



## **Filters for control and communication lines with HEMP-Protection according to MIL-STD 188-125-1**

100 V AC/DC, 100 mA

**Series/Type:**            **B84312CxxxxJ303**

**Date:**                    September 2017

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## Filters for control and communication lines with HEMP-Protection

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- HEMP protection acc. MIL-STD-188-125-1
- Passband up to 300 kHz
- Stopband attenuation up to 40 GHz



### Features

- Extended performance
- For installation outside the shielded area
- Multi step EMP protection

### Design

The electrical components are incorporated in an RF-tight case of tin-plated sheet steel. Coaxial feed-through capacitors are used at the input and output of the filter circuit. Filters are available for upright installation on shielding wall.

### Installation

Single filters are attached directly to the shielding wall. Larger numbers can be housed in filter cabinets or boxes. Various models and the matching flexible connector fittings are available. Further an adapter housing for flat installation on the shielding exists.

### Technical data and measuring conditions

Rated voltage	$V_{R, AC}$	100 V	
Rated voltage	$V_{R, DC}$	100 V	
Rated frequency	$f_R$	See characteristics	Pass bandwidth at $Z_L$
Rated current	$I_R$	100 mA	$T_A = 40\text{ °C}$
Line impedance	$Z_L$	See characteristics	
Number of lines / line pairs		See characteristics	
Test voltage	$V_{test}$	250 V DC, 2 s 250 V DC, 2 s	Line/line Line/case
Maximum DC resistance	$R_{DC}$	See characteristics	
Permissible ambient temperature	$T_A$	-25 ... +40 °C	
Climatic category (EN 60068-1: 1992)		25/085/56	
Degree of protection (IEC 60529: 2013)		IP 20	
Weight		4.5 kg	

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**Characteristics and ordering codes**

$I_R$	Rated frequency	$Z_L$	$R_{DC}$	Circuit diagram	Number of lines / line pairs	Ordering code
A	$f_R$	$\Omega$	$\Omega$			
0.1	DC ... 3.4	600	14	1	4 line pairs <sup>1)</sup>	B84312C0020J303
1	— <sup>1)</sup>	— <sup>2)</sup>	1.4		8 single lines	B84312C0030J303
0.1	DC ... 50	600	4.1		4 line pairs <sup>1)</sup>	B84312C0040J303
0.1	DC ... 120	150	8.4	2	4 line pairs	B84312C0050J303
0.1	DC ... 300	150	4.0		4 line pairs	B84312C0060J303
0.1	DC ... 3.4	600	18	3	4 line pairs	B84312C0090J303

1) Control line filters, not matched

2) Not specified

**Approvals / Test reports acc. to MIL-STD 188-125-1**

 Test report from EMCCons DR. RAŠEK GmbH & Co. KG ([www.emcc.de](http://www.emcc.de)) acc. to MIL-STD 188-125-1 (short and intermediate pulse test) available.

