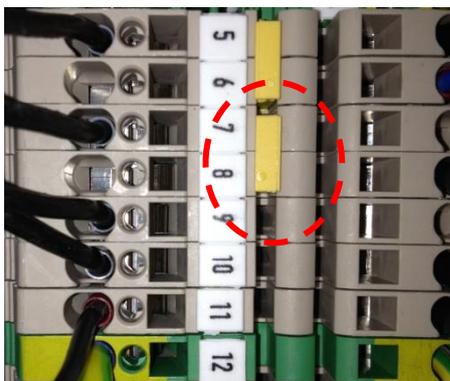


Fig. 7: Terminals for auxiliary power supply



### Setting correct voltage

Incorrectly set voltage can damage the device irreparably. Incorrect setting of auxiliary power supply voids the warranty of the device.

### 500-690V ECOsine<sup>®</sup> active

Please check the connection of the auxiliary supply and adjust it if required!

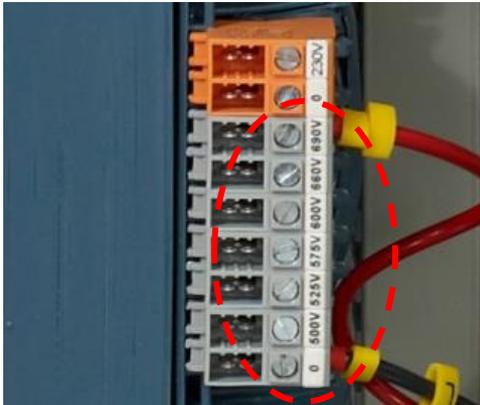


Fig. 8: Terminals for auxiliary power supply



**NOTICE**

#### **Setting correct voltage**

Incorrectly set voltage can damage the device irreparably. Incorrect setting of auxiliary power supply voids the warranty of the device.

---

### 3.3.3 Water collection tray with drain tube

In order to protect the IP54 space below, a water collection tray is integrated in the cabinet. Under normal conditions no liquid or condensate should accumulate in this tray.

In case of water entering the upper part of the enclosure it will be collected in the tray and drain through a drain-tube installed in the rear of the tray.

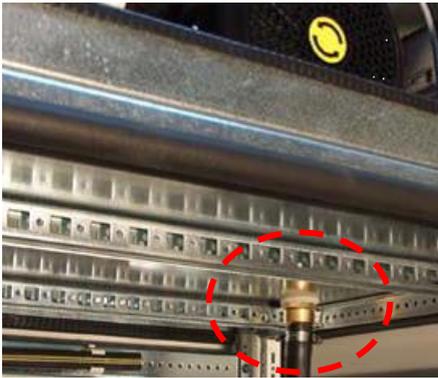


Fig. 9: Drain-tube of water tray



Fig. 10: Drain duct at the cabinet bottom

#### Note

##### Proper installation of the outlet hose

The drain has to be connected to a gully or a sufficiently large tank outside the switch cabinet. Max. 12 liters of liquid can escape by leakage. Liquid penetrating from the outside (e.g. splash water), if applicable, must be additionally taken into account!

### 3.3.4 Interior air cooling system SK3305.xxx

The interior air cooler mounted in the door is an active cooling system, which produces condensate. Normally, this condensate evaporates in the cooling unit such that no condensate escapes.

If the device is used under the specified environmental conditions, condensate escape is not to be expected provided that the switch cabinet openings are closed correctly.

#### Note

##### Install condensate drain if required

The evaporation system can evaporate up to 2.4l condensate/day. If the amount exceeded, condensate can escape at the overflow on the front side of the cooler.

If condensate escapes, check first whether the openings of the switch cabinet in particular in the area of the cable entry are sealed.

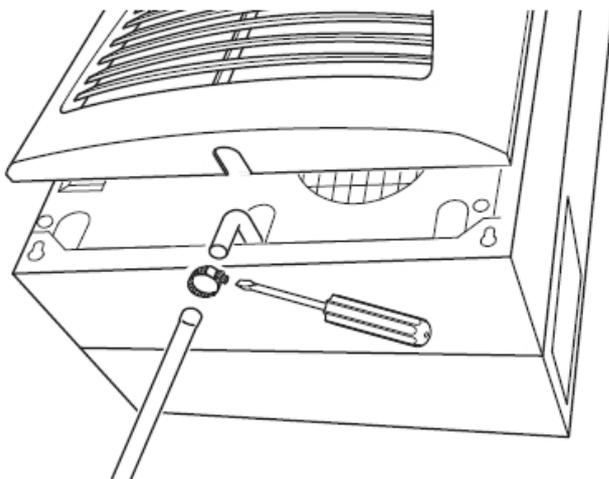


Fig. 11: Connection option for condensate drain at the interior air cooler

##### Seal cabinet entries

The cabinet openings (especially at the cable entry area) must be sealed after installation of the cables to avoid the suction of moist air and formation of condensate.



### 3.3.6 System messages via display – SK3305.5xx with comfort control

Valid starting from the following manufacturer data:

FN34xx-200/250/300-4xx-x: Starting from calendar week 37 2014 with W/O 3205199 S/N001  
 FN3420-200-690-3: Version has not been specified at the time of issue  
 FN3420-200-690-3-UL: Starting from calendar week 30 2014 with W/O 3204699 S/N001

Display indication	System message	Possible cause	Measures for troubleshooting
A01	Switch cabinet door open	Door open or door limit switch positioned incorrectly	Close the door, position the door limit switch correctly, if necessary, check the connection.
A02	Internal temperature of the control cabinet is too high	Cooling capacity is too low/ device is undersized. Consequential errors of messages A03 to A17.	Check the cooling capacity
A03	Filter monitoring	Filter mat soiled	Clean or replace; reset e-comfortcontroller (Reset)
A04	Ambient temperature is too high / too low	Ambient temperature is outside the permissible operating range (+10 °C to +60 °C)	Increase or decrease the ambient temperature (e.g. heat or ventilate the room)
A05	Risk of freezing	Operational indication in case of risk of freezing. Evaporator fan is possibly blocked mechanically, defective or cold air outlet is blocked.	Set the nominal value for the internal temperature of the cabinet. Regulate the evaporator fan, if necessary, unblock or replace it.

Display indication	System message	Possible cause	Measures for troubleshooting
A06	PSA <sup>H</sup> – pressure switch	Ambient temperature too high	Decrease the ambient temperature; reset e-comfortcontroller (Reset)
		Condenser soiled	Clean the condenser; reset e-comfortcontroller (Reset)
		Filter mat soiled	Clean or replace; reset e-comfortcontroller (Reset)
		Condenser fan defective	Replace; reset e-comfortcontroller (Reset)
		TX valve defective	Repair by the refrigeration engineer; reset e-comfortcontroller (Reset)
		PSA <sup>H</sup> -pressure switch defective	Replacement by the refrigeration engineer; reset e-comfortcontroller (Reset)
A07	Evaporator	Lack of refrigerant; sensor before or after the condenser is defective	Repair by the refrigeration engineer; reset e-comfortcontroller (Reset)
A08	Condensate warning	Condensate drain hose buckled or clogged	Check the condensate drain hose; eliminate possible kinks or clogging in the hose
		Only for devices with optional condensate evaporation	Check evaporation unit, if necessary, replace it.
A09	Condenser fan	Blocked or defective	Eliminate blocking; if necessary, replacement
A10	Evaporator fan	Blocked or defective	Eliminate blocking; if necessary, replacement
A11	Compressor	Compressor overloaded (internal winding protector)	No action; device switches on again automatically.
		Fault (check the resistance measurement of the winding)	Replacement by the refrigeration engineer
A12	Temperature sensor condenser	Open circuit or short circuit	Replacement
A13	Temperature sensor Ambient temperature	Open circuit or short circuit	Replacement
A14	Temperature sensor Freezing	Open circuit or short circuit	Replacement

Display indication	System message	Possible cause	Measures for troubleshooting
A15	Temperature sensor Condensate warning	Open circuit or short circuit	Replacement
A16	Temperature sensor Internal temperature	Open circuit or short circuit	Replacement
A17	Phase monitoring	Only for three-phase current devices: Wrong rotating field/phase missing	Interchange two phases
A18	EPROM error	New PCB installed	Software update necessary (only after PCB with more recent software has been installed): use code 22 to go to the programming level; press key 1 and confirm with "Set", until "Acc" is displayed. Disconnect the device from the network and connect it again.
A19	LAN / Master – Slave	Master and slave are not connected	Check the setting or cable
A20	Voltage drop	Fault indication is not displayed	Event is saved in the log file
E0	Display message	Connection problem between the display and control PCB	Reset: Switch off the power supply and then switch it on again after approx. 2 s
		Cable is defective; plug-in connection is loose	Replace the PCBs
OL	Overload	Ambient parameters or power dissipation outside the device application limit	
b07	Leakage Cooling circuit	Sensors B3 and B4 are interchanged	Replace the relevant sensors
rSt	Reset	Manual device reset required,	

Table 8: System messages cooling unit SK3305.5xx

### Resetting e-comfortcontroller (Reset)

After the faults A03, A06 and A07 you must reset the e-comfort controller (perform reset).  
 → Press the keys 1 (▲) and 3 (▼) (fig. 34) simultaneously and keep them pressed for 5 s.  
 The system messages disappear and the temperature indication is displayed.

Source: Mounting, installation and operating instructions control cabinet cooler by Rittal

## 3.4 Dimensional drawings

### 3.4.1 Dimensional drawings ECOsine® active FN3420-030/050-xxx-3

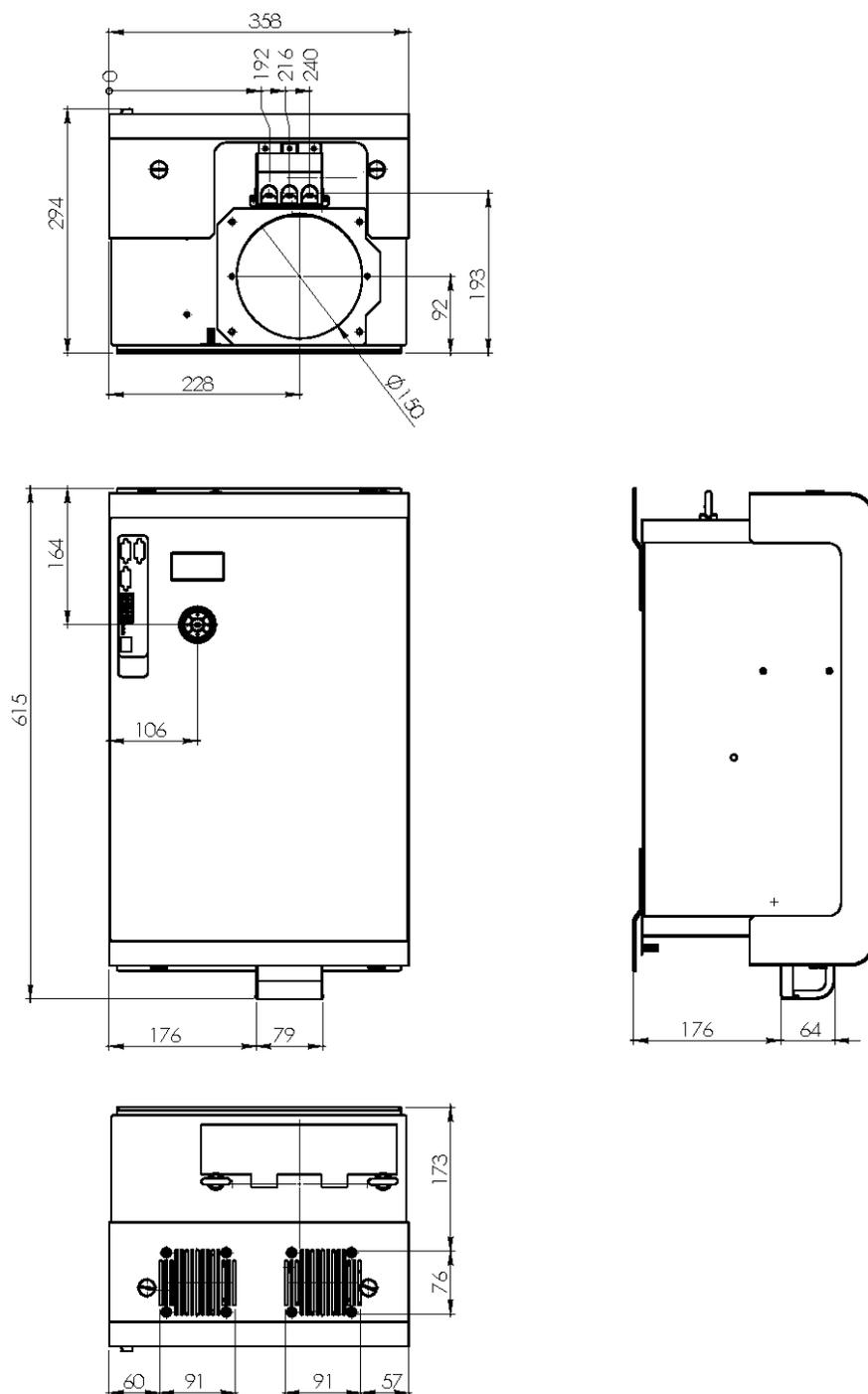


Fig. 12: Dimensional drawings ECOsine® active-030/050-xxx-3

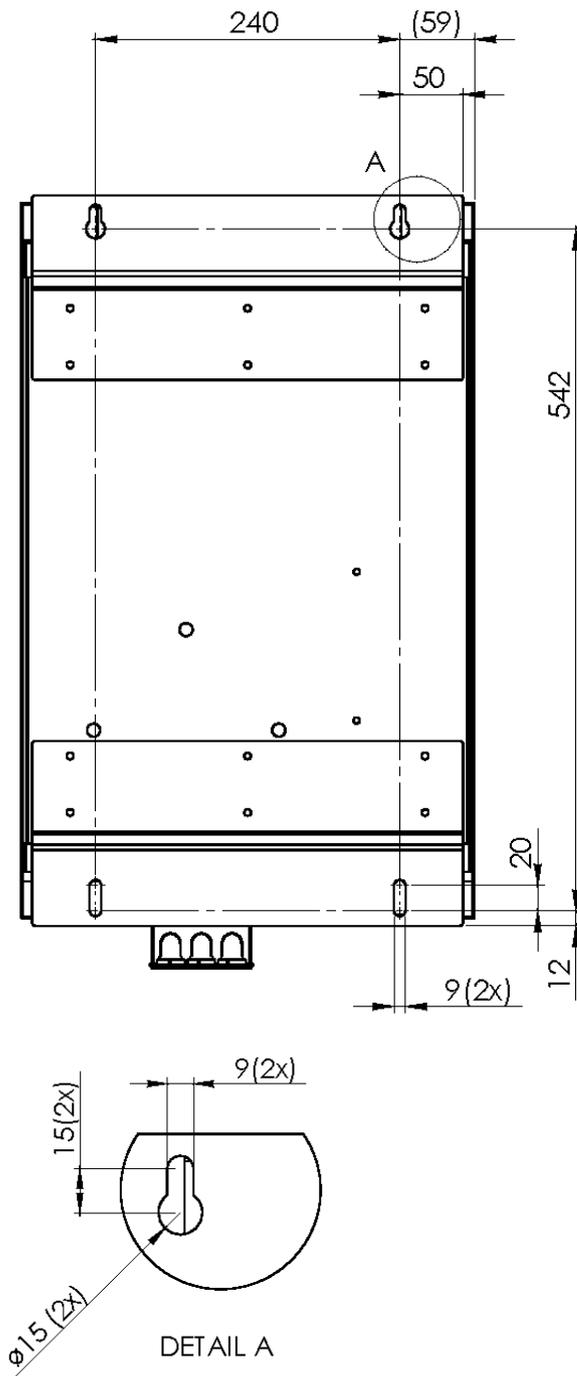


Fig. 13: Drilling template ECOsine® active FN3420-030/050-xxx-3

Side	Recommended minimum clearance
Top (air outlet)	300 mm
Bottom (air inlet)	300 mm
Lateral	50 mm

Table 9: Installation clearances ECOsine® active FN3420-030/050-xxx-3

### 3.4.2 Dimensional drawings ECOsine® active FN3430-030/060-xxx-4

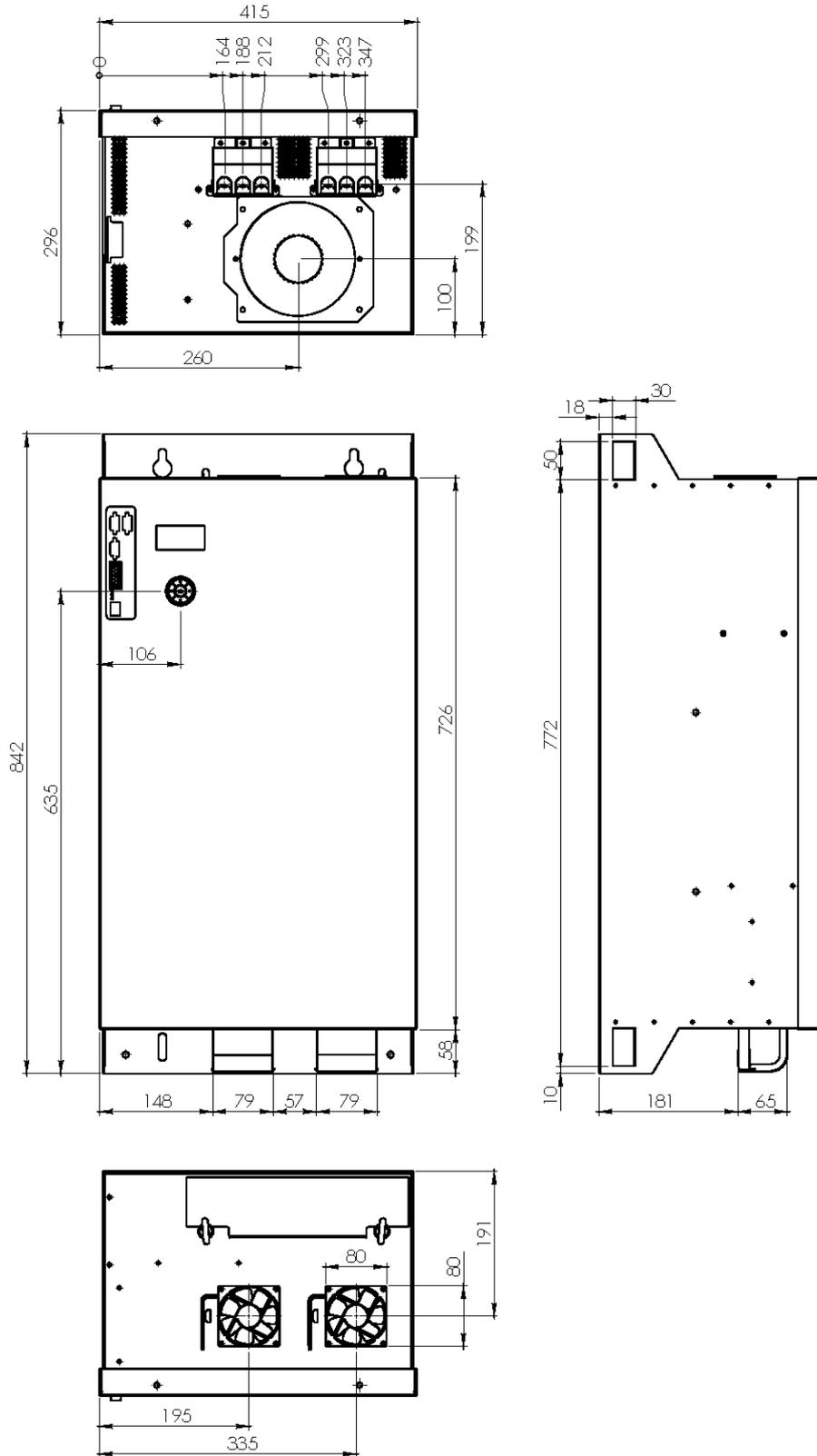


Fig. 14: Dimensional drawings ECOsine® active FN3430-030/060-xxx-4

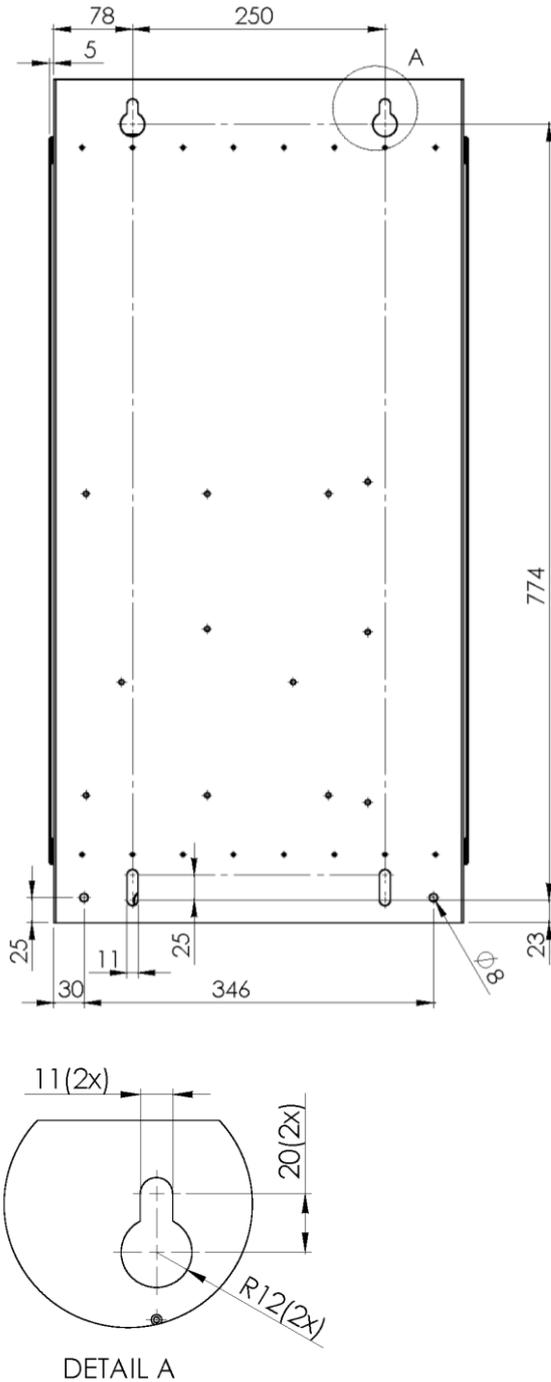


Fig. 15: Drilling template ECOsine® active FN3430-030/060-xxx-4

Side	Recommended minimum clearance
Top (air outlet)	300 mm
Bottom (air inlet)	300 mm
Lateral	Side-by-side installation without any clearance

Table 10: Installation clearances ECOsine® active FN3430-030/060-xxx-4

### 3.4.3 Dimensional drawings ECOsine® active FN3420-100/120-xxx-3

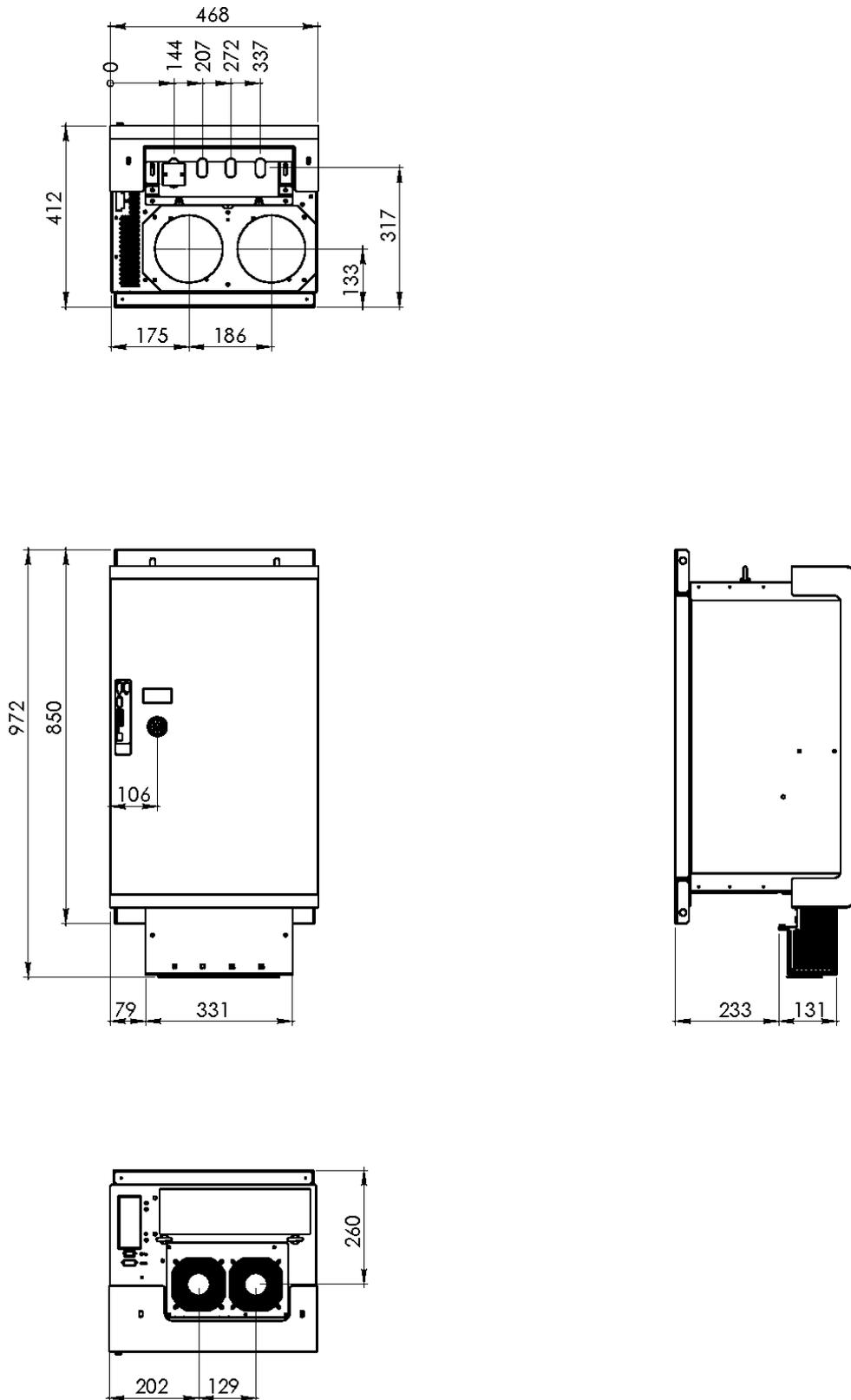


Fig. 16: Dimensional drawings ECOsine® active FN3420-100/120-xxx-3

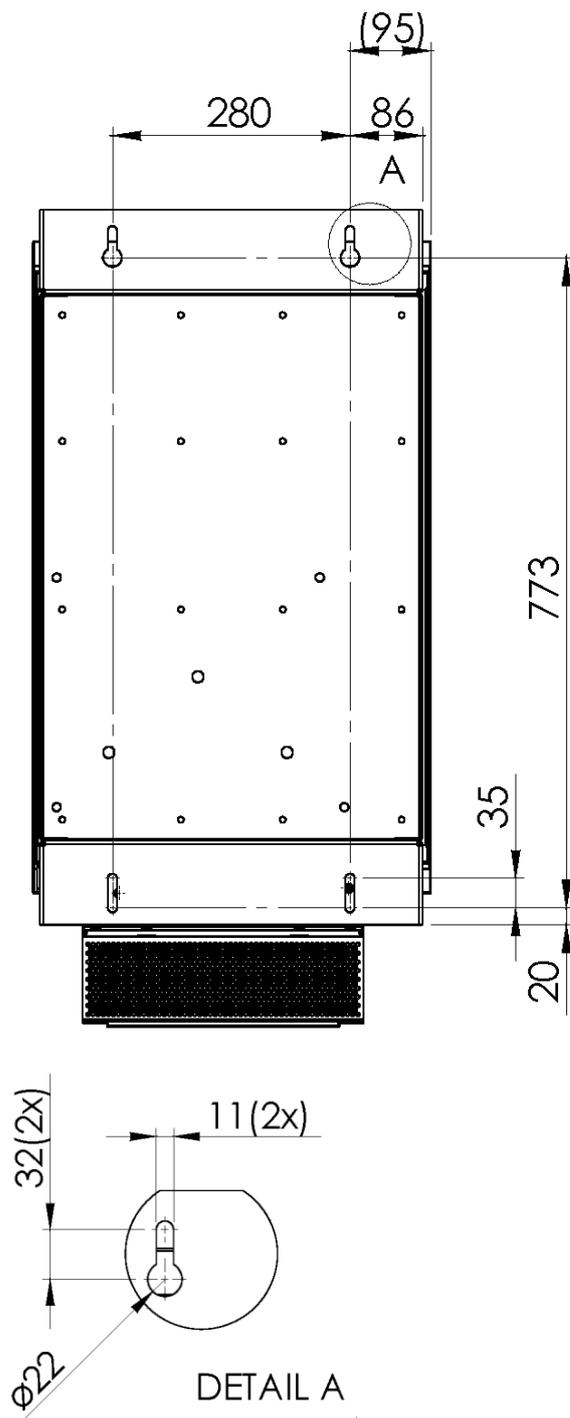


Fig. 17: Drilling template ECOsine® active-100/120-xxx-3

Side	Recommended minimum clearance
Top (air outlet)	300 mm
Bottom (air inlet)	300 mm
Lateral	50 mm

Table 11: Installation clearances ECOsine® active FN3420-100/120-xxx-3

### 3.4.4 Dimensional drawings ECOsine® active FN3420-100/120-480-3-GL

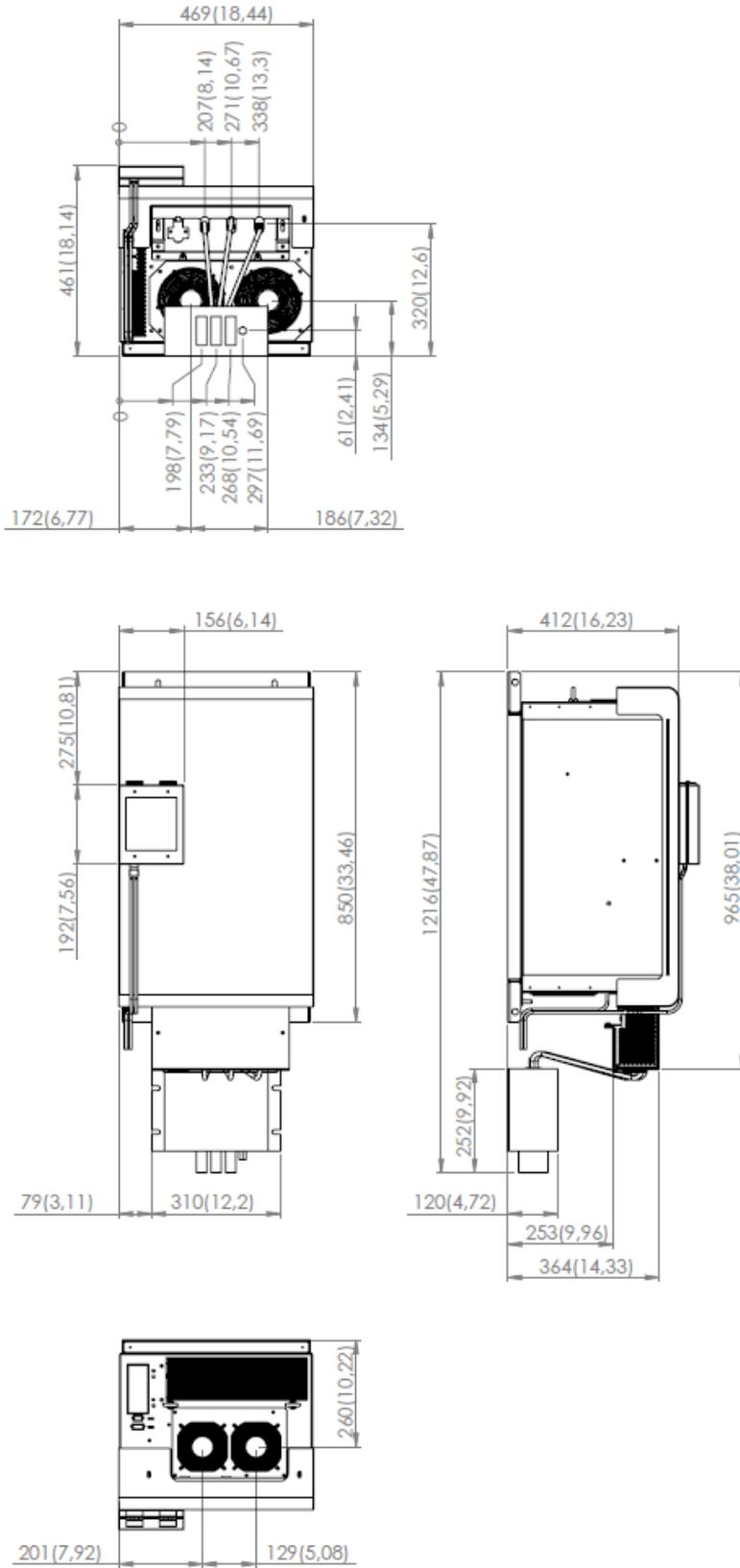


Fig. 18: Dimensional drawings ECOsine® active FN3420-100/120-480-3-GL

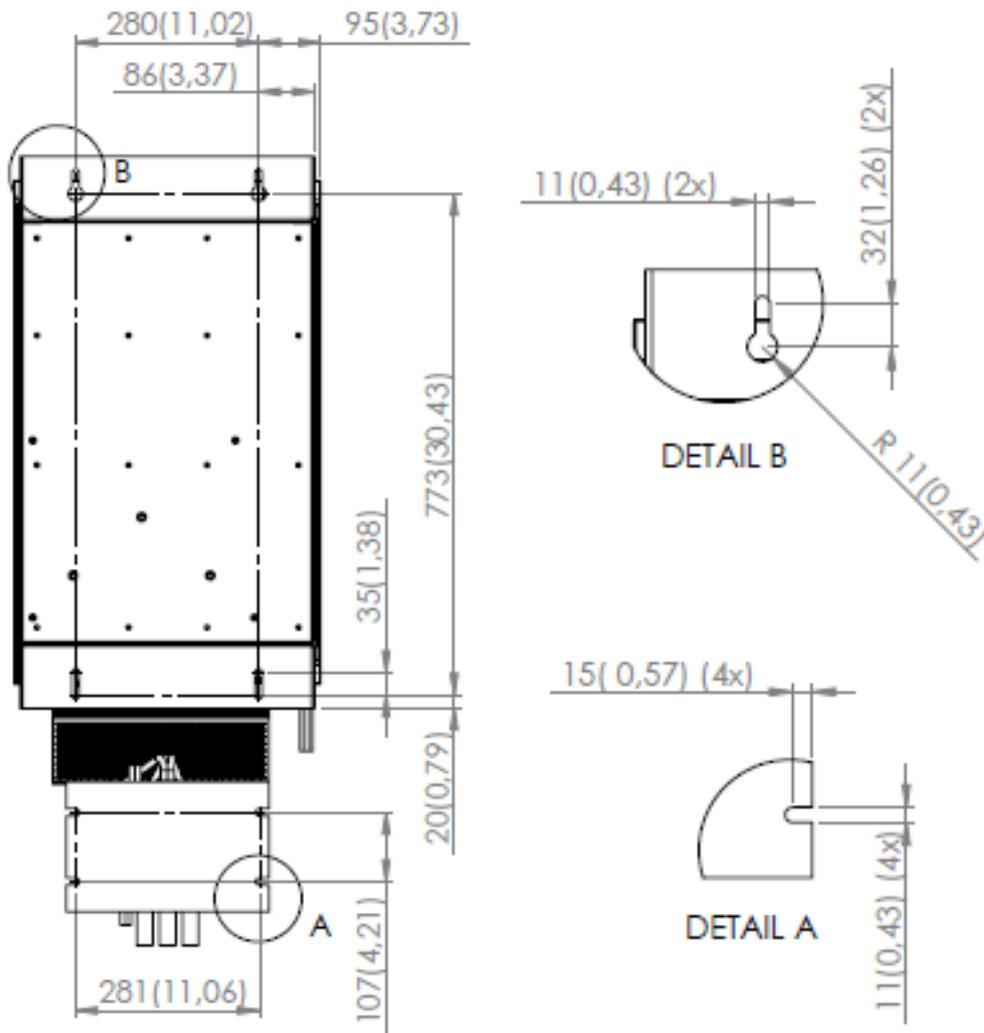


Fig. 19: Drilling template ECOsine® active FN3420-100/120-480-3-GL

Side	Recommended minimum clearance
Top (air outlet)	300 mm
Bottom (air inlet)	300 mm
Lateral	50 mm

