

## EMC filters

3-line filters  
for converters and power electronics

**Series/Type:** B84143A\*166

**Date:** May 2012

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**Power line filters for 3-phase systems**
**Rated voltage  $V_R$ : 520/300 V AC**
**Rated current  $I_R$ : 10 A to 35 A**
**Construction**

- 3-line filters
- Metal case

**Features**

- Excellent price/performance ratio
- Ultra-compact design
- Low weight
- Easy to install
- Optimized for short motor cables and operation under full load
- ENEC10, UL and cUL approval


**Typical applications**

- Frequency converters for motor drives, e.g.
  - elevators
  - pumps
  - HVAC systems (heating, ventilation and air conditioning)
- Power supplies

**Terminals**

- Tab connectors (10 A ... 20 A)
- Finger-safe terminal blocks (35 A)

**Marking**

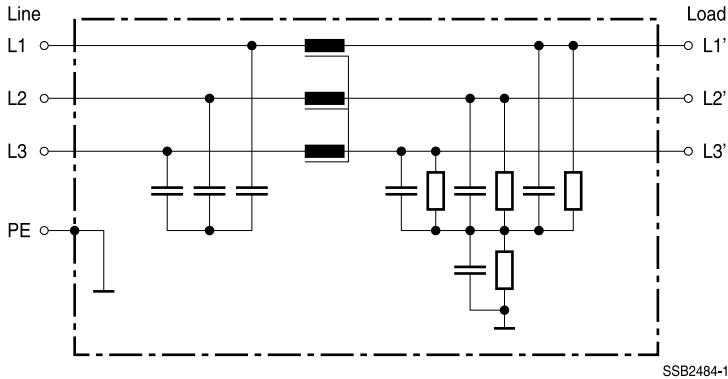
Marking on component:

Manufacturer's logo, ordering code, rated voltage, rated current, rated temperature, climatic category, date code, approvals

Minimum data on packaging:

Manufacturer's logo, ordering code, quantity, date code



**3-line filters**
**B84143A\*166**
**for converters and power electronics**
**Typical circuit diagram**

**Technical data and measuring conditions**

Rated voltage $V_R$	520/300 V AC (50/60 Hz)
Rated current $I_R$	Referred to 50 °C rated temperature <sup>1)</sup>
Test voltage $V_{test}$	2236 V DC, 2 s (line/line) 2720 V DC, 2 s (lines/case)
Overload capability (thermal)	1.5 · $I_R$ for 3 min per hour or 2.5 · $I_R$ for 30 s per hour
Climatic category (IEC 60068-1)	25/100/21 (–25 °C/+100 °C/21 days damp heat test)
Approvals	IEC 60939, UL 1283, CSA C22.2 No.8

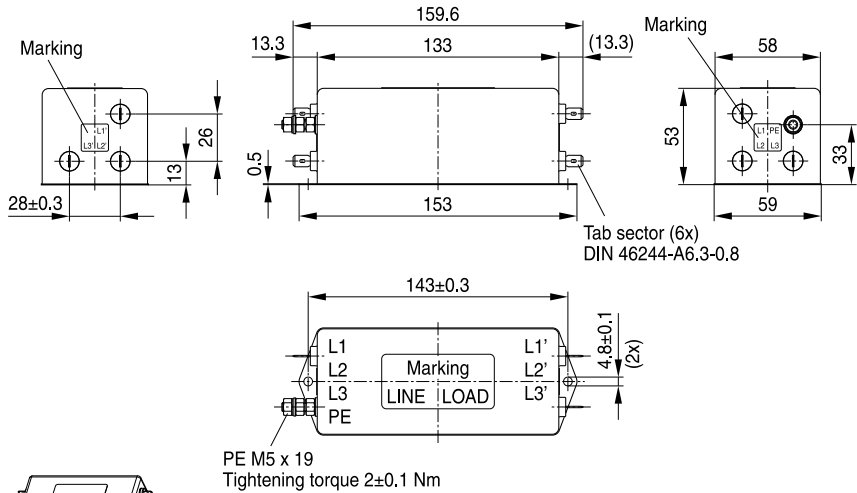
1) For use at higher ambient temperature as the rated temperature, see current derating in our data book.