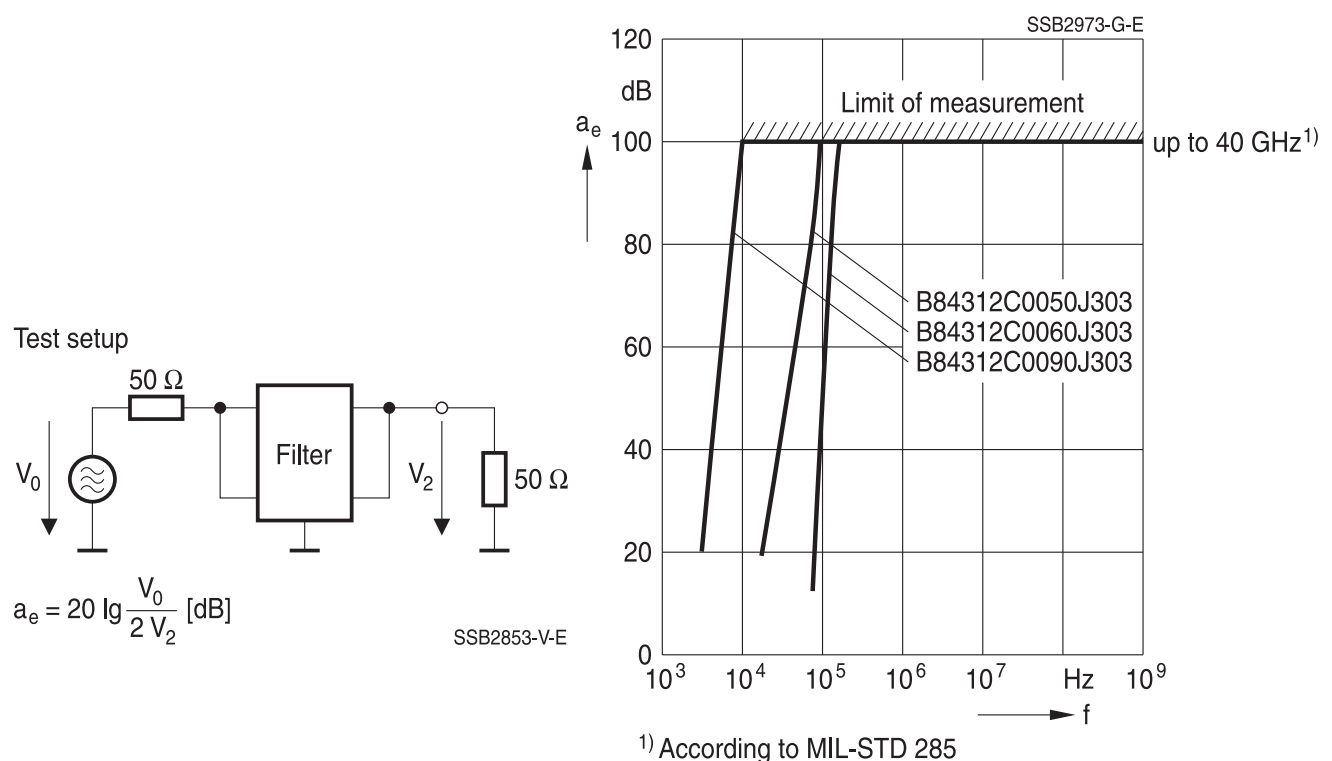
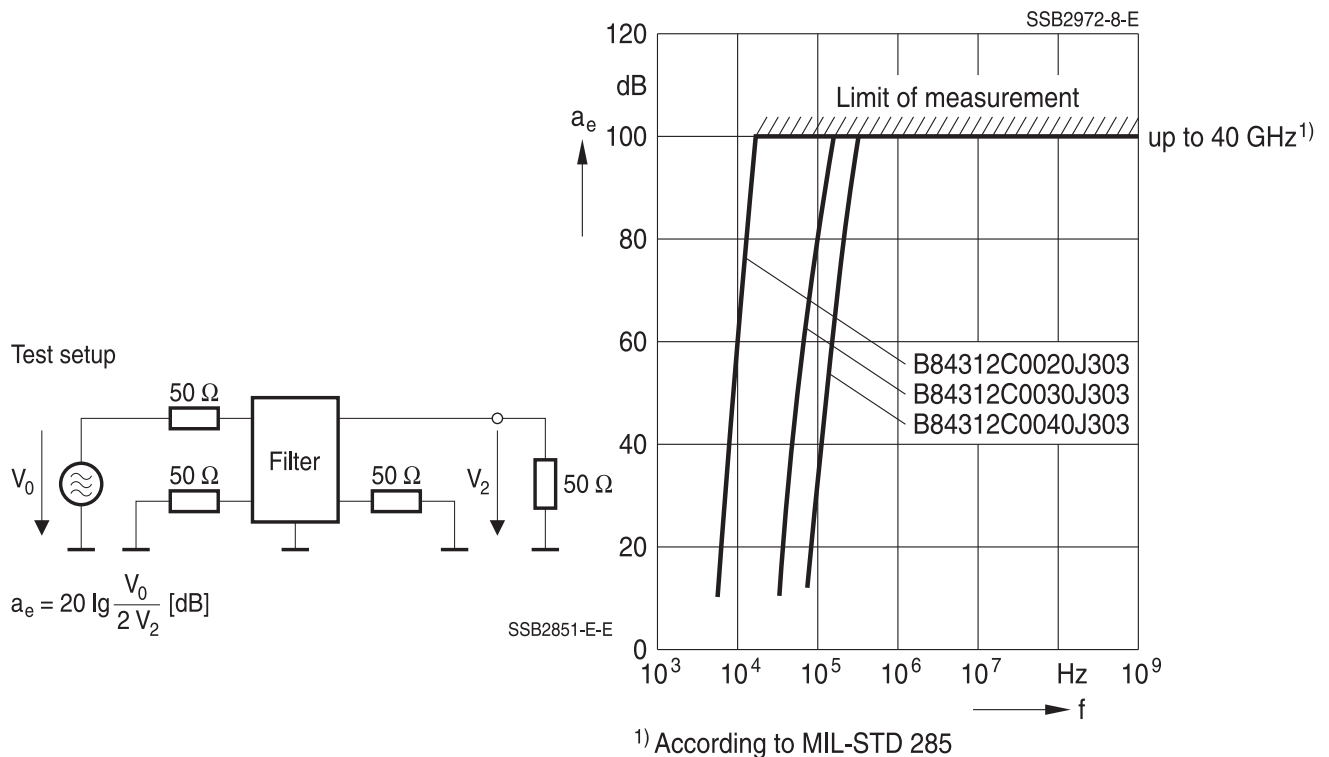
Ordering code	Test report	Response current short pulse	Response current intermediate pulse
B84312C0020J303	EMCC-860009.1GDB, 2017-1-24	Compliant	Compliant
B84312C0030J303	EMCC-860009.1GB, 2016-09-09	Compliant	Compliant
B84312C0040J303	EMCC-860009.1GDB, 2017-1-24	Compliant	Compliant
B84312C0050J303		Compliant	Compliant
B84312C0060J303		Compliant	Compliant
B84312C0090J303		Compliant	Compliant

# Filters for control and communication lines with HEMP-Protection

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## Insertion loss $a_e$ as a function of frequency $f$ (typical values) for each line pair

