



# Filters for Communication Lines

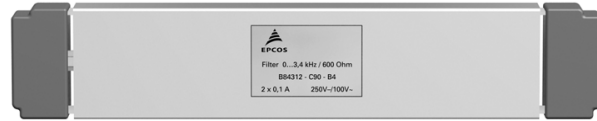
## Analog Systems and Control Lines

**Series/Type:**        **B84312**

Date: January 2004

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**Passband up to 300 kHz**  
**Stopband attenuation up to 40 GHz**



### Features

- Use of coaxial feed-through capacitors on input and output
- Single or current-balanced chokes depending on requirement
- Insertion loss to CISPR 17
- Also available with integrated EMP protection

### 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.

### Mechanical design

The electrical components are incorporated in an RF-tight case of tin-plated sheet steel. Filters are available for 2 or 20 lines and for upright or flat installation on shielding wall.

Model	Installation		Filter selection
B84312C	Upright	Space-saving solution for installing a number of different filters.	B84312C*B (2-line) B84312C*H (20-line)
B84312F	Flat	Low profile and thus advantage especially for just one or a few filters.	B84312F*B (2-line)

### Filter applications

The following standard filters are designed for the most common applications; customized models can be produced for differing requirements.

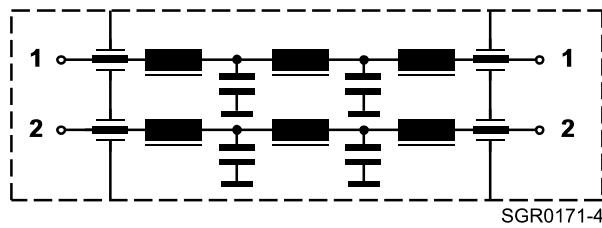
Passband	Z <sub>L</sub>	I <sub>R</sub>	Application	Circuit diagram	No. of lines	Series
kHz	Ω	A				B84312
DC ... 3.4	600	0.1	Standard filters for telephone systems	1	2 20	+0020B*** C0020H***
DC ... 3.4	600	0.1	Telephone systems for enhanced requirements (stopband attenuation of 100 dB above 10 kHz )	3	2 20	+0090B*** C0090H***
DC ... 50	600	0.1	Filters for telephone systems and modem cables, conditionally for control lines with critical signal rise times	1	2 20	+0040B*** C0040H***
DC ...120	150	0.1	Data signals with balanced signal transmission mode as used by modems or interfaces RS 485 up to 9600 Baud and/or RS 422 up to 19200 Baud	2	2 20	+0050B*** C0050H***
DC ... 300	150	0.1		2	2 20	+0060B*** C0060H***
DC ... 120	100	2	Smoke detectors with serial data transmission in bus systems and remote power feeding, temperature switches, 24 V emergency lighting, DC motors	2	2 20	+0050B*** C0050H***
–	–	3	24-V emergency lighting, DC motors, signal and control lines	2	2 20	+0050B*** C0050H***
–	–	1	Universal filters for signal and control lines with up to 1 A	1	2 20	+0030B*** C0030H***
–	–	1	Control lines with up to 1 A and enhanced attenuation requirements	3	2 20	+0100B*** C0100H***

+: C = upright installation, F = flat installation

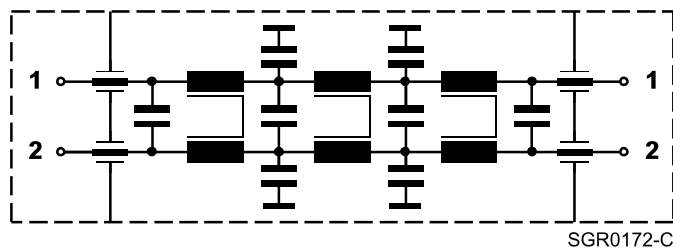
**Circuit diagrams**

The diagrams each show a circuit of a 2-line filter.  
In the series of 20-line filters there are 10 of them in each case.