Table 12: Installation clearances ECOsine® active FN3420-100/120-480-3-GL

### 3.4.5 Dimensional drawings ECO<sup>sine</sup>® active FN3430-100/120-400-4

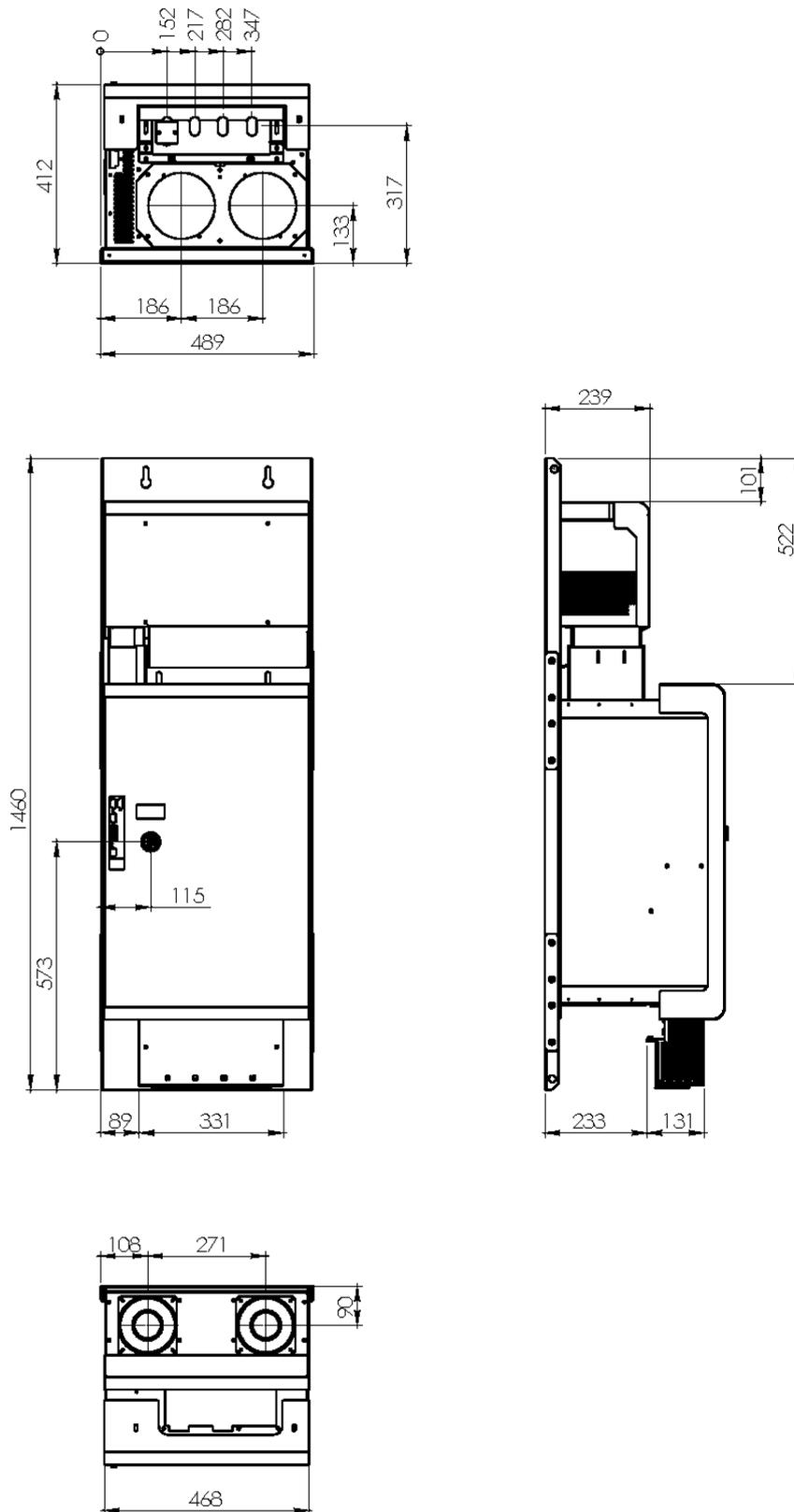


Fig. 20: Dimensional drawings ECO<sup>sine</sup>® active FN3430-100/120-400-4

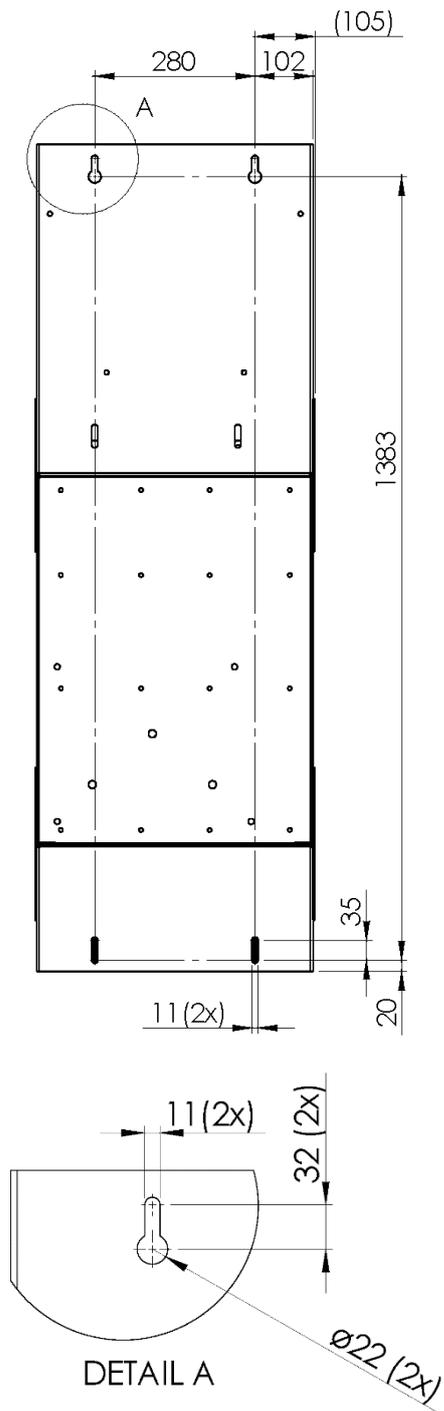


Fig. 21: Drilling template ECOsine® active FN3430-100/120-400-4

Side	Recommended minimum clearance
Top (air outlet)	300 mm
Bottom (air inlet)	300 mm
Lateral	50 mm

Table 13: Installation clearances ECOsine® active FN3430-100/120-400-4

### 3.4.6 Dimensional drawings ECOsine® active FN3420-200/250/300-480-3

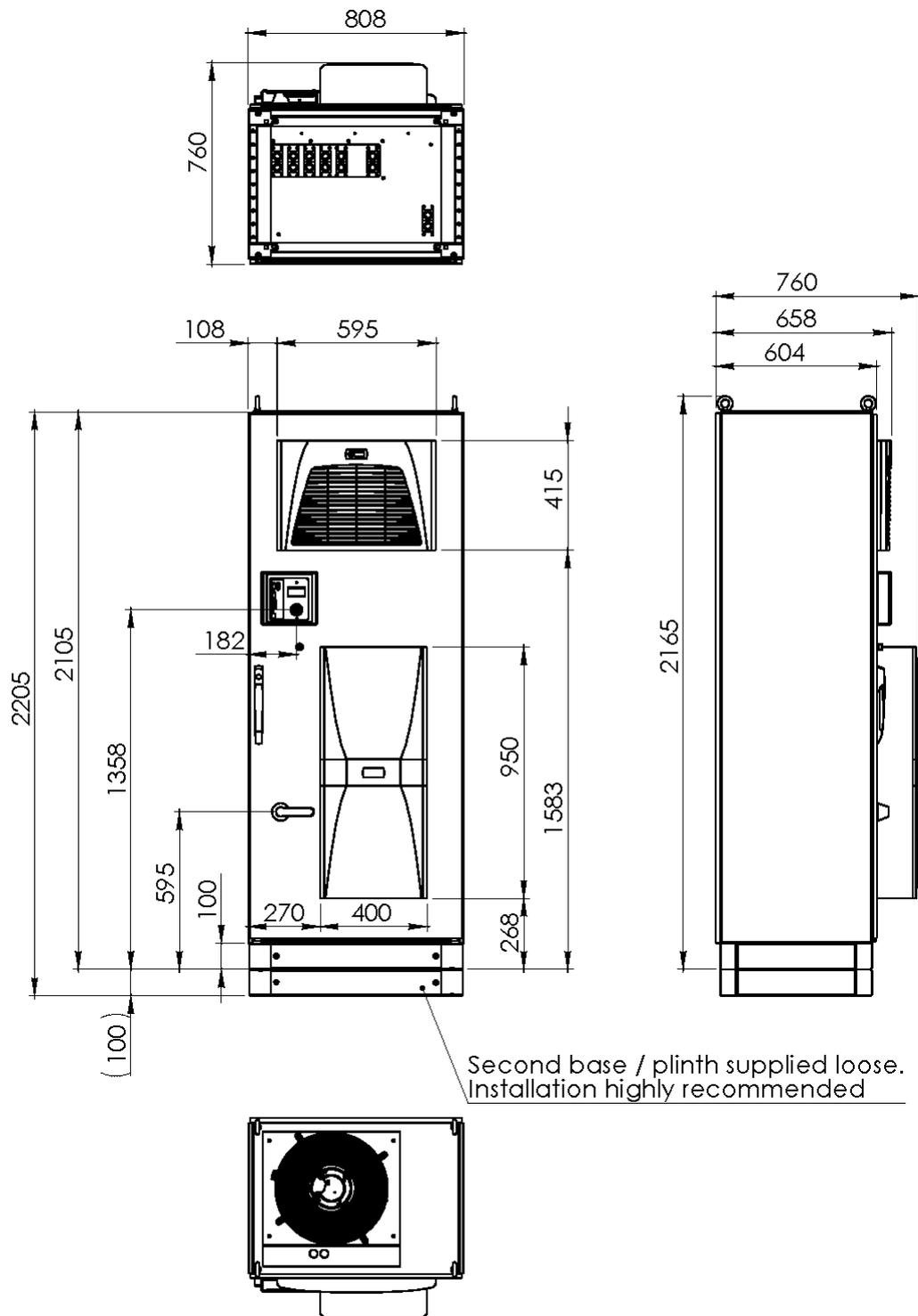


Fig. 22: Dimensional drawings ECOsine® active-200/250/300-480-3 (with mounted base 100 mm)\*

\* To comply with the required bending radii for the connection cables, we recommend to install the second base included in the scope of delivery (height 100 mm).

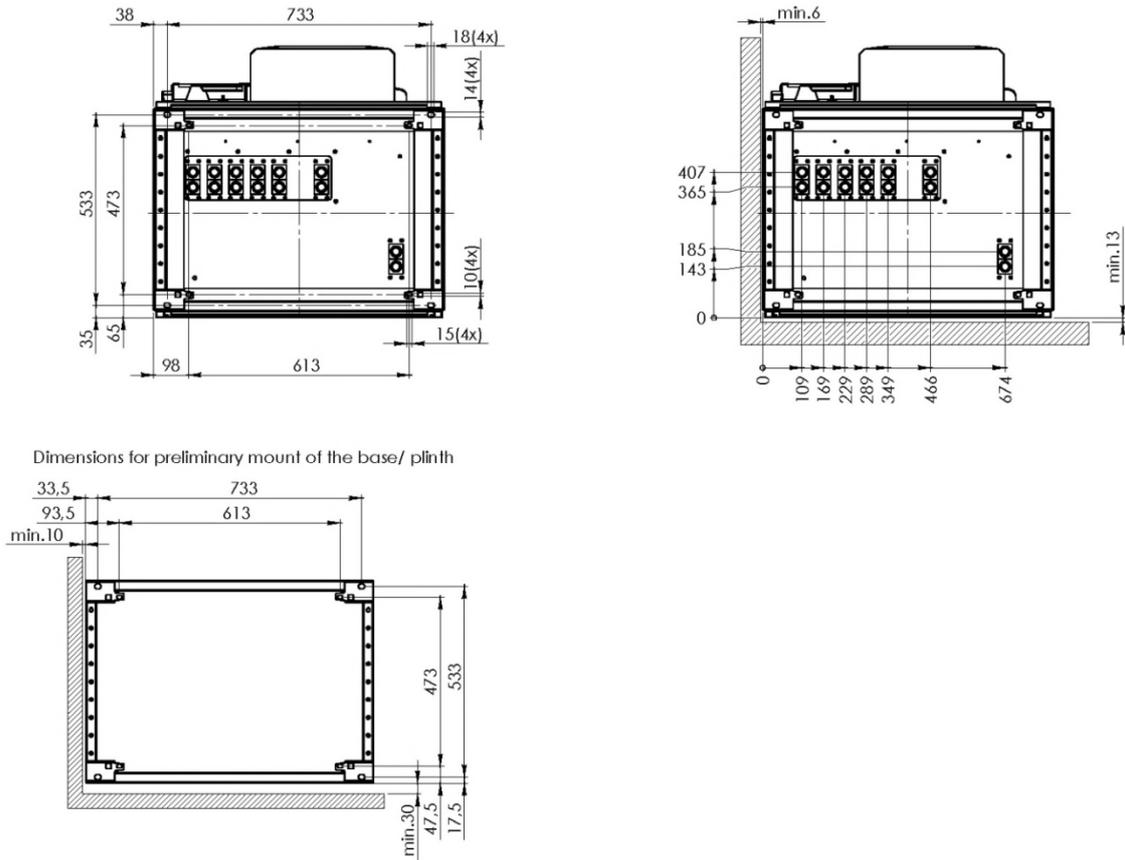


Fig. 23: View from below ECOsine® active FN3420-200/250/300-480-3

Side	Recommended minimum clearance
Top (air outlet)	300 mm
Front (air inlet)	900 mm (to open the door)
Lateral	Side-by-side installation without any clearance

Table 14: Installation clearances ECOsine® active FN3430-200/250/300-400-4

### 3.4.7 Dimensional drawings ECOsine® active FN3430-200/250/300-400-4

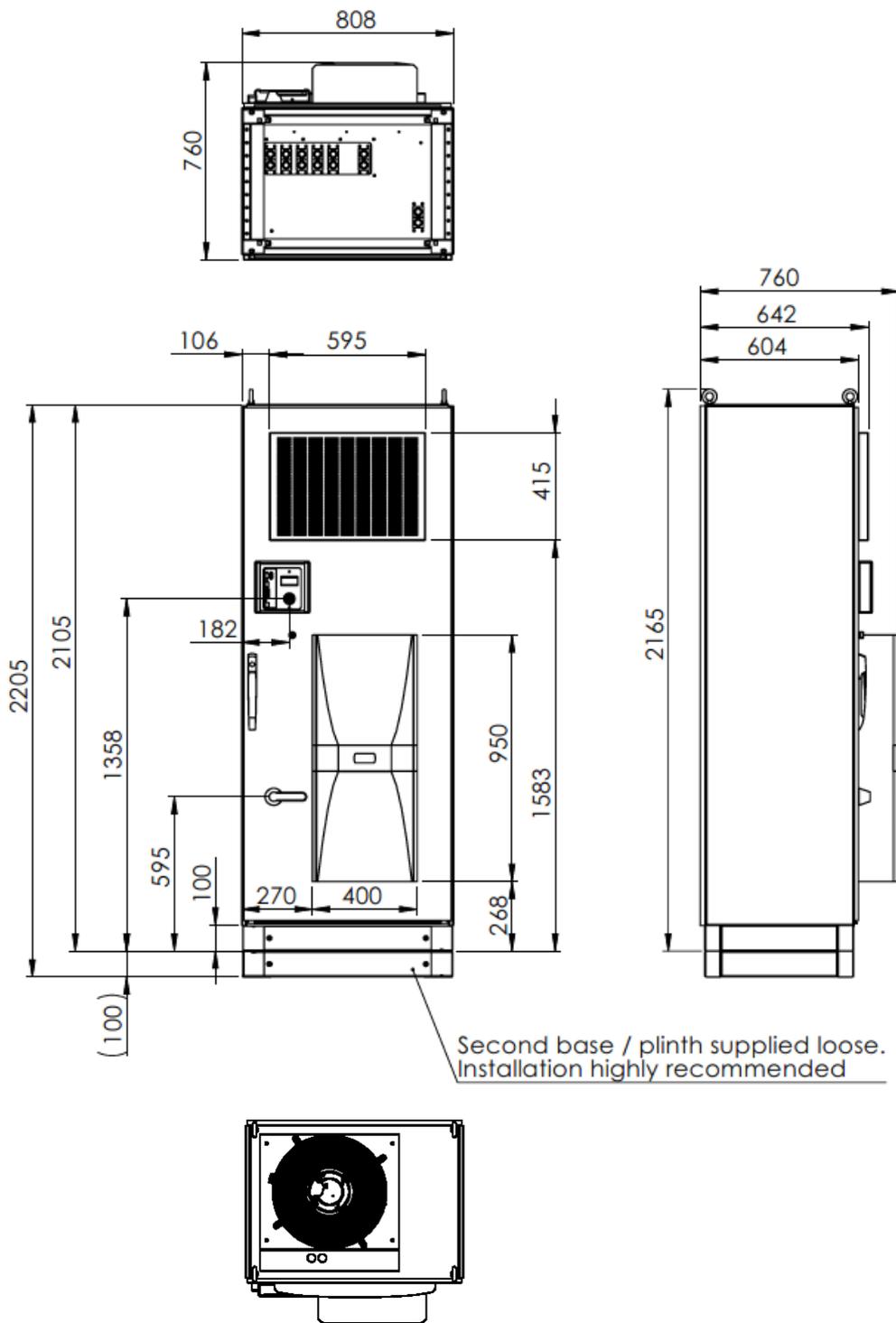


Fig. 24: Dimensional drawings ECOsine® active FN3430-200/250/300-400-4 (with mounted base 100 mm)\*

\* To comply with the required bending radii for the connection cables, we recommend to install the second base included in the scope of delivery (height 100 mm).

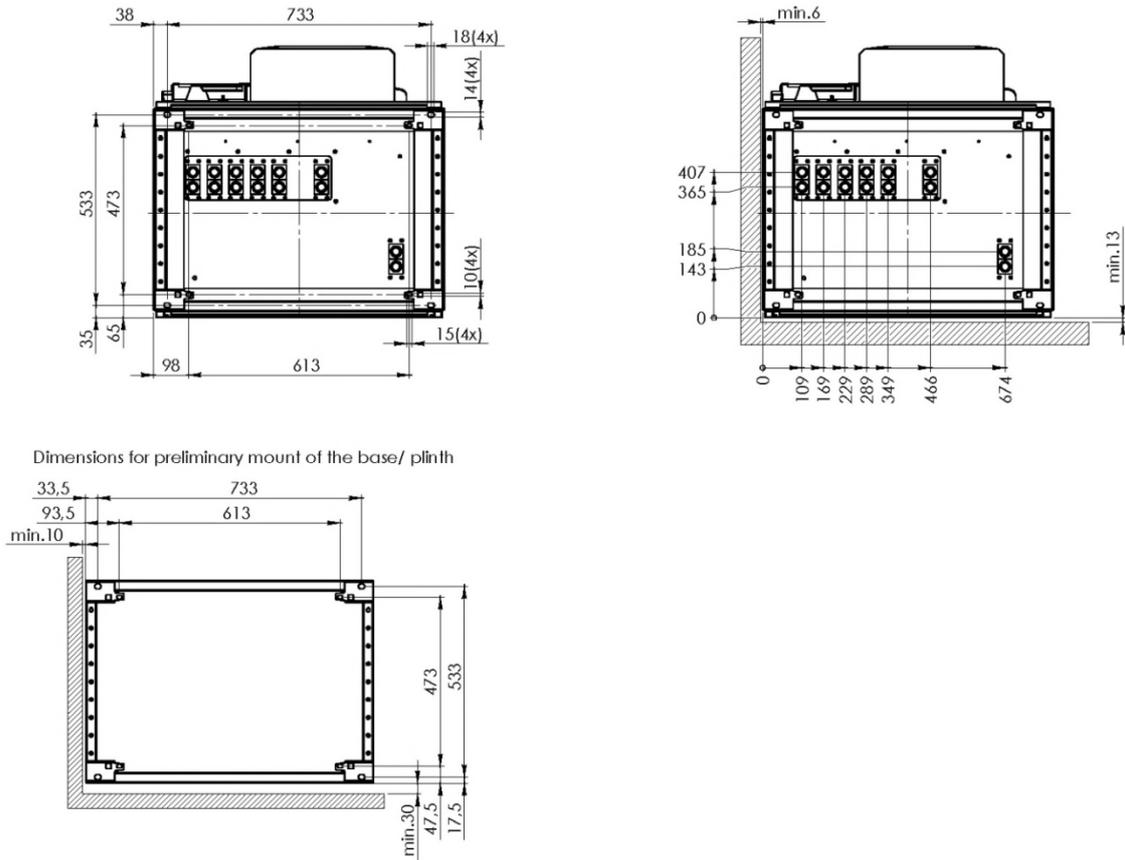


Fig. 25: View from below ECOsine® active FN3430-200/250/300-400-4

Side	Recommended minimum clearance
Top (air outlet)	300 mm
Front (air inlet)	900 mm (to open the door)
Lateral	Side-by-side installation without any clearance

Table 15: Installation clearances ECOsine® active FN34xx-200/250/300-xxx-x

### 3.4.8 Dimensional drawings ECOsine® active FN3420-200-690-3

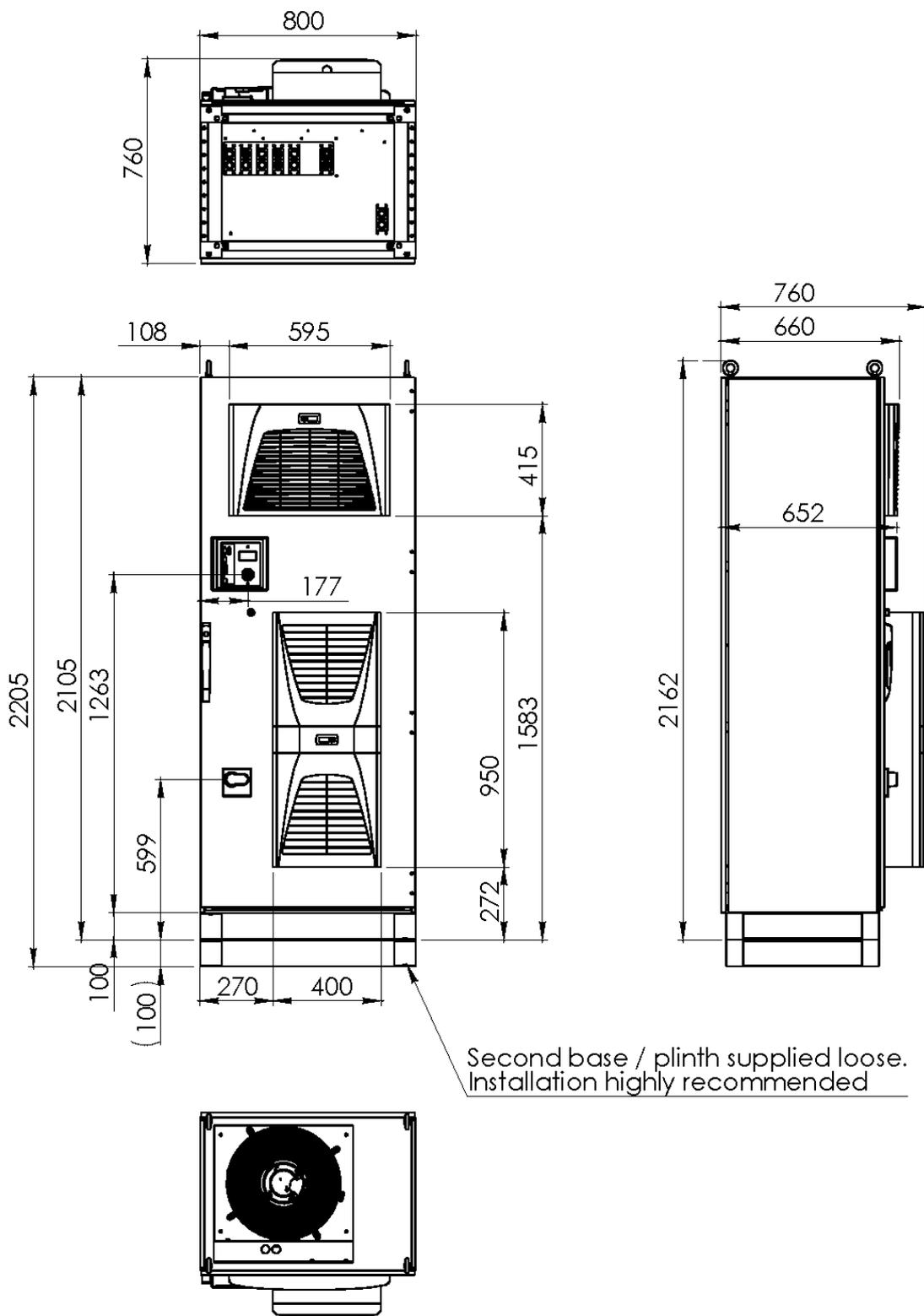


Fig. 26: Dimensional drawings ECOsine® active FN3420-200-690-3 (with installed base 100 mm)\*

\* To comply with the required bending radii for the connection cables, we recommend to install the second base included in the scope of delivery (height 100 mm).

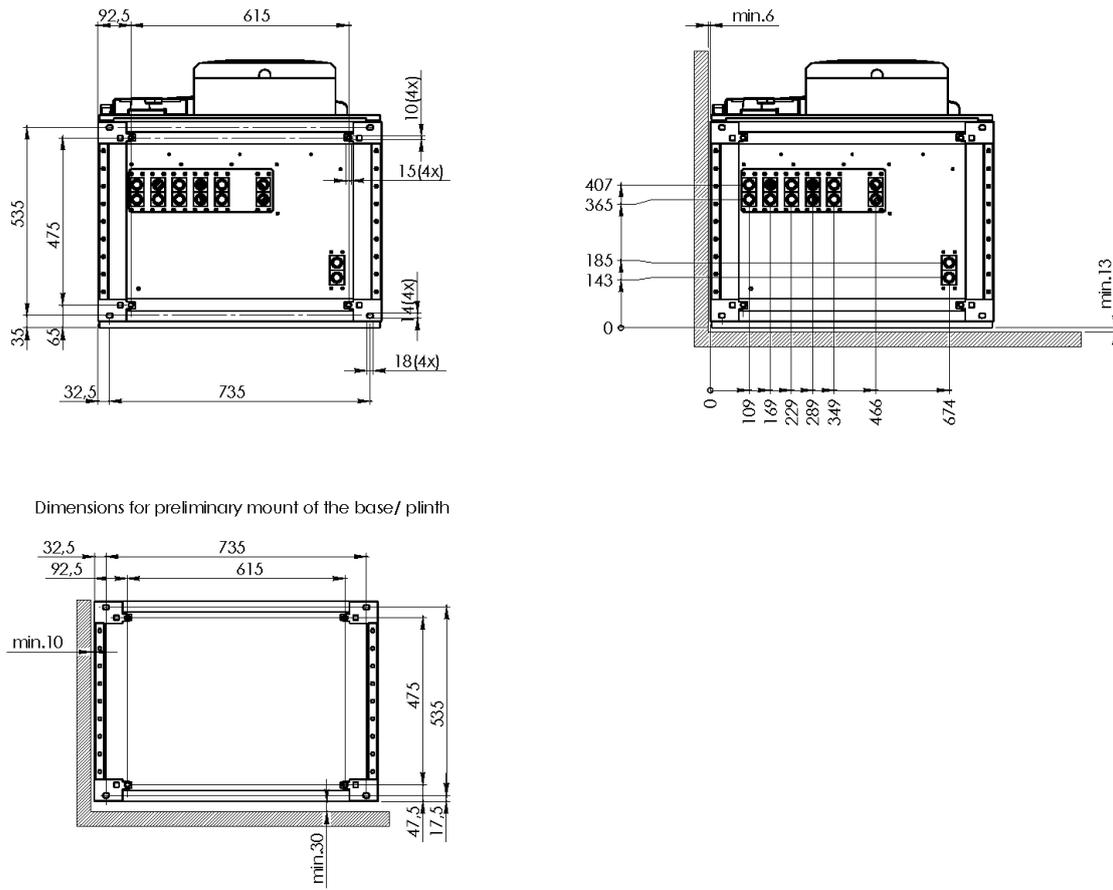


Fig. 27: View from below ECOsine® active FN3420-200-690-3

Side	Recommended minimum clearance
Top (air outlet)	300 mm
Front (air inlet)	900 mm (to open the door)
Lateral	Side-by-side installation without any clearance

Table 16: Installation clearances ECOsine® active FN3420-200-690-3

### 3.4.9 Dimensional drawings ECOsine® active FN3420-200-690-3-UL

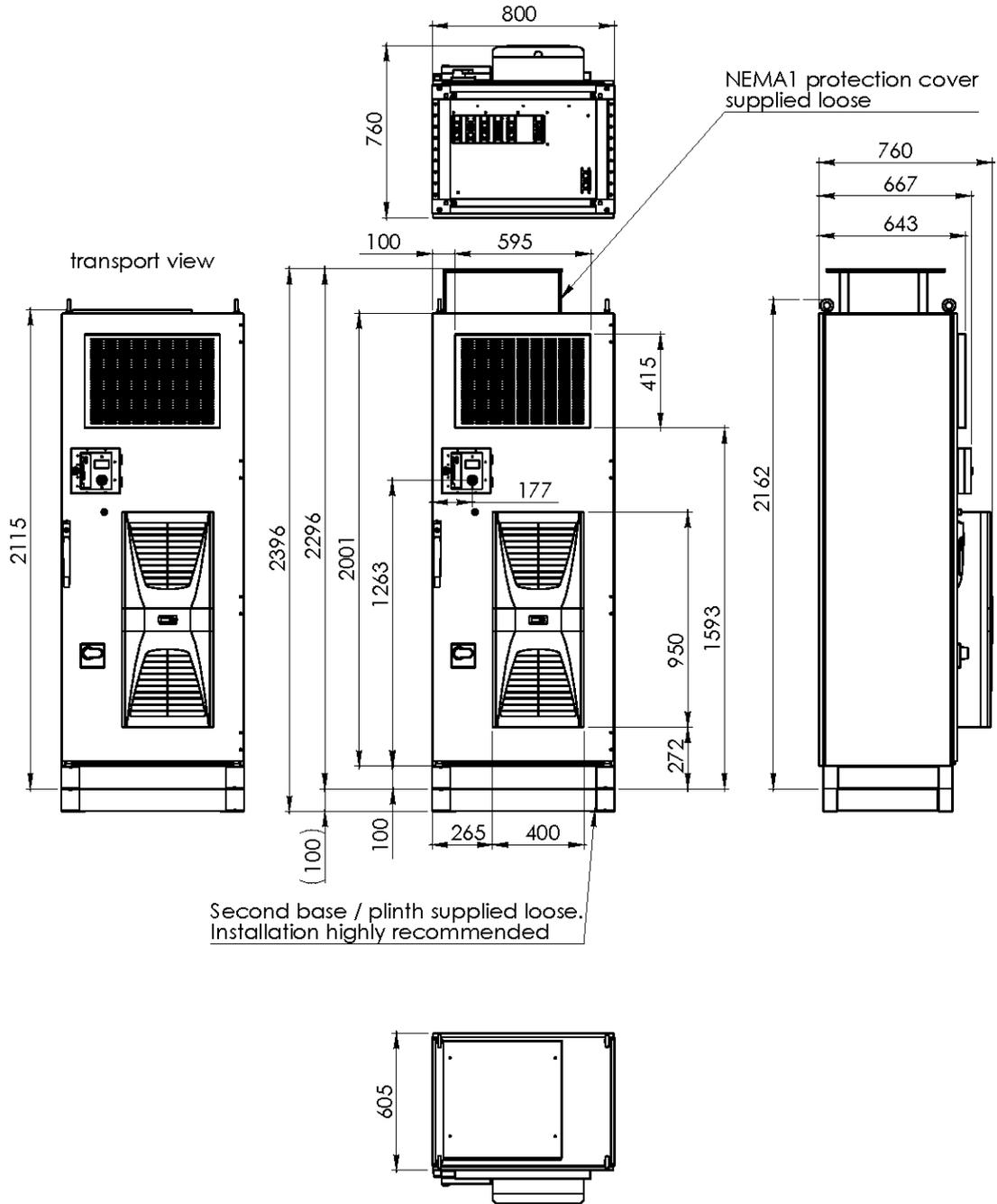
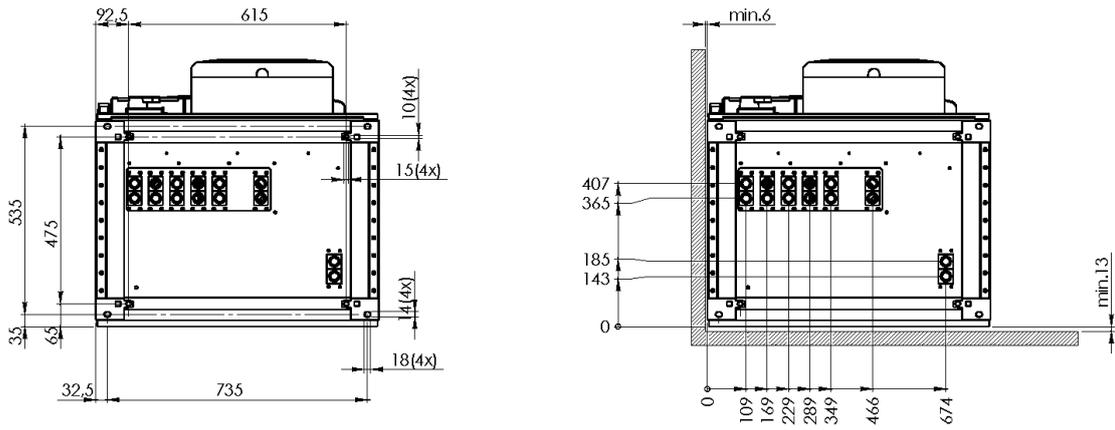


Fig. 28: Dimensional drawings ECOsine® active FN3420-200-690-3-UL (with mounted base 100 mm)\*

\* To comply with the required bending radii for the connection cables, we recommend installing the second base included in the scope of delivery (height 100 mm).