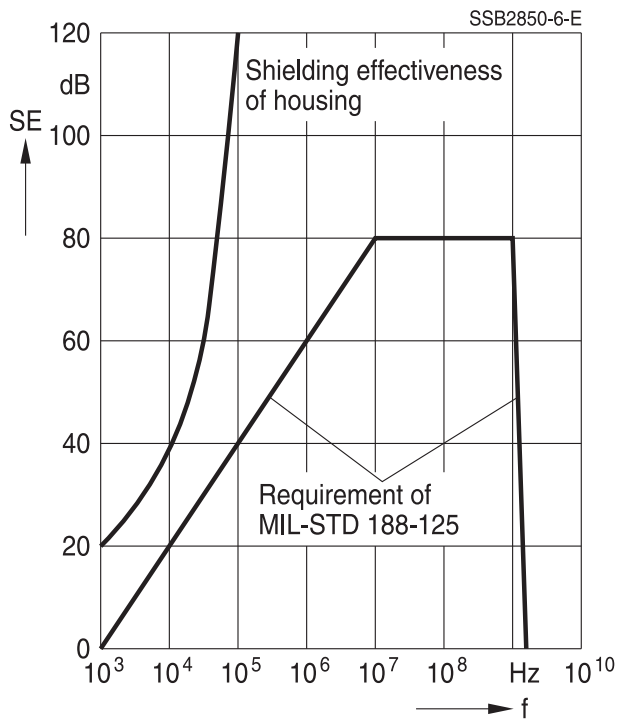


**Filters for control and communication lines with HEMP-Protection**

**100 V AC/DC, 100 mA**

**B84312CxxxxJ303**

**Shielding effectiveness of filter housing acc. MIL-STD 188-125-1**



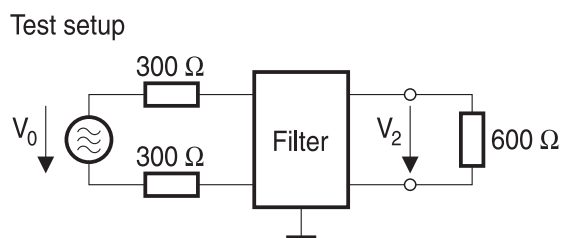
## Filters for control and communication lines with HEMP-Protection

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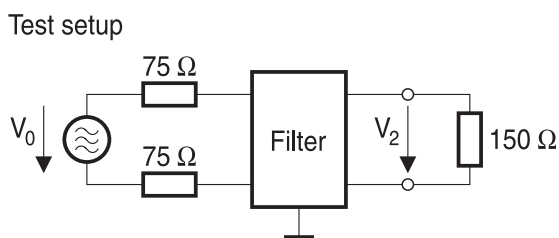
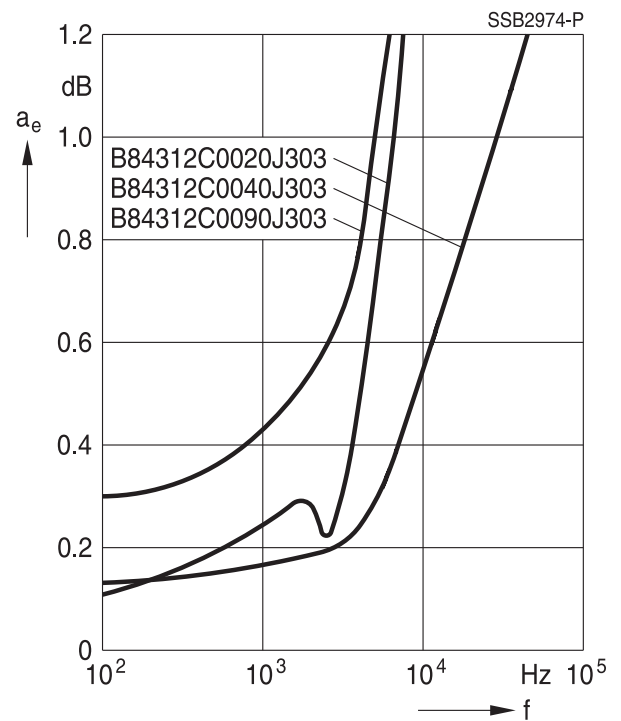
### Insertion loss $a_e$ in the passband (typical values) for each line pair

Insertion loss  $a_e$  in the passband (typical values)