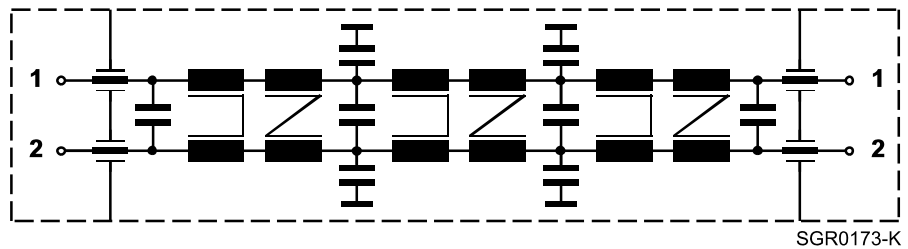
Circuit diagram 1



Circuit diagram 2



Circuit diagram 3



Note on circuit diagrams 2 and 3:

These filters are mounted with current-compensated chokes. Make sure that the forward and return line are routed paired through one filter.

**General technical data**

Rated voltage	$V_{R,AC}$	100	V	
Rated voltage	$V_{R,DC}$	100	V	
Rated frequency	$f_R$			Pass bandwidth at $Z_L$
Rated current	$I_R$	See characteristics		$T_A = 40\text{ °C}$
Line impedance	$Z_L$	See characteristics		
Test voltage	$V_{test}$	250 VDC, 2 s		Line/line
		250 VDC, 2 s		Line/case
Maximum DC resistance	$R_{max}$	See characteristics		Per line
Permissible ambient temperature	$T_A$	-25/+40	°C	
Climatic category (EN 60068-1)		25/085/56		-25 °C/+85 °C/56 days damp heat test
Weight		560	g	2-line filters
		4.5	kg	20-line filters
Mechanical version		C		Upright for 2- and 20-line filters
		F		Flat for 2-line filters

**Filters with EMP protection:**

Nominal DC spark-over voltage	$V_{sdCN}$	<500	V	Per line
Surge response voltage		<800	V	At 1 kV/ $\mu$ s
		<800	V	At 1 kV/ns
Nominal surge current (8/20 $\mu$ s)		5/10	kA	
Suppression condition		$I \leq I_R$		

**Maximum voltage on filter output for filters with EMP protection**

Series	B84312	...0020+1**	...0030+1**	...0040+1**	...0050+1**	...0060+1**
		...0090+1**	...0100+1**			

**Pulse shape in symmetrical circuit**

dv/dt = 0.1	kV/ $\mu$ s	2 V	360 V	8 V	3 V	12 V
dv/dt = 1	kV/ $\mu$ s	1 V	60 V	3 V	2 V	9 V
dv/dt = 1	kV/ns <sup>1)</sup>	0.5 V	2 V	0.5 V	0.5 V	1.2 V
Nominal surge current (8/20 $\mu$ s)		5 V	290 V	12 V	10 V	12 V

**Pulse shape in unsymmetrical circuit**

dv/dt = 0.1	kV/ $\mu$ s	50 V	700 V	250 V	120 V	280 V
dv/dt = 1	kV/ $\mu$ s	35 V	130 V	60 V	25 V	30 V
dv/dt = 1	kV/ns <sup>1)</sup>	1 V	5 V	3 V	1 V	1 V
Nominal surge current (8/20 $\mu$ s)		20 V	200 V	110 V	25 V	50 V

 1) Typical test pulse: rise time 10 ns, time to half value 1500 ns, charge voltage min. 50 kV, source impedance 90  $\Omega$