**Characteristics and ordering codes**

$I_R$	Terminal cross section	$I_{LK}^{1)}$	$R_{typ}$	Approx. weight	Ordering code	Approvals		
A	mm <sup>2</sup>	mA	mΩ	kg				
<b><math>V_R = 520/300</math> V AC</b>								
10	5	3.1	12.9	0.6	B84143A0010A166	×	×	×
20	5	3.1	4.9	0.75	B84143A0020A166	×	×	×
35	6	5.0	2.7	1.1	B84143A0035R166	×	×	×

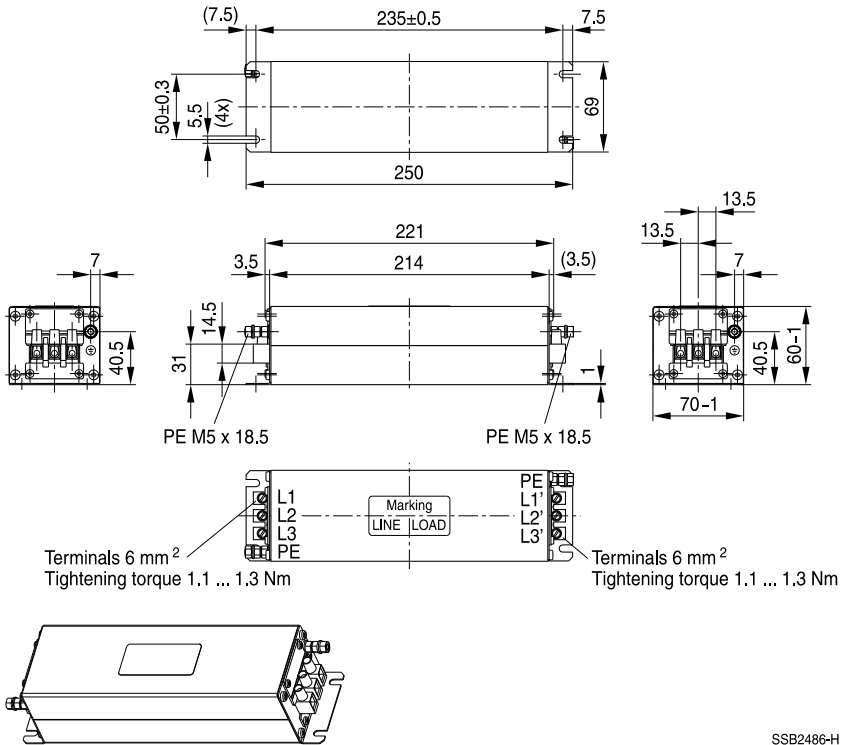
× = Approval granted

1) Calculation according IEC 60939-1 (04.2011), annex A, "Calculation of leakage current" at  $V_R$ , 50 Hz.

**Dimensional drawings**
**B84143A0010A166, B84143A0020A166 (10 A, 20 A)**


SSB2485-9

 General tolerances according to ISO 2768—C  
 Dimensions in mm

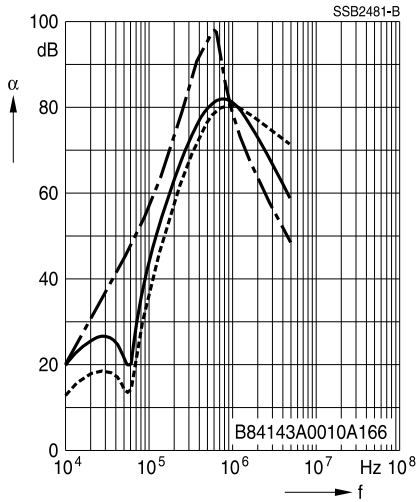
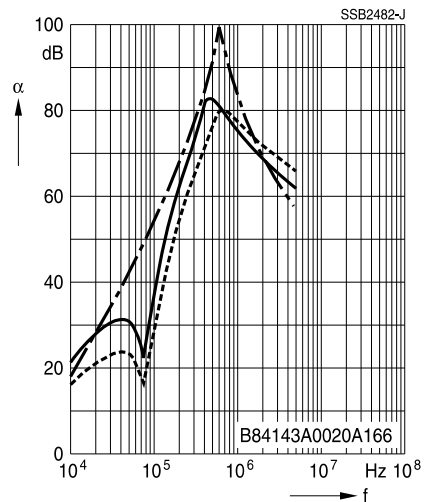
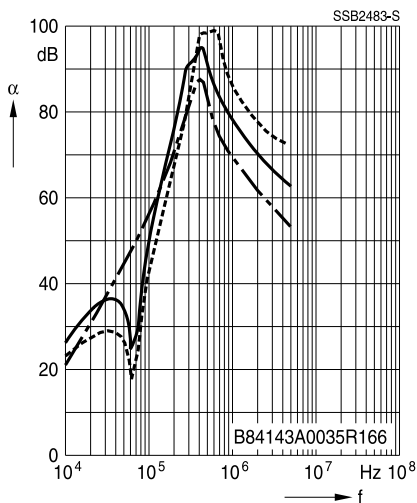
**B84143A0035R166 (35 A)**


SSB2486-H

 General tolerances according to ISO 2768-C  
 Dimensions in mm

**Insertion loss** (typical values at  $Z = 50 \Omega$ )

- unsymmetrical, adjacent branches terminated
- - - - - common mode, all branches in parallel (asymmetrical)
- - - - - differential mode (symmetrical)