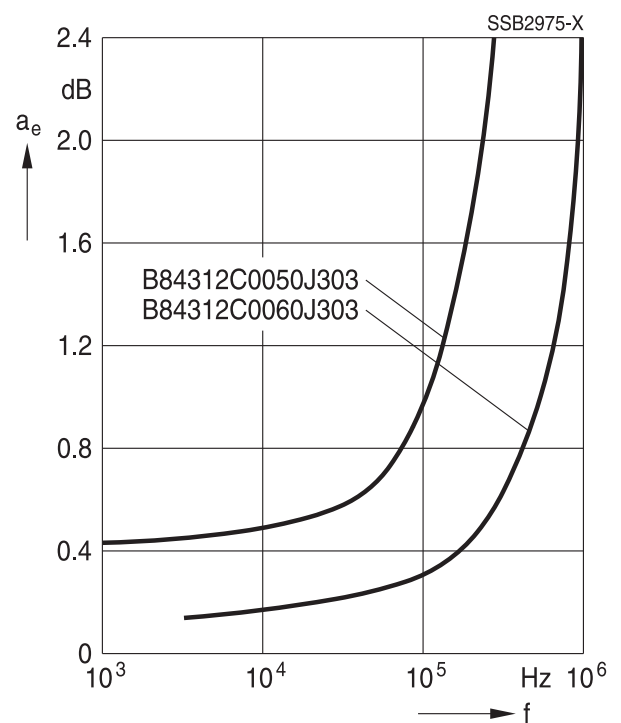
$$a_e = 20 \lg \frac{V_0}{2 V_2} \text{ [dB]}$$

SSB2855-C-E



$$a_e = 20 \lg \frac{V_0}{2 V_2} \text{ [dB]}$$

SSB2857-TE



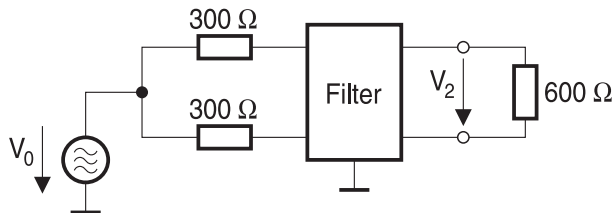
## Filters for control and communication lines with HEMP-Protection

100 V AC/DC, 100 mA

B84312CxxxxJ303

**Common mode rejection of types B84312C0020J303, B84312C0040J303, B84312C0050J303, B84312C0060J303, B84312C0090J303**

Test setup



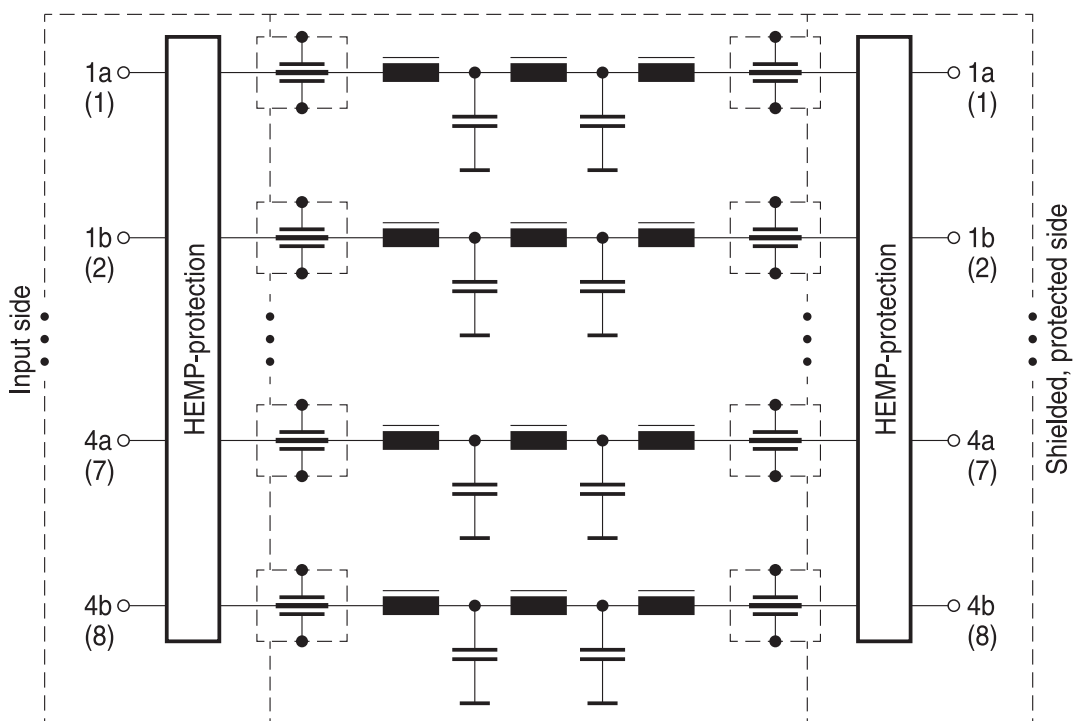
$$CMR = 20 \lg \frac{V_0}{2 V_2} \text{ [dB]}$$