**Characteristics and ordering codes**

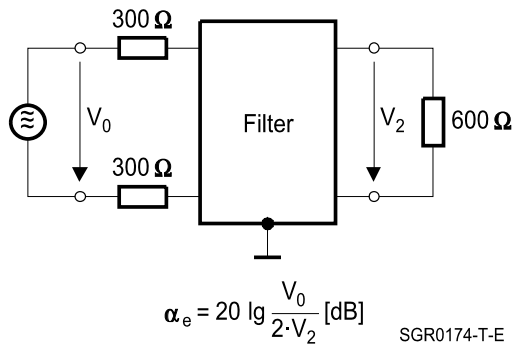
$I_R$	Pass bandwidth kHz	$Z_L$ $\Omega$	$R_{max}$ Per line $\Omega$	Circuit diagram	Number of lines	Ordering code
0.1	DC ... 3.4	600	11	1	2	B84312C0020B*03
0.1	DC ... 3.4	600	11	1	2	B84312F0020B*03
0.1	DC ... 3.4	600	11	1	20	B84312C0020H*03
1	— <sup>2)</sup>	<sup>3)</sup>	0.4	1	2	B84312C0030B*03
1	— <sup>2)</sup>	<sup>3)</sup>	0.4	1	2	B84312F0030B*03
1	— <sup>2)</sup>	<sup>3)</sup>	0.4	1	20	B84312C0030H*03
0.1	DC ... 50	600	1.1	1	2	B84312C0040B*01
0.1	DC ... 50	600	1.1	1	2	B84312F0040B*01
0.1	DC ... 50	600	1.1	1	20	B84312C0040H*01
0.1	DC ... 120	150	4.4	2	2	B84312C0050B*01
0.1	DC ... 120	150	4.4	2	2	B84312F0050B*01
0.1	DC ... 120	150	4.4	2	20	B84312C0050H*01
2	DC ... 120	100	0.4	2	2	B84312C0050B*21
2	DC ... 120	100	0.4	2	2	B84312F0050B*21
2	DC ... 120	100	0.4	2	20	B84312C0050H*21
3	— <sup>2)</sup>	<sup>3)</sup>	0.2	2	2	B84312C0050B*31
3	— <sup>2)</sup>	<sup>3)</sup>	0.2	2	2	B84312F0050B*31
3	— <sup>2)</sup>	<sup>3)</sup>	0.2	2	20	B84312C0050H*31
0.1	DC ... 300	150	1.0	2	2	B84312C0060B*01
0.1	DC ... 300	150	1.0	2	2	B84312F0060B*01
0.1	DC ... 3.4	600	17	3	2	B84312C0090B*04
0.1	DC ... 3.4	600	17	3	2	B84312F0090B*04
0.1	DC ... 3.4	600	17	3	20	B84312C0090H*04
1	— <sup>2)</sup>	<sup>3)</sup>	0.6	3	2	B84312C0100B*03
1	— <sup>2)</sup>	<sup>3)</sup>	0.6	3	2	B84312F0100B*03
1	— <sup>2)</sup>	<sup>3)</sup>	0.6	3	20	B84312C0100H*03

\*: 0 = Standard filters  
1 = Filters with EMP protection

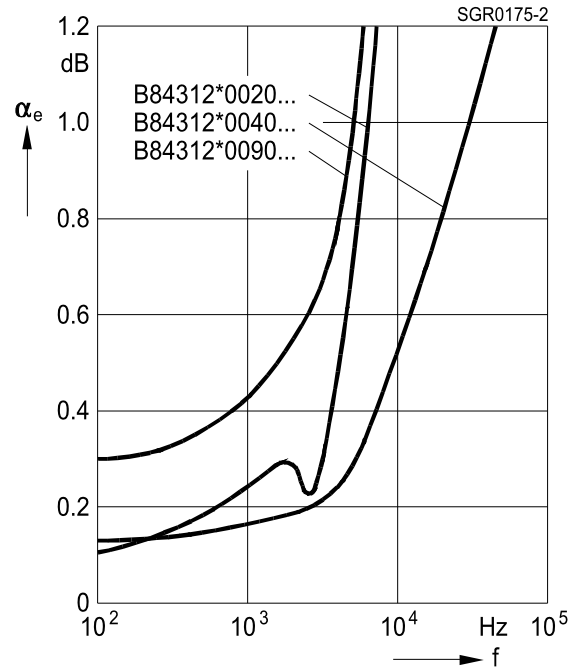
2) Control line filters, not matched  
3) Not specified

Insertion loss  $\alpha_e$  in passband (typical)