Dimensions for preliminary mount of the base/ plinth

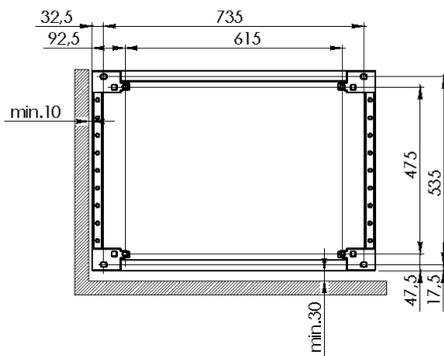


Fig. 29: View from below ECOsine® active FN3420-200-690-3-UL

Side	Recommended minimum clearance
Top (air outlet)	300 mm
Front (air inlet)	900 mm (to open the door)
Lateral	Side-by-side installation without any clearance

Table 17: Installation clearances ECOsine® active FN3420-200-690-3-UL

## 3.5 Position of the connecting terminals

### 3.5.1 Connecting terminals ECOsine® active FN3420-30/50-xxx-3

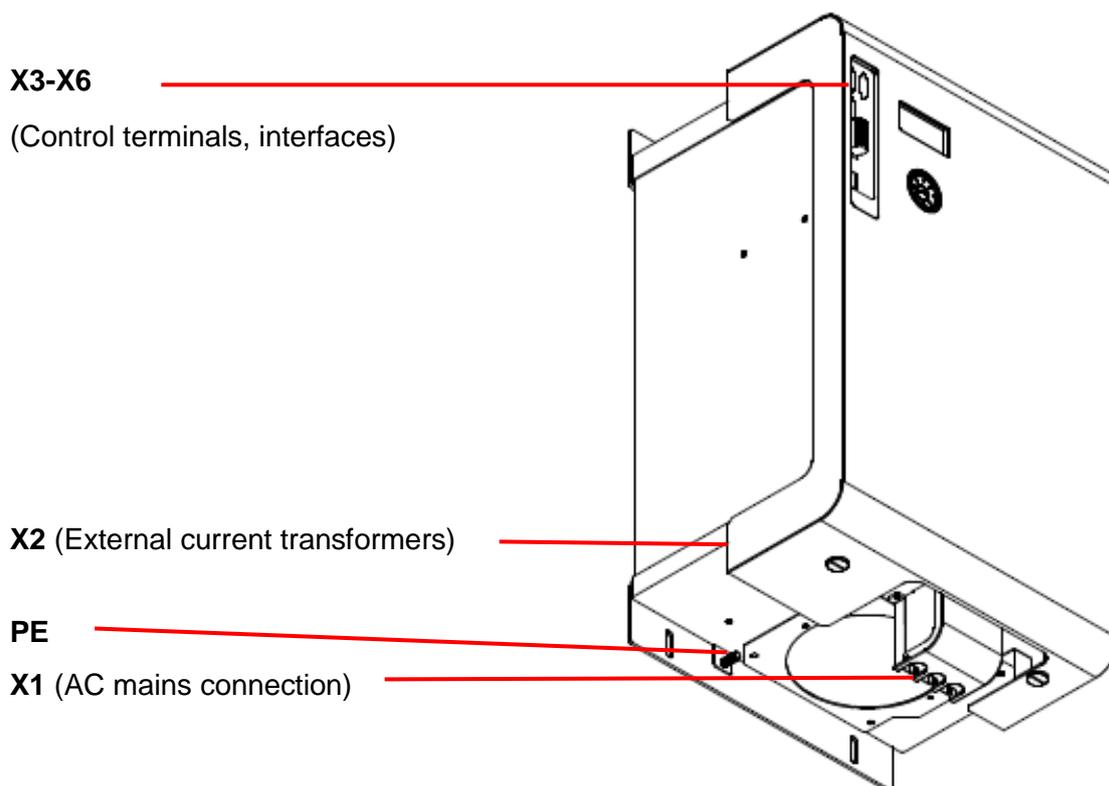


Fig. 30: Position of the electrical connecting terminals ECOsine® active -30/50-xxx-3

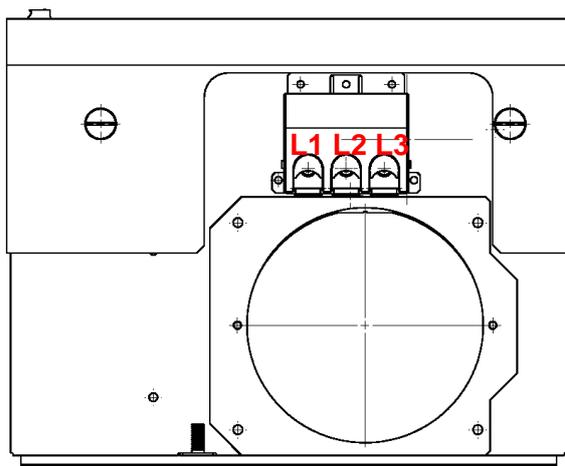


Fig. 31: Connection ECOsine® active FN3420-30/50-xxx-3

### 3.5.2 Connecting terminals ECOsine<sup>®</sup> active FN3430-30/60-xxx-4

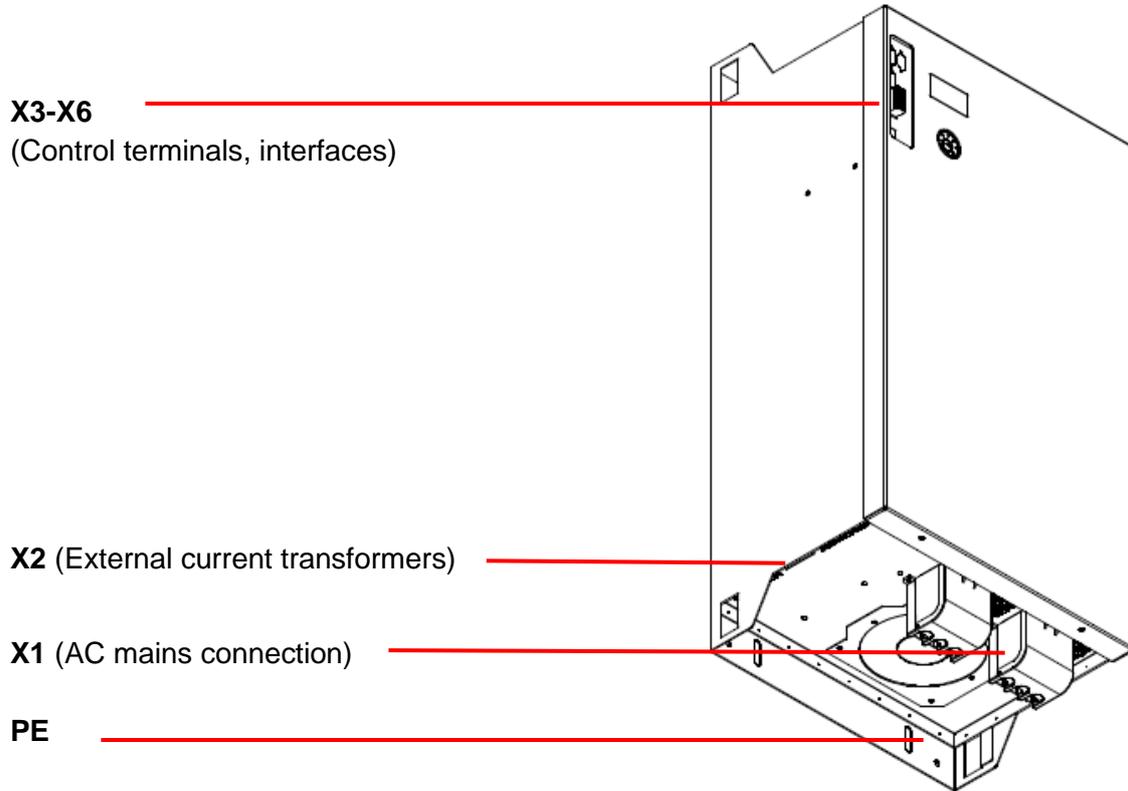


Fig. 32: Position of the electrical connecting terminals ECOsine<sup>®</sup> active FN3430-30/60-xxx-4

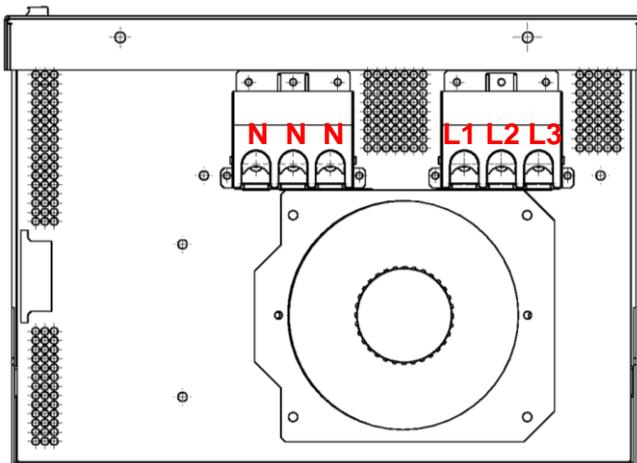


Fig. 33: Connection ECOsine<sup>®</sup> active FN3430-30/60-xxx-4

### 3.5.3 Connecting terminals ECOsine® active FN3420-100/120-xxx-3

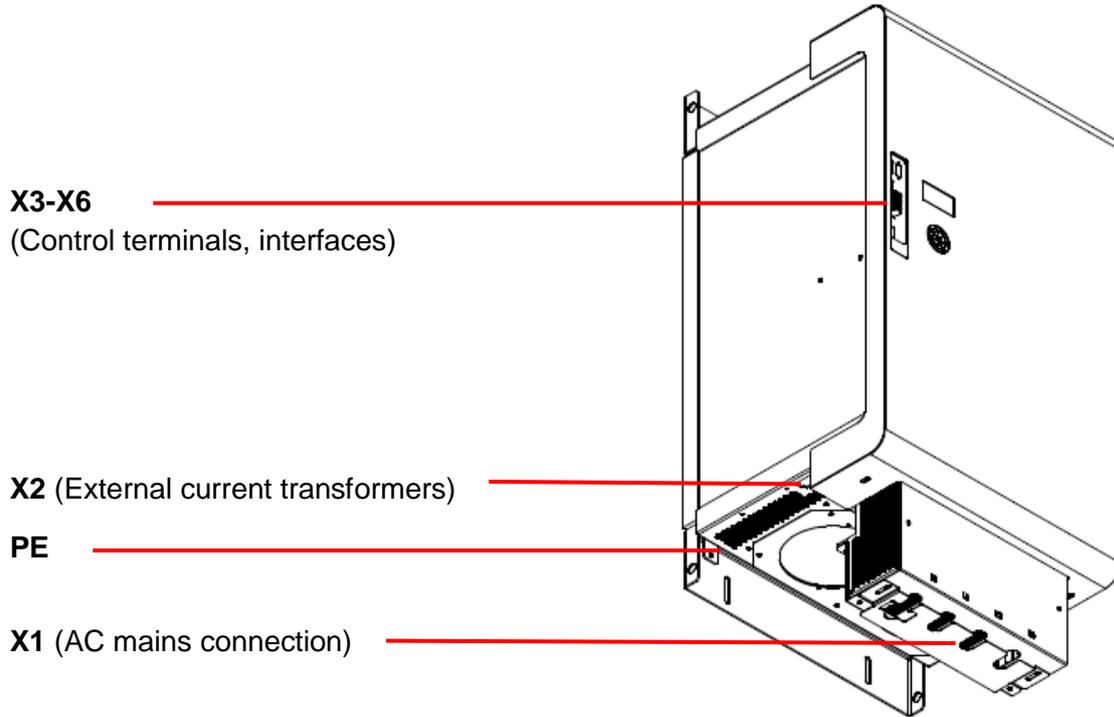


Fig. 34: Position of the electrical connecting terminals ECOsine™ active FN3420-100/120-xxx-3

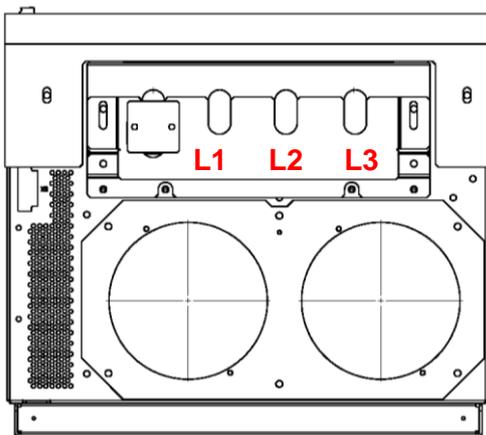


Fig. 35: Connection ECOsine® active FN3420-100/120-xxx-3

### 3.5.4 Connecting terminals ECOsine<sup>®</sup> active FN3430-100/120-400-4

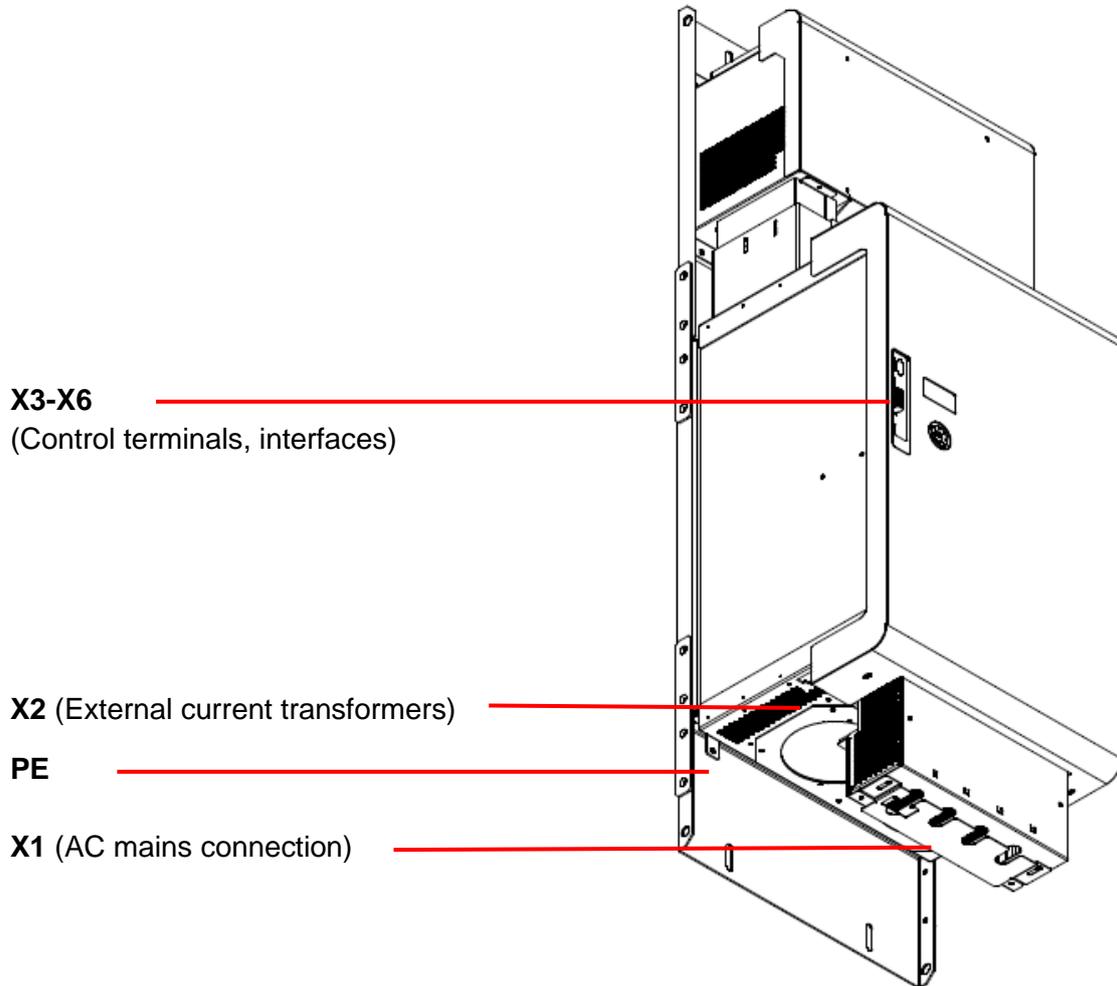


Fig. 36: Position of the electrical connecting terminals ECOsine<sup>®</sup> active FN3430-100/120-400-4

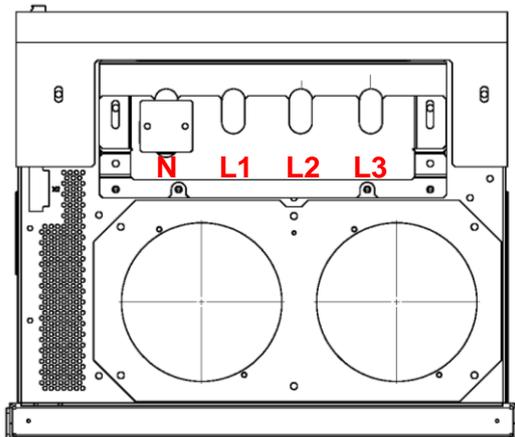


Fig. 37: Connection ECOsine<sup>®</sup> active FN3430-100/120-400-4

### 3.5.5 Connecting terminals ECOsine® active FN34xx-200/250/300-4xx-x

**X2, X5**  
(Control terminals, interfaces)

**X1** (AC mains connection)

**Neutral wire**  
(Only ECOsine® active 200/250/300-400-4, see detailed figure)

**PE**

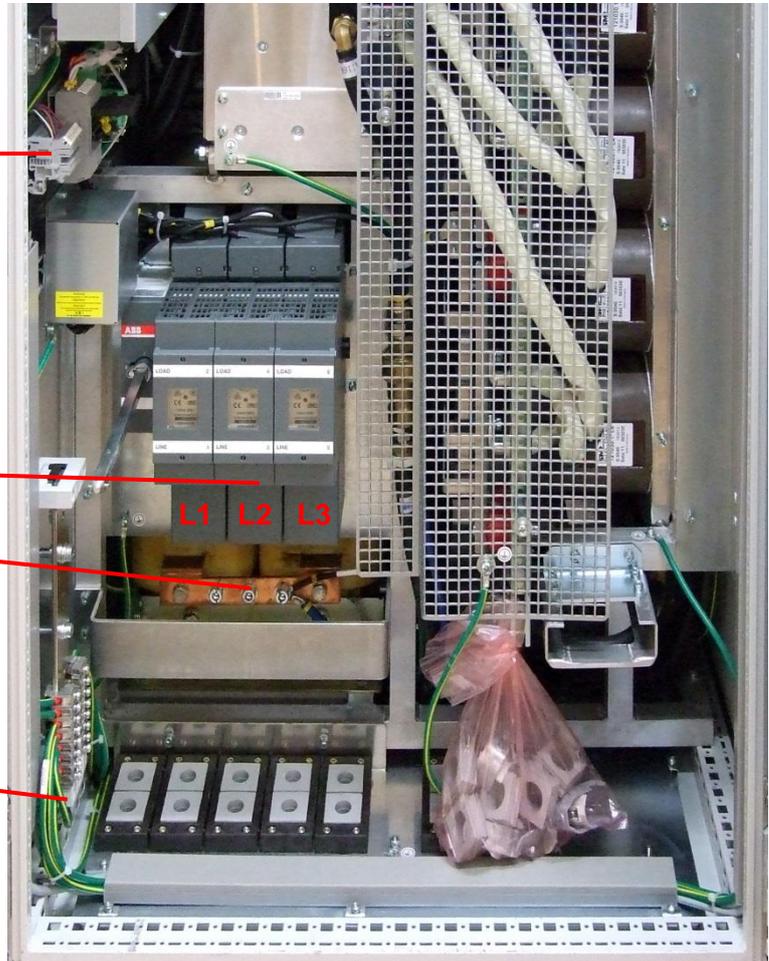


Fig. 38: Position of the electrical connecting terminals ECOsine® active FN34xx-200/250/300-4xx-x

**Note**

The cable entries must be closed with suitable seals to prevent ingress of moisture and humid outside air.

Suitable cable entry inserts: Icotek ([www.icotek.com](http://www.icotek.com)) cable inserts, large (KT16 – KT32)

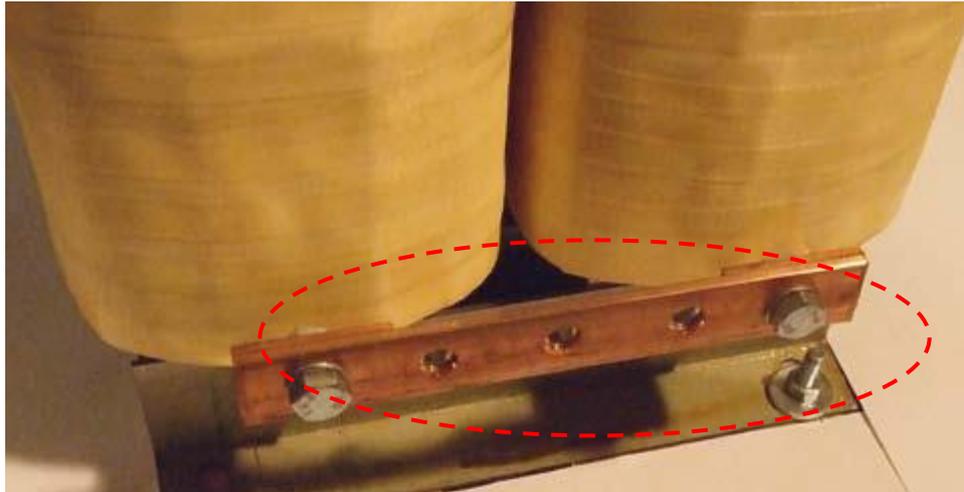


Fig. 39: Connecting bar neutral wire ECOsine® active -200/250/300-xxx-4

### 3.5.6 Connecting terminals ECOsine® active FN3420-200-690-3

X2, X5  
(Control terminals, interfaces)

X1 (AC mains connection)

PE

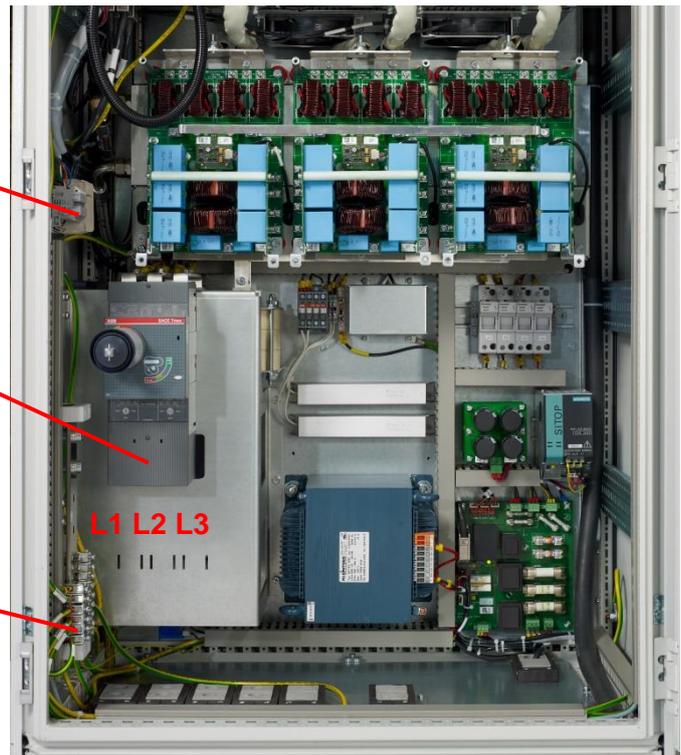


Fig. 40: Position of electrical connecting terminals ECOsine® active FN3420-200-690-3

#### Note

The cable entries must be closed with suitable seals to prevent ingress of moisture and humid outside air.

Suitable cable entry inserts: Icotek ([www.icotek.com](http://www.icotek.com)) cable inserts, large (KT16 – KT32)

## 3.6 External fuse protection

### 3.6.1 Recommended external mains fuse

ECOsine® active devices must always be protected on the mains side by means of suitable fuses or line circuit breakers. When selecting fuses, ambient conditions, the harmonic content and load change cycles must be taken into account as they significantly influence the ageing of the fuses. Besides, the fuses must be designed according to the valid standards to suit the supply lines used.

Device	External fuse (cable and line protection, e. g. type gL/gG)
ECOsine® active-030-xxx-x	50 A
ECOsine® active-050-xxx-3	80 A
ECOsine® active-060-xxx-4	100 A
ECOsine® active-100-xxx-x	160 A
ECOsine® active-120-xxx-x	200 A

Table 18: Recommended external ac mains protection

### 3.6.2 External fuse protection for UL conformity

To ensure UL conformity, one of the following class T fuses must be used.

Device	External Fuse	Designation
ECOsine® active-030-480-3	50 A	Littelfuse JLLS50 or Bussmann-Cooper JJS-50
ECOsine® active-050-480-3	80 A	Littelfuse JLLS80 or Bussmann-Cooper JJS-80
ECOsine® active-100-480-3	150 A	Littelfuse JLLS150 or Bussmann-Cooper JJS-150
ECOsine® active-200/250/300-480-3-UL	400 A (internal)	Already integrated in device (Littelfuse JLLS400 or Bussmann-Cooper JJS-400)

Table 19: Fuse types required for UL conformity

### 3.6.3 Devices with integrated fuse

Devices with compensating current higher than 200A have fuses or circuit breakers installed internally in order to protect the device. The back-up fuses must be adapted to the supply lines, while ensuring this, adhere to the valid standards. Besides, you should note the selectivity of the fuses.

Device	Internal fuse	
ECOsine® active-200/250/300-xxx-x400 A Type gG/gL	400 A	The following fuse is available in the device on delivery: SIBA. NH2 400A gG 500VAC / 2000413.400
ECOsine® active-200/250/300-480-3-UL	400 A	The following fuse is available in the device on delivery: Type: Littelfuse JLLS400 or Bussmann-Cooper JJS-400
ECOsine® active-200-690-3	215 A	Circuit breaker type: ABB 690VAC/250A T4V250 R250 – TMA – detection mode UL
ECOsine® active-200-690-3-UL	215 A	Circuit breaker type: ABB 690VAC/250A T4V250 R250 – TMA – detection mode UL

Table 20: Devices with integrated fuse

## 3.7 Connection of ac mains (X1)

The device must be grounded. Observe the following ac mains connection cross sections and the tightening torque:

Device	Min. value cable cross section	Max. value cable cross section	Connecting bolt	Tightening torque
ECOsine® active-030/050-xxx-3	1 x 25mm <sup>2</sup> per phase and PE	2 x 35mm <sup>2</sup> or 1 x 50mm <sup>2</sup> per phase and PE	M8 Older version M6	M8: 9,5Nm (84.0 lbf in) M6: 3,5Nm (31.0 lbf in)
ECOsine® active-030/060-xxx-4	1 x 25mm <sup>2</sup> per phase and PE 1 x 50 mm <sup>2</sup> (N)	1 x 50mm <sup>2</sup> per phase and PE 3 x 50 mm <sup>2</sup> (N) or 1 x 95 mm <sup>2</sup>	M8	9,5Nm (84.0 lbf in)
ECOsine® active-100/120-xxx-x	1 x 35mm <sup>2</sup> per phase and PE 2 x 50mm <sup>2</sup> or 1 x 95 mm <sup>2</sup> (N)	2 x 50mm <sup>2</sup> or 1 x 95mm <sup>2</sup> per phase and PE 2 x 120mm <sup>2</sup> (N)	M10	19Nm (168.0 lbf in)
ECOsine® active-200/250/300-xxx-x	1 x 185mm <sup>2</sup> per phase and PE 2 x 240mm <sup>2</sup> (N)	2 x 120mm <sup>2</sup> or 1 x 240 mm <sup>2</sup> per phase and PE 2 x 240mm <sup>2</sup> (N)	Standard Version: M10 UL Version: Terminal ABB OZXA-26	19Nm (168.0 lbf in)
ECOsine® active-200-690-3	2 x 70mm <sup>2</sup> per phase and PE	2 x 70mm <sup>2</sup> per phase and PE	M8 (without connecting lug EF T4)	M8: 9,5Nm (84.0 lbf in)
	1 x 120mm <sup>2</sup> per phase and PE	2 x 120mm <sup>2</sup> per phase and PE	M10 (with connecting lugEF T4)	19Nm (168.0 lbf in)
ECOsine® active-200-690-3-UL	250 MCM (Kcmil)	350 MCM (Kcmil)	Terminal ABB FC CuAl T4 1x185	31 Nm (274 lbf in)

Table 21: Connection cross sections and tightening torque mains connection

Use the correct cable cross sections in consideration of cable type and type of cable mounting. To ensure UL conformity, use UL listed cable (90°C, AWG4 or larger) and suitable UL listed wire-lugs.



**DANGER**

Ensure correct grounding

Insufficient grounding of AHF may cause malfunction of the device and its destruction.