CMR > 40 dB in the pass band

SSB2859-A-E

### Circuit diagrams

Circuit diagram 1: B84312C0020J303, B84312C0030J303, B84312C0040J303

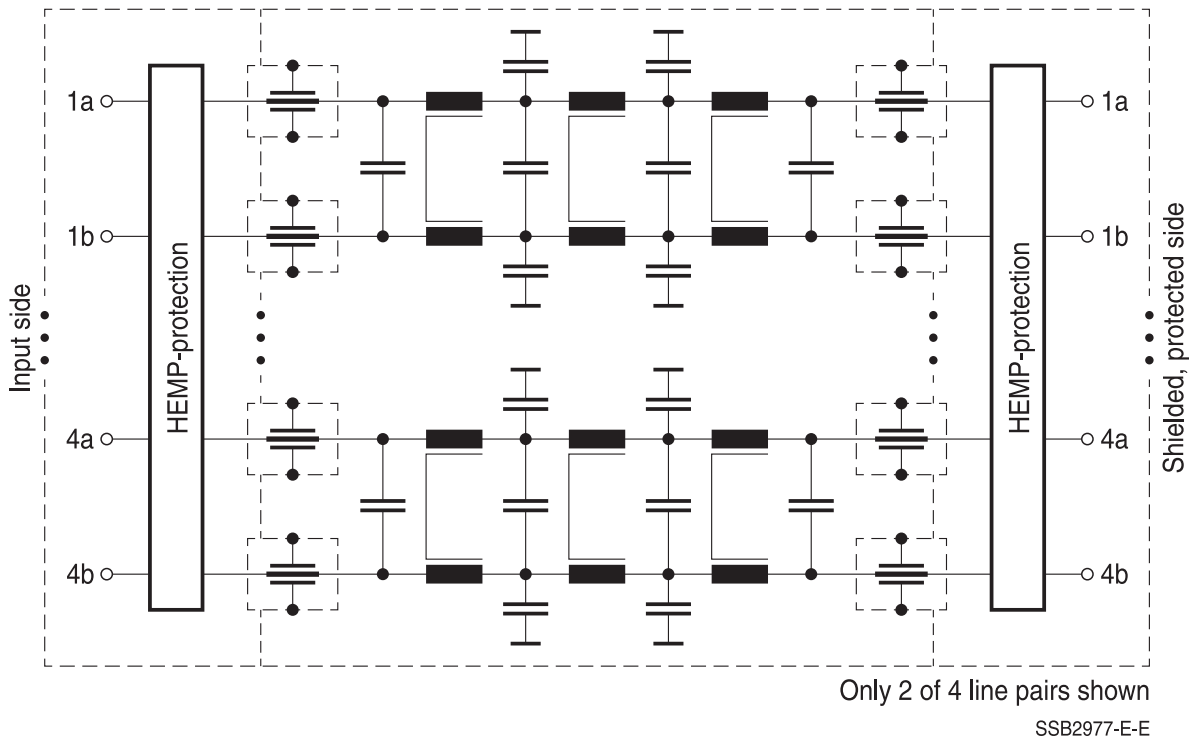


At B84312C0020/C0040J303: only 2 of 4 line pairs shown  
At B84312C0030J303: only 4 of 8 lines shown