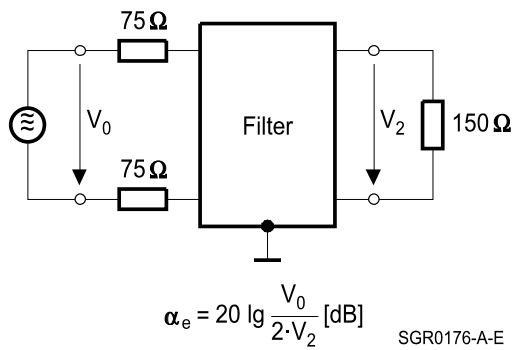
Measurement circuit



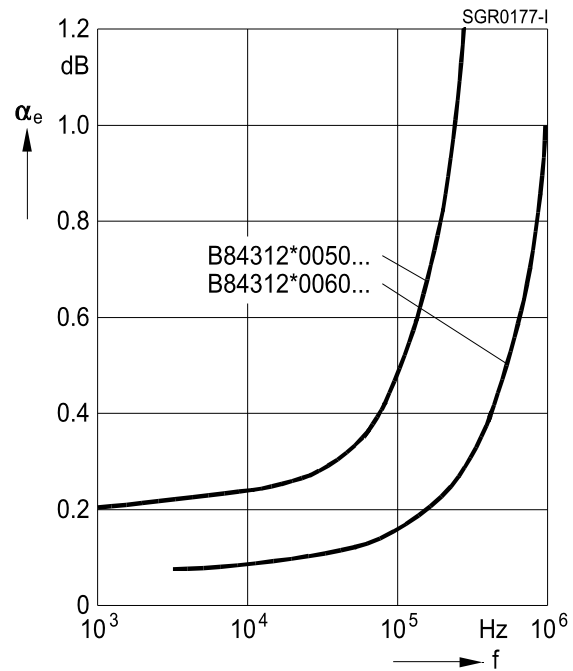
Symmetrical measurement circuit  
with  $Z_L = 600 \Omega$



Measurement circuit

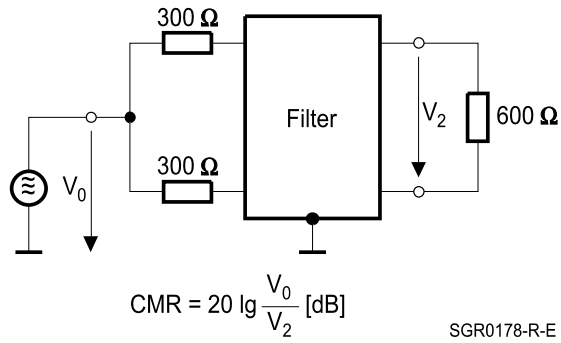


Symmetrical measurement circuit  
with  $Z_L = 150 \Omega$



**Unsymmetrical measurement (common-mode-rejection) in passband**

Measurement circuit



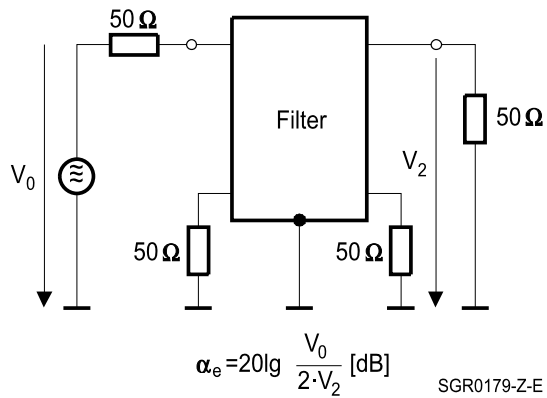
Filter with  $Z_L = 600 \Omega$

CMR >40 dB in passband



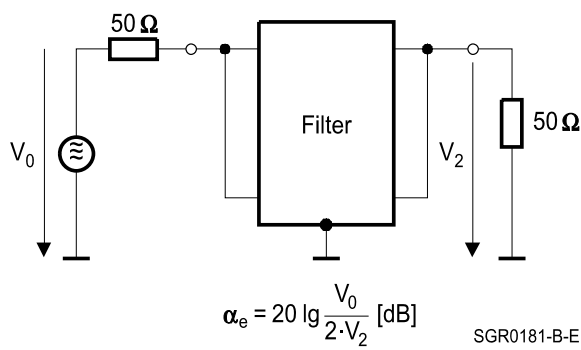
Insertion loss  $\alpha_e$  in stopband (typical)