### 3.7.1 Connection of 3-wire devices

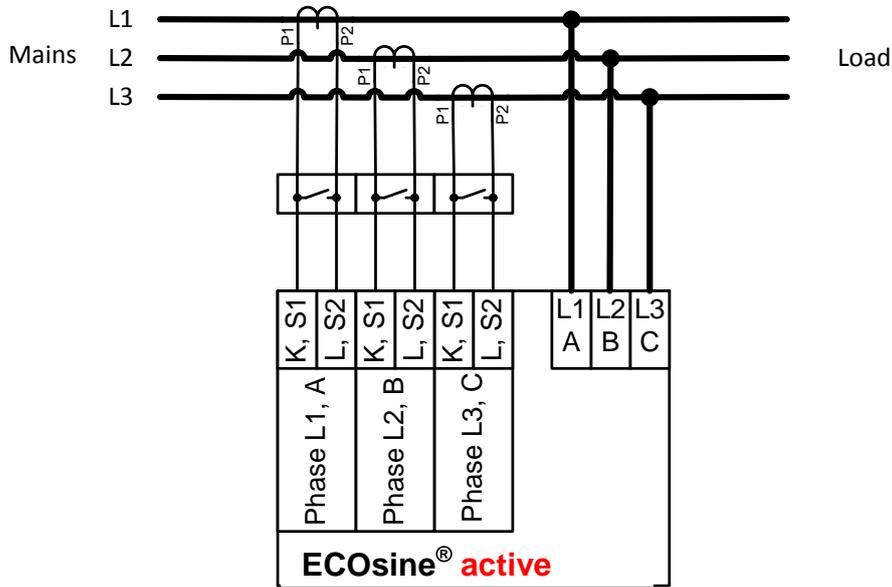


Fig. 41: Connection of 3-wire devices

### 3.7.2 Connection of 4-wire devices

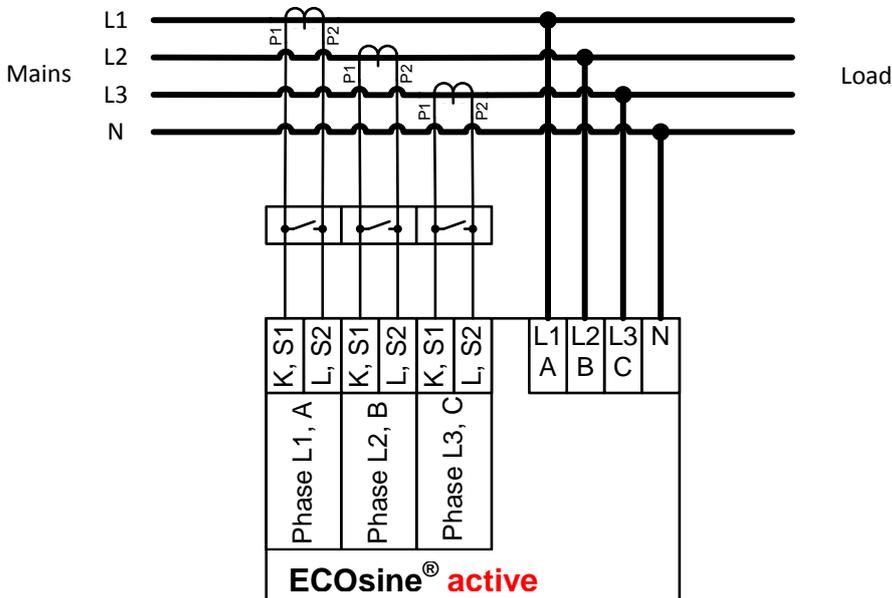


Fig. 42: Connection of 4-wire devices

## 3.8 Component layout plan

### 3.8.1 Component layout plan FN3420-30/50-xxx-3

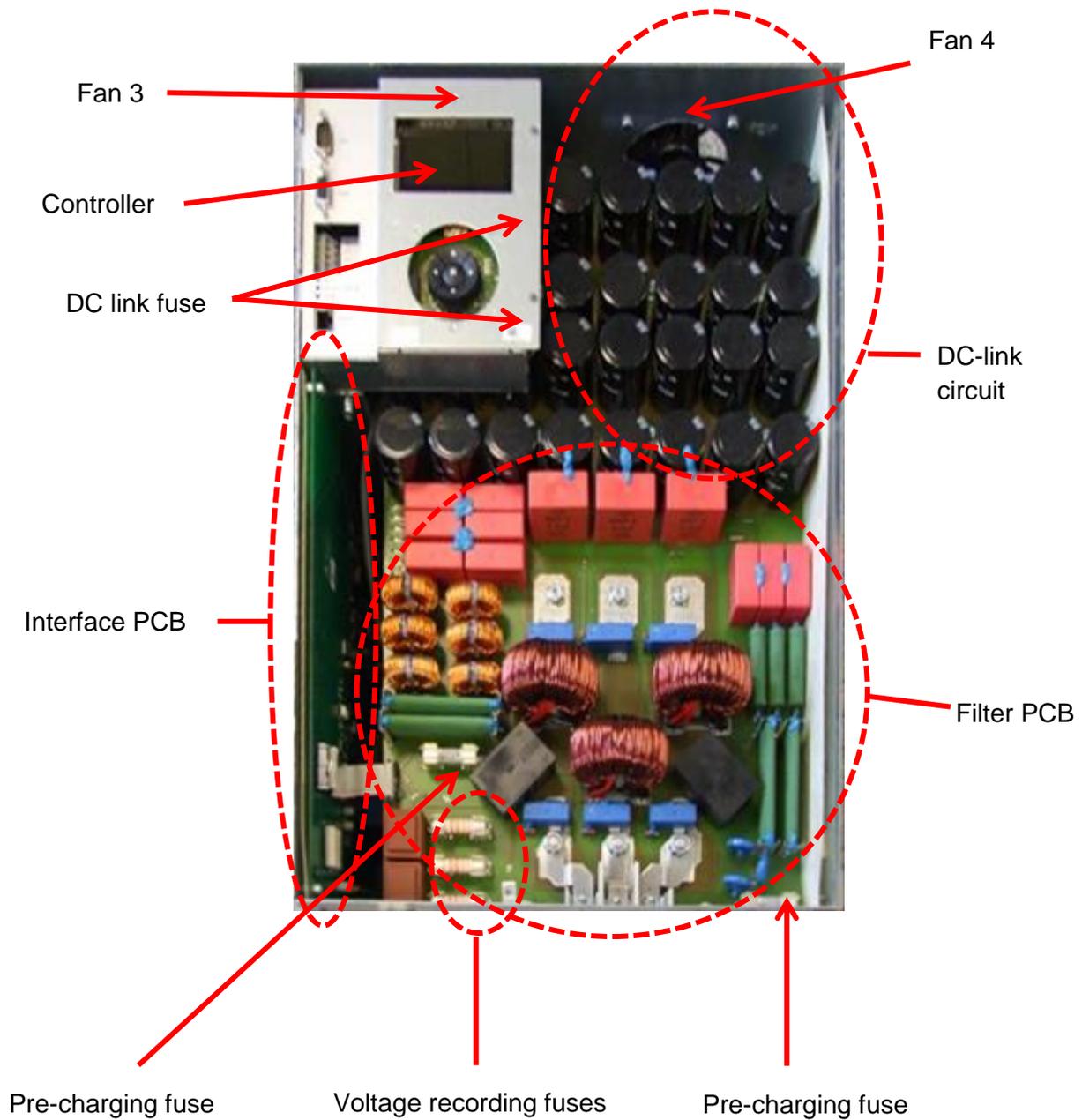


Fig. 43: Component layout plan ECOsine® active FN3420-30/50-xxx-3

### 3.8.2 Component layout plan FN3430-30/60-xxx-4

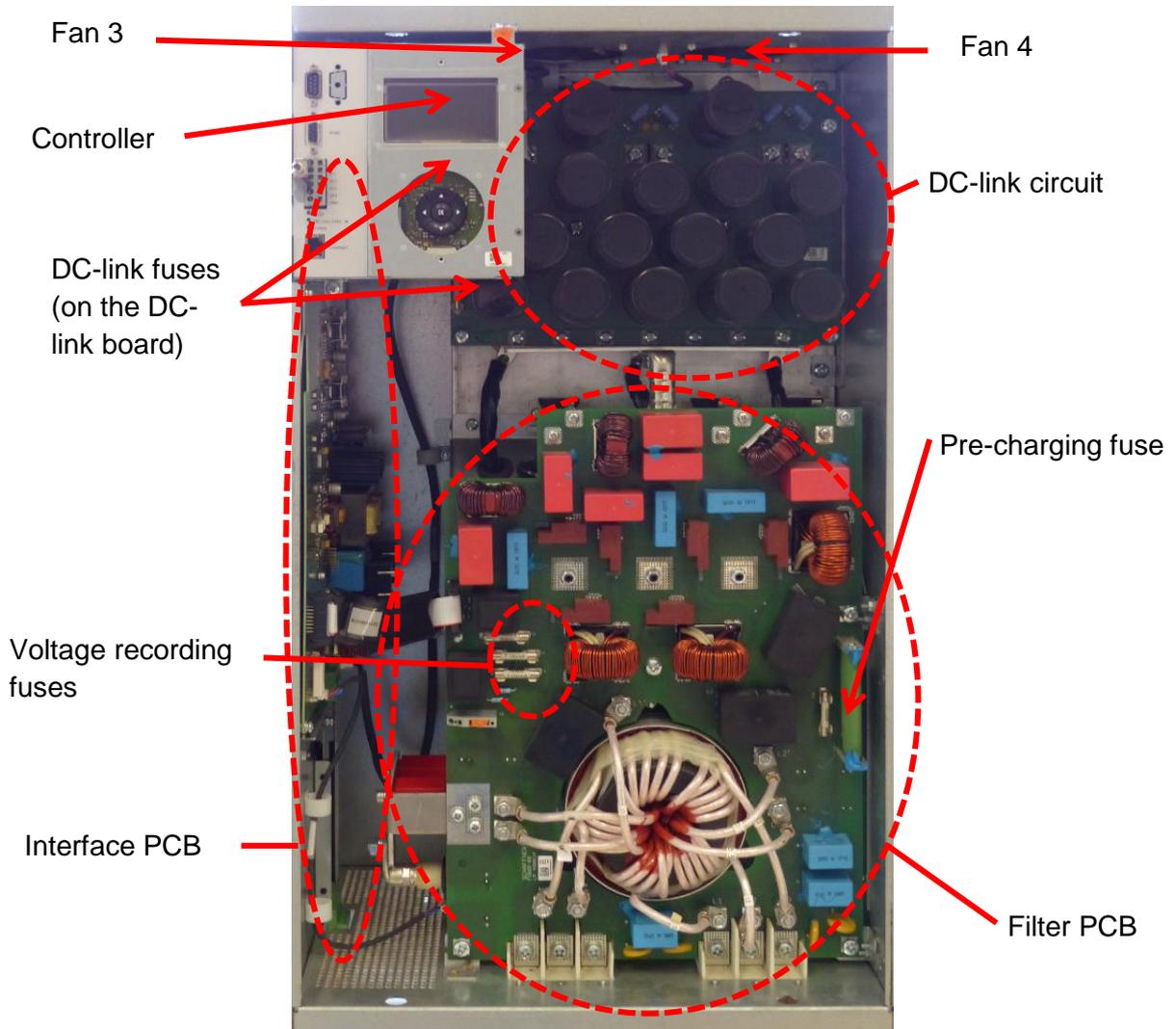


Fig. 44: Component layout plan ECOsine® active FN3420-30/60-xxx-4

### 3.8.3 Component layout plan FN3420-100/120-xxx-3

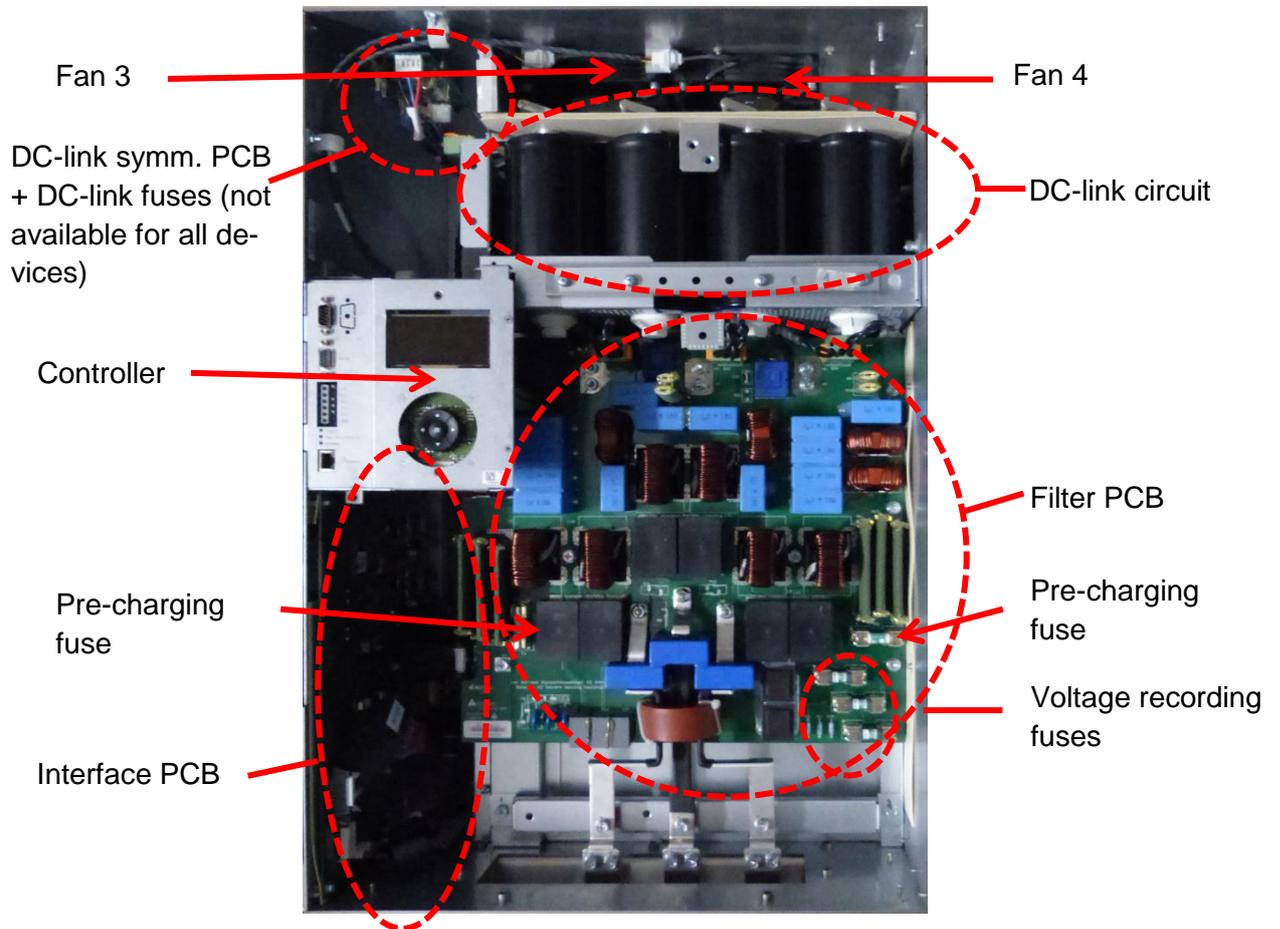


Fig. 45: Component layout plan ECOsine® active FN3420-100/120-xxx-3

### 3.8.4 Component layout plan FN3430-100/120-400-4

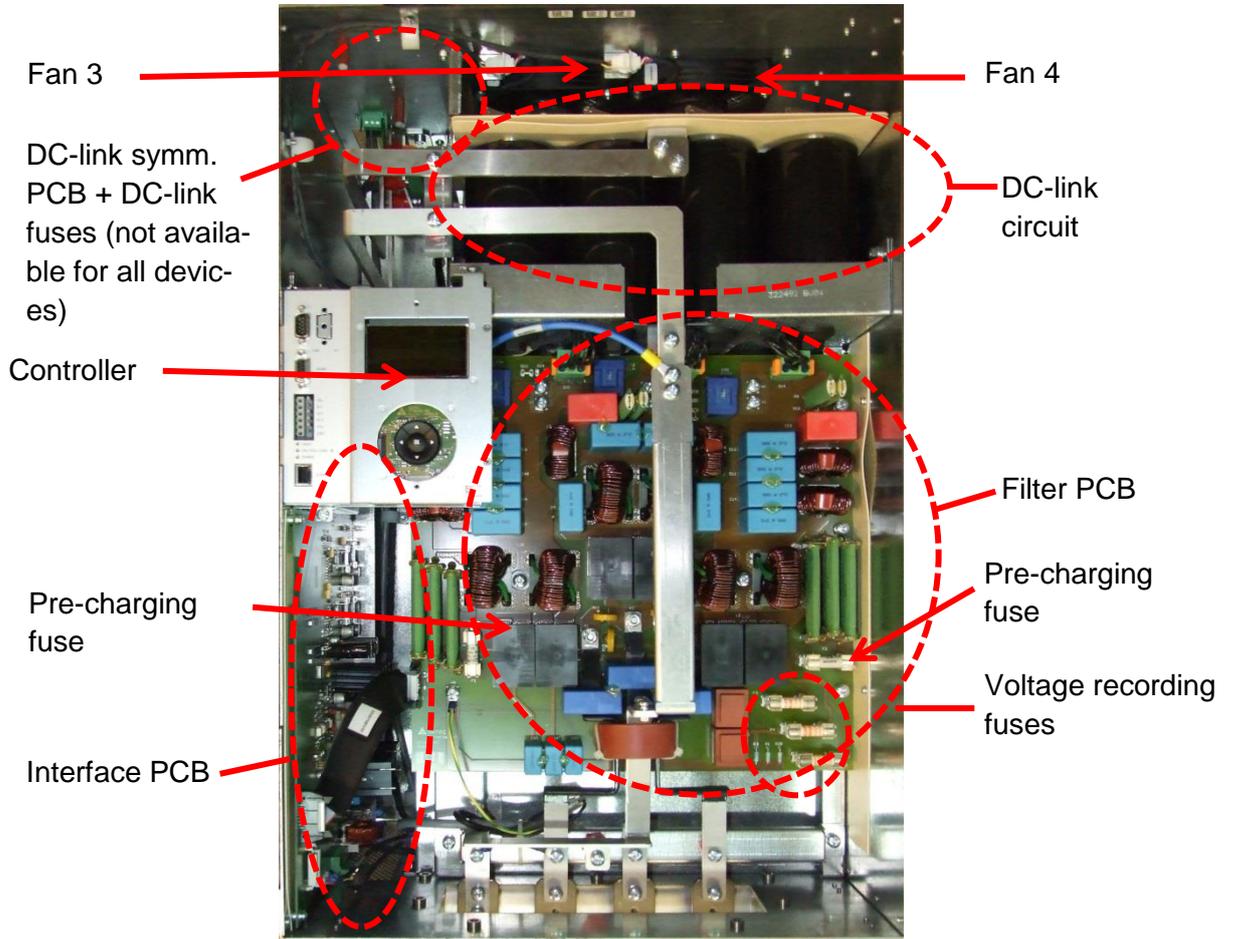


Fig. 46: Component layout plan ECOsine® active FN3430-100/120-400-4

### 3.8.5 Component layout plan FN34xx-200/250/300-4xx-x

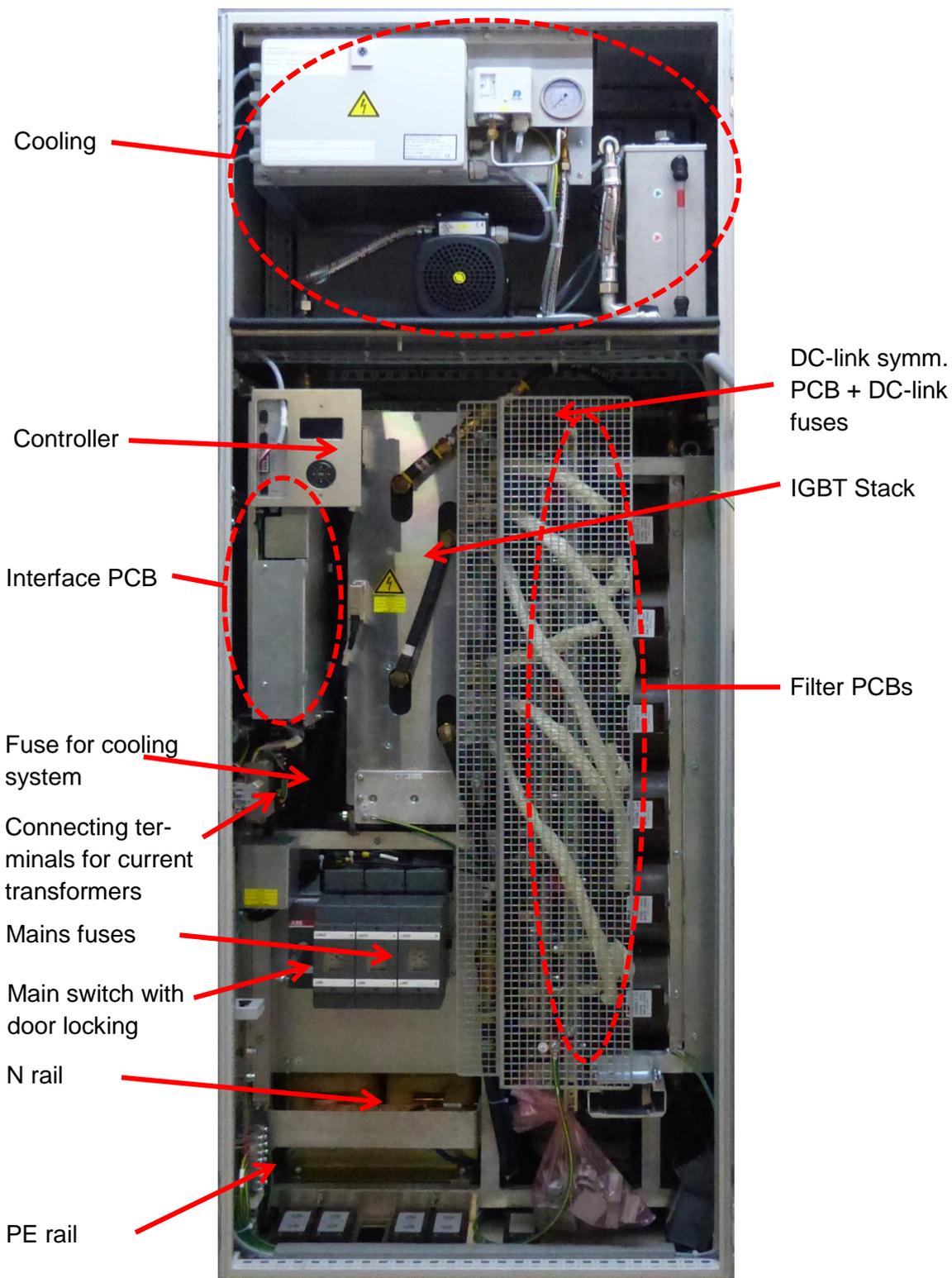


Fig. 47: Component layout plan ECOsine® active FN34xx-200/250/300-4xx-x

### 3.8.6 Component layout plan FN3420-200-690-3

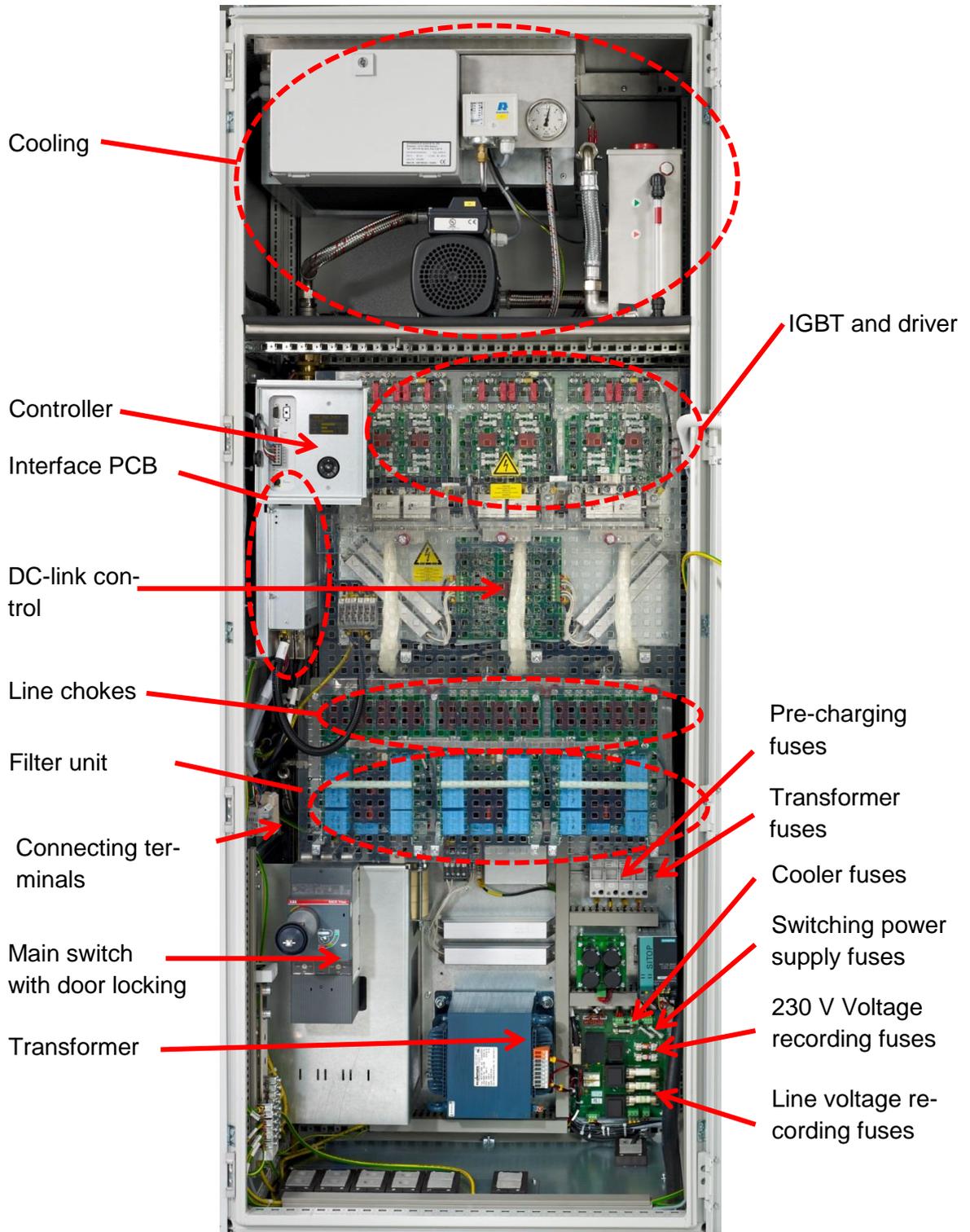


Fig. 48: Component layout plan ECOsine® active FN3420-200-690-3

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## 3.9 Connection of the external current transformers (X2)

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### Dangerous Voltage

**Risk of death due to short circuits and electric shock if the current transformers are connected incorrectly.**

- **BEFORE** installing the current transformers on the primary conductor: short circuit them on the secondary side with separable short-circuit jumpers (not in the scope of delivery).
  - Keep the current transformers short circuited until the ECOsine<sup>®</sup> active devices are connected with these separable connecting terminals.
  - **BEFORE** disconnecting the current transformers from the ECOsine<sup>®</sup> active, short-circuit them with the separable short-circuit plugs.
- 

### 3.9.1 Current transformers specification

Please observe the following instructions when installing the external current transformers.

- For correct ECOsine<sup>®</sup> active operation, **three** external current transformers must be connected. This applies regardless of whether it is a 3-wire or 4-wire filter.
- For parallel operation of more than one ECOsine<sup>®</sup> active the external current transformers must be installed **on the load side** of the filter. For stand-alone operation of one ECOsine<sup>®</sup> active the transformers can be installed on the mains or load side of the filter.
- Separate transformer circuits are mandatory for proper operation of ECOsine<sup>®</sup> active. Dedicated current transformers must be used. Current transformer secondary circuits must not be looped through additional sense loads.
- A current transformer terminal-block with separable short-circuit plugs must be installed between the external current transformers and the X2 connecting terminal. This is necessary in order to be able to short-circuit the current transformers before disconnecting the X2 terminal strip on the ECOsine<sup>®</sup> active during any kind of service work.
- The power dissipation of the current transformer wiring must be considered when selecting the current transformer power. See Table 21 and Table 22.
- The grounding of the electrical circuit of the current transformer is not required.

Characteristic	Value
Rated secondary current	5 A
Primary current	The primary current has to be selected for the peak rms current (example: starting current 1800A ⇒ use current transformer 2000A : 5A)
Accuracy class	1.0 (or better) <b>The total accuracy calculated from CT primary current and CT class should not exceed 10% of the AHF nominal current.</b> <b>example 1:</b> CT 1000:5A (class 1.0), AHF 100A accuracy 10A (1% of 1000A) ≤ 10A (10% not 100A) ⇒ <b>ok</b> <b>example 2:</b> CT 2000:5A (class 1.0), AHF 50A accuracy 20A (1% of 2000A) ≥ 5A (10% not 50A) ⇒ <b>not ok</b> <b>example 3:</b> CT 2000:5A (class 0.5), ECOsine® active 100A accuracy 10A (0.5% of 2000 A) ≤ 10 A (10% of 100 A) ⇒ <b>ok</b>
Output power	At least. 2,5 VA (1 ECOsine® active) At least. 5,0 VA (2 ECOsine® active in parallel operation) At least. 7,5 VA (3 ECOsine® active in parallel operation) At least. 10,0 VA (4 ECOsine® active in parallel operation) At least. 12,5 VA (5 ECOsine® active in parallel operation)

Table 22: Current transformer specification

Line cross-section	Power in watts per meter at 5A (Consider forward and return lines!)
1.5 mm <sup>2</sup> (AWG 16)	0.2917 W/m
2.5 mm <sup>2</sup> (AWG 14)	0.1750 W/m
4 mm <sup>2</sup> (AWG 12)	0.1094 W/m
6 mm <sup>2</sup> (AWG 10)	0.0729 W/m

Table 23: Power consumption of the current transformer lines valid for copper wires

Example: With a distance of 5 meters between current transformer and ECOsine® active, the line length in the transformer circuit is 10m. If 1.5mm<sup>2</sup> line is used, the line losses are:  
 $P_v = 0.2917 \frac{W}{m} \times 10m = 2.917W$  This power loss must be considered when selecting the current transformers.

### 3.9.2 Current transformer specification for UL conformity

To ensure UL conformity, UL-compliant external current transformers must be used.

Manufacturer	Current transformer type
Flex Core	FCL series

Table 24: Example of a current transformer with UL conformity

### 3.9.3 Current transformer connection for operation of one ECOsine® active

To ensure that currents are correctly detected, observe the specified direction of the current flow from the transformers and the correct phase assignment.

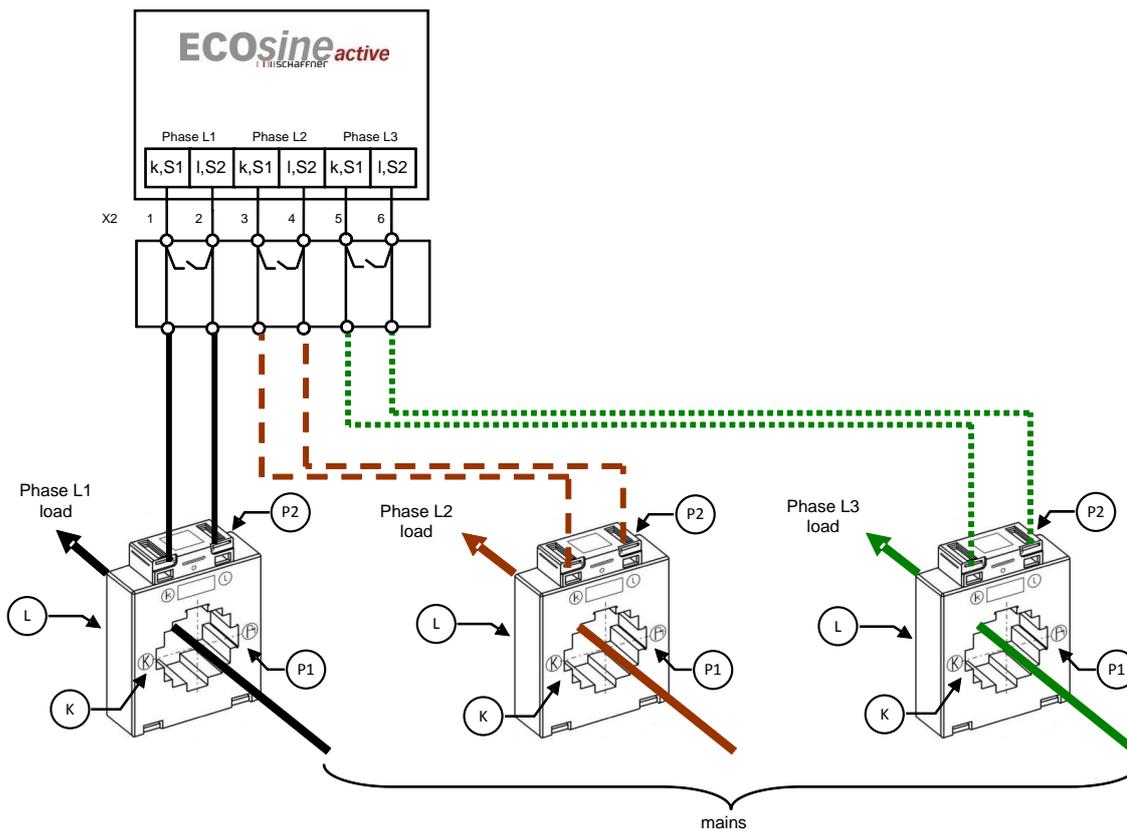


Fig. 49: CT wiring for operation of one ECOsine® active

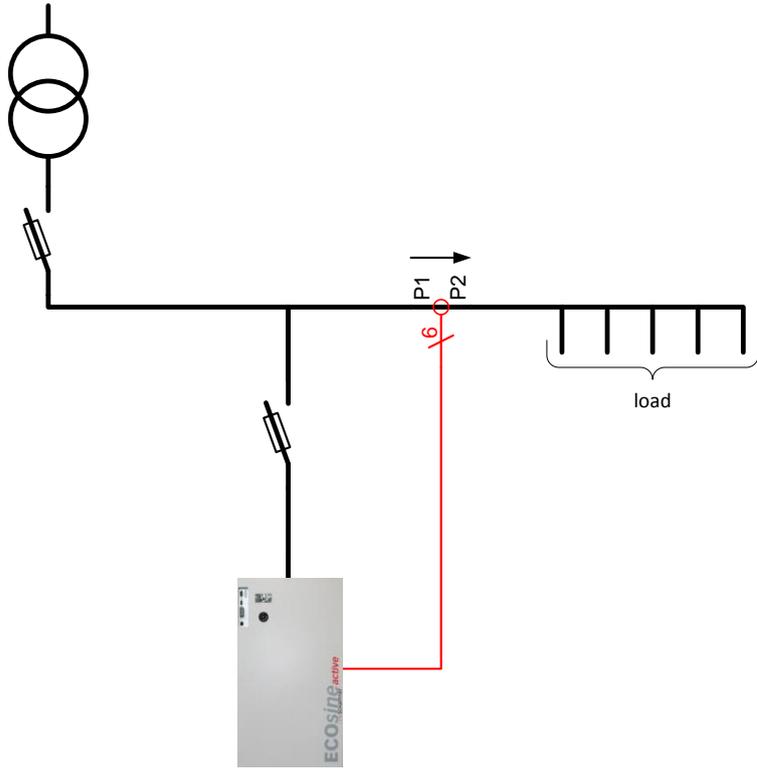


Fig. 50: CT installation on load side for operation of one ECOsine<sup>®</sup> active

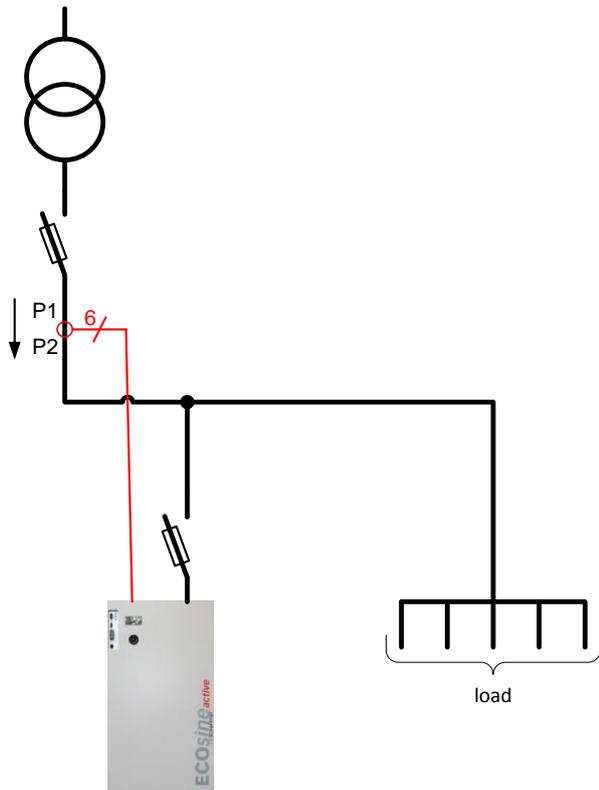


Fig. 51: CT installation on mains side for operation of one ECOsine<sup>®</sup> active

### 3.9.4 Current transformer connection for parallel operation of several ECOsine® active

The available compensation current can be increased through parallel operation of several ECOsine® active devices. In doing so, the current signal from the external current transformers is looped through all the ECOsine® active devices in accordance with the following schematic. **The current transformers must be installed on load side.**

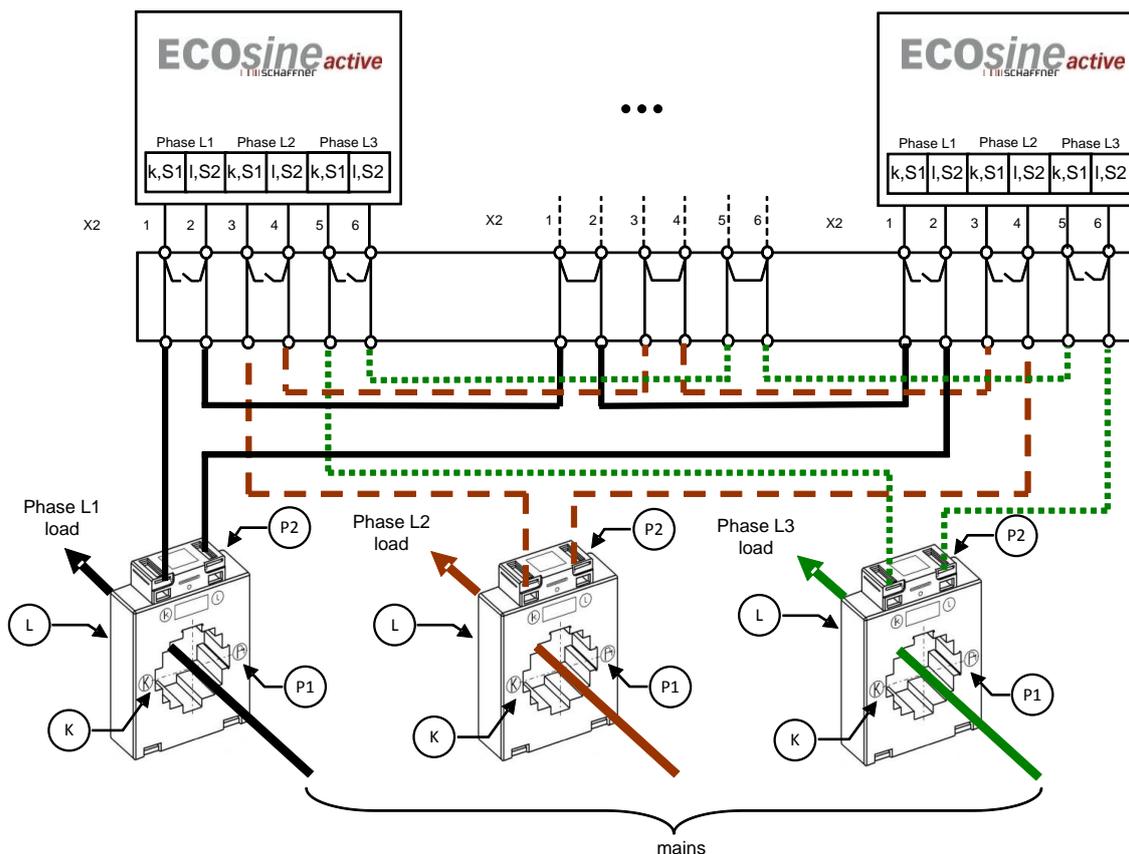


Fig. 52: CT wiring for parallel operation of up to five ECOsine® active devices

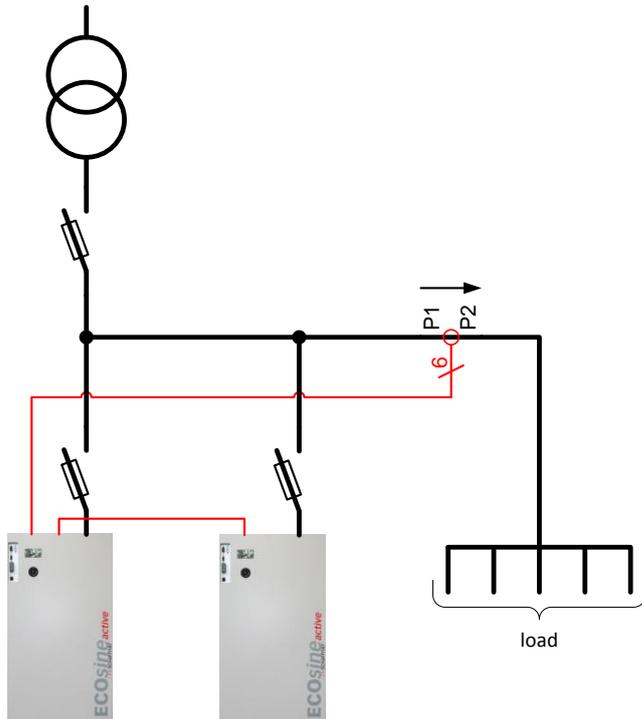


Fig. 53: CT installation on load side for parallel operation of several ECOSine® active devices

### Note

A maximum of five ECOSine® active devices may be operated on one current transformer set due to the maximum power output of the external current transformers. Additional current transformers must be installed if more than five devices are to be operated in parallel. For parallel operation of more than one ECOSine® active, the current transformers must be installed on **load side** of the filter.

**P320** has to be set to the sum of the entire rated compensation currents connected in parallel (See [chapter 4.5](#)).

### Note

For additional CT installations, as well as additional information regarding sizing and connection of CTs two knowledge base articles are available:

- **Knowledge base information No. 002 – Current transformer special applications**
- **Knowledge base information No. 011 – Current transformer installation**

### 3.9.5 Current transformer terminals on the active filter (X2)

X2 terminal	Designation	Note
1	k, S1	Phase L1 current transformer
2	l, S2	Phase L1 current transformer
3	k, S1	Phase L2 current transformer
4	l, S2	Phase L2 current transformer
5	k, S1	Phase L3 current transformer
6	l, S2	Phase L3 current transformer

Table 25: X2 terminal strip – connection terminals for external current transformers

Device	Cable cross section external current transformers
ECOsine® active-30/50/60/100/120-xxx-x	X2: 2.5 mm <sup>2</sup>
ECOsine® active-200/250/300-xxx-x	X2: 4.0 ... 6.0 mm <sup>2</sup>

Table 26: Cable cross section external current transformers



Fig. 54: X2 terminal strip – ext. current transformers

#### External current transformer block necessary

A current transformer terminal block with separable short-circuit terminals must be installed between the external current transformers and the X2 connection terminal strip. They are required to short-circuit the current transformers secondary's before disconnecting the X2 terminal strip from the ECOsine® active device during service work. The load resistors (terminating resistors) of the external current transformers are located in the ECOsine® active.



### Risk of Electric Shock due to loose cables

If inadequately secured live cables may be accidentally disconnected, potentially causing current transformer failure and/or severe electric shock.

The X2 terminal strip must be secured with the two bolts provided to prevent inadvertent disconnection.

## 3.9.6 Grounding of the current transformers

According to DIN VDE 0100 one-side grounding of the current transformers is compulsory only starting from 3 kV rated voltage, it helps to prevent risk for the operating personnel in case of an insulation fault. For voltages below 3 kV, grounding of the current transformers is not required, unless it is necessary for a correct measurement. If it is necessary to ground the current transformers, then grounding should be performed in the following way:

### Note

Grounding has to be performed only once for each current transformer circuit!

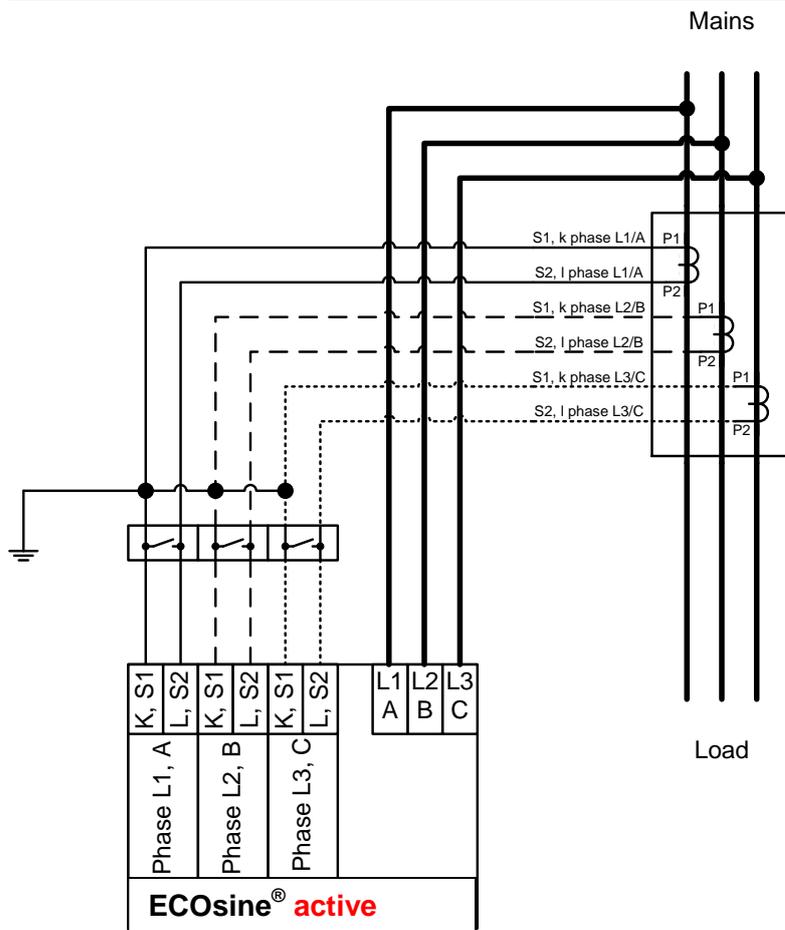


Fig. 55: Grounding of the current transformers (optional)

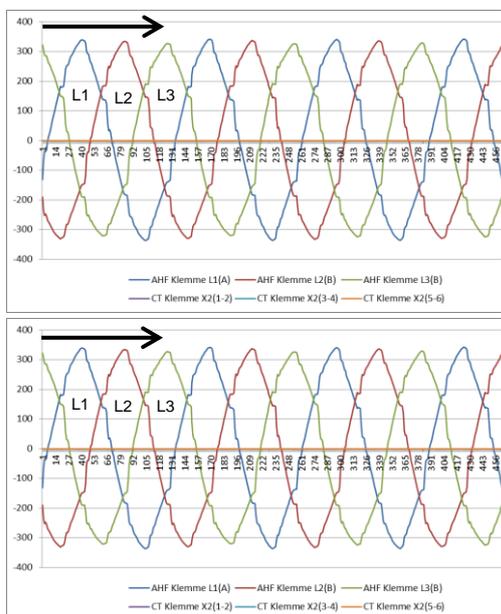
### 3.9.7 Checking current transformers rotating field

Start an single measurement using the AHF Viewer and display the following parameters:

- Voltage values
  - Instantaneous voltage value in phase 1 (P113)
  - Instantaneous voltage value in phase 2 (P114)
  - Instantaneous voltage value in phase 3 (P115)
  
- Current values depending on the installation of the current transformers
  - Current transformers on the load side:
    - Load current phase 1 (P133)
    - Load current phase 2 (P134)
    - Load current phase 3 (P135)
  - Current transformers on the mains side:
    - Mains current phase 1 (P123)
    - Mains current phase 2 (P124)
    - Mains current phase 3 (P125)

If the current transformers are connected correctly, then the rotating field of the voltage and current is identical. If the rotating field is revolving in the opposite direction, two current transformers are reversed in the phases.

Voltage



Current

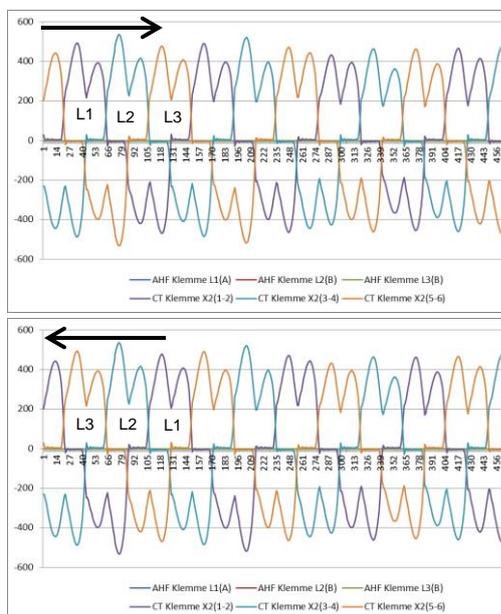


Fig. 56: Checking rotating field of current and voltage

## 3.9.8 Checking current transformers phase assignment

If the rotating field is correct, the same measured values can be used to check the phase location of current and voltage.

### Example 1:

Phase location of current and voltage match.

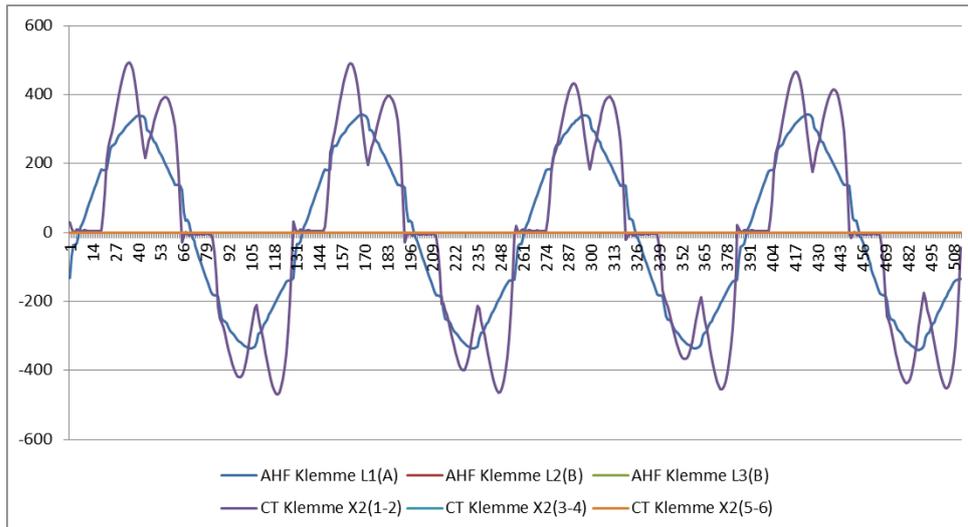


Fig. 57: Phase of current and voltage is correct

### Example 2:

Phase location of current and voltage is shifted through  $180^\circ$ . Here both connections (S1 and S2) of the current transformer are interchanged or the current transformer is installed incorrectly. It becomes evident in 2 different ways. On the one hand, it becomes apparent as shown in Fig. 58 in form of the opposite current with respect to the voltage curve of the same phase. Just as it is apparent in Fig. 59 when displaying all 3 currents, on the basis of incomplete current pattern which does not have a negative current curve for each positive current curve.