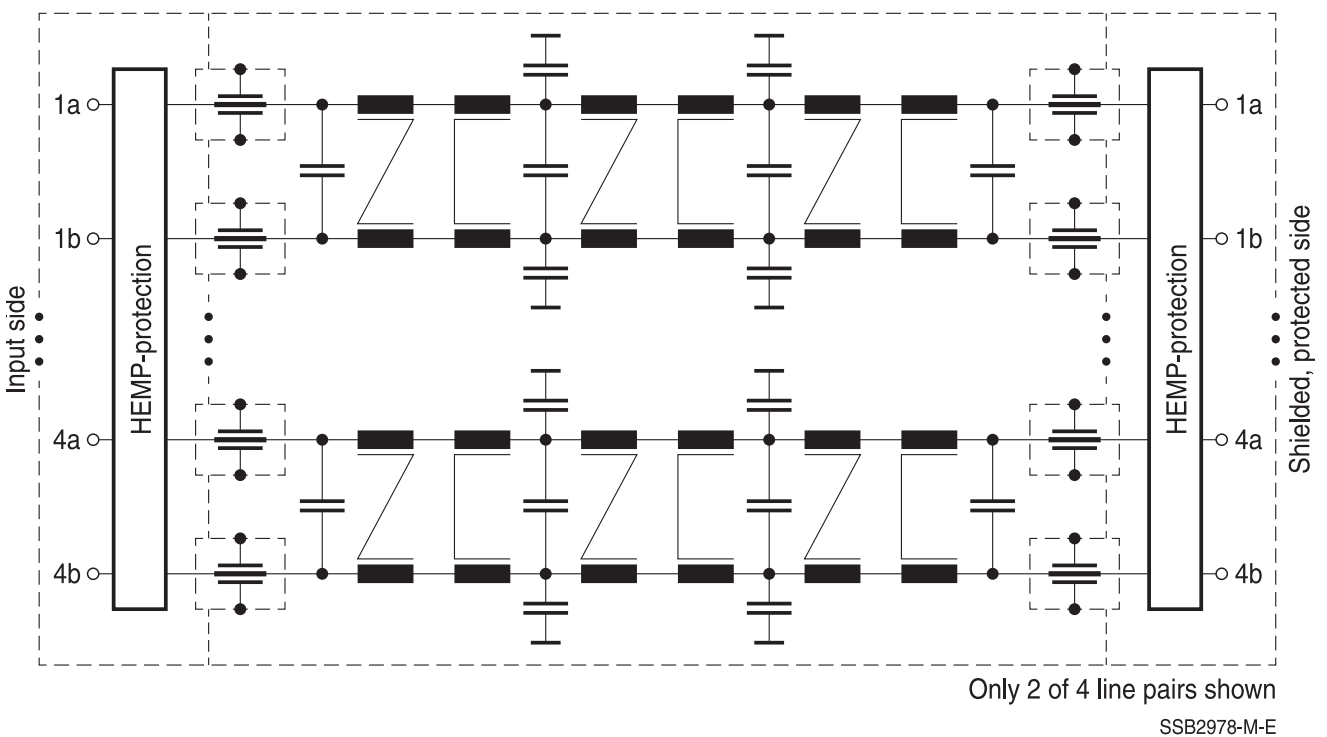
SSB2976-6-E

**Filters for control and communication lines with HEMP-Protection**  
**100 V AC/DC, 100 mA** **B84312CxxxxJ303**

Circuit diagram 2: B84312C0050J303, B84312C0060J303



Circuit diagram 3: B84312C0090J303



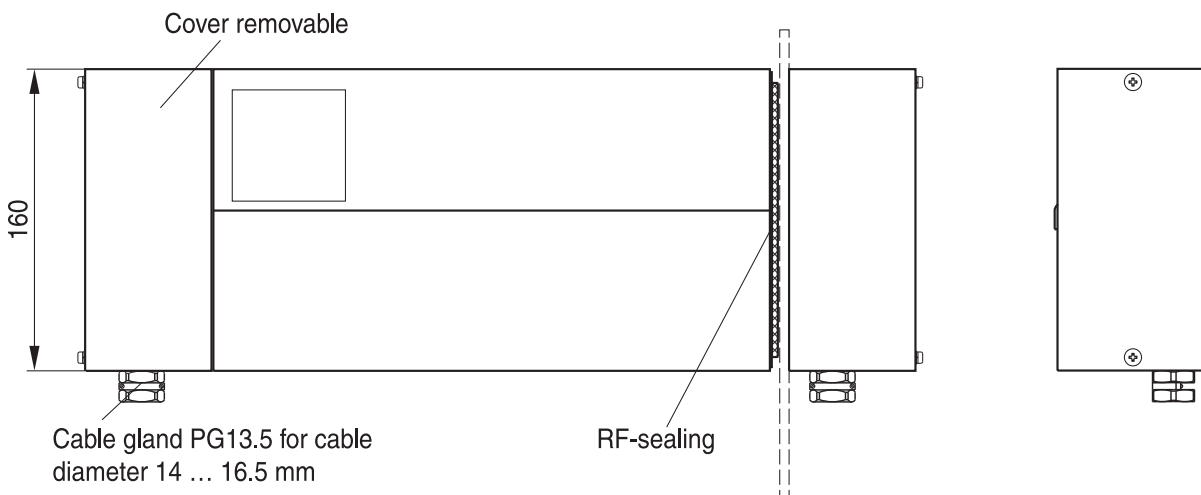
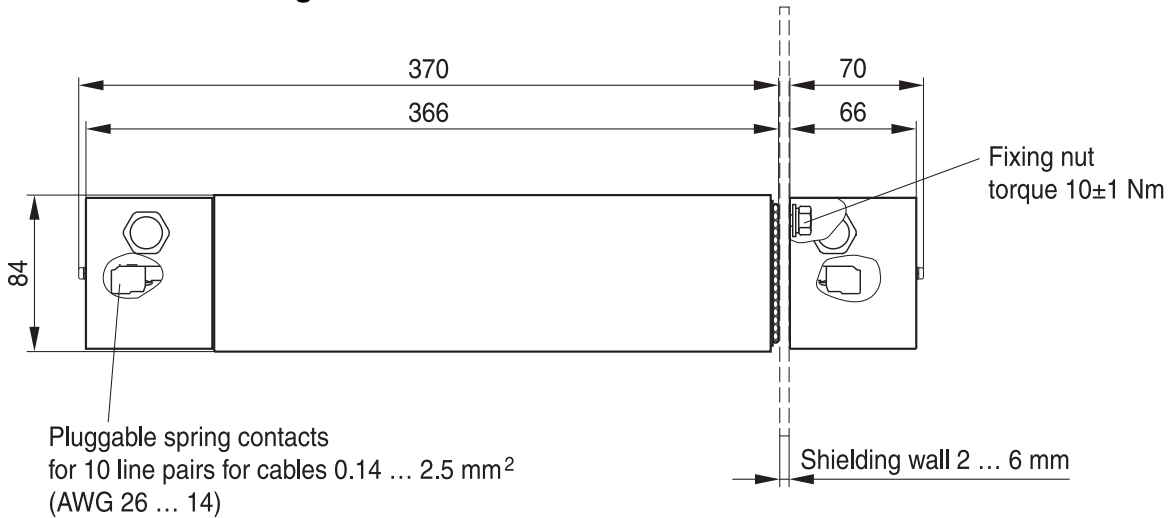