Measurement circuit

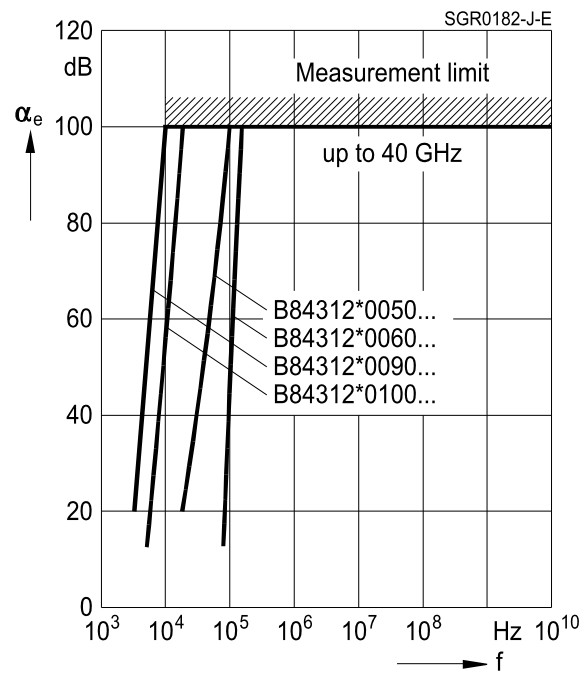
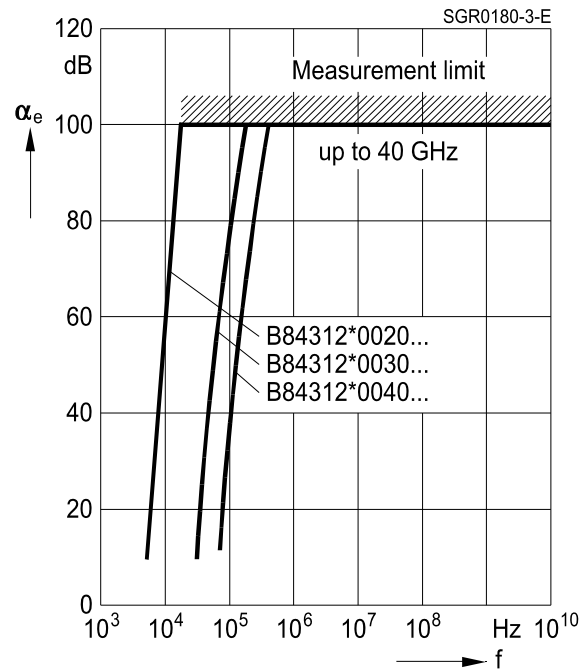