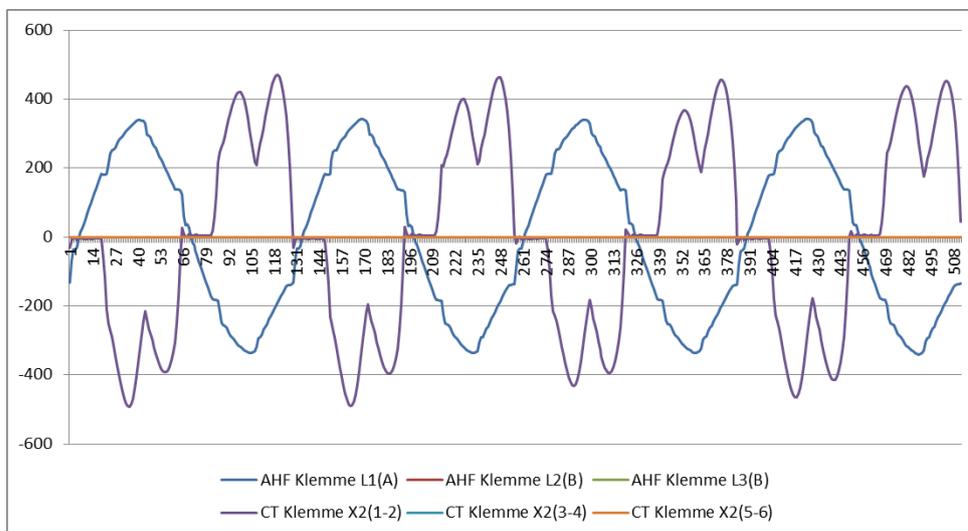


Fig. 58: Phase of current and voltage is shifted through  $180^\circ$ .

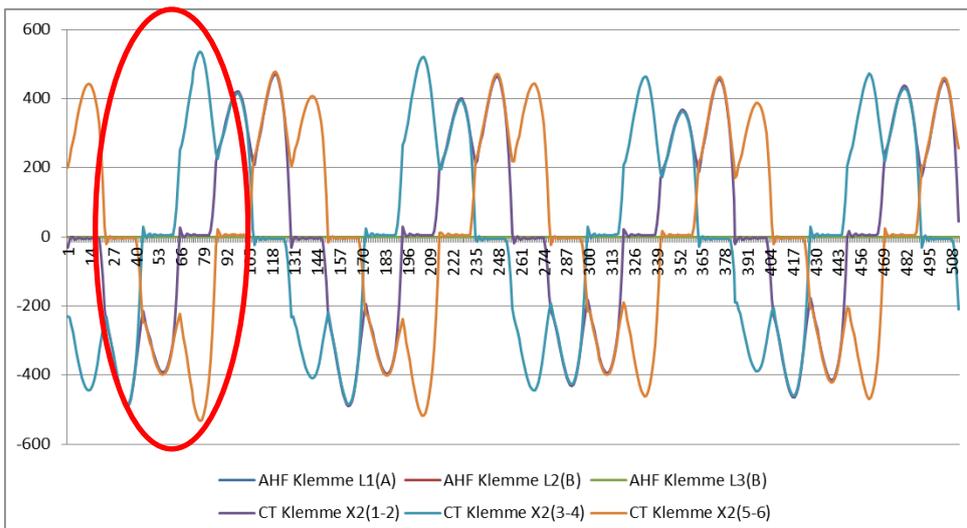


Fig. 59: Current transformer 1 phase-is shifted through 180°.

**Example 3:**

Current transformers of individual phases are interchanged, it becomes apparent already during the rotating field check. The comparison of current and voltage shows that the phase shifting of current and voltage exceeds 90°. See Fig. 60

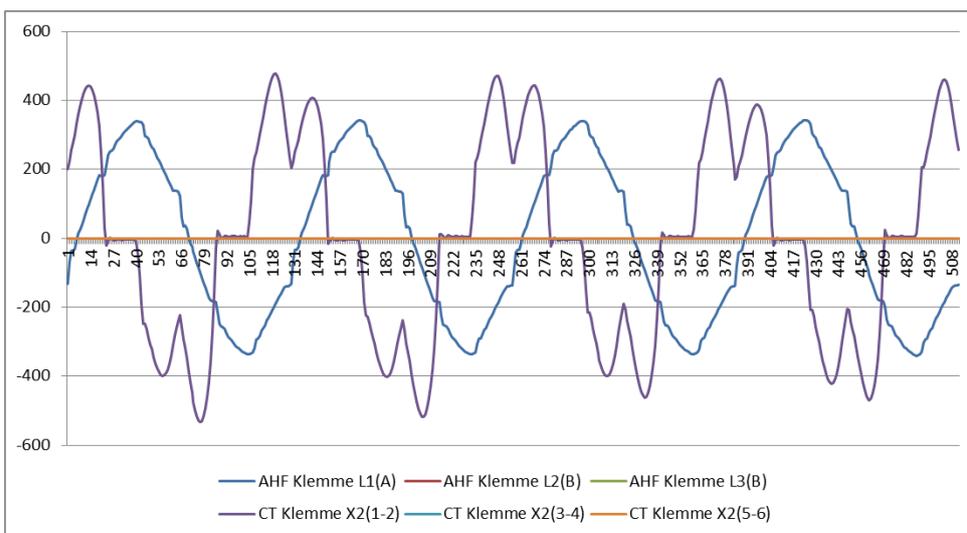


Fig. 60: Current transformers of phase 1 and 3 are interchanged

## 3.10 Connection of the external interfaces

### 3.10.1 Overview

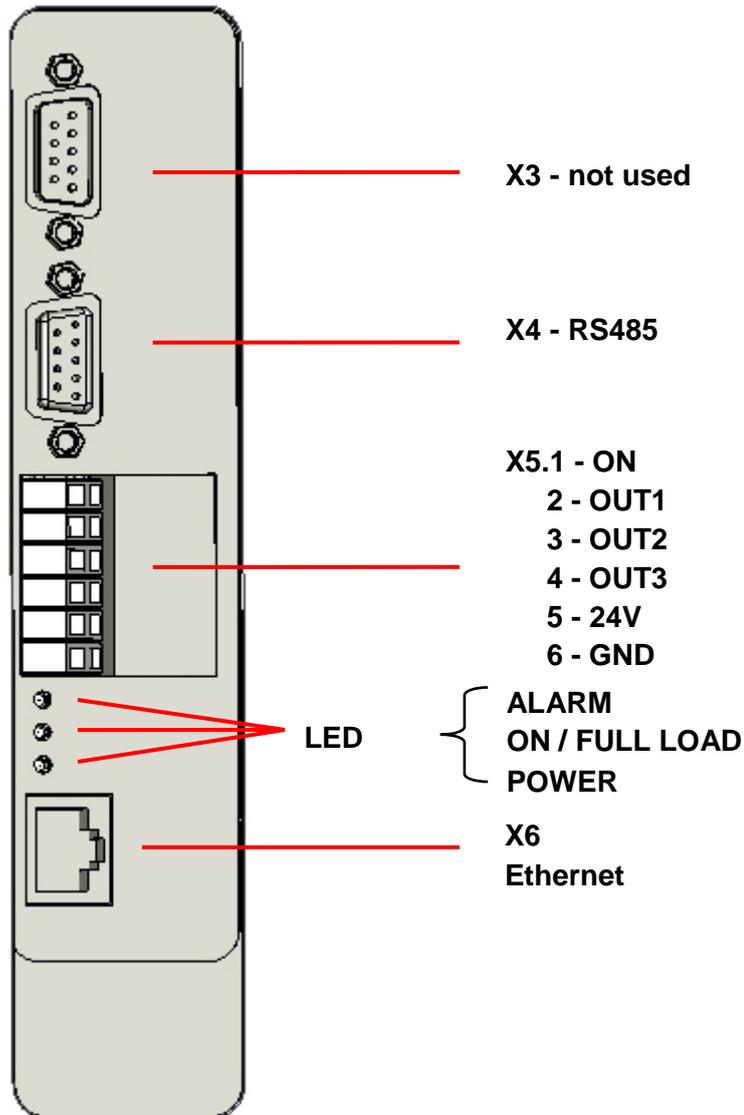


Fig. 61: Position of the control terminals

### 3.10.2 RS485 (X4) serial service interface

This terminal is used to connect to a PC with the AHF Viewer operating program (see also section 6.2)

### 3.10.3 Digital inputs and outputs (X5)

ECOSine® active has 1 digital input and 3 digital outputs. The function of these inputs and outputs is as follows:

X5 terminal	Designation	Comments
1	ON	<b>Digital input</b> 0 V (not connected): ECOSine® active OFF 24 V DC (from X5.5): ECOSine® active ON <b>Input only active when "P202 = terminal strip", otherwise ECOSine® active is switched on and off by P202</b> (P202 = direct ON or P202 = direct OFF)
2	OUT1	<b>Digital output</b> (24 V, max. 20 mA) Low = Alarm (" <b>ALARM</b> ") High (24 V DC) = no alarm <b>This is valid for "P201 = low active" (factory setting). Polarity can be adjusted by P201.</b>
3	OUT2	<b>Digital output</b> (24 V, max. 20 mA) Low = device not in operation High (24 V DC) = device in operation ("ON")
4	OUT3	<b>Digital output</b> (24 V, max. 20 mA) Low = device not fully loaded High (24 V DC) = full load (" <b>FULL LOAD</b> ")
5	24 V	Max. 20 mA Only to supply the X5.1 digital input, no connection of external loads permitted.
6	GND	Ground 0 V (reference potential for digital outputs)

Table 27: Assignment of the digital inputs and outputs

The digital inputs/outputs are short circuit-proof and electrically isolated from the control electronics.

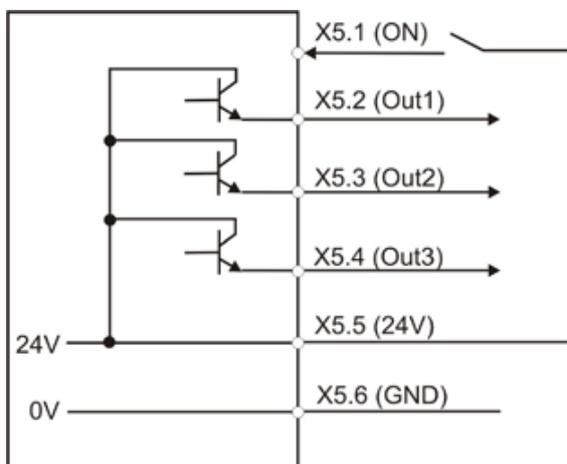


Fig. 62: Functional connection of digital input/outputs



Fig. 63: X5 terminal strip – digital inputs and outputs (ECOsine® active 30/50/60/100/120-xxx-x)

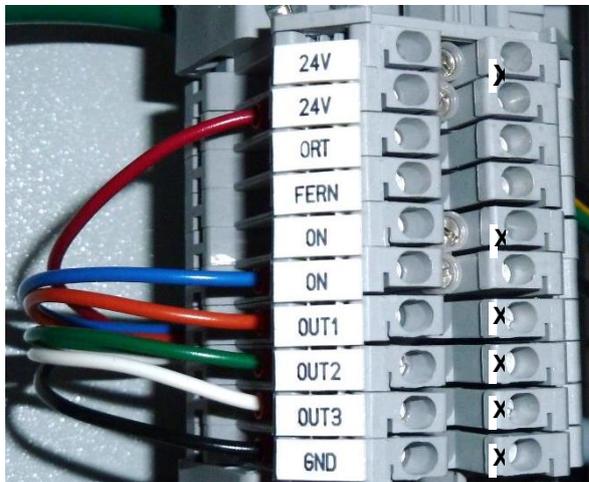


Fig. 64: X5a terminal strip – digital inputs and outputs (ECOsine® active 200/250/300-xxx-x)

For ECOsine® active 200/250/300-xxx-x, an ON-OFF switch is integrated in the cabinet door. The switch connects terminal X5.1 to X5.5.



Fig. 65: Integrated ON-OFF switch (ECOsine® active 200/250/300-xxx-x)

## 3.10.4 Ethernet (X6)

This interface is used to connect to a PC with the AHF Viewer operating program or to connect to a LAN network (see also [chapter 6.2](#)).

## 3.10.5 Meaning of status LED

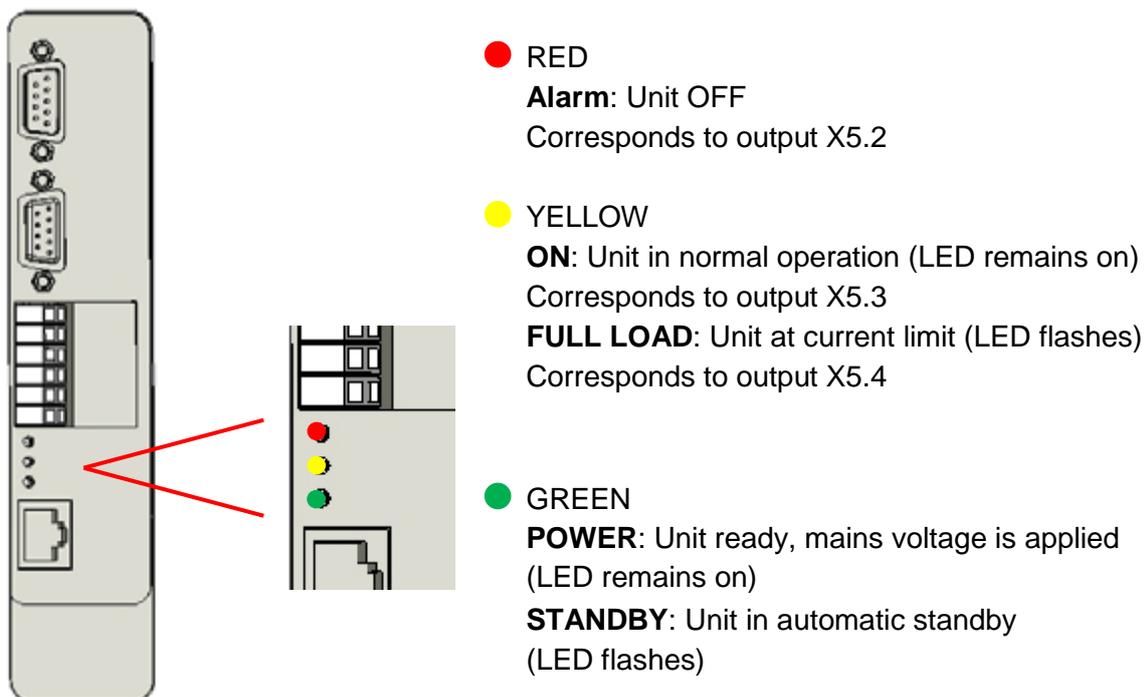


Fig. 66: Meaning of status LED

Continual operation at full load is possible; the device reduces the compensation current to the rated value. Operation at full load results in a reduction of current and voltage quality at mains connection point. The compensation current may need to be increased (use of additional ECOsine® active) to attain the desired ac mains quality.

# 4 Commissioning

ECOsine® active harmonic filters can be commissioned via the integrated display and keypad.

## 4.1 Integrated display and keypad

The parameter menu can be navigated via integrated keypad:

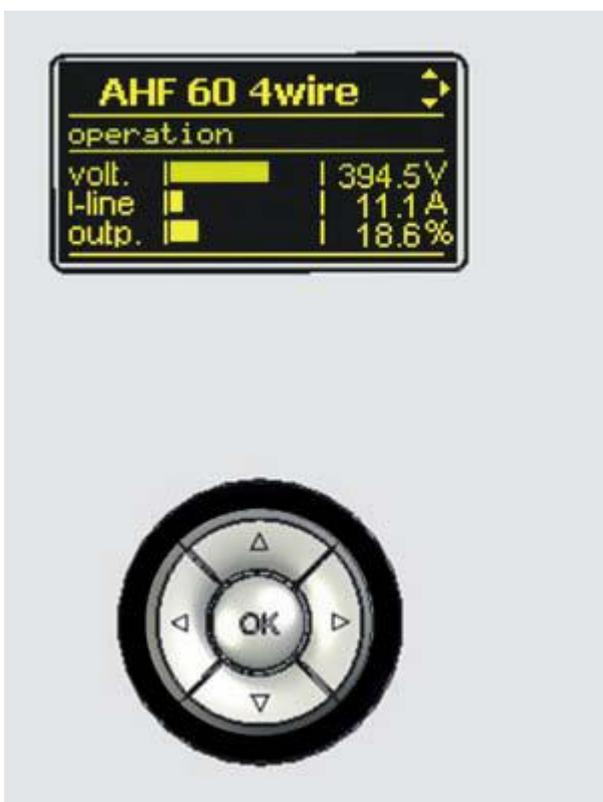


Fig. 67: Display and keypad

The keys have the following functions:

Key	Function
▶	Go down one menu level
◀	Back to the higher menu level, exit menu Scroll inside information screen
▲	Go up one line Change information screen
▼	Go down one line Change information screen
OK	Change parameters Save value Go down one menu level

Table 28: Key functions

## 4.2 Information screen

Starting from basic screen some information windows in level 0 are available. Level 1 can be reached by pressing ► from each information screen. Press the ▼ and ▲ keys to switch between the information screens.

If the display shows the screen saver, which is activated after approx. 2 minutes, press any key to quit it, the display switches automatically to the basic screen.

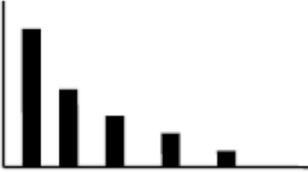
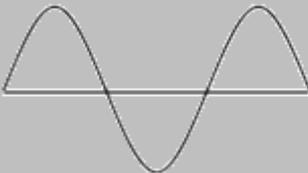
Level 0	Notes
<b>AHF xxx xwire</b> Status volt        xxx V I-load      xxx A Outp.      xx %	Basic screen with status information, line values and device output. Scrolling to next/previous screen with ▼ or ▲.
<b>information</b> FWVersion Vxx.xx.xx FPVers    V_xx LTCVers   V_xx rotating   right/left ... MAC        xx.xx.xx.xx ...	Information about firmware versions, direction of rotation, MAC address and other internal status information in case of service. Scrolling between the lines inside the screen by ◀.
<b>Harmonics</b> 	Harmonics spectrum and THDi of line current phase L1.
<b>Mains current L1</b> 	Waveform of mains current phase L1.
<b>State</b> Pxxx changed Full load ...	Event log of the last load events (since power on), such as changing of parameters, full load (Note: The detailed event log is available with software AHF viewer, see <a href="#">chapter 6</a> ).

Table 29: Information screen

## 4.3 Parameter menu structure

Level 1	Level 2	Level 3
<b>Main menu</b>	<b>0 Device specs</b>	
0	Device specs	002 Rated current
1	Measurements	003 Overload current
2 ... 5	Commissioning	...
6	fault messages	
	<b>1 Measurements</b>	
	100	Mains frequency
	101	THDi L1
	...	
	<b>2 ... 5 Commissioning</b>	<b>2 Basic setup</b>
	2	Basic setup
	3	Current transformer
	4	Operating mode
	5	Experts
		<b>3 Current transformer</b>
		300 Transformer placement
		310 Transformer ratio
		<b>4 Operating mode</b>
		400 Reactive power
		401 Cosphi lower limit
	<b>6 Alarms</b>	
	021	cause of fault
	...	

Table 30: ECOsine® active menu structure

For commissioning, you have to check several values in menu 1 and set the parameters in menus 2, 3, and 4. The shown menu structure is an example; all available parameters are explained in chapter 5. Use the ▼ and ▲ keys to scroll through the parameter values directly without going one level back each time to select a value.

---

## 4.4 Changing parameters

To change a parameter, select it using the arrow keys and open by pressing 'OK'. If the 'OK' key is pressed once again, the color of the value is reversed. In this state you can use the ▼ and ▲ keys to change the setting value.

## 4.5 Commissioning procedure

### Note for Commissioning with AHF-Viewer (PC commissioning tool)

It is recommended always to use the newest version of AHF-Viewer. The software can be downloaded at [www.schaffner.com](http://www.schaffner.com) in Downloads/Software. For commissioning of ECOsine<sup>®</sup> active 500-690V AHF-Viewer Version V02.02.00.08 or higher is needed.

1. Check the ambient conditions (see [chapter 7](#)):
  - ! Ambient temperature < 30°C or 40°C, with higher temperature values of up to max. 55°C, the device switches to derating.
  - ! Altitude < 1000 m
  - ! Check the ventilation of the room or control cabinet to find out whether sufficient cooling air is available.
  - ! Make sure that the ambient conditions from chapter 1.3 are complied with and no conductive dust can enter the ECOsine<sup>®</sup> active
2. Make sure that the electrical connection (see [chapter 3](#)) has been performed correctly. The following prerequisites must be met:
  - ! External fuse protection is installed (see [chapter 3.6](#)).
  - ! Make sure that the grounding has been performed correctly, check the conductor cross-section
  - ! Mains phases L1, L2, and L3 are connected (see chapter 3.6.3).
  - ! Check the conductor cross-section of the external conductor
  - ! Check the conductor cross-section of the neutral conductor (only 4-wire devices)
  - ! Check the tightening torque of the conductors
3. Check the current transformers
  - ! External current transformers for all three mains phases are connected, installation site, current flow direction and phase assignment are OK (see [chapter 3.9](#))
4. Check the installation clearances and conditions
  - ! Minimum installation clearance for air inlet, bottom 300 mm
  - ! Minimum installation clearance for air outlet, top 300 mm
  - ! Lateral installation clearance of the EMC filter is min. 100 mm (only 100 A / 120 A 4-wire devices)
5. Before the first switching-on
  - ! Check, if formation of the DC-link capacitor is necessary (see [chapter 3.2](#))
  - ! Disconnect the short-circuit jumpers of the external currents transformers.
  - ! Terminal X5.1= 0 V (disconnect the connection between X5.5 and 5.1)
6. **Only for ECOsine<sup>®</sup> active -200/250/300-xxx-x:**
  - ! Check the supply voltage for auxiliary units and adjust it if required (see chapter 3.3.2) – 400VAC and 480VAC variants  
**NOTICE! Incorrect connection of the auxiliary supply can result in damage to the device!**





## 4.6 Status messages

Message in display	Code (P20)	Meaning	Note
Fault	0	Error, ECOsine <sup>®</sup> active not working	See error codes
	1		(code not used)
Operation	2	ECOsine <sup>®</sup> active in operation	-
Off	3	ECOsine <sup>®</sup> active is off	See P202
Full load	4	ECOsine <sup>®</sup> active operating at full load	-
DC link too high	5	Temporary switch-off of ECOsine <sup>®</sup> active due to exceeding of the maximum DC-link voltage (P103)	See P504, 547, 549 The reason for this might be fast load fluctuations, in this case reduce the value of the recharging controller (P504 for minimum 0.5).
Overcurrent	6	Temporary switch-off of ECOsine <sup>®</sup> active due to exceeding of the maximum output current.	See P500, 548 Current peaks caused by commutation notches are also included here. In this case, reduce the notch depth or the compensation of ECOsine <sup>®</sup> active.
Standby	7	Device is off, since the required compensation current is lower than the standby limit.	See P406
Line synchronization	8	After "Power supply ON" ECOsine <sup>®</sup> active is waiting for successful mains synchronization. ECOsine <sup>®</sup> active not in operation	Can be triggered by means of additional zero cycles for DC drives. See P544
	9		(code not used)
Red. operation	10	Internal control has deactivated the upper higher harmonic controllers, operation of ECOsine <sup>®</sup> active is continued	See P177, P537 For further information, see Error 11 "Harmonic resonance"

Message in display	Code (P20)	Meaning	Note
Check CT	11	ECOsine® active has not been switched on yet and the measurement signal of current transformers is not plausible (possible switching-on is not prevented)	<p>Check:</p> <ul style="list-style-type: none"> <li>  Current transformer wiring See P300, 310</li> <li>  Current transformer installed in correct position</li> <li>  Wiring of current transformers – ECOsine® active is correct</li> <li>  Installation position of the current transformers does not match with P300</li> <li>  Phase assignment of the current transformers is correct</li> <li>  This message is valid as soon as generator load is available</li> </ul>
THDu resonance	12	Temporary switching off of ECOsine® active to check the line resonance	See P119, 178, 179, 554

Table 31: Status messages of ECOsine® active

## 4.7 Error messages

If error messages are displayed, please document them by proceeding as follows (before clearing the error):

- Copy all parameters using the AHF Viewer while the error is still active to prevent loss of the error codes due to a reset.
- Copy the event log using the AHF Viewer to be able to analyze the preceding errors.
- Save both files for later error analysis.
- If necessary, note down further information.

Message in display	Code (P21)	Meaning	Note
	0		(no error)
Overcurrent	1	ECOSine® active is off for several minutes because of multiple exceeding of the maximum output current.	Check line situation See P500, 548 automatic restart after some minutes
Fan error	2	An internal fan is not working	Check the fan and, if necessary, replace it (see P182 and P183); if necessary, contact Schaffner service
Power failure	3	Missing line voltage	Check the mains voltage (see P110 – P112). Check the mains voltages to determine whether the fuse has triggered in a phase. Check the voltage recording fuses to determine whether a fuse has triggered here. If necessary, contact Schaffner service
	4		(code not used)
CPU init	5	Internal hardware problem	Contact Schaffner service
FPGA init	6	Internal hardware problem	Contact Schaffner service
Over-temp.	7	ECOSine® active switched off due to high internal temperature of the device.	Wait until it has cooled down, automatic restart is performed after cooling down. Check the fan, air inlet and outlet openings and clean them, if necessary. Too high ambient temperature can also cause excessive temperature in the device. If necessary, contact Schaffner service
	8		(code not used)

Message in display	Code (P21)	Meaning	Note
Liquid cooling	9	Pressure loss in cooling system (only at devices with liquid cooling)	Check the cooling system Leakage Coolant level Operating pressure (nominal >2.5 bar) Pump motor is running If necessary, contact Schaffner Service
IGBT Uce max.	10	Temporarily switch off due to overcurrent, if permanent error: internal hardware problem	Contact Schaffner service
Harmonic resonance	11	ECOsine® active has been stopped due to detection of line resonance	Check the line situation and parameterization See P177, 500, 537. Restart only by means of OFF/ON Hardware fault can cause this error message, contact Schaffner Service.
Contr. Instable	12	Temporary switch-off of ECOsine® active due to unstable control. P185 > P552	Check line situation and parameter setting see P185, 187, 500, 552 automatic restart after some seconds
Notch filter	13	Temporary switch-off of ECOsine® active due to exceeding of the max. internal pulse filter current.	Check line situation and parameter setting see P186, 553 automatic restart after some seconds
THDu resonan.	14	ECOsine® active has been stopped due to exceeding of the THDu limit (line resonance) P119 > P179	Check line situation and parameter setting see P178, 179, 554 Restart only via OFF/ON
CPU Over-temp.	15	ECOsine® active switched off due to high temperature at the control unit.	Wait for cooling down Automatic restart after cooling down. Check the fan, air inlet and outlet openings and clean them, if necessary. Too high ambient temperature can also cause excessive temperature in the device. If necessary, contact Schaffner Service
Uzk min.	16	ECOsine® active switched off because the min. DC-link has not been reached.	Restart only via OFF/ON. If error continues to occur, contact Schaffner service
IGBT DC error	17	The DC share in the ECOsine® active device current exceeds the limit value of P556	Check the proper function and compensation of ECOsine® active. Possibly internal hardware problem, contact Schaffner Service.

Message in display	Code (P21)	Meaning	Note
IGBT CTRL error	18	The DC share in the ECOsine® active device current exceeds the limit value of P556	Check the proper function and compensation of ECOsine® active. Possibly internal hardware problem, contact Schaffner Service.
max. load	19	Temporary switching off for some seconds because the overload threshold has been reached (RMS current higher than $I_N * P548$ )	Check load state and current controller settings (500 ... 504) If required, increase the value of P548. Automatic restart after some seconds. P548 max 177% (147% for 120 A versions)
Auxiliary supply.	20	Power supply for the auxiliary drives of pump and air-conditioning device	<b>Only ECOsine® active 690 V</b> 230V auxiliary supply is outside the tolerance range (230V +/- 10%). See P188. Auxiliary drives are not switched on. Maybe, the auxiliary supply has been connected incorrectly. See chapter 3.3.2
Voltage too high	21	Operating voltage is too high	Device has been operated using incorrect mains voltage. For example, 200V device with 400V mains.
Main fan error.	22	Main fan is defective	<b>Only ECOsine® active 690 V</b> Error contact on the main fan has triggered. Check the main fan and, if necessary, replace it.
precharge	23	DC link voltage after pre-charging too low.	<b>Only ECOsine® active 690 V</b> DC pre-charging has not reached the value of $U_{DC} = 1,2 \times U_{Ph-Ph}$ within 10 seconds. Reset possible only by disconnecting from the mains.
DC link inbal.	24	DC link voltage is not symmetrical	<b>Only ECOsine® active 690 V</b> Contact Schaffner service
Overtemp cab.	25	Internal temperature in switch cabinet	<b>Only ECOsine® active 690 V</b> internal temperature switch opens at $60^{\circ}\text{C} \pm 3\text{K}$ and closes at $52^{\circ}\text{C} \pm 4\text{K}$ Check the door air conditioning unit for proper function, wait for the control cabinet to cool down, automatic restart is performed after that.

<b>Message in display</b>	<b>Code (P21)</b>	<b>Meaning</b>	<b>Note</b>
IGBT Temp. failure	26	IGBT temperature not reasonable	Plausibility of the each IGBT temperature is monitored and when missing or being out of tolerance, a failure is indicated. Any loose contact on the temperature probes might be a reason. Where necessary contact Schaffner Service.
SNT Voltage too low	27	SMPS voltage too low	Voltage of the SMPS is below 20V. Please contact Schaffner Service. This failure might be present in the Eventlog after a shutdown of the mains voltage.
Control IGBT	28	Failure IGBT gate signals	Contact Schaffner Service

Table 32: Error messages of ECOsine® active

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## 4.8 Information for Schaffner Service

When contacting Schaffner Service, always keep the following information at hand:

- Filter type
- Serial number of the filter (WOxxxxxxx S/Nxxx xxxxP)
- Description of the error (frequency, regular occurrence etc.)
- Application description, for example load types
- Copy of event log (\*.txt file)
- Copy of filter parameterization during which the error is pending (.btp file)

## 5 Parameter list

All measured values and parameters to be set are identified with a parameter number. The parameters are sorted into groups. The parameter number corresponds to the menu group number in the display.

<b>Parameter group</b>	<b>Meaning</b>	<b>Comments</b>
P0xx	Device data	<b>Read only</b> Display of device data (rated current, overload current, ...)
P1xx	Measured values	<b>Read only</b> Display of measured values (mains voltages, load currents, mains currents, filter currents, intermediate circuit voltages, ...)
P2xx	Basic settings	<b>Commissioning parameter</b> (settings for language, date, ...)
P3xx	Current transformer	<b>Commissioning parameter</b> (settings for current transformer position, transforming ratio, parallel operation of ECOsine® active, ...)
P4xx	Type of compensation	<b>Commissioning parameter</b> (activation of reactive power compensation, harmonic current compensation, ...)
P6xx	Alarms	<b>Read only</b> Display of error messages

Table 33: Overview of the parameter groups

## 5.1 Parameter groups P0xx, P1xx (read only)

The following parameters display the device data and measured values. Instantaneous values are not shown in the display, as the representation of time-related curves is only useful in AHF Viewer.

No.	Designation	Unit	Meaning
002	rated current	A	RMS value rated current
003	overload current		Maximum overload current – peak value
004	rated voltage	V	Rated voltage of the active filter
008	MAC address		MAC address of control unit example:08:00:70:22:44:11
009	S/N control board		Serial no. of control unit
010	firmware version		Version of the device firmware
011	firmware LTC		Version of power section firmware
012	status LTC		Status of power board controller
013	troublecode LTC		Internal failure code
014	hardware code		Hardware version of the active filter
015	version device code		Version of device code
016	CT offset L1	mA	CT offset L1 (secondary site)
017	CT offset L2	mA	CT offset L2 (secondary site)
018	CT offset L3	mA	CT offset L3 (secondary site)
020	status		Current device status
021	cause of fault		Error cause
030	operating hours	h	Number of operating hours
100	mains frequency	Hz	Measured mains frequency
101	THDi L1	%	Total harmonic distortion mains current L1
102	cos phi		cos $\varphi$ mains side phase 1
103	DC-link voltage	V	DC-Bus voltage
104	device load	%	Device usage, based on the rated current
105	active power L1	kW	RMS value of active power L1
106	active power L2	kW	RMS value of active power L2
107	active power L3	kW	RMS value of active power L3
108	reactive current device	A	Reactive device current – rms
109	rotating field		Direction of rotating field
110	line voltage rms U12	V	Mains voltage U12 – rms
111	line voltage rms U23	V	Mains voltage U23 – rms
112	line voltage rms U31	V	Mains voltage U31 – rms
113	line voltage U1	V	Mains voltage U1 – instantaneous value
114	line voltage U2	V	Mains voltage U2 – instantaneous value
115	line voltage U3	V	Mains voltage U3 – instantaneous value
116	line voltage U12	V	Mains voltage U12 – instantaneous value
117	line voltage U23	V	Mains voltage U23 – instantaneous value
118	line voltage U31	V	Mains voltage U31 – instantaneous value
119	THDu Umains	%	THDu of the linked mains voltage

No.	Designation	Unit	Meaning
120	line current rms L1	A	Mains current L1 – rms
121	line current rms L2	A	Mains current L2 – rms
122	line current rms L3	A	Mains current L3 – rms
123	line current L1	A	Mains current L1 – instantaneous value
124	line current L2	A	Mains current L2 – instantaneous value
125	line current L3	A	Mains current L3 – instantaneous value
126	line current neutral	A	Mains current Neutral – instantaneous value
130	load current rms L1	A	Load current L1 – rms
131	load current rms L2	A	Load current L2 – rms
132	load current rms L3	A	Load current L3 – rms
133	load current L1	A	Load current L1 – instantaneous value
134	load current L2	A	Load current L2 – instantaneous value
135	load current L3	A	Load current L3 – instantaneous value
136	load current neutral	A	Load current Neutral – instantaneous value
140	out current rms L1	A	Compensating current L1 – rms
141	out current rms L2	A	Compensating current L2 – rms
142	out current rms L3	A	Compensating current L3 – rms
143	out current L1	A	Compensating current L1 – instantaneous value
144	out current L2	A	Compensating current L2 – instantaneous value
145	out current L3	A	Compensating current L3 – instantaneous value
146	out current neutral	A	Compensating current Neutral – instantaneous value
147	line current rms neutral	A	Mains current Neutral – rms
148	load current rms neutral	A	Load current Neutral – rms
149	out current rms neutral	A	Compensating current Neutral – rms
177	max. harmonic		highest active harmonic controller (due to resonance monitoring)
178	THDu reference	%	THDu reference detected at AHF switching on
179	THDu limit	%	THDu limit (P179 = P178 * P554)
180	module temperature	°C	IGBT-Module temperature
181	temperature	°C	Temperature inside active filter
182	enclosure fan 3	rpm	Speed of fan 3 (left)
183	enclosure fan 4	rpm	Speed of fan 4 (right)
184	harmonic controller peak	V	Harmonic content of output voltage (peak value)
185	proportional controller rms	V	proportional controller output, rms
186	notch-filter rms	A	Current of internal notch filter, rms
187	Proportional Controller rms max.	V	Latched max. value of P185, rms
188	auxiliary supply	V	Voltage of auxiliary supply
189	cabinet temperature	°C	<b>Only AHF 690V</b> Temperature inside of the cabinet.