**Filters for control and communication lines with HEMP-Protection**

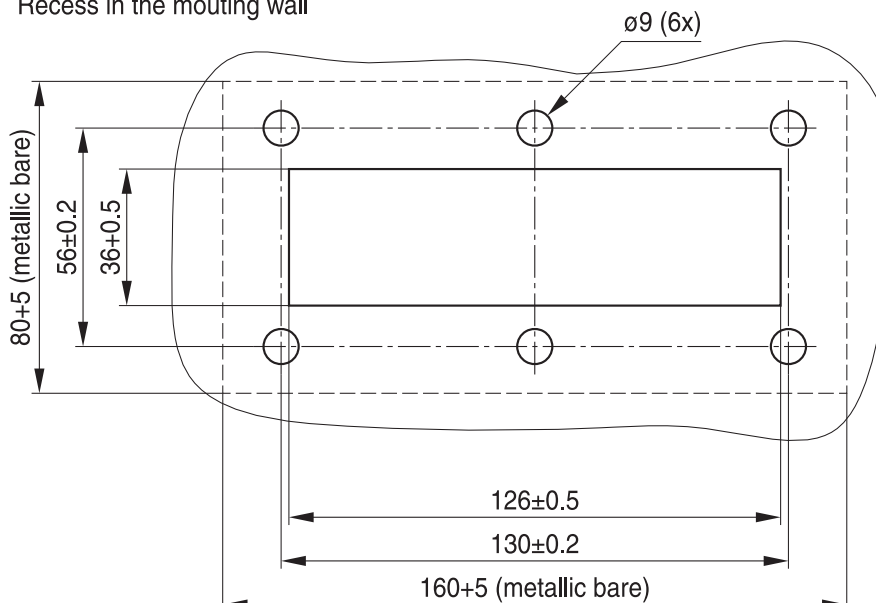
**100 V AC/DC, 100 mA**

**B84312CxxxxJ303**

**Dimensional drawing**



**Recess in the mouting wall**



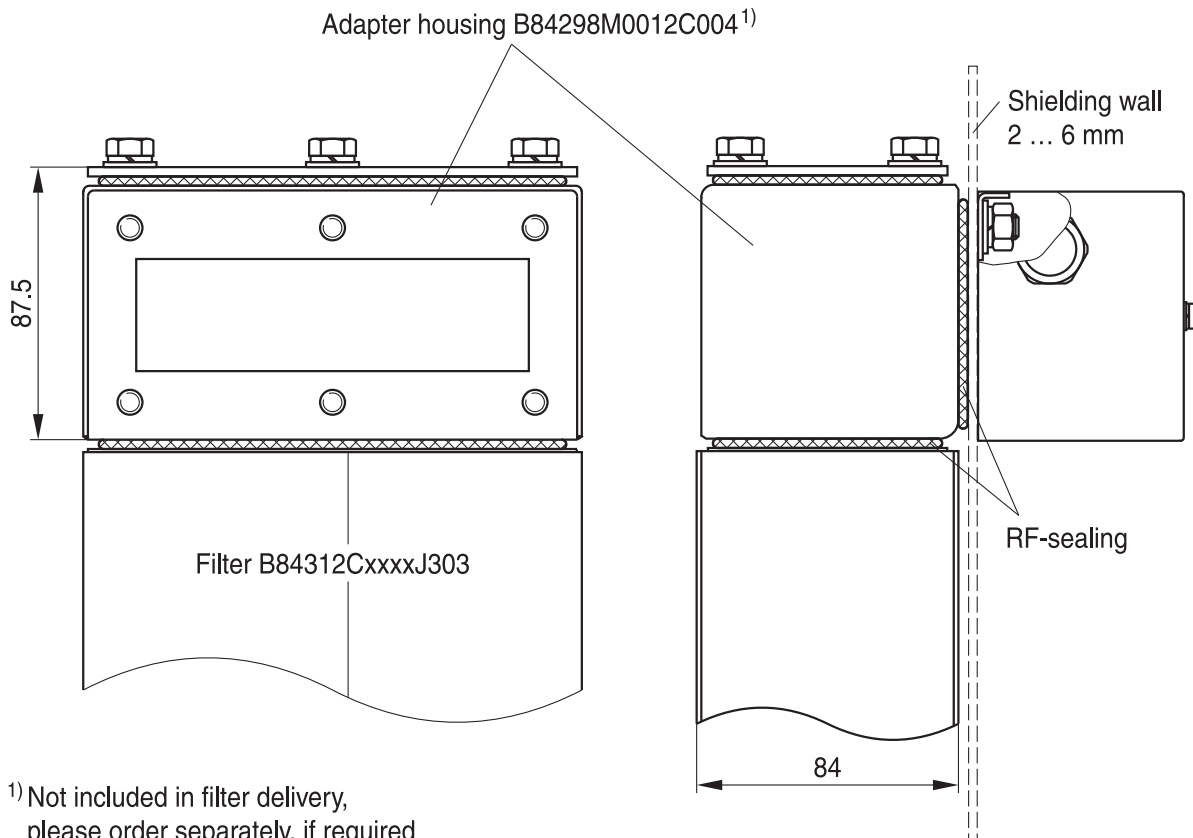
SSB2979-V-E

**Filters for control and communication lines with HEMP-Protection**

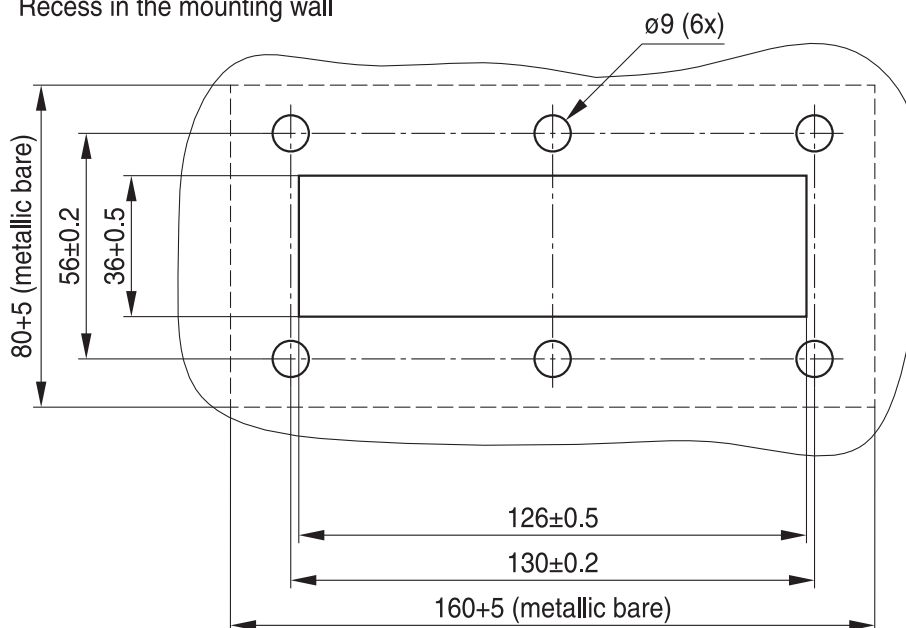
**100 V AC/DC, 100 mA**

**B84312CxxxxJ303**

**Flat installation of HEMP-Filter with adapter housing B84298M0012C004**



**Recess in the mounting wall**



SSB2980-Y-E

Please read all safety and warning notes carefully before installing the filter and putting it into operation. The same applies to the warning signs on the filter. Please ensure that the signs are not removed nor their legibility impaired by external influences.

Death, serious bodily injury and substantial material damage to equipment may occur if the appropriate safety measures are not carried out or the warnings in the text are not observed.

### Using according to the terms

The filters may be used only for their intended application within the specified values in low voltage networks in compliance with the instructions given in the data sheets and the data book.

The conditions at the place of application must comply with all specifications for the filter used.

### Warning

- 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. 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 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 filter or 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).
- Filters must be protected in the application against impermissible exceeding of the rated currents by overcurrent protective devices.
- 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  $I_L^{(1)} \leq 10$  mA the PE conductor must have a KU value<sup>2)</sup> of 4.5<sup>3)</sup>; for leakage currents  $I_L > 10$  mA the PE conductor must have a KU value of 6<sup>4)</sup>.