Unsymmetrical measurement circuit

Measurement circuit

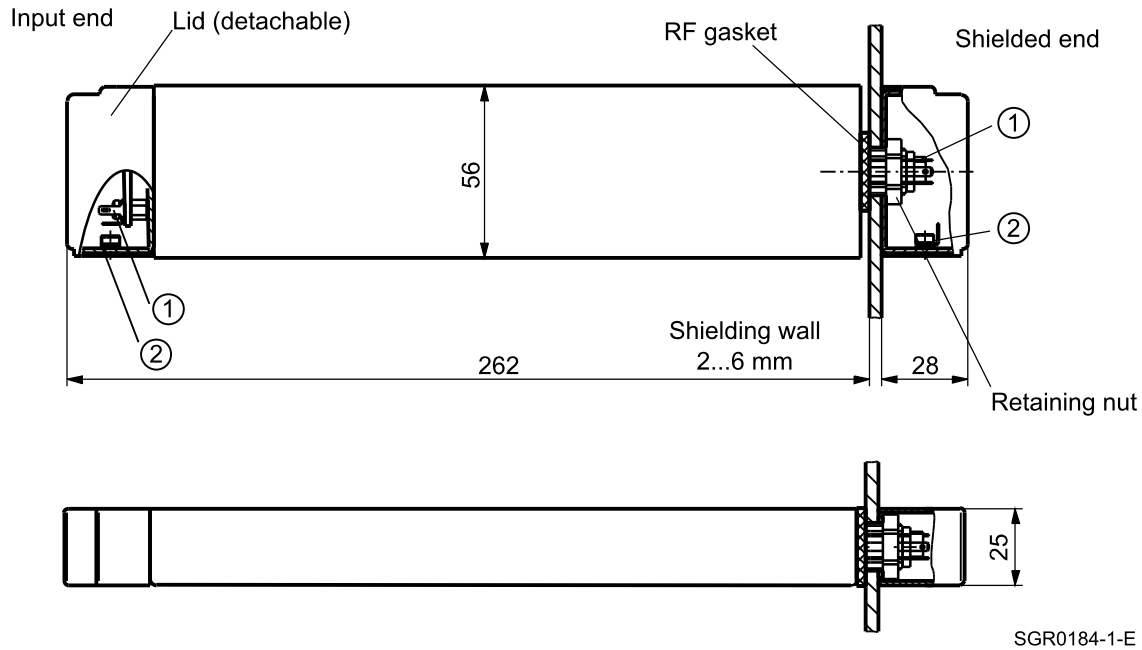


Asymmetrical measurement to MIL-STD-220A



**Dimensional drawings**

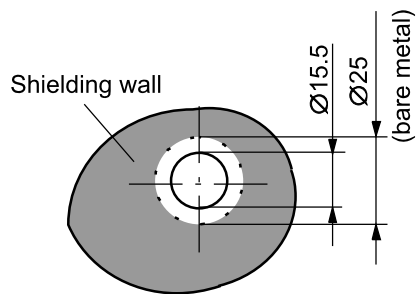
**2-line filters, upright installation**



SGR0184-1-E

- ① Line connections at both ends:  
2 x tab connectors for receptacle 2.8 x 0.5 (in accessory bag)
- ② Strain relief with ground connection for cable diameter 4.5 ... 6 mm

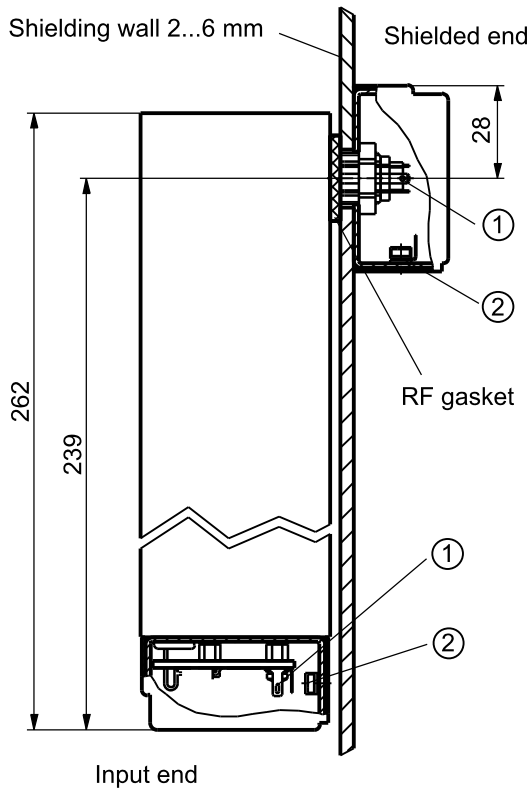
**Hole for installation in shielding wall**