No.	Designation	Unit	Meaning
198	ON signal		Switch on slope 0 → 1 (for AHF Viewer switch-on-trigger)
199	OFF signal		Switch off slope 0 → 1 (for AHF Viewer switch-off-trigger)

Table 34: Parameters P0xx to P1xx

## 5.2 Parameter groups P2xx, P3xx and P4xx (Commissioning parameters)

Parameter No.	Designation	Factory setting	Meaning
200	language	English	Language shown on display   German   English   Chinese   French
201	polarity ALARM X5.2	Low active	Polarity of output OUT1 (X5.2) ALARM   Low active   High active
202	switch on	Terminal strip	How to switch on   Terminal strip   Direct ON   Direct OFF
210	default values	No action	Set the standard factory settings
220	date		Current date and time, must be set during commissioning.
230	MB slave ID	1	Modbus node address (1... 247)
231	MB baud rate	38400	Modbus baud rate   2400   9600   14400   19200   38400   57600   64800   115200
232	MB parity	NO	Modbus parity   NO   ODD   EVEN
233	MB stop bit	1	No. of stop bits   0,1,2 (if P233 = 2, then automatically P232 is set to Parity = NO)
240	IP address	192.168.1.2	IP address   Fix IP address if P241 DHCP = OFF   Automatic assignment of an IP address by a DHCP server if P241 DHCP = ON

Parameter No.	Designation	Factory setting	Meaning
241	DHCP	ON	Allocation of IP address by DHCP server <b>OFF</b> (in that case please set the following parameters: <ul style="list-style-type: none"> <li>! P240 IP address</li> <li>! P242 subnet mask</li> <li>! P243 default gateway)</li> </ul> <b>ON</b> (in that case the parameters P240, P241 and P242 are allocated automatically by DHCP server)
242	subnet mask	255.255.255.0	Subnet mask Fix subnet mask if P241 DHCP = OFF Automatic assignment of the subnet mask by a DHCP server if P241 DHCP = ON
243	default gateway	192.168.1.50	Default gateway Fixed address of the default gateway if P241 DHCP = OFF Automatic assignment of the default gateway by a DHCP server if P241 DHCP = ON
300	transformer placement	Load side	Placement of the external current transformers <ul style="list-style-type: none"> <li>! Load side</li> <li>! Mains side</li> </ul>
310	transformer ratio	500:5 (A)	Transmission ratio of the external current transformers If summation current transformers are used, the sum of all current transformers must be set here. 50:5 to 50000:5

Parameter No.	Designation	Factory setting	Meaning
311	CT check	ON	<p><b>P311 = ON</b>  Checks the signal from external CT to plausibility.  This check is carried out automatically when AHF is OFF. If CTs are not ok, a warning "Check current transformer" will be displayed. <b>This warning does not inhibit the switch on of AHF. During operation no check is carried out.</b>  This function works only for symmetric steady state loads with minimum current of 10A and minimum power of 1kW, e.g. frequency converters. A wrong warning may be displayed if you have extremely unbalanced loads, like welding applications or generator loads.  <b>P311 = OFF</b>  no test of signals</p>
320	total current parallel	xx A (rated current)	Sum of all rated compensation currents of the ECOsine® active connected in parallel to one set of current transformers.
400	reactive power	0 %	<p>Degree of the reactive power compensation 0 ... 100% Compensates the specified percentage value of the currently measured reactive power (e.g. 30%) independently of <math>\cos \varphi</math> on mains side</p> <p>P400 = 0 → function deactivated</p> <p>P400≠0 → P401/402 are set to 0</p>

Parameter No.	Designation	Factory setting	Meaning
401	cosphi lower limit	0.0	<p>Specifies the target <math>\cos \varphi</math> range on mains side (lower limit)  <math>\cos \varphi</math> on mains side is kept in the range between P401 and P402. The input value is adapted to the value range if required. Values outside of 0.7 cannot be entered</p> <p>-0.99 ... -0.7 / 0.0 / 0.7 ... (+)1</p> <p><b>Negative values:</b> capacitive  <b>Positive values:</b> inductive                      To activate this <math>\cos \varphi</math> controller function, <u>both</u> parameters (P401 and P402) must be set to valid values (<math>\pm 0.7 \dots 1.0</math>)</p> <p>Function disabled                      P401 <math>\neq 0 \rightarrow</math> P400 is set to 0</p>
402	cosphi upper limit	0.0	<p>Specifies the target <math>\cos \varphi</math> on mains side (upper limit)                      For details, see P401</p>

Only one of the two  $\cos \varphi$  – controls can be set:

- P400 – direct reactive power compensation in percent or
- P401/P402 – keeping  $\cos \varphi$  in the specified target range

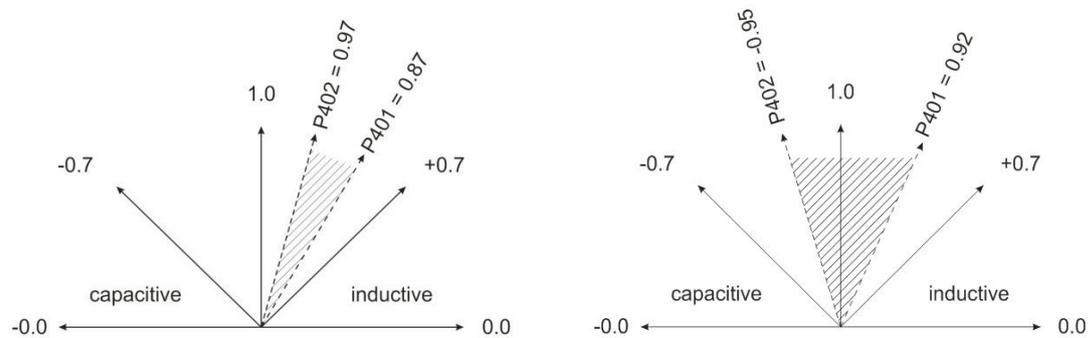


Fig. 68: Example for  $\cos \varphi$  control ( $\cos \varphi$  on mains side is kept in the hatched target range)

405	load balancing	OFF	<p>Activation or deactivation of load balancing between phases</p> <p>█ OFF                      █ ON</p> <p>Load balancing is active <b>only</b> if <b>simultaneously</b> P410 = ON is set.</p>
406	standby threshold	0 %	<p>Automatic standby of ECOsine® active when requested compensating current (rms) is lower than threshold. The hysteresis is 2% of rated current.                      0% = no automatic standby</p>

Parameter No.	Designation	Factory setting	Meaning
407	priority full load	0 = no priority	<p>Compensation priority at full load</p> <p><b>0 = none</b> (symmetric limitation of harmonic, reactive compensation – default value)</p> <p><b>1 = reactive current</b> (priority to reactive current compensation during full load)</p> <p><b>2 = harmonics</b> (priority to harmonic compensation during full load – recommended value for soft starters)</p>
410	harmonic compensation	OFF	<p>Activation or deactivation of the harmonic current compensation</p> <p><b>OFF</b></p> <p>The controllers of harmonic compensation (P411 – P434) are not active</p> <p><b>ON</b></p> <p>The controllers of harmonic compensation (P411 – P434) are active</p>

Table 35: Parameters P2xx to P410 (basic commissioning parameters)

## 5.3 Parameter groups P4xx (setting of the compensation degree)

Parameter no.	Designation	Factory settings	Meaning
411	h3 compensation	0% (3 wire) 80% (4 wire)	Adjustable degree of compensation 3 <sup>rd</sup> harmonic 1% ... 100%
412	h5 compensation	80%	Adjustable degree of compensation 5 <sup>th</sup> harmonic 1% ... 100%
413	h7 compensation	80%	Adjustable degree of compensation 7 <sup>th</sup> harmonic 1% ... 100%
414	h9 compensation	0% (3 wire) 50% (4 wire)	Adjustable degree of compensation 9 <sup>th</sup> harmonic 1% ... 100%
415	h11 compensation	50%	Adjustable degree of compensation 11 <sup>th</sup> harmonic 1% ... 100%
416	h13 compensation	40%	Adjustable degree of compensation 13 <sup>th</sup> harmonic 1% ... 100%
417	h15 compensation	0%	Adjustable degree of compensation 15 <sup>th</sup> harmonic 0% ... 100%
418	h17 compensation	30%	Adjustable degree of compensation 17 <sup>th</sup> harmonic 0% ... 100%
419	h19 compensation	20%	Adjustable degree of compensation 19 <sup>th</sup> harmonic 0% ... 100%
420	h21 compensation	0%	Adjustable degree of compensation 21 <sup>st</sup> harmonic 0% ... 100%
421	h23 compensation	15%	Adjustable degree of compensation 23 <sup>rd</sup> harmonic 0% ... 100%
422	h25 compensation	15%	Adjustable degree of compensation 25 <sup>th</sup> harmonic 0% ... 100%
423	h27 compensation	0%	Adjustable degree of compensation 27 <sup>th</sup> harmonic 0% ... 100%
424	h29 compensation	10%	Adjustable degree of compensation 29 <sup>th</sup> harmonic 0% ... 100%

Parameter no.	Designation	Factory settings	Meaning
425	h31 compensation	10%	Adjustable degree of compensation 31 <sup>st</sup> harmonic 0% ... 100%
426	h33 compensation	0%	Adjustable degree of compensation 33 <sup>rd</sup> harmonic 0% ... 100%
427	h35 compensation	0%	Adjustable degree of compensation 35 <sup>th</sup> harmonic 0% ... 100%
428	h37 compensation	0%	Adjustable degree of compensation 37 <sup>th</sup> harmonic 0% ... 100%
429	h39 compensation	0%	Adjustable degree of compensation 39 <sup>th</sup> harmonic 0% ... 100%
430	h41 compensation	0%	Adjustable degree of compensation 41 <sup>st</sup> harmonic 0% ... 100%
431	h43 compensation	0%	Adjustable degree of compensation 43 <sup>rd</sup> harmonic 0% ... 100%
432	h45 compensation	0%	Adjustable degree of compensation 45 <sup>th</sup> harmonic 0% ... 100%
433	h47 compensation	0%	Adjustable degree of compensation 47 <sup>th</sup> harmonic 0% ... 100%
434	h49 compensation	0%	Adjustable degree of compensation 49 <sup>th</sup> harmonic 0% ... 100%

Table 36: Parameters P411 to P434 (adjust degree of compensation)

## 6 AHF Viewer PC operating program

The AHF viewer PC operating program supports ECOsine® active commissioning and enables further diagnosis. For details on the AHF Viewer, refer to the Help file of the AHF Viewer, as well as the AHF Viewer operating instructions which are enclosed with the download files of the AHF Viewer.

A firmware update of the active filter can be done by using AHF Viewer. (Possible with the RS485 interface only.)

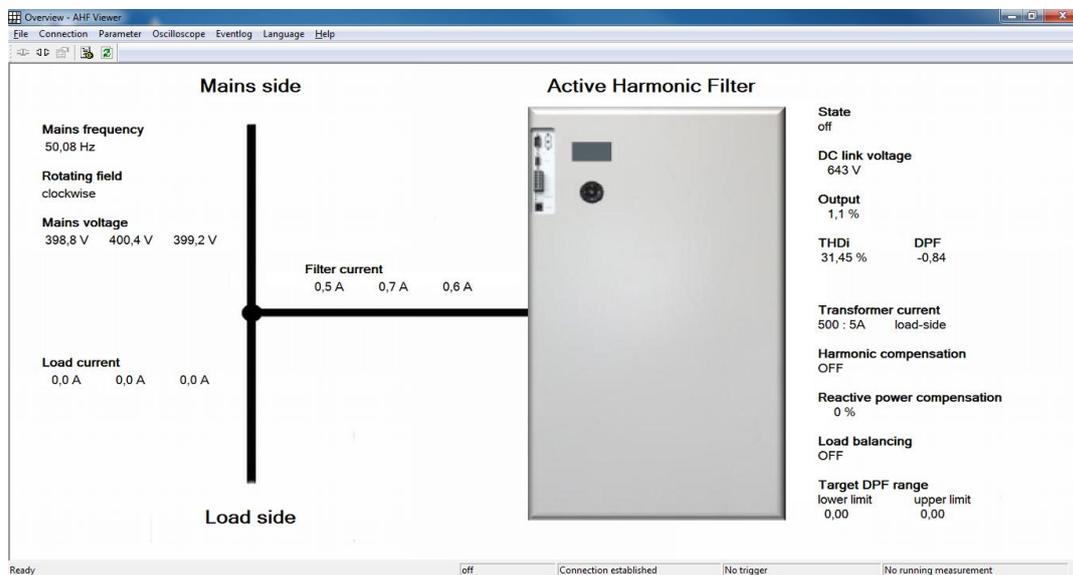


Fig. 69: AHF viewer basic screen

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## 6.1 Operating system

<b>Feature</b>	<b>Level</b>
Operating system	Windows XP Windows Vista (see "readme.txt" before installation) Windows 7 (run in "compatibility mode" when indicated)

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Table 37: AHF Viewer prerequisites

## 6.2 Connecting to the PC

The connection is established via the RS485 interface to ECOsine® active (terminal X4) or via Ethernet (terminal X6).

### 6.2.1 Connection via RS485

PC connection with RS485 requires a suitable interface converter.

#### Designation

Galvanic isolation	With
Terminating resistance	Activated (on last bus participant)
Echo mode	Off

Table 38: Interface converter specifications RS485

Designation	Manufacturer	Illustration
USB-485-Mini/OP	CTI GmbH <a href="http://www.cti-lean.com">www.cti-lean.com</a> <a href="http://www.cti-shop.com">www.cti-shop.com</a>	 CTI GmbH Order No.: 95030202
AHF-PC interface	CTI GmbH <a href="http://www.cti-lean.com">www.cti-lean.com</a> <a href="http://www.cti-shop.com">www.cti-shop.com</a>	 CTI GmbH Order No.: 95030212

Table 39: Recommended galvanic isolation interface converter USB – RS485

The connection to ECOsine® active is established by means of a galvanically isolated interface converter via a 2-wire cable.

Terminal	Terminal X4	Meaning
<b>Interface converter</b>		
A	X4.9	Signal A
B	X4.5	Signal B
	X4.1	Ground (not connected to interface converter)
	X4.2	5 V (not connected to interface converter)

Table 40: Pin assignment of connecting cable interface converter – ECOsine® active

For proper operation of the RS485 bus a **termination resistor 120 Ω** is needed, especially if long cables or a bus structure with more than one unit is used. The interfaces are configured by the following parameters, see [chapter 5](#).

Parameter no.	Designation	Factory setting	Meaning
230	MB Slave ID	1	Modbus node address (1... 247)
231	MB baud rate	38400	Modbus baud rate   2400   9600   14400   19200   38400   57600   64800   115200
232	MB Parity	NO	Modbus parity   NO   ODD   EVEN
233	MB Stop bits	1	No. of stop bits   0,1,2 (if P233 = 2, the P232 parity = NO is set)

Table 41: Parameters for the interface configuration RS 485

## 6.2.2 Connection via Ethernet

To establish connection to ECOsine® active via Ethernet, both devices must be in the same subnet or a connection via router must be available. During this process ECOsine® active can optionally obtain an IP address, subnet mask and the default gateway using a DHCP server or they must be preset manually.

To establish a direct connection between the PC and ECOsine® active, a simple Ethernet cable (not a crossover cable) is necessary. DHCP must be switched off for this purpose and the corresponding settings must be performed at the PC. For PC and ECOsine® active a different IP address must be set, for example on the PC 192.168.1.1. The subnet mask must be set to 255.255.255.0 and the default gateway can remain empty.

### Note

A knowledge base is available for further information on the Ethernet settings.

**I Knowledge base information No.004 – AHF connection via Ethernet cable (TCP/IP)**

Parameter no.	Designation	Factory setting	Meaning
240	IP address	192.168.1.2	<p><b>IP address</b></p> <p>Fixed IP address if P241 DHCP = OFF Automatic assignment of an IP address by a DHCP server if P241 DHCP = ON</p>
241	DHCP	ON	<p>Activation of the IP address allocation by DHCP server</p> <p><b>OFF</b></p> <p>the following parameters must be set:</p> <ul style="list-style-type: none"> <li>  P240 IP address</li> <li>  P242 subnet mask</li> <li>  P243 default gateway</li> </ul> <p><b>ON</b></p> <p>the following parameters are automatically assigned by the DHCP server:</p> <ul style="list-style-type: none"> <li>  P240 IP address</li> <li>  P242 subnet mask</li> <li>  P243 default gateway</li> </ul>
242	Subnet mask	255.255.255.0	<p>Subnet mask</p> <ul style="list-style-type: none"> <li>  Fixed subnet mask if P241 DHCP = OFF</li> <li>  Automatic assignment of the subnet mask by a DHCP server if P241 DHCP = ON</li> </ul>
243	Default gateway	192.168.1.50	<p>Default gateway address</p> <ul style="list-style-type: none"> <li>  Fixed address of the default gateway if P241 DHCP = OFF</li> <li>  Automatic assignment of the default gateway by a DHCP server if P241 DHCP = ON</li> </ul>

Table 42: Parameters for interface configuration

# 7 Technical Data

## 7.1 General technical data

### 7.1.1 General technical data 400V / 480V and 200V / 240V

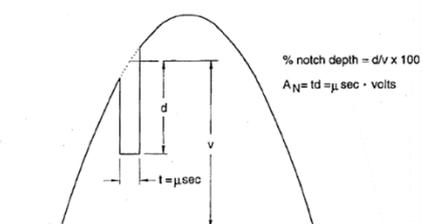
Characteristics	Value	Notes
Altitude	Up to 1000 m without derating of compensating current From 1000 to 4000 m automatic derating 1 % / 100 m	<b>Attention!</b> If the device is used in altitudes >2000m the transient Voltages (1.2 $\mu$ s / 50 $\mu$ s) must not exceed the following values:    3000 m: max. 5.26 kV (L-PE)   4000 m: max. 4.65 kV (L-PE)
Installation	Upright	The device has to be installed in upright position.
Current transformer	50:5 A up to 50.000 : 5 A	Adjustable in 1 A steps, <b>see also chapter 3.9.1</b>
Power connections	Copper, nickel-plated	
Parallel operation	up to 5 units on <b>one</b> current transformer set	For more than 5 units use an additional set of current transformers
EMC	EN61000-6-4, EN61000-6-2 EN61800-3	
Commutation notches	$\leq 65\%$ (Limit value of IEEE519 is $\leq 50\%$ )	
Commutation area $A_N$	$\leq 76 \times U_{nominal} [V\mu s]$ (Limit value of IEEE519)	Limit value for 400 V systems: $A_{N\_Max} = 76 \times 400V \times \mu s = 30400 V\mu s$ Limit value for 480V systems: $A_{N\_Max} = 76 \times 480V \times \mu s = 36480 V\mu s$
Vibration corresponding to IEC 60068-2-6 : 2007 IEC 60068-2-27 : 2008 IEC 60068-2-64 : 2008	Acceleration: 1,3g per axis Random 1,3g per axis Shock: 11g (10ms)	IP 20 devices

Table 43: General technical data ECOsine® active series 400V/480V and 200V/240V

## 7.1.2 General technical data 500V / 690V

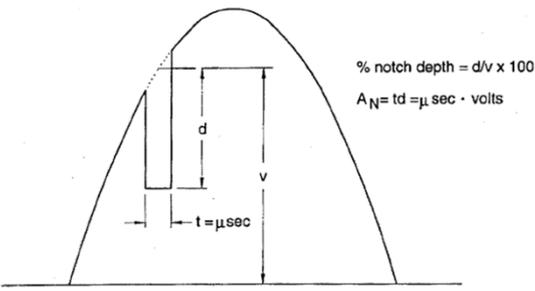
Characteristics	Value	Notes
Altitude	Up to 1000 m without derating of compensating current From 1000 to 4000 m automatic derating 1 % / 100 m	<b>Attention!</b> If the device is used in altitudes >2000m the transient Voltages (1.2 μs / 50 μs) must not exceed the following values: 3000 m: max. 3.51 kV 4000 m: max. 3.10 kV
Installation	Upright	The device has to be installed in upright position.
Current transformer	50:5 A up to 50.000 : 5 A	Adjustable in 1 A steps, <a href="#">see also chapter 3.9.1</a>
Power connections	Copper, nickel-plated	
Parallel operation	up to 5 units on <b>one</b> current transformer set	For more than 5 units use an additional set of current transformers
EMC	EN61000-6-2:2005 EN61000-3-11:2000 EN61000-3-12:2011 EN55011:2009 / A1: 2010* EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6	FN3420-200-690-3-xx is designed for the supply by means of a separate power transformer or generator of the operator and not for direct operation at the public low-voltage supply system.
Commutation notches	≤ 65% (limit value of IEEE519 is ≤ 50%)	
Commutation area $A_N$	≤ $76 \times U_{nominal} [V\mu s]$ (Limit value of IEEE519)	Limit value for 690V systems: $A_{N\_Max} = 76 \times 690V \times \mu s = 52440 V\mu s$
Vibration according to <b>IEC 60068-2-6 : 2007</b> <b>IEC 60068-2-27 : 2008</b> <b>IEC 60068-2-64 : 2008</b>	<ul style="list-style-type: none"> <li>■ Amplitude: 0,075mm (5 – 57,7Hz)</li> <li>■ Acceleration: 1g (57,7 – 150Hz)</li> <li>■ Shock: 4g (11ms)</li> </ul>	
Vibration according to	MIL-STD-810G, method 514.6 Annex C	

Table 44: General technical data ECOsine® active series 500V / 690V

### 7.1.3 Maximum output current for harmonics

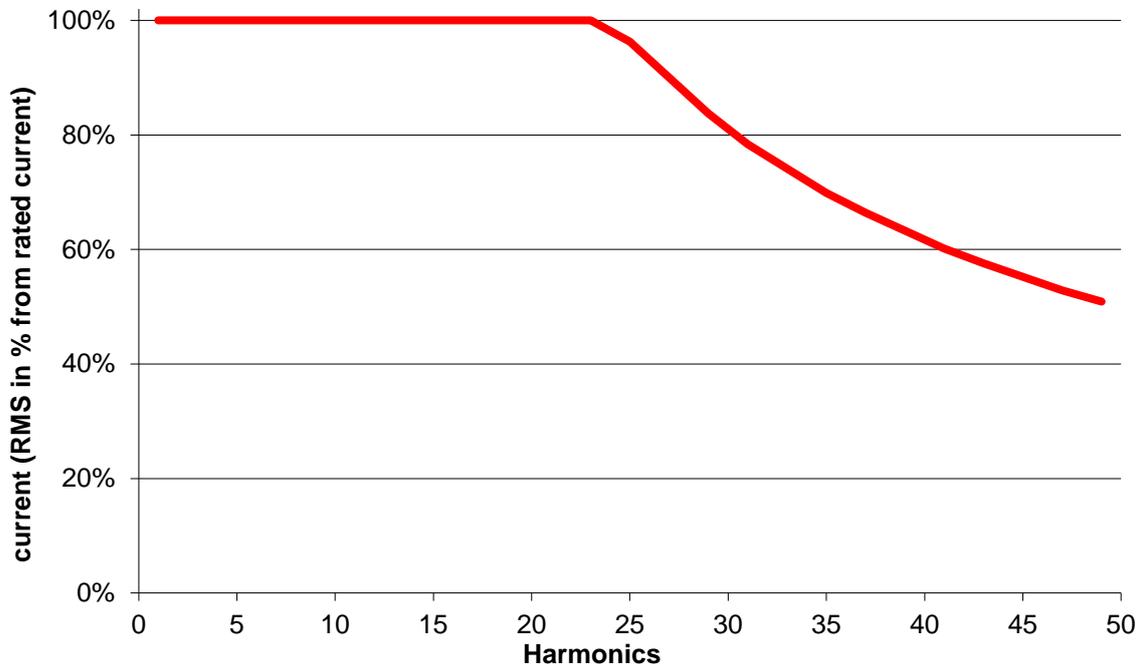


Fig. 70: Current limit curve

## 7.2 Device-specific data for ECOsine® active with mains voltage 200V / 240V

### 7.2.1 Device-specific data for ECOsine® active FN3430-030-200-4

	Value
Rated compensation current (continuous operation at the load limit possible)	30 A (phase) 90 A (neutral conductor)
Overload capability	75 A (peak value) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 30 °C without derating 30 – 55 °C with derating 3%/K
Power dissipation	Max. 900W
Cooling air demand at full load	approx. 400 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: Side-by-side installation without any clearance
Mains frequency	47 ... 63 Hz
Mains voltage	200 V / 240 V (AC) ± 10%
Phase connection	3 phases + N + PE
Connection cross-section	Min: 1 x 25mm <sup>2</sup> per phase and PE 1 x 50mm <sup>2</sup> neutral conductor Max: 1 x 50mm <sup>2</sup> per phase and PE 3 x 50 mm <sup>2</sup> or 1 x 95 mm <sup>2</sup> neutral conductor
Tightening torque	M8: 9.5Nm (84.0 lbf in)
Fuse protection	50 A (cable and line protection, e.g. type gL/gG)
Protection class	IP20
Noise emission at 1 m distance	63 dBA
Dimensions (W x H x D)	415 x 840 x 300 mm
Weight	70 kg
Approval	CE

Table 45: Technical data ECOsine® active FN3430-030-200-4

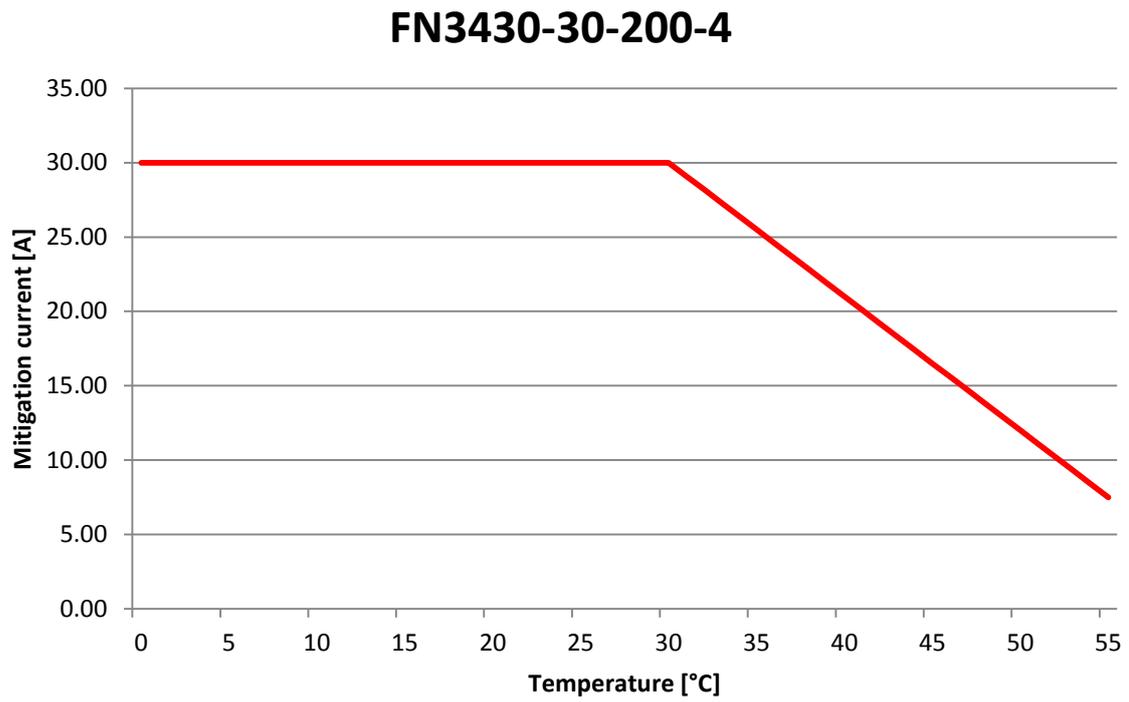


Fig. 71: Derating ECOsine<sup>®</sup> active FN3430-30-200-4

## 7.2.2 Device-specific data for ECOsine<sup>®</sup> active FN3420-50-200-3

	Value
Rated compensation current (continuous operation at the load limit possible)	50 A
Overload capability	125 A (peak value) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C without derating 40 – 55 °C with derating 3%/K
Power dissipation	Max. 1150 W
Cooling air demand at full load	approx. 550 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: 50 mm
Mains frequency	47 ... 63 Hz
Mains voltage	200 V / 240 V (AC) ± 10%
Phase connection	3 phases + PE
Connection cross-section	Min: 1 x 25mm <sup>2</sup> per phase and PE Max: 2 x 35mm <sup>2</sup> or 1 x 50mm <sup>2</sup> per phase and PE
Tightening torque	M8: 9.5Nm (84.0 lbf in)
Fuse protection	80 A (cable and line protection, e.g. type gL/gG)
Protection class	IP20
Dimensions (W x H x D)	360 x 590 x 290 mm
Weight	47 kg
Approval	CE

Table 46: Technical data ECOsine<sup>®</sup> activeFN3420-50-200-3

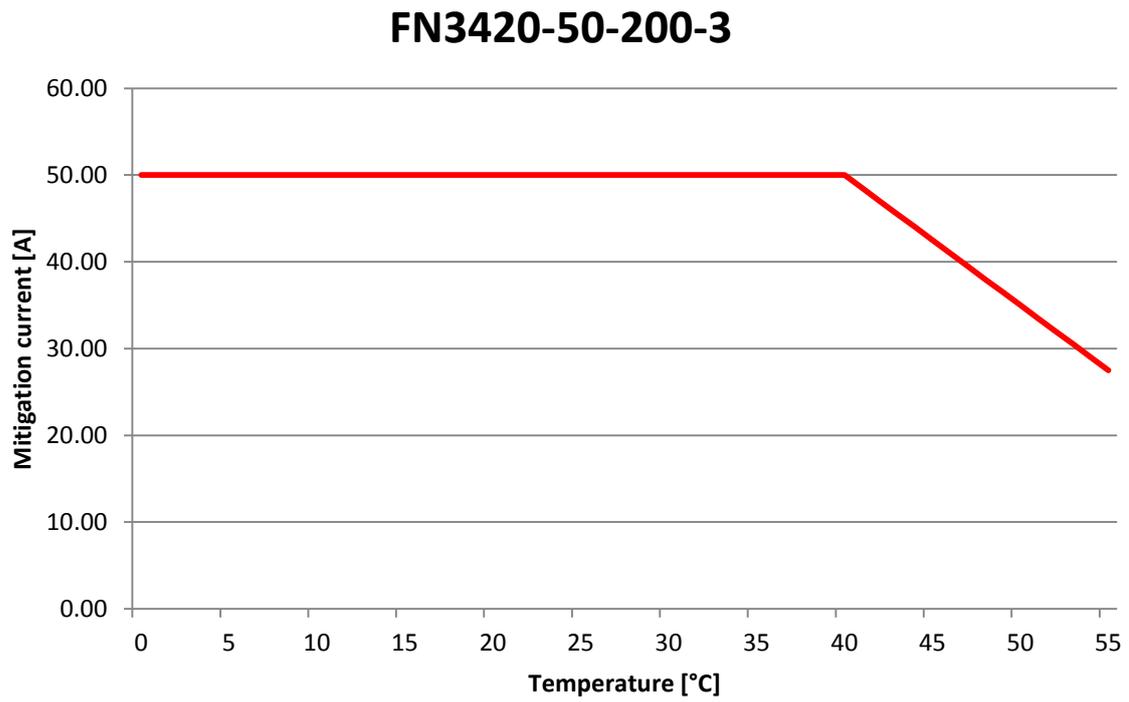


Fig. 72: Derating ECOsine® active FN3420-50-200-3

### 7.2.3 Device-specific data for ECOsine® active FN3430-060-200-4

	Value
Rated compensation current (continuous operation at the load limit possible)	60 A (phase) 180 A (neutral conductor)
Overload capability	150 A (peak value) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 30 °C without derating 30 – 55 °C with derating 3%/K
Power dissipation	Max. 1600 W
Cooling air demand at full load	ca. 600 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: Side-by-side installation without any clearance
Mains frequency	47 ... 63 Hz
Mains voltage	200 V / 240 V (AC) ± 10%
Phase connection	3 phases + N + PE
Connection cross-section	Min: 1 x 25mm <sup>2</sup> per phase and PE 1 x 50mm <sup>2</sup> neutral conductor Max. 1 x 50 mm <sup>2</sup> per phase and PE 3 x 50 mm <sup>2</sup> or 1 x 95 mm <sup>2</sup> neutral conductor
Tightening torque	M8: 9.5Nm (84.0 lbf in)
Fuse protection	100 A (cable and line protection, e.g. type gL/gG)
Protection class	IP20
Dimensions (W x H x D)	415 x 840 x 300 mm
Noise emission at 1 m distance	63 dBA
Weight	70 kg
Approval	CE

Table 47: Technical data ECOsine® active FN3430-060-200-4

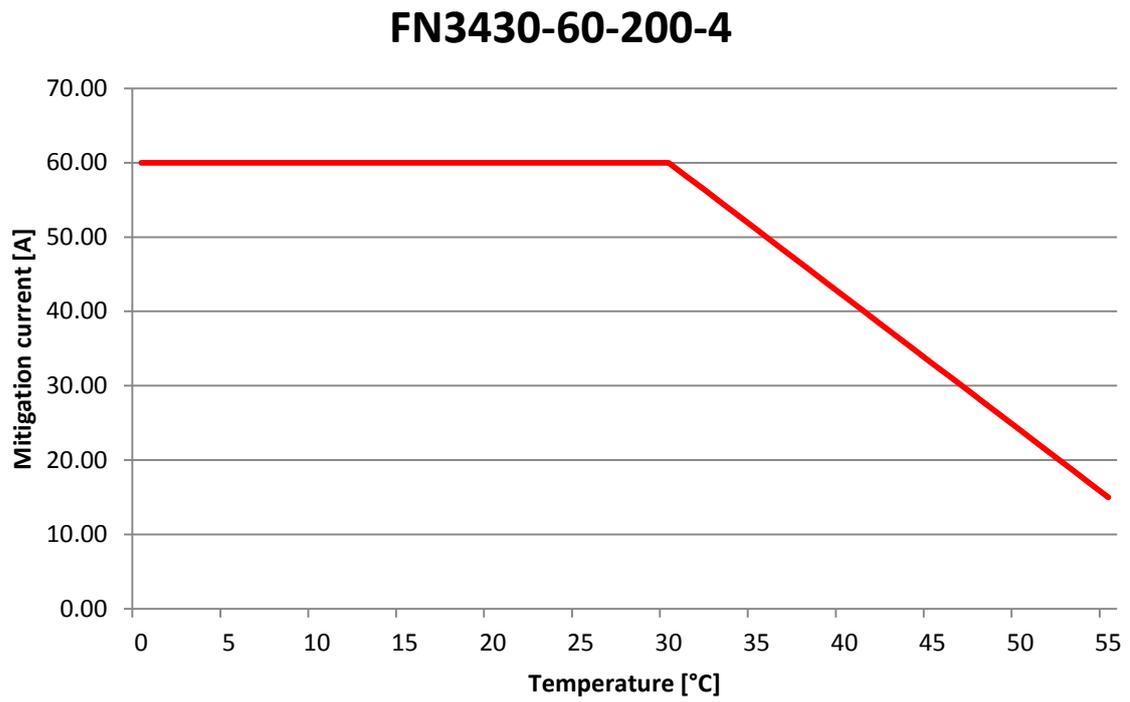


Fig. 73: Derating ECOsine® active FN3430-60-200-4

## 7.2.4 Device-specific data for ECOsine® active FN3420-100-200-3

	Value
Rated compensation current (continuous operation at the load limit possible)	100 A (phase)
Overload capability	250 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C without derating 40 – 55 °C with derating 3%/K
Power dissipation	Max. 2000 W
Cooling air demand at full load	Approx. 1400 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: 50 mm
Mains frequency	47 ... 63 Hz
Mains voltage	200 V / 240 V (AC) ± 10%
Phase connection	3 phases + PE
Connection cross-section	Min: 1 x 35 mm <sup>2</sup> per phase and PE Max: 2 x 50 mm <sup>2</sup> or 1 x 95mm <sup>2</sup> per phase and PE
Tightening torque	M10: 19 Nm (168.0 lbf in)
Fuse protection	160 A (cable and line protection, e.g. type gL/gG)
Protection class	IP20
Noise emission at 1 m distance	68 dBA
Dimensions (W x H x D)	468 x 970 x 412 mm
Weight	105 kg
Approval	CE

Table 48: Technical data ECOsine® active FN3420-100-200-3

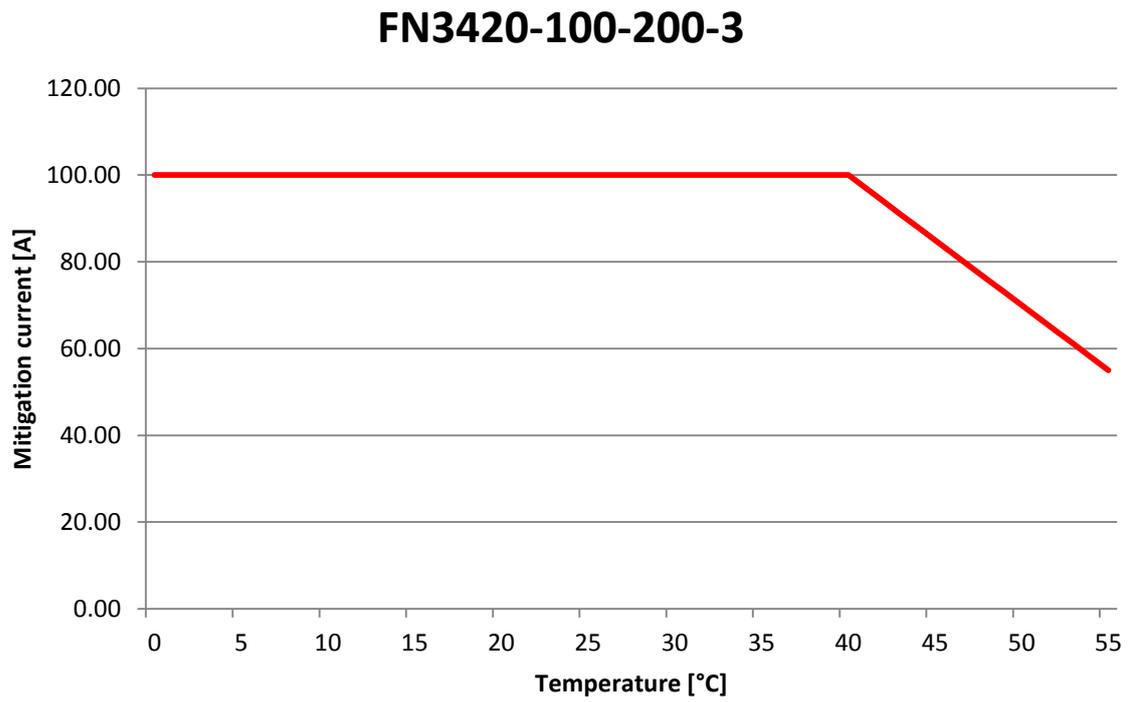


Fig. 74: Derating ECOsine® active FN3420-100-200-3

## 7.3 Device-specific data for ECOsine® active with mains voltage 400V / 480V

### 7.3.1 Device-specific data for ECOsine® active FN3420-030-480-3

	Value
Rated compensation current (continuous operation at the load limit possible)	30 A (Phase)
Overload capability	75 A (peak value phase current) for 10ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C, up to 55 °C with derating (2%/K)
Power dissipation	Max. 900 W
Cooling air demand at full load	Approx. 350 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: 50 mm
Mains frequency	47 ... 63 Hz
Mains voltage	380 V (AC) ± 15% ... 480 V (AC) ± 10%
Phase connection	3 phases + PE
Connection cross-section	Min: 1 x 25mm <sup>2</sup> per phase and PE Max: 2 x 35mm <sup>2</sup> or 1 x 50mm <sup>2</sup> per phase and PE
Tightening torque	M8: 9.5Nm (84.0 lbf in)
Fuse protection	50 A (cable and line protection, e.g. type gL/gG) UL conformity: Little fuse JLLS50 or UL conformity: Bussmann-Cooper JJS-50
Protection class	IP20
Noise emission at 1 m distance	65 dBA
Dimensions (W x H x D)	360 x 590 x 290 mm
Weight	47 kg
Approval	CE, UL