- Because the product can become very hot during operation, there is the risk of burns if touched. The product can remain hot for some time after the power is switched off!

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1)  $I_L$  = 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.

3)  $I_L$  = A value of KU = 4.5 with respect to interruptions is attained with: a) permanently connected protective earth connection  $\geq 1.5$  mm<sup>2</sup> and b) a protective earth connection  $\geq 2.5$  mm<sup>2</sup> via connectors for industrial equipment (IEC 6030902)

4) KU = 6 with respect to interruptions is achieved for fixed-connection lines  $\geq 10$  mm<sup>2</sup> where the type of connection and installation correspond to the requirements for PEN conductors as specified in relevant standards.

**Filters for control and communication lines with HEMP-Protection**
**Symbols and terms**
**B84312CxxxxJ303**

Symbol	English	German
$dv/dt$	Rate of voltage rise	Spannungsanstiegsgeschwindigkeit
$f_R$	Rated frequency	Bemessungsfrequenz
$f_{Pass}$	Passband	
$I_{LK}$	Filter leakage current	Filter-Ableitstrom
$I_{reactive}$	Capacitive reactive current	Kapazitiver Blindstrom
$I_N$	Nominal current	Nennstrom
$I_R$	Rated current	Bemessungsstrom
$I_{over}$	Overcurrent	Überstrom
$P_D$	Power dissipation	Verlustleistung
$R_I$	Internal resistance	Innenwiderstand
$R_{DC}$	Maximum DC resistance	Max. Gleichstromwiderstand (Gleichspannung)
$T_A$	Ambient temperature	Umgebungstemperatur
$T_D$	Transverse delay time	
$T_R$	Rated temperature	Bemessungstemperatur
$THD_{max}$	Max. permissible harmonic distortion	
$V_{br}$	Breakdown voltage	
$V_{cl}$	Max. clamping voltage	
$V_N$	Nominal network voltage	Netzspannung
$V_{test}$	Test voltage	Prüfspannung
$V_R$	Rated voltage	Bemessungsspannung
$Z$	Impedance	Scheinwiderstand
$Z_L$	Line impedance	Leitungsimpedanz
$\alpha_e$	Insertion loss	Einfügungsdämpfung
$\Delta V$	Voltage drop	Spannungsabfall

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