

## DC-DC CONVERTER HFBC80-W/Ks, Ksl, Ksp

RAILWAY CONVERTER.

### FOR CHASSIS MOUNTING



### HIGHLIGHTS

- + Output Power up to 80 Watts\*
- + Efficiency up to 92 %
- + Ultra Wide Input Range
- + Wide Temperature Range
- + Hold-up-time > 10 ms
- + RoHS compliance
- + According to EN50155

### INPUT

<b>Input Voltage Nominal</b>	24, 36, 48, 72, 96 and 110 VDC
<b>Input Voltage Operating</b>	16,8 - 137,5 VDC
<b>Input Voltage Range</b>	14,4-154 VDC (t ≤ 1,0 sec.) (Class C1)
<b>No Load Input Current</b>	See table page 2

### OUTPUT

<b>Output Voltage</b>	12 V (other voltages on request)
<b>Initial Set Accuracy</b>	< 2 % (no load)
<b>Minimum Load</b>	No minimum load
<b>Short circuit</b>	Continuous short circuit proof
<b>Line Regulation</b>	< 0,5 %
<b>Load Regulation</b>	< 1 % (0 % - 100 % load),
<b>Ripple &amp; Noise</b>	< 2 % pk-pk, 20 MHz bandwidth
<b>Start Time</b>	< 500 ms
<b>Max. Output Capacitance</b>	2000 µF x I <sub>out nom</sub>
<b>Temperature Coefficient</b>	< 0.01 %/°C

### FEATURES

<b>Active Reserve Polarity Protection</b>	Max. 160 V
<b>Active Inrush Current Limitation</b>	Max. 8 A (at t > 100µs) < 0,1 A <sup>2</sup> s
<b>Hold-up-time</b>	> 10 ms at full load (Class S2)
<b>Enable</b>	See page 5
<b>Tracking</b>	See page 5
<b>Adjust</b>	See page 5
<b>Parallel Operation</b>	See page 5

### PROTECTION

<b>Over Voltage Protection (OVP)</b>	110 - 130 % V <sub>out nom</sub>
<b>Over Current Protection (OCP)</b>	See table page 2
<b>Over Temperature Protection (OTP)</b>	Shutdown at +105 - 110 °C PCB-temp. with about 5 °C hysteresis and auto recovery

### GENERAL

<b>Product Standard</b>	EN 50155:2017
<b>Isolation</b>	2200 VDC Input to Output 2200 VDC Input to Case (PE) 750 VDC Output to Case (PE)
<b>Pollution Degree</b>	PD2 according to EN 50124-1:2017
<b>Switching Frequency</b>	Typ. 120 kHz
<b>Dimensions [mm]</b>	113,5 x 35 x 46 see page 3
<b>Weight</b>	approx. 320 g
<b>MTBF / Useful Life</b>	TBD / L4 (20 years)
<b>Fire &amp; Smoke</b>	EN 45545-2:2020,HL-HL2-HL3 (R24, R25)

### ENVIRONMENTAL

<b>Operating Ambient Temp.</b>	-40 °C to +85 °C* (Class OT4 + ST1, ST2)
<b>Storage Temperature</b>	-55 °C to +100 °C
<b>Rapid Temperature Variation</b>	Class H1
<b>Altitude</b>	Up to 2000 m
<b>Vibration / Shock / Bump</b>	EN 61373:2010, Cat. 1B

### EMC

<b>EMC Standard</b>	EN 50121-3-2:2016
<b>Conducted Emissions</b>	EN 55011:2016+A1:2017, Class A**
<b>Radiated Emissions</b>	EN 55011:2016+A1:2017, Class A**
<b>ESD Immunity</b>	EN 61000-4-2:2009, level 3 (6 kV/8 kV), Criteria A
<b>Burst</b>	EN 61000-4-4:2012, level 3 (2 kV), Criteria A
<b>Surge</b>	EN 50121-3-2:2016, line to line ±1 kV, 42 R, line to case ±2 kV, 42 R, Criteria B EN 61000-4-5:2014,+A1:2017 line to line ±0,5 kV, line to case ±1 kV
<b>Conducted Immunity</b>	EN 61