Table 49: Technical data ECOsine® active FN3420-030-480-3

### FN3420-30-480-3

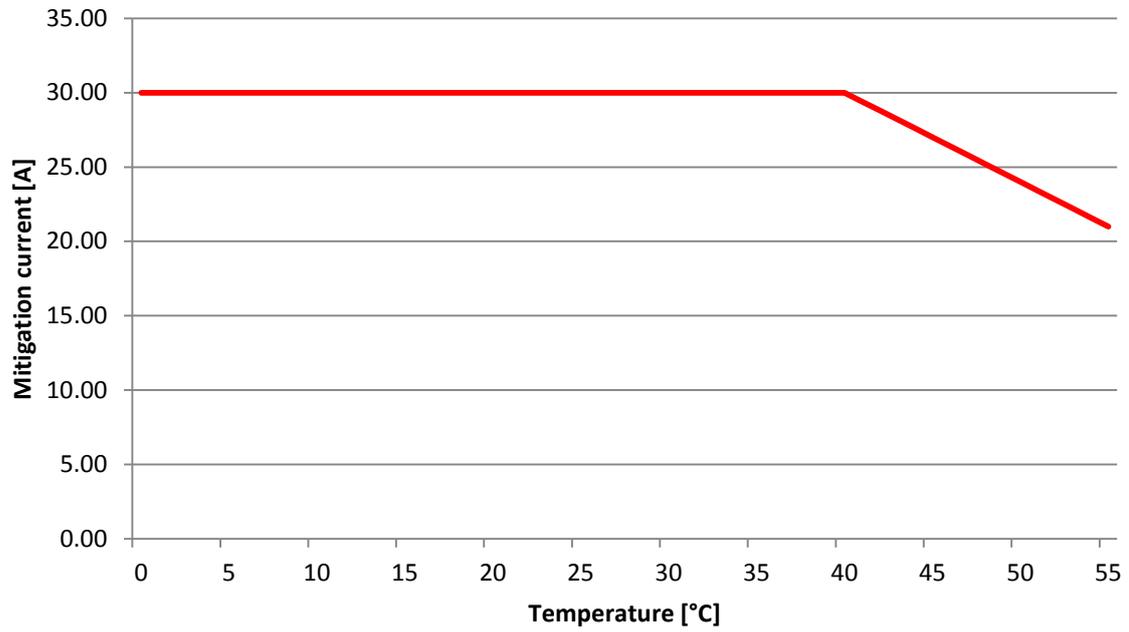


Fig. 75: Derating ECOsine® active FN3420-30-480-3

### 7.3.2 Device-specific data for ECOsine<sup>®</sup> active FN3430-030-400-4

	Value
Rated compensation current (continuous operation at the load limit possible)	30 A (phase) 90 A (neutral conductor)
Overload capability	75 A (peak value) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C, to 55 °C with derating 2%/K
Power dissipation	Max. 950 W
Cooling air demand at full load	Approx. 400 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: Side-by-side installation without any clearance
Mains frequency	47 ... 63 Hz
Mains voltage	380 V ± 15% ... 415 V (AC) ± 10%
Phase connection	3 phases + N + PE
Connection cross-section	Min: 1 x 25mm <sup>2</sup> per phase and PE 1 x 50mm <sup>2</sup> neutral conductor Max: 1 x 50 mm <sup>2</sup> per phase and PE 3 x 50 mm <sup>2</sup> or 1 x x95 mm <sup>2</sup> neutral conductor
Tightening torque	M8: 9.5Nm (84.0 lbf in)
Fuse protection	50 A (cable and line protection, e.g. type gL/gG)
Protection class	IP20
Noise emission at 1 m distance	63 dBA
Dimensions (W x H x D)	415 x 840 x 300 mm
Weight	70 kg
Approval	CE

Table 50: Technical data ECOsine<sup>®</sup> active FN3430-030-400-4

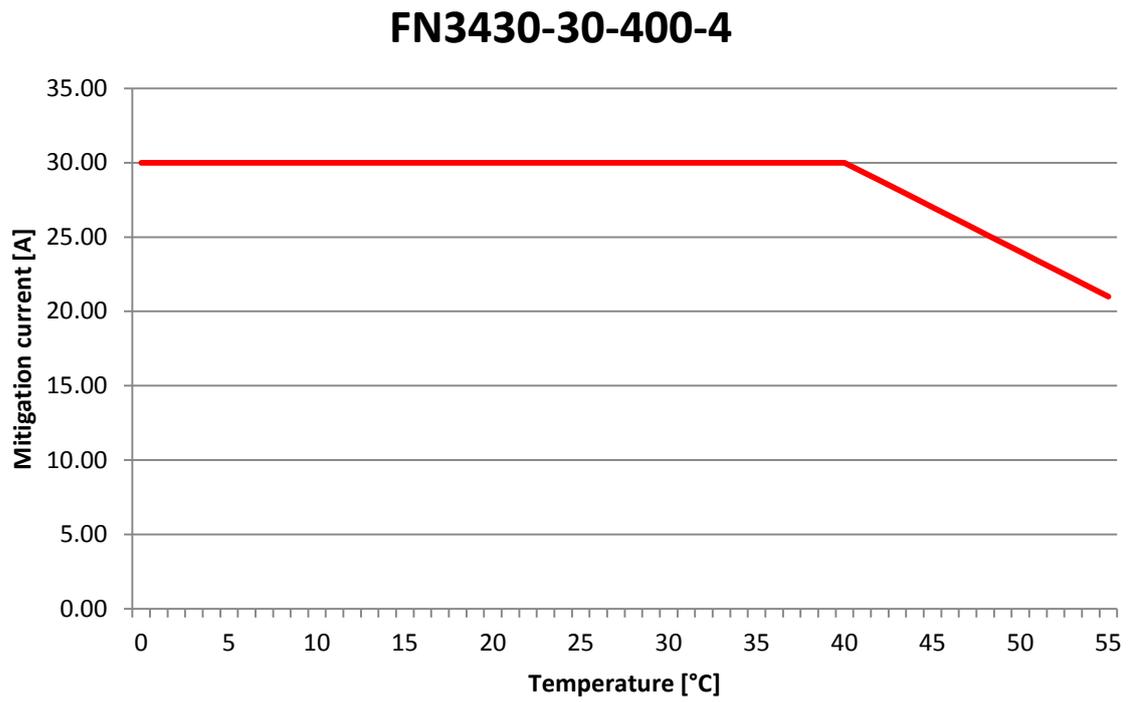


Fig. 76: Derating ECOsine® active FN3430-30-400-4

### 7.3.3 Device-specific data for ECOsine® active FN3420-050-480-3

	Value
Rated compensation current (continuous operation at the load limit possible)	50 A
Overload capability	125 A (peak value) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C, up to 55 °C with derating (2%/K)
Power dissipation	Max. 1300 W
Cooling air demand at full load	Approx. 550 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: 50 mm
Mains frequency	47 ... 63 Hz
Mains voltage (other voltages upon request)	380 V (AC) ± 15% ... 480 V (AC) ± 10%
Phase connection	3 phases + PE
Connection cross-section	Min: 1 x 25mm <sup>2</sup> per phase and PE Max: 2 x 35mm <sup>2</sup> or 1 x 50mm <sup>2</sup> per phase and PE
Tightening torque	M8: 9.5Nm (84.0 lbf in)
Fuse protection	80 A (cable and line protection, e.g. type gL/gG) UL conformity: Littlefuse JLLS80 or UL conformity: Bussmann-Cooper JJS-80
Protection class	IP20
Noise emission at 1 m distance	65 dBA
Dimensions (W x H x D)	360 x 590 x 290 mm
Weight	47 kg
Approval	CE

Table 51: Technical data ECOsine® active FN3420-050-480-3

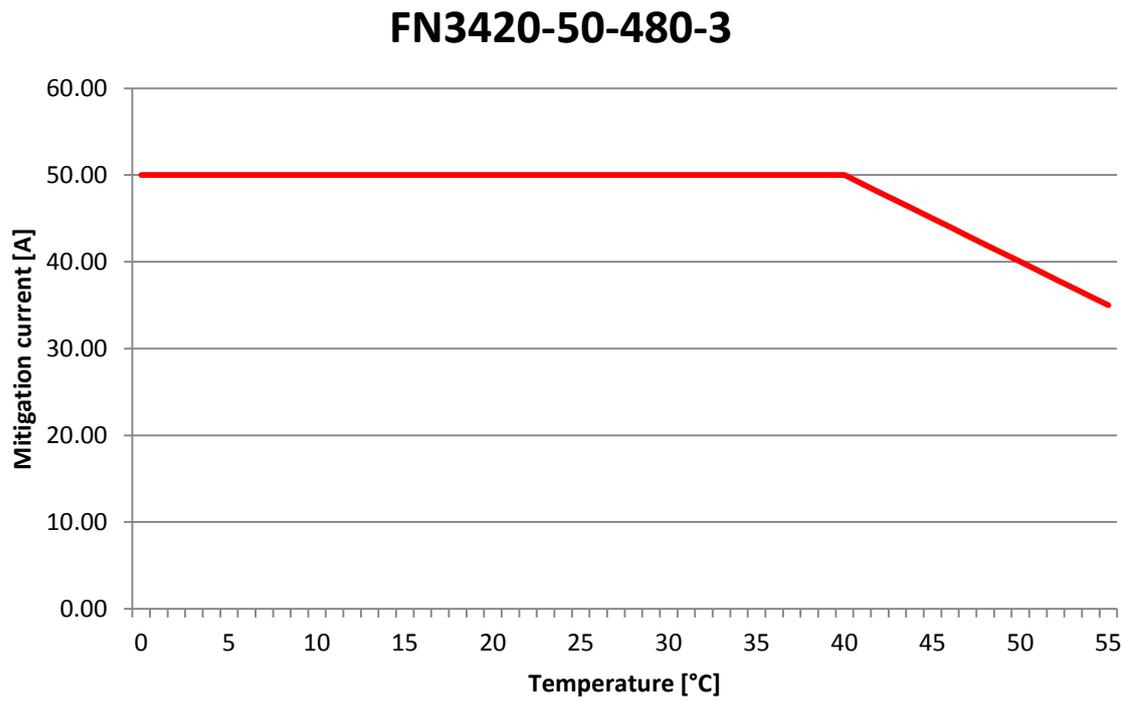


Fig. 77: Derating ECOsine® active FN3420-50-480-3

### 7.3.4 Device-specific data for ECOsine® active FN3430-060-400-4

	Value
Rated compensation current (continuous operation at the load limit possible)	60 A (phase) 180 A (neutral conductor)
Overload capability	150 A (peak value) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 30 °C without derating 30 – 55 °C with derating 2%/K
Power dissipation	Max. 1800 W
Cooling air demand at full load	Approx. 600 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: Side-by-side installation without any clearance
Mains frequency	47 ... 63 Hz
Mains voltage (other voltages upon request)	380 V ± 15% ... 415 V (AC) ± 10%
Phase connection	3 phases + N + PE
Connection cross-section	Min: 1 x 25mm <sup>2</sup> per phase and PE 1 x 50mm <sup>2</sup> neutral conductor Max: 1 x 50 mm <sup>2</sup> per phase and PE 3 x 50 mm <sup>2</sup> or 1 x x95 mm <sup>2</sup> neutral conductor
Tightening torque	M8: 9.5Nm (84.0 lbf in)
Fuse protection	100 A (cable and line protection, e.g. type gL/gG)
Protection class	IP20
Noise emission at 1 m distance	63 dBA
Dimensions (W x H x D)	415 x 840 x 300 mm
Weight	70 kg
Approval	CE

Table 52: Technical data ECOsine® active FN3430-060-400-4

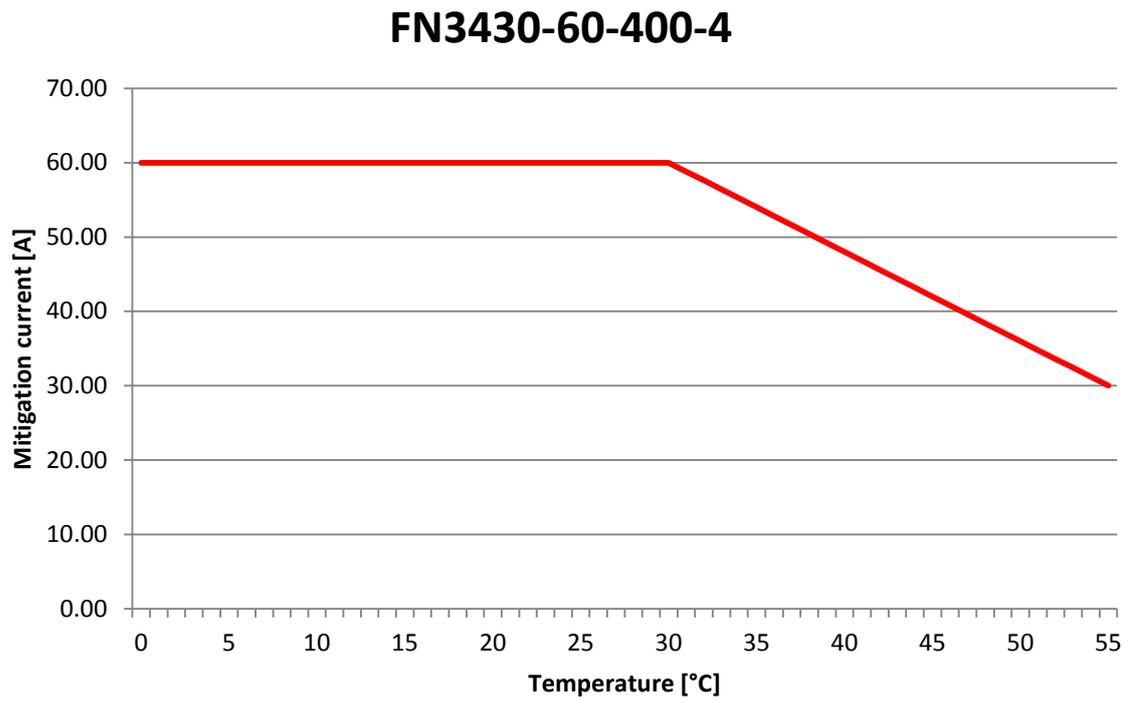


Fig. 78: Derating ECOsine<sup>®</sup> active FN3430-60-400-4

### 7.3.5 Device-specific data for ECOsine® active FN3420-100-480-3

	Value
Rated compensation current (continuous operation at the load limit possible)	100 A (phase)
Overload capability	250 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C without derating 40 – 55 °C with derating 2%/K
Power dissipation	Max. 2200 W
Cooling air demand at full load	Approx. 1400 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: 50 mm
Mains frequency	47 ... 63 Hz
Mains voltage (other voltages upon request)	380 V (AC) ± 15% ... 480 V (AC) ± 10%
Phase connection	3 phases + PE
Connection cross-section	1 x 35mm <sup>2</sup> per phase and PE 2 x 50mm <sup>2</sup> or 1 x 95mm <sup>2</sup> per phase and PE
Tightening torque	M10: 19 Nm (168.0 lbf in)
Fuse protection	160 A (cable and line protection, e.g. type gL/gG) UL conformity: 150 A Littlefuse JLLS150 or UL conformity: 150 A Bussmann-Cooper JJS-150
Protection class	IP20
Noise emission at 1 m distance	68 dBA
Dimensions (W x H x D)	468 x 970 x 412 mm
Weight	105 kg
Approval	CE, UL

Table 53: Technical data ECOsine® active FN3420-100-480-3

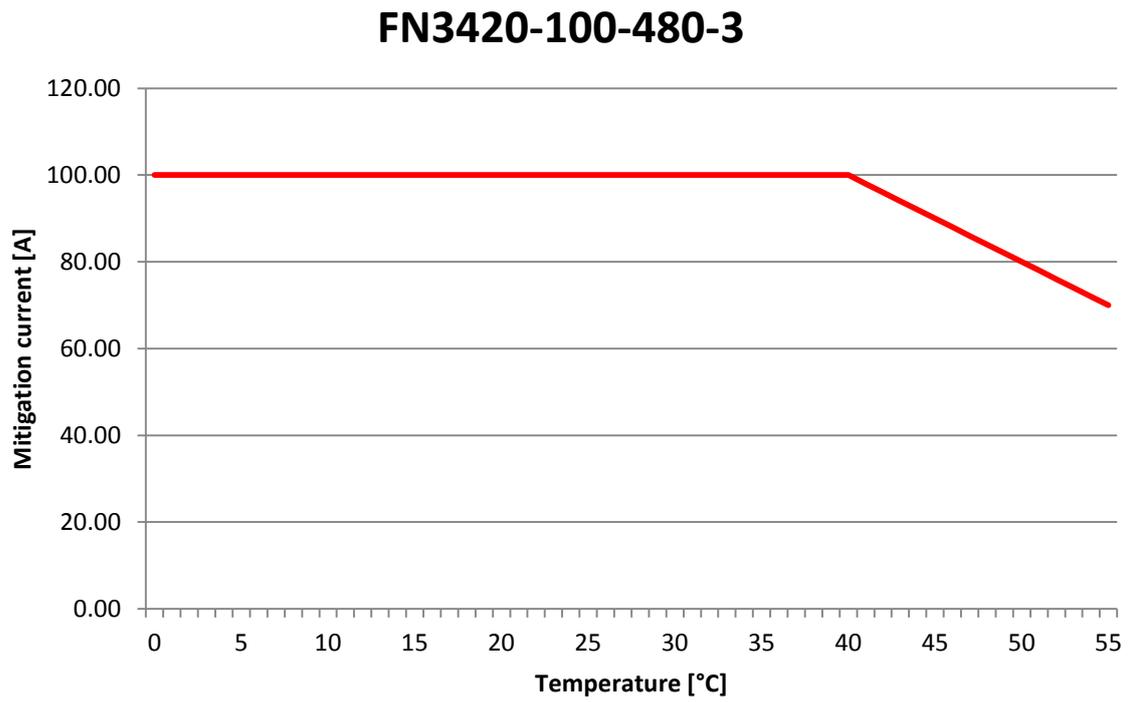


Fig. 79: Derating ECOsine® active FN3420-100-480-3

### 7.3.6 Device-specific data for ECOsine® active FN3420-100-480-3-GL

	Value
Rated compensation current (continuous operation at the load limit possible)	100 A (phase)
Overload capability	250 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C without derating 40 – 55 °C with derating 2%/K
Power dissipation	Max. 2200 W
Cooling air demand at full load	Approx. 1400 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: 50 mm
Mains frequency	47 ... 63 Hz
Mains voltage	380 V ± 15% ... 415 V (AC) ± 10%
Phase connection	3 phases + PE
Connection cross-section	1 x 35 mm <sup>2</sup> (AWG 4) per phase and PE 1 x 95 mm <sup>2</sup> (AWG 4/0) per phase and PE
Tightening torque	M10: 20Nm (177.0 lbf in)
Fuse protection	160 A (cable and line protection, e.g. type gL/gG)
Protection class	IP20
Dimensions (W x H x D)	469 x 1216 x 461 mm
Weight	112 kg (Incl. filter RU 33092-120-3L)
Approval	CE, GL

Table 54: Technical data ECOsine® active FN3420-100-480-3-GL

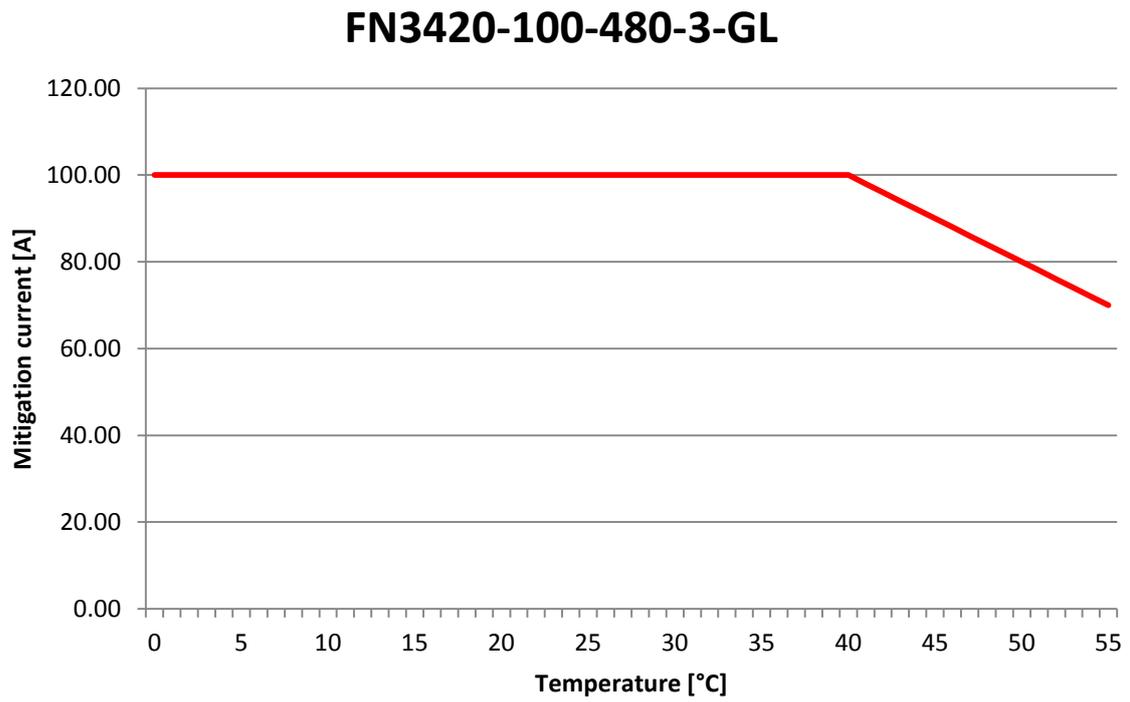


Fig. 80: Derating ECOsine® active FN3420-100-480-3-GL

### 7.3.7 Device-specific data for ECOsine® active FN3430-100-400-4

	Value
Rated compensation current (continuous operation at the load limit possible)	100 A (phase) 300 A (neutral conductor)
Overload capability	250 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C without derating 40 – 55 °C with derating 2%/K
Power dissipation	Max. 3000 W
Cooling air demand at full load	Approx. 1700 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: 50 mm
Mains frequency	47 ... 63 Hz
Mains voltage	380 V ± 15% ... 415 V (AC) ± 10%
Phase connection	3 phases + N + PE
Connection cross-section	Min: 1 x 35 mm <sup>2</sup> per phase and PE 2 x 50 mm <sup>2</sup> or 1 x 95 mm <sup>2</sup> neutral conductor Max: 2 x 50 mm <sup>2</sup> or 1 x 95mm <sup>2</sup> per phase and PE 2 x 120 mm <sup>2</sup> neutral conductor
Tightening torque	M10: 19 Nm (168.0 lbf in)
Fuse protection	160 A (cable and line protection, e.g. type gL/gG)
Protection class	IP20
Noise emission at 1 m distance	69 dBA
Dimensions (W x H x D)	468 x 1460x 412 mm
Weight	145 kg
Approval	CE

Table 55: Technical data ECOsine® active FN3430-100-400-4

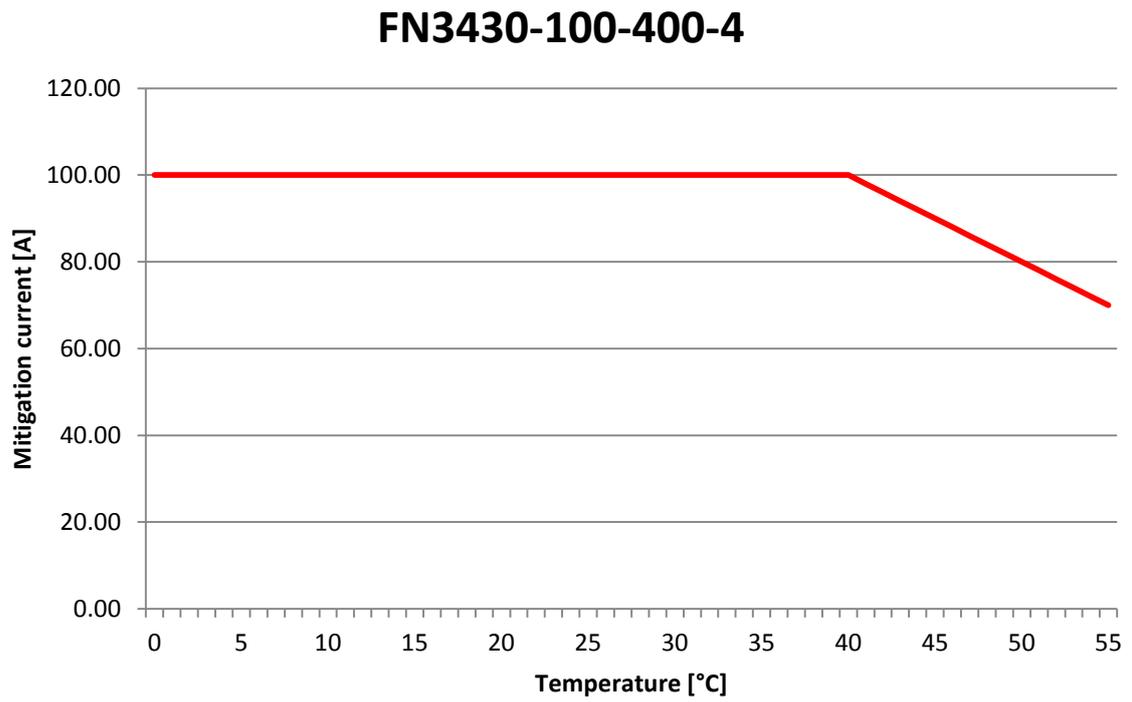


Fig. 81: Derating ECOsine® active FN3430-100-400-4

### 7.3.8 Device-specific data for ECOsine® active FN3420-120-480-3

	Value
Rated compensation current (continuous operation at the load limit possible)	120 A (phase)
Overload capability	250 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 – 30 °C without derating 30 – 40 °C with derating 1.2%/K 40 – 55 °C with derating 2%/K
Power dissipation	Max. 2500 W
Cooling air demand at full load	Approx. 1400 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: 50 mm
Mains frequency	47 ... 63 Hz
Mains voltage	380 V (AC) ± 15% ... 480 V (AC) ± 10%
Phase connection	3 phases + PE
Connection cross-section	Min: 1 x 35mm <sup>2</sup> per phase and PE Max: 2 x 50mm <sup>2</sup> or 1 x 95mm <sup>2</sup> per phase and PE
Tightening torque	M10: 19 Nm (168.0 lbf in)
Fuse protection	200 A (cable and line protection, e.g. type gL/gG)
Protection class	IP20
Noise emission at 1 m distance	68 dBA
Dimensions (W x H x D)	468 x 970 x 412 mm
Weight	105 kg
Approval	CE

Table 56: Technical data ECOsine® active FN3420-120-480-3

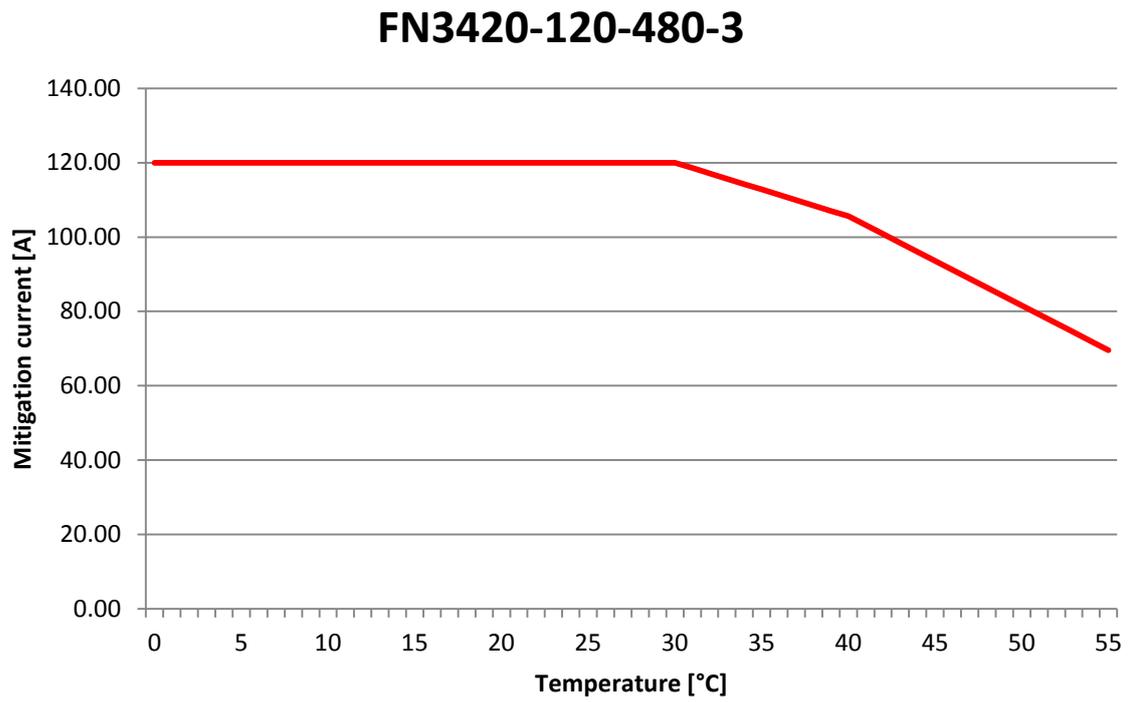


Fig. 82: Derating ECOsine® active FN3420-120-480-3

### 7.3.9 Device-specific data for ECOsine® active FN3420-120-480-3-GL

	Value
Rated compensation current (continuous operation at the load limit possible)	120 A (phase)
Overload capability	250 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 30 °C without derating 30 – 40 °C with derating 1.2%/K 40 – 55 °C with derating 2%/K
Power dissipation	Max. 2200 W
Cooling air demand at full load	Approx. 1400 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: 50 mm
Mains frequency	47 ... 63 Hz
Mains voltage	380 V ± 15% ... 415 V (AC) ± 10%
Phase connection	3 phases + PE
Connection cross-section	Min: 1 x 35 mm <sup>2</sup> (AWG 4) per phase and PE Max: 1 x 95 mm <sup>2</sup> (AWG 4/0) per phase and PE
Tightening torque	M10: 20Nm (177.0 lbf in)
Fuse protection	200 A (cable and line protection, e.g. type gL/gG)
Protection class	IP20
Noise emission at 1 m distance	68 dBA
Dimensions (W x H x D)	469 x 1216 x 461 mm
Weight	112 kg (incl. filter RU 33092-120-3L)
Approval	CE, GL

Table 57: Technical data ECOsine® active FN3420-120-480-3-GL

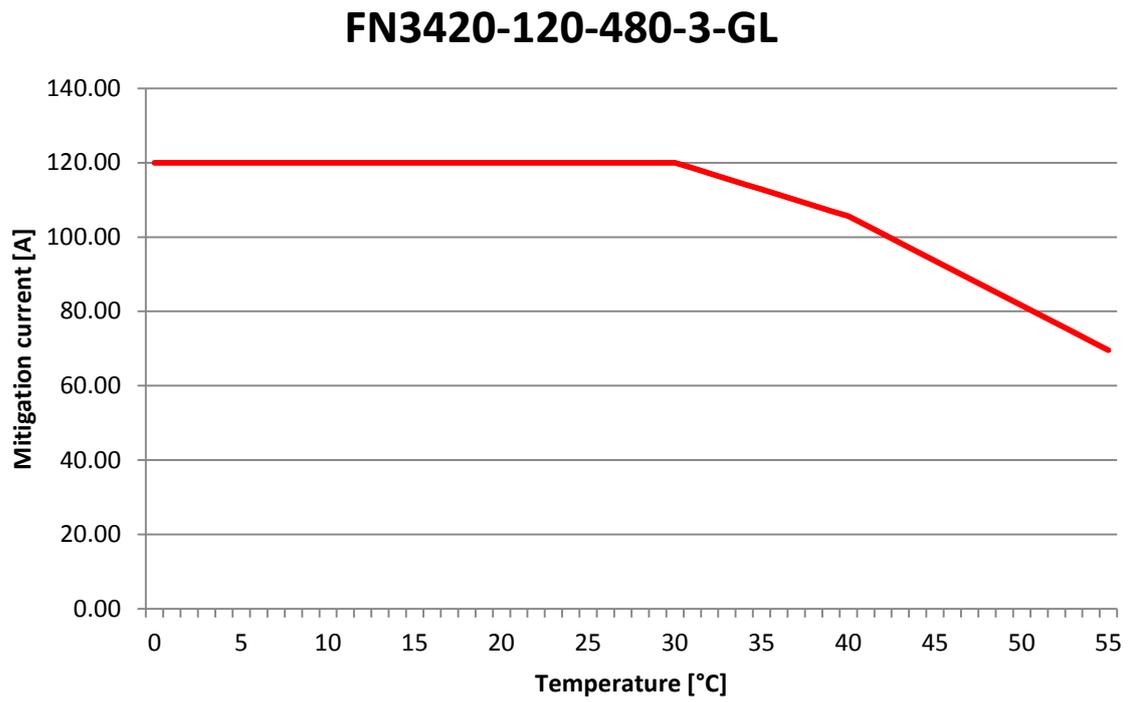


Fig. 83: Derating ECOsine<sup>®</sup> active FN3420-120-480-3-GL

### 7.3.10 Device-specific data for ECOsine® active FN3430-120-400-4

	Value
Rated compensation current (continuous operation at the load limit possible)	120 A (phase) 300 A (neutral conductor)
Overload capability	250 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 – 30 °C without derating 30 – 40 °C with derating 1.2%/K 40 – 55 °C with derating 2%/K
Power dissipation	Max. 3000 W
Cooling air demand at full load	approx. 1700 m <sup>3</sup> /h
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 300 mm Lateral: 50 mm
Mains frequency	47 ... 63 Hz
Mains voltage	380 V ± 15% ... 415 V (AC) ± 10%
Phase connection	3 phases + N + PE
Connection cross-section	Min: 1 x 35 mm <sup>2</sup> per phase and PE 2 x 50 mm <sup>2</sup> or 1 x 95 mm <sup>2</sup> neutral conductor Max: 2 x 50 mm <sup>2</sup> or 1 x 95mm <sup>2</sup> per phase and PE 2 x 120 mm <sup>2</sup> neutral conductor
Tightening torque	M10: 19 Nm (168.0 lbf in)
Fuse protection	200 A (cable and line protection, e.g. type gL/gG)
Protection class	IP20
Noise emission at 1 m distance	69 dBA
Dimensions (W x H x D)	468 x 1460 x 412 mm
Weight	145 kg
Approval	CE

Table 58: Technical data ECOsine® active FN3430-120-400-4

### FN3430-120-400-4

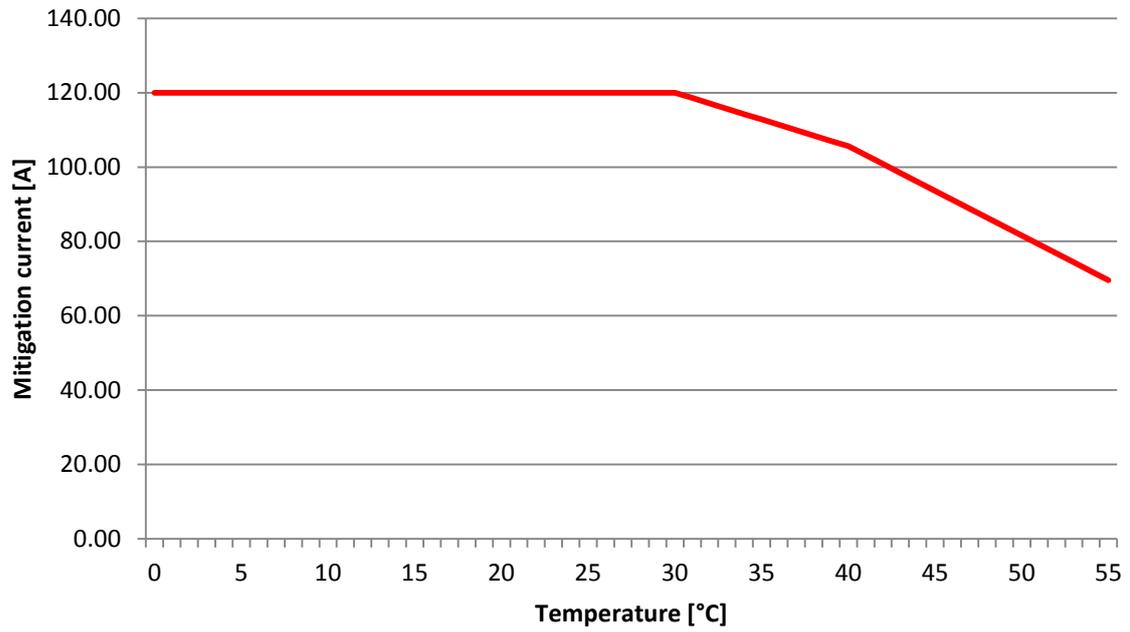


Fig. 84: Derating ECOsine® active FN3430-120-400-4

### 7.3.11 Device-specific data for ECOsine® active FN3420-200-480-3

	Value
Rated compensation current (continuous operation at the load limit possible)	200 A (phase)
Overload capability	500 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C without derating 40 – 55 °C with derating 2%/K
Power dissipation	Max. 5000 W
Cooling air demand at full load	approx. 2600 m <sup>3</sup> /h
Coolant	Water-glycol mixture
Coolant manufacturer	Clariant
Coolant additive	Antifrogen N
Mixture ratio (water/coolant additive)	70/30
Coolant quantity	12 liters
Primary pressure	0 bar (in the switched off, de-energized condition)
Operating pressure	2.5 – 5.5 bar (depending on the device type and mains frequency 50/60 Hz)
Installation clearances	Top (air outlet): 300 mm Front (air inlet): 900 mm (to open the door) Lateral: Side-by-side installation without any clearance
Mains frequency	47 ... 63 Hz
Mains voltage (other voltages upon request)	<b>50 Hz:</b> 380 V (AC) ± 15% ... 415 V (AC) ± 10% <b>60 Hz:</b> 480 V (AC) ± 10%
Phase connection	3 phases + PE
Fuse protection	400 A (cable and line protection, e.g. type gL/gG) UL conformity: Littlefuse JLLS400 or UL conformity: Bussmann-Cooper JJS-400
Protection class	IP54
Noise emission at 1 m distance	70 dBA
Dimensions (W x H x D)	800 x 2100 x 600 mm (incl. mounted 100 mm base) Additional 100 mm base included in the scope of delivery. Depth with air conditioning unit 760 mm
Weight	440 kg
Approval	CE, UL