**Filter for 10 A**

**Filter for 20 A**

**Filter for 35 A**


### Cautions and warnings

- Please note the advices in our data book “EMC Filters” (latest edition); attention should be paid to the chapter “General safety notes”.
- It shall be ensured that only qualified persons (electricity specialists) are engaged on work such as planning, assembly, installation, operation, repair and maintenance. They must be provided with the corresponding documentation.
- Danger of electric shock. EMC filters contain components that store an electric charge. Dangerous voltages can continue to exist at the filter terminals for longer than five minutes even after the power has been switched off.
- The protective earth connections shall be the first to be made when the EMC filter is installed and the last to be disconnected. Depending on the magnitude of the leakage currents, the particular specifications for making the protective-earth connection must be observed.
- Impermissible overloading of the EMC filter, such as with circuits able to cause resonances, impermissible voltages at higher frequencies etc. can lead to bodily injury and death as well as cause substantial material damages (e.g. destruction of the filter housing).
- EMC filters must be protected in the application against impermissible exceeding of the rated currents by overcurrent protective.
- In case of leakage currents  $>3.5$  mA you shall mount the PE conductor stationary with the required cross section before beginning of operation and save it against disconnecting. For leakage currents  $I_{LK}^{(1)} < 10$  mA the PE conductor must have a KU value<sup>2)</sup> of 4.5; for leakage currents  $I_{LK} \geq 10$  mA the PE conductor must have a KU value of 6.

1)  $I_{LK}$  = leakage current let-go

2) The KU value (symbol KU) is a classification parameter of safety-referred failure types designed to ensure protection against hazardous body currents and excessive heating. A value of KU = 4.5 with respect to interruptions is attained: a) with a permanently connected protective earth circuit  $\geq 1.5$  mm<sup>2</sup> and b) with a protective earth circuit  $\geq 2.5$  mm<sup>2</sup> connected via shroud connectors (IEC 60309-2). KU = 6 with respect to interruptions is achieved for fixed-connection lines  $\geq 10$  mm<sup>2</sup> where the type of connection and line layout correspond to the requirements for PEN conductors as specified in relevant standards.

**Symbols and terms**

Symbol	English	German
$\alpha$	Insertion loss	Einfügungsdämpfung
$C_R$	Rated capacitance	Bemessungskapazität
$C_X$	Capacitance X capacitor	Kapazität X-Kondensator
$C_Y$	Capacitance Y capacitor	Kapazität Y-Kondensator
$\Delta V$	Voltage drop (input to output)	Spannungsabfall im Filter
$dv/dt$	Rate of voltage rise	Spannungsanstiegsgeschwindigkeit
$f$	Frequency	Frequenz
$f_M$	Converter output frequency	Motorfrequenz
$f_P$	Pulse frequency	Pulsfrequenz
$f_R$	Rated frequency	Bemessungsfrequenz
$f_{res}$	Resonant frequency	Resonanzfrequenz
$I_{LK}$	Filter leakage current	Filter-Ableitstrom
$I_C$	Current through capacitor	Strom durch Kondensator
$I_{max}$	Maximum current	Maximalstrom
$I_N$	Nominal current	Nennstrom
$I_{op}$	Operating current (design current)	Betriebsstrom
$I_q$	Capacitive reactive current	Kapazitiver Blindstrom
$I_R$	Rated current	Bemessungsstrom
$I_S$	Interference current	Störstrom
$L$	Inductance	Induktivität
$L_R$	Rated inductance	Bemessungsinduktivität
$L_{stray}$	Stray inductance	Streuinduktivität
$P_{loss}$	Power loss	Verlustleistung
$R$	Resistance	Widerstand
$R_{is}$	Insulation resistance	Isolationswiderstand
$R_{typ}$	DC resistance, typical value	Gleichstromwiderstand, Richtwert
$T_A$	Ambient temperature	Umgebungstemperatur
$T_{max}$	Upper category temperature	Obere Kategorietemperatur
$T_{min}$	Lower category temperature	Untere Kategorietemperatur
$T_R$	Rated temperature	Bemessungstemperatur
$V_{eff}$	RMS voltage	Effektivspannung
$V_{LE}$	Voltage line to earth; voltage line to ground	Spannung Phase zu Erdpotential
$V_N$	Nominal voltage	Netzspannung
$V_R$	Rated voltage	Bemessungsspannung
$V_{peak}$	Peak voltage	Spitzenspannung
$V_{test}$	Test voltage	Prüfspannung
$V_X$	Voltage over X capacitor	Spannung über X-Kondensator
$V_Y$	Voltage over Y capacitor	Spannung über Y-Kondensator
$Z$	Impedance	Scheinwiderstand
$ Z $	Impedance, absolute value	Scheinwiderstand (Betragswert)



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