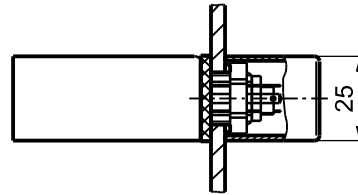
SGR0185-9-E

**2-line filters, flat installation**

**Side view**



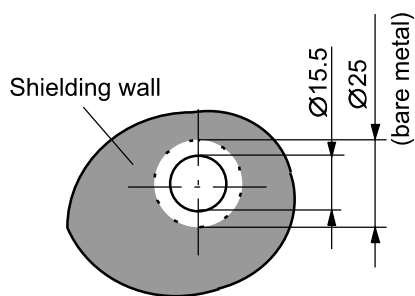
**Plan view**



SGR0186-H-E

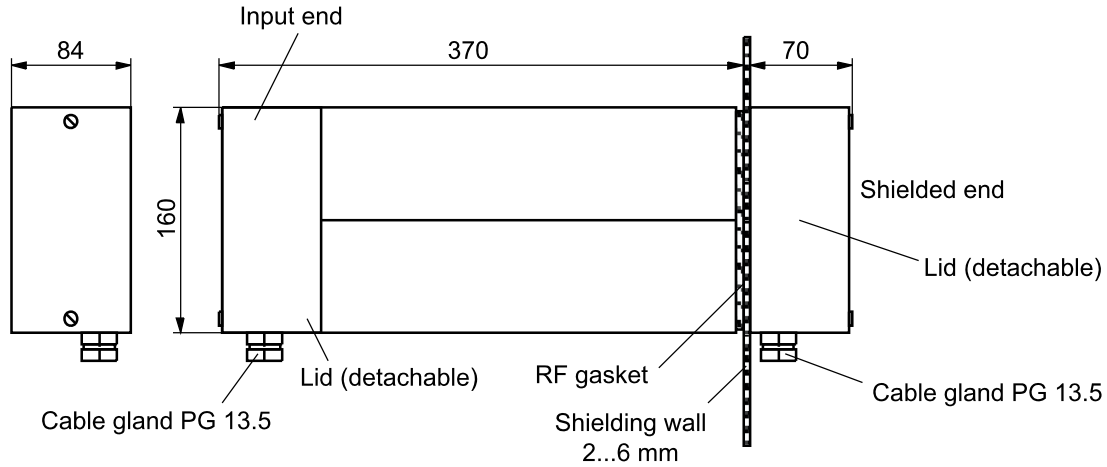
- ① Line connections at both ends:  
2 x tab connectors for receptacle 2.8 x 0.5 (in accessory bag)
- ② Strain relief with ground connection for cable diameter 4.5 ... 6 mm

**Hole for installation in shielding wall**



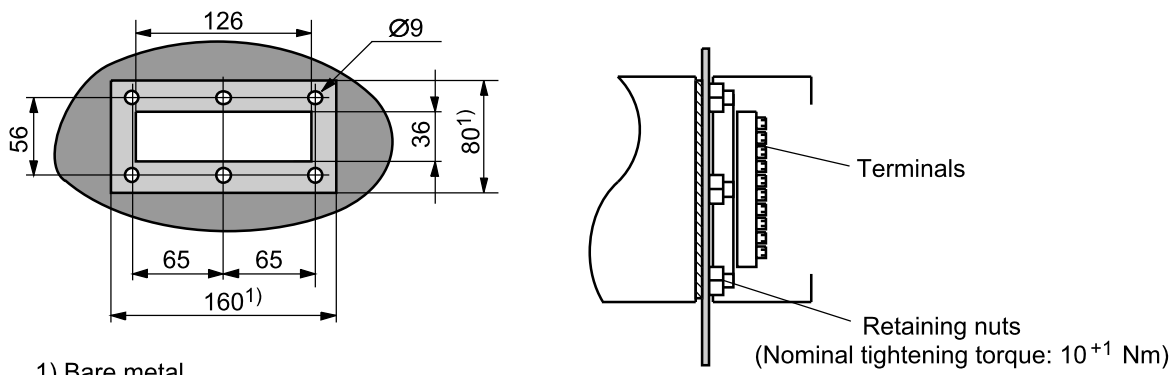
SGR0185-9-E

**20-line filters, upright installation**



SGR0187-Q-E

**Hole for installation in shielding wall**



1) Bare metal

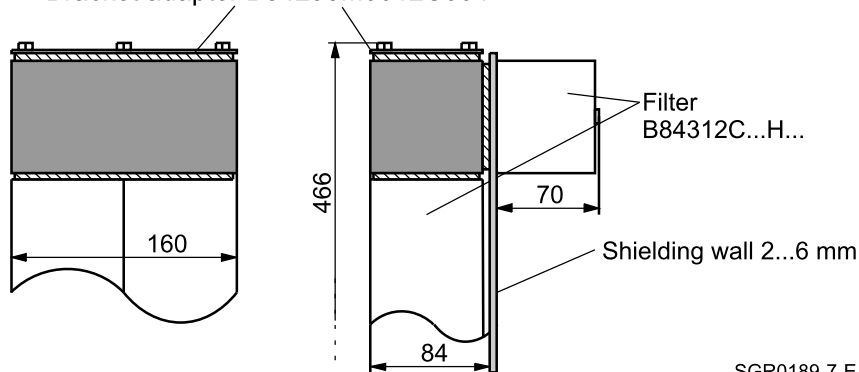
(Nominal tightening torque:  $10^{+1}$  Nm)  
SGR0188-Y-E

**Adapter**

A bracket adapter is available for flat installation on the shielding wall.

Ordering code: B84298M0012C004

Bracket adapter B84298M0012C004



SGR0189-7-E