Table 59: Technical data ECOsine® active FN3420-200-480-3

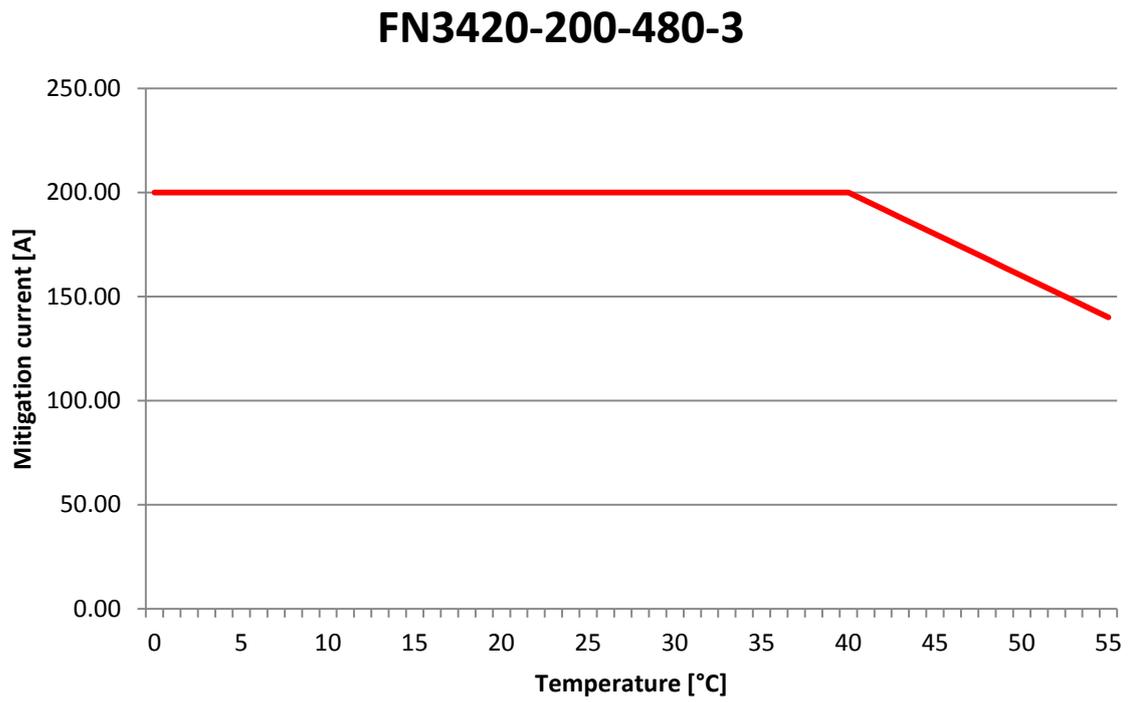


Fig. 85: Derating ECOsine<sup>®</sup> active FN3420-200-480-3

## 7.3.12 Device-specific data for ECOsine® active FN3430-200-400-4

	Value
Rated compensation current (continuous operation at the load limit possible)	200 A (phase) 600 A (neutral conductor)
Overload capability	500 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C without derating 40 – 55 °C with derating 2%/K
Power dissipation	Max. 5500 W
Cooling air demand at full load	approx. 2800 m³/h
Coolant	Water-glycol mixture
Coolant manufacturer	Clariant
Coolant additive	Antifrogen N
Mixture ratio (water/coolant additive)	70/30
Coolant quantity	12 liters
Primary pressure	0 bar (in the switched off, de-energized condition)
Operating pressure	2.5 – 5.5 bar (depending on the device type and mains frequency 50/60 Hz)
Installation clearances	Top (air outlet): 300 mm Front (air inlet): 900 mm (to open the door) Lateral: Side-by-side installation without any clearance
Mains frequency	47 ... 53 Hz
Mains voltage (other voltages on request)	<b>50 Hz:</b> 380 V ± 15% ... 415 V (AC) ± 10%
Phase connection	3 phases + N + PE
Connection cross-section	Min: 1 x 185 mm² per phase and PE 2 x 240 mm² neutral conductor Max: 2 x 120mm² or 1 x 240mm² per phase and PE 2 x 240mm² neutral conductor
Tightening torque	M10: 19 Nm (168.0 lbf in)
Fuse protection	400 A (cable and line protection, e.g. type gL/gG)
Protection class	IP54
Noise emission at 1 m distance	70 dBA
Dimensions (W x H x D)	800 x 2100 x 600 mm (incl. mounted 100 mm base) Additional 100 mm base included in the scope of delivery. Depth with air conditioning unit 760 mm
Weight	525 kg
Approval	CE

Table 60: Device-specific data for ECOsine® active FN3430-200-400-4

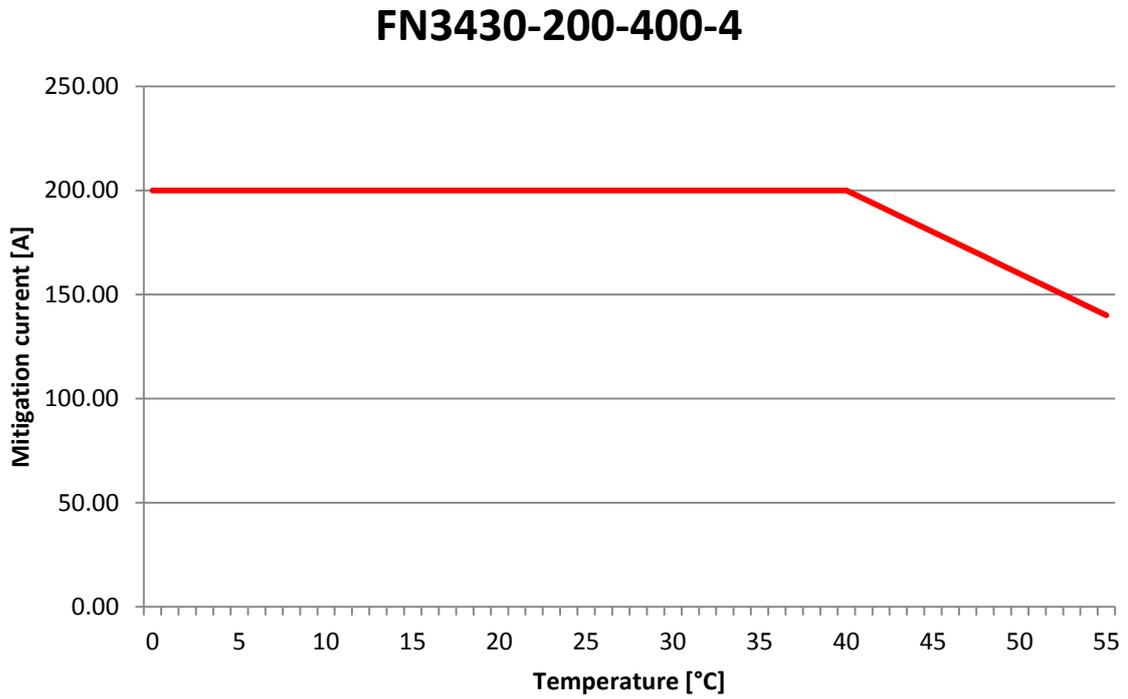


Fig. 86: Derating ECOsine® active FN3430-200-400-4

### 7.3.13 Device-specific data for ECOsine® active FN3420-250-480-3

	Value
Rated compensation current (continuous operation at the load limit possible)	250 A (phase)
Overload capability	625 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C without derating 40 – 55 °C with derating 2%/K
Power dissipation	Max. 6000 W
Cooling air demand at full load	approx. 3100 m <sup>3</sup> /h
Coolant	Water-glycol mixture
Coolant manufacturer	Clariant
Coolant additive	Antifrogen N
Mixture ratio (water/coolant additive)	70/30
Coolant quantity	12 liters
Primary pressure	0 bar (in the switched off, de-energized condition)
Operating pressure	2.5 – 5.5 bar (depending on the device type and mains frequency 50/60 Hz)
Installation clearances	Top (air outlet): 300 mm Bottom (air inlet): 900 mm (to open the door) Lateral: Side-by-side installation without any clearance
Mains frequency	47 ... 63 Hz
Mains voltage (other voltages upon request)	<b>50 Hz:</b> 380 V (AC) ± 15% ... 415 V (AC) ± 10% <b>60 Hz:</b> 480 V (AC) ± 10%
Phase connection	3 phases + PE
Connection cross-section	Min: 1 x 185mm <sup>2</sup> per phase and PE Max: 2 x 120 mm <sup>2</sup> or 1 x 240 mm <sup>2</sup> per phase and PE
Tightening torque	M10: 19 Nm (168.0 lbf in)
Fuse protection	400 A (cable and line protection, e.g. type gL/gG) UL conformity: Littlefuse JLLS400 UL conformity: Bussmann-Cooper JJS-400
Protection class	IP54
Noise emission at 1 m distance	70 dBA
Dimensions (W x H x D)	800 x 2100 x 600 mm (incl. mounted 100 mm base) Additional 100 mm base included in the scope of delivery. Depth with air conditioning unit 760 mm
Weight	440 kg
Approval	CE, UL

Table 61: Technical data ECOsine® active FN3420-250-480-3

### FN3420-250-480-3

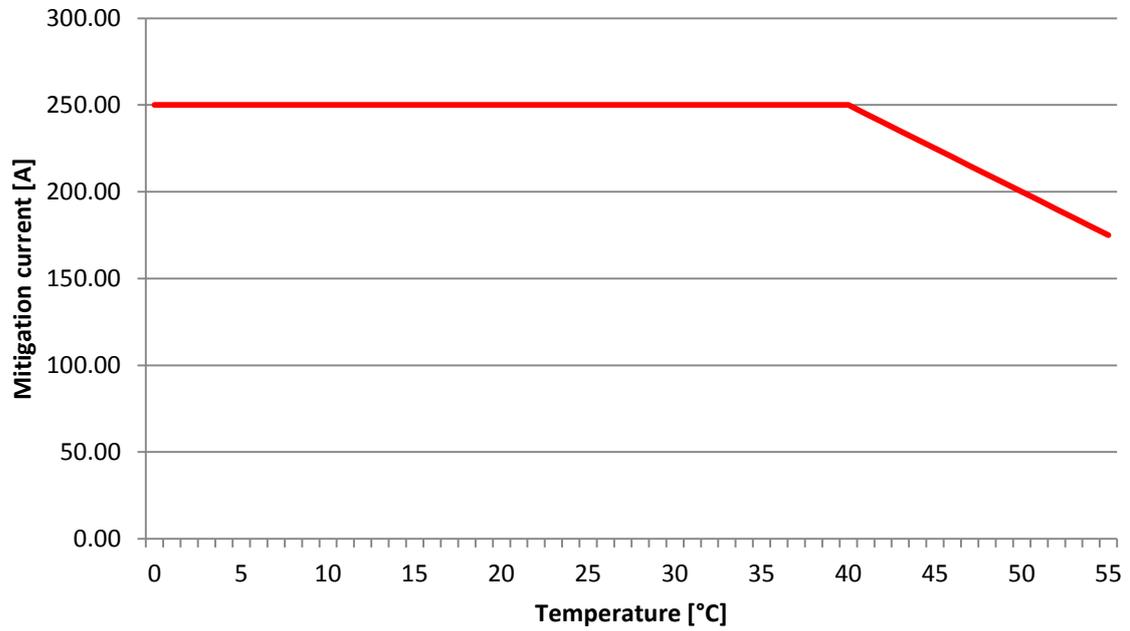


Fig. 87: Derating ECOsine® active FN3420-250-480-3

### 7.3.14 Device-specific data for ECOsine® active FN3430-250-400-4

	Value
Rated compensation current (continuous operation at the load limit possible)	250 A (phase) 750 A (neutral conductor)
Overload capability	625 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C without derating 40 – 55 °C with derating 2%/K
Power dissipation	Max. 6500 W
Cooling air demand at full load	approx. 3300 m <sup>3</sup> /h
Coolant	Water-glycol mixture
Coolant manufacturer	Clariant
Coolant additive	Antifrogen N
Mixture ratio (water/coolant additive)	70/30
Coolant quantity	12 liters
Primary pressure	0 bar (in the switched off, de-energized condition)
Operating pressure	2.5 – 5.5 bar (depending on the device type and mains frequency 50/60 Hz)
Installation clearances	Top (air outlet): 300 mm Front (air inlet): 900 mm (to open the door) Lateral: Side-by-side installation without any clearance
Mains frequency	47 ... 53 Hz
Mains voltage (other voltages upon request)	<b>50 Hz:</b> 380 V ± 15% ... 415 V (AC) ± 10%
Phase connection	3 phases + N + PE
Connection cross-section	Min: 1 x 185 mm <sup>2</sup> per phase and PE 2 x 240 mm <sup>2</sup> neutral conductor Max: 2 x 120mm <sup>2</sup> or 1 x 240mm <sup>2</sup> per phase and PE 2 x 240mm <sup>2</sup> neutral conductor
Tightening torque	M10: 19 Nm (168.0 lbf in)
Fuse protection	400 A (cable and line protection, e.g. type gL/gG)
Protection class	IP54
Noise emission at 1 m distance	70 dBA
Dimensions (W x H x D)	800 x 2100 x 600 mm (incl. mounted 100 mm base) Additional 100 mm base included in the scope of delivery. Depth with air conditioning unit 760 mm
Weight	525 kg (ECOsine® active-250-400-4)
Approval	CE

Table 62: Technical data ECOsine® active FN3430-250-400-4

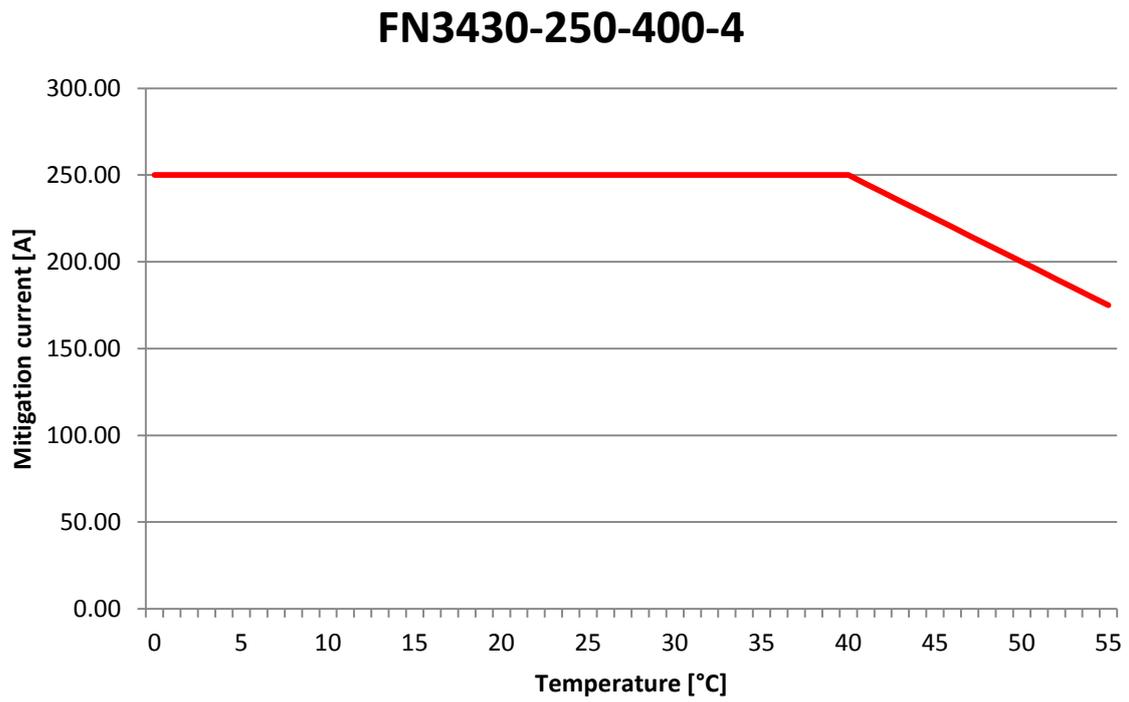


Fig. 88: Derating ECOsine® active FN3430-250-400-4

### 7.3.15 Device-specific data for ECOsine® active FN3420-300-480-3

	Value
Rated compensation current (continuous operation at the load limit possible)	300 A (phase)
Overload capability	750 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C without derating 40 – 55 °C with derating 2%/K
Power dissipation	Max. 7500 W
Cooling air demand at full load	approx. 3400 m <sup>3</sup> /h
Coolant	Water-glycol mixture
Coolant manufacturer	Clariant
Coolant additive	Antifrogen N
Mixture ratio (water/coolant additive)	70/30
Coolant quantity	12 liters
Primary pressure	0 bar (in the switched off, de-energized condition)
Operating pressure	2.5 – 5.5 bar (depending on the device type and mains frequency 50/60 Hz)
Installation clearances	Top (air outlet): 300 mm Front (air inlet): 900 mm (to open the door) Lateral: Side-by-side installation without any clearance
Mains frequency	47 ... 63 Hz
Mains voltage (other voltages upon request)	<b>50 Hz:</b> 380 V (AC) ± 15% ... 415 V (AC) ± 10% <b>60 Hz:</b> 480 V (AC) ± 10%
Phase connection	3 phases + PE
Connection cross-section	Min: 1 x 185mm <sup>2</sup> per phase and PE Max: 2 x 120 mm <sup>2</sup> or 1 x 240 mm <sup>2</sup> per phase and PE
Tightening torque	M10: 19 Nm (168.0 lbf in)
Fuse protection	400 A (cable and line protection, e.g. type gL/gG) UL conformity: Littlefuse JLLS400 or Bussmann-Cooper JJS-400
Protection class	IP54
Noise emission at 1 m distance	70 dBA
Dimensions (W x H x D)	800 x 2100 x 600 mm (incl. mounted 100 mm base) Additional 100 mm base included in the scope of delivery. Depth with air conditioning unit 760 mm
Weight	440 kg
Approval	CE, UL

Table 63: Technical data ECOsine® active FN3420-300-480-3

### FN3420-300-480-3

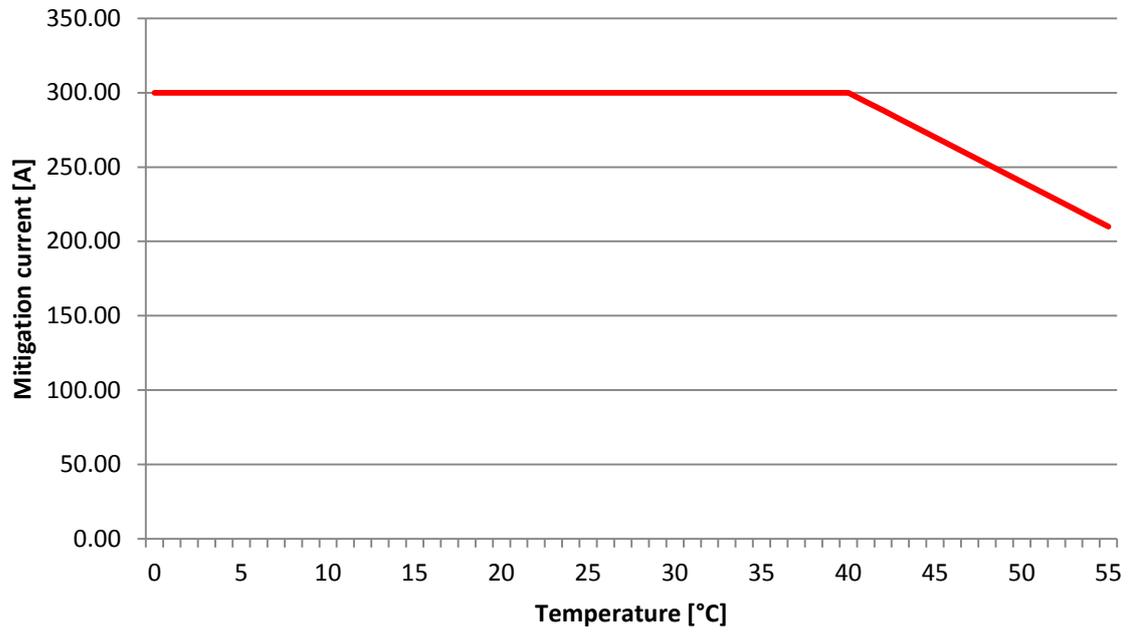


Fig. 89: Derating ECOsine® active FN3420-480-3

### 7.3.16 Device-specific data for ECOsine® active FN3430-300-400-4

	Value
Rated compensation current (continuous operation at the load limit possible)	300 A (phase) 750 A (neutral conductor)
Overload capability	750 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 – 30 °C without derating 30 – 40 °C with derating 1.6%/K 40 – 55 °C with derating 2%/K
Power dissipation	Max. 8500 W
Cooling air demand at full load	approx. 3600 m³/h
Coolant	Water-glycol mixture
Coolant manufacturer	Clariant
Coolant additive	Antifrogen N
Mixture ratio (water/coolant additive)	70/30
Coolant quantity	12 liters
Primary pressure	0 bar (in the switched off, de-energized condition)
Operating pressure	2.5 – 5.5 bar (depending on the device type and mains frequency 50/60 Hz)
Installation clearances	Top (air outlet): 300 mm Front (air inlet): 900 mm (to open the door) Lateral: Side-by-side installation without any clearance
Mains frequency	47 ... 53 Hz
Mains voltage (other voltages upon request)	<b>50 Hz:</b> 380 V ± 15% ... 415 V (AC) ± 10%
Phase connection	3 phases + N + PE
Connection cross-section	Min: 1 x 185 mm² per phase and PE 2 x 240 mm² neutral conductor Max: 2 x 120mm² or 1 x 240mm² per phase and PE 2 x 240mm² neutral conductor
Tightening torque	M10: 19 Nm (168.0 lbf in)
Fuse protection	400 A (cable and line protection, e.g. type gL/gG)
Protection class	IP54
Noise emission at 1 m distance	70 dBA
Dimensions (W x H x D)	800 x 2100 x 600 mm (incl. mounted 100 mm base) Additional 100 mm base included in the scope of delivery. Depth with air conditioning unit 760 mm
Weight	525 kg
Approval	CE

Table 64: Technical data ECOsine® active FN3430-300-400-4

### FN3430-300-400-4

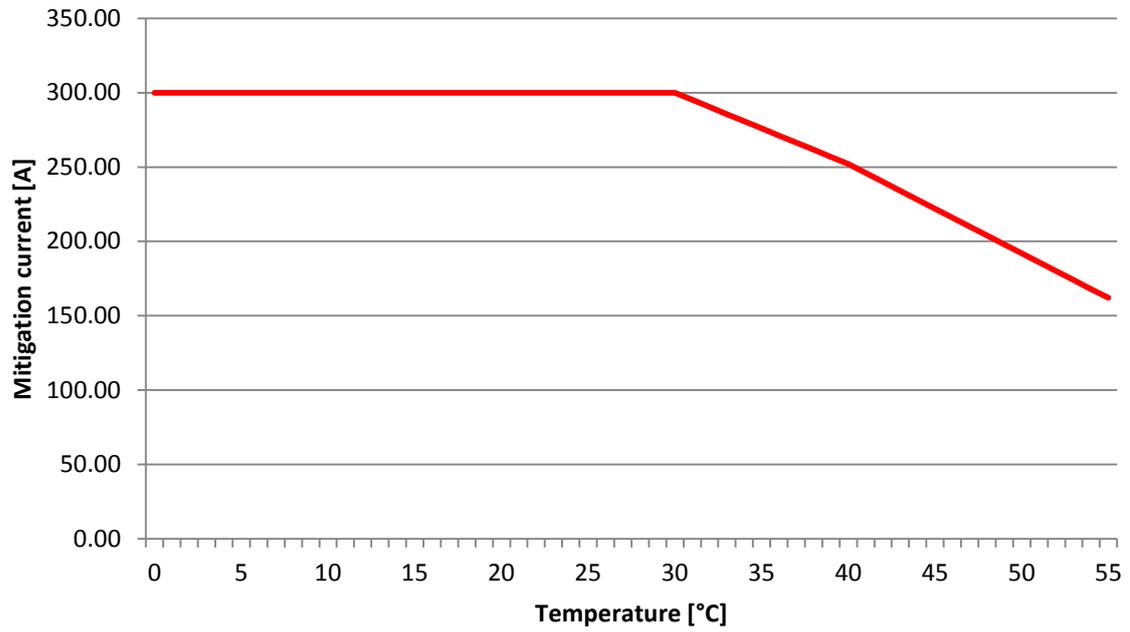


Fig. 90: Derating ECOsine® active N3430-300-400-4

## 7.4 Device-specific data for ECOsine® active with mains voltage 500V / 690V

### 7.4.1 Device-specific data for ECOsine® active FN3420-200-690-3

	Value
Rated compensation current (continuous operation at the load limit possible)	200 A (phase)
Overload capability	500 A (peak value phase current) for 10 ms, load limit rated compensation current (RMS)
Switching frequency	16 kHz
Cooling type	Air cooling
Ambient temperature	0 - 40 °C without derating 40 – 55 °C with derating 2%/K
Power dissipation	Max. 7900 W
Cooling air demand at full load	approx. 3400 m³/h
Coolant	Water-glycol mixture
Coolant manufacturer	Clariant
Coolant additive	Antifrogen N
Mixture ratio (water/coolant additive)	70/30
Coolant quantity	12 liters
Primary pressure	0 bar (in the switched off, de-energized condition)
Operating pressure	2.5 – 5.5 bar (depending on the device type and mains frequency 50/60 Hz)
Installation clearances	Top (air outlet): 300 mm Front (air inlet): 900 mm (to open the door) Lateral: Side-by-side installation without any clearance
Mains frequency	47 ... 63 Hz
Mains voltage (other voltages on request)	<b>ECOsine® active-200-690-3</b> 500 V, 525 V, 575 V, 600 V, 660 V, 690 V(AC) ± 10% <b>ECOsine® active-200-690-3-UL</b> 500 V, 525 V, 575 V, 600 V (AC) ± 10%
Phase connection	3 phases
Connection cross-section (without connecting lug EF T4)	1 x 70 mm² per phase and PE 2 x 70 mm² per phase and PE
Tightening torque (without connecting lug EF T4)	M8: 9.5Nm (84.0 lbf in)
Connection cross-section (with connecting lug EF T4)	1 x 120mm² per phase and PE 2 x 120mm² per phase and PE

	Value
Tightening torque with connecting lug EF T4)	M10: 19 Nm (168.0 lbf in)
Fuse protection	A circuit breaker is integrated in the device. Type: 690 VAC/250A T4V250 R250 – TMA – Detection mode UL Setting value 215 A
Protection class	IP54
Dimensions (W x H x D)	800 x 2100 x 600 mm (incl. mounted 100 mm base) Additional 100 mm base included in the scope of delivery. Depth with air conditioning unit 760 mm
Weight	520 kg
Approval	CE, UL

Table 65: Technical data ECOsine® active FN3420-200-690-3

### FN3420-200-690-3

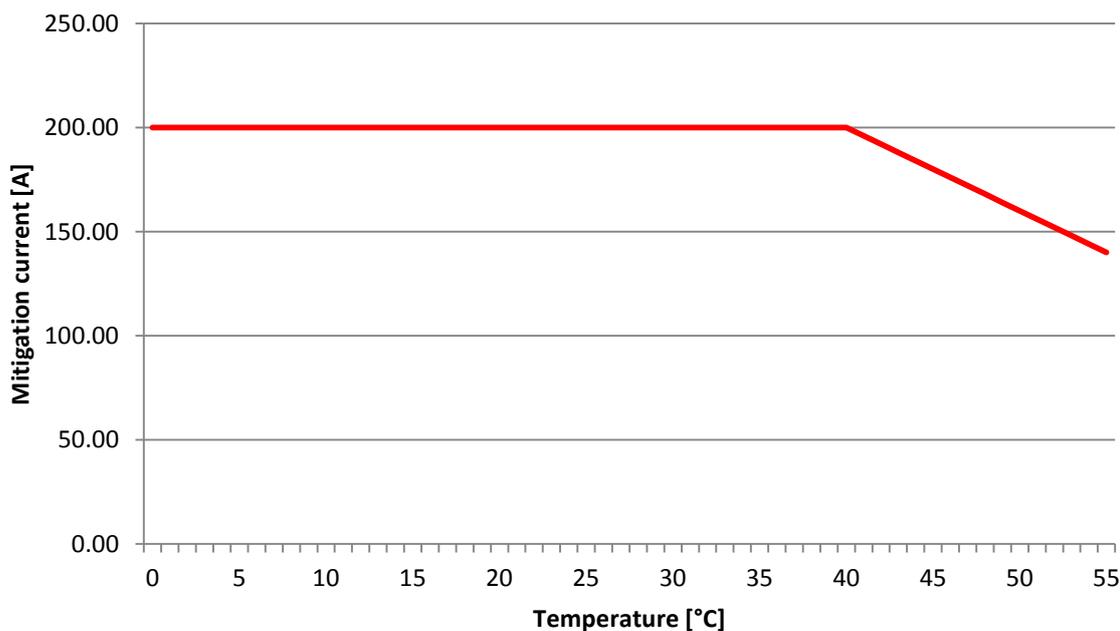


Fig. 91: Derating ECOsine® active FN3420-200-690-3

## 8 Maintenance

The maintenance intervals listed here refer to ECOsine® active which are operated under typical conditions:

- Devices 30 – 120 A are mounted in a control cabinet with air inlet filter
- The ambient temperature is approx. 25°C
- Symmetric 3-phase load is available
- Average utilization of the filter 60%
- Maximum 1 Off / On cycle per month

For all listed maintenance operations except for cleaning of the ventilation grilles and refilling of cooling water, contact the Schaffner Service or an authorized Schaffner Service partner.

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## 8.1 Cleaning of the ventilation grilles

To clean the ventilation grilles blow those out using compressed air with the filter switched off. If it is necessary to remove the cover for cleaning, wait for 10 minutes after switching off the mains voltage before performing it.



### **Dangerous voltage**

Even after switching-off of the mains voltage, the device still carries hazardous voltage.

The device cover may only be removed after 10 minutes.

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## 8.2 Refilling the coolant

If the coolant level in the switched-off state of ECOsine® active is not between the minimum and maximum marks (see chapter 3.3), then it has to be adjusted. To do so, fill in the water up to the Max mark according to the specification on the data sheet of the cooling system. The data sheet is located in the document pocket of the switch cabinet.



### Refill cooling liquid carefully

If any refill of cooling liquid is needed please use only water according to the hydrological data listed in the description (located in the document bag in front door)

Do the refill carefully via the tank inlet on the top of the cabinet. Disconnect the cabinet from supply voltage before doing this.

---















## **9      Declarations of Conformity**

# 9.1 ECOsine® active FN34xx-30/50/60/100/120/200/250/300-xxx-x



## Konformitätserklärung Declaration of Conformity

Produkt Product	ECOsine® Active	BLUEWAVE
Typ Type	FN3420-300(250,200,120,100,50,30)-480-3 FN3420-100(50)-200-3 FN3420-300(250,200)-480-3-UL FN3430-300(250,200,150,120,100,60,30)-400-4 FN3420-60(30)-200-4	BLUEWAVE-300(250,200,120,100,50,30)-480-3 BLUEWAVE-300(250,200,190,180)-400-4 BLUEWAVE-150(120,100,80,60,30)-400-4

**Hersteller**  
Manufacturer Schaffner Deutschland GmbH, Raidwanger Str. 12, D 72622 Nürtingen

**Niederspannungsrichtlinie**  
Low voltage directive 2006/95/EG

**EMV-Richtlinie**  
EMC directive 2004/108/EG

**Normen**  
Standards EN 50178 (IEC 62102)  
EN61000-4-2 EN61000-4-4 EN61000-4-5 EN61000-4-6  
EN61800 -3

Bei dem Produkt handelt es sich um eine Einbaukomponente. Die Einhaltung der Forderungen der Niederspannungsrichtlinie setzt den entsprechenden Einbau der Komponente in die Anlage bzw. Maschine voraus. Diese Erklärung gilt somit ausschließlich für die Komponente und nicht für das Endprodukt.

The product is designed to be installed as a component into a machine or system. Therefore the requirements for an installation have to meet the requested standards. This declaration is only valid for the product as a component of a machine or system and not for the complete machine or system.

Die Bewertung der elektrischen und mechanischen Sicherheit, der Umwelteinflüsse (Fremdkörper, Feuchtigkeit) muss im eingebauten Zustand am Endprodukt erfolgen.

The product may only be assessed with regard to its electrical and mechanical safety as well as to environmental effects (foreign particles, moisture) after it has been installed in the product intended for the final user.

Die Messungen wurden gemäß den zutreffenden Forderungen der aufgelisteten Normen durchgeführt.

The measurements were made according the relevant requirements of the standards listed above.

Nürtingen, 25.03.2014

  
Michele Diforte  
Leitung AHF Entwicklung  
Head of AHF development

  
Dipl.-Ing. Harald Lautz  
Leitung AHF Marketing und Vertrieb  
Head of AHF Marketing and Sales

Änderungen im Inhalt der Konformitätserklärung sind vorbehalten. Derzeit gültige Ausgabe auf Anfrage.  
We reserve the right to make changes in the conformity declaration. Presently applicable edition can be obtained upon request.

## 9.2 ECOSine® active FN3420-100/120-480-3-GL



### Konformitätserklärung Declaration of Conformity

Produkt Product	ECOSine® Active		
Typ Type	FN3420-120(100)-480-3 GL		

Hersteller  
Manufacturer Schaffner Deutschland GmbH, Raidwanger Str. 12, D 72622 Nürtingen

Niederspannungsrichtlinie  
Low voltage directive 2006/95/EG

EMV-Richtlinie  
EMC directive 2004/108/EG

Normen  
Standards

EN 50178 (IEC 62102)			
EN61000-4-2	EN61000-4-3	EN61000-4-4	EN61000-4-5
EN61000-4-6	55016		

Bei dem Produkt handelt es sich um eine Einbaueinheit. Die Einhaltung der Forderungen der Niederspannungsrichtlinie setzt den entsprechenden Einbau der Komponente in die Anlage bzw. Maschine voraus. Diese Erklärung gilt somit ausschließlich für die Komponente und nicht für das Endprodukt.

The product is designed to be installed as a component into a machine or system. Therefore the requirements for an installation have to meet the requested standards. This declaration is only valid for the product as a component of a machine or system and not for the complete machine or system.

Die Bewertung der elektrischen und mechanischen Sicherheit, der Umwelteinflüsse (Fremdkörper, Feuchtigkeit) muss im eingebauten Zustand am Endprodukt erfolgen.

The product may only be assessed with regard to its electrical and mechanical safety as well as to environmental effects (foreign particles, moisture) after it has been installed in the product intended for the final user.

Die Messungen wurden gemäß den zutreffenden Forderungen der aufgelisteten Normen durchgeführt.

The measurements were made according to the relevant requirements of the standards listed above.

Nürtingen, 27.01.2014

Michele Diforte  
Leitung AHF Entwicklung  
Head of AHF development

Dipl.-Ing. Harald Lautz  
Leitung AHF Marketing und Vertrieb  
Head of AHF Marketing and Sales

Änderungen im Inhalt der Konformitätserklärung sind vorbehalten. Derzeit gültige Ausgabe auf Anfrage.  
We reserve the right to make changes in the conformity declaration. Presently applicable edition can be obtained upon request.

# Type Approval Certificate



This is to certify that the undemoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No.	95 088 - 14 HH
Company	Schaffner EMV AG Nordstr. 11 4542 Luterbach, SWITZERLAND
Product Description	ECOsine® Active Harmonic Filter
Type	FN3420-100-480-3-GL, FN3420-120-480-3GL
Environmental Category	A, EMC2
Technical Data / Range of Application	Active harmonic filter for wall mounting. Rated compensation current: 100A (phase) FN3420-100-480-3-GL 120A (phase) FN3420-120-480-3-GL  Main Voltage: 400 VAC Mains frequency: 50Hz, 60Hz Phase connection: 3 phases + PE Power dissipation: max. 2200 W FN3420-100-480-3 GL max.2500 W FN3420-120-480-3 GL  Cooling type: Fan cooled Degree of protection: IP20  Software version: 2.08.xx (Firmware Ecosine active)
Test Standard	Guidelines for the Performance of Type Approvals, Chapter 2, Edition 2012
Documents	Test reports: Phoenix Testlab no. E130592E1 (14.02.13), U130592E1 (06.03.13), U131953E1 (05.06.13); Schaffner: Appendix TestReports_PhoenixTestlab version 1v1 (12.02.14), Schaffner no. 0996_00 version B (04.03.14); Operating and Installation Instructions (rev. 4) October 2013; Installation Instruction EMC-Filter (V0 march 2014); Drawings, circuit diagrams, partlists acc. To submitted files; Software Questionnaire requirement class 3 (18.02.14)
Remarks	The external EMC-Filter RU33092-120-3L must be used.

Valid until 2019-05-21

Page 1 of 1

File No. LL.02

Hamburg, 2014-05-22

Type Approval Symbol



**Germanischer Lloyd**

Marco Rinkel

Klaus-Peter Schröder

This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1, Procedure".

## 9.3 ECOsine® active FN3420-200-690-3



### Konformitätserklärung Declaration of Conformity

<b>Produkt</b> <i>Product</i>	ECOsine™ Active		
<b>Hersteller</b> <i>Manufacturer</i>	Schaffner Deutschland GmbH Raidwanger Str. 12 D 72622 Nürtingen		
<b>Typ</b> <i>Type</i>	FN3420-200-690-3		
<b>Niederspannungsrichtlinie</b> <i>Low voltage directive</i>	2006/95/EG		
<b>EMV-Richtlinie</b> <i>EMC directive</i>	2004/108/EG		

**Normen**  
*Standards*

EN 50178 (IEC 62102)			
EN 61000-3-11:2000	EN 61000-3-12:2011	EN61000-4-2	EN61000-4-3
EN61000-4-4	EN61000-4-5	EN61000-4-6	EN 61000-6-2:2005
55011:2009/A1:2010*			

\*ist für die Versorgung durch einen eigenen Leistungstransformator oder Generator des Betreibers und nicht für den direkten Betrieb am öffentlichen Niederspannungsnetz vorgesehen.

*\*is provided to be supplied by a private power transformer or generator and not directly by public low voltage distribution*

Bei dem Produkt handelt es sich um eine Einbaukomponente. Die Einhaltung der Forderungen der Niederspannungsrichtlinie setzt den entsprechenden Einbau der Komponente in die Anlage bzw. Maschine voraus. Diese Erklärung gilt somit ausschließlich für die Komponente und nicht für das Endprodukt.

*The product is designed to be installed as a component into a machine or system. Therefore the requirements for an installation have to meet the requested standards. This declaration is only valid for the product as a component of a machine or system and not for the complete machine or system.*

Die Bewertung der elektrischen und mechanischen Sicherheit, der Umwelteinflüsse (Fremdkörper, Feuchtigkeit) muss im eingebauten Zustand am Endprodukt erfolgen.

*The product may only be assessed with regard to its electrical and mechanical safety as well as to environmental effects (foreign particles, moisture) after it has been installed in the product intended for the final user.*

Die Messungen wurden gemäß den zutreffenden Forderungen der aufgelisteten Normen durchgeführt.

*The measurements were made according the relevant requirements of the standards listed above.*

Nürtingen, 29.10.2013

  
Dr. Guido Schlegelmilch  
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Head of EMC Division

  
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Head of AHF Marketing and Sales

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We reserve the right to make changes in the conformity declaration. Presently applicable edition can be obtained upon request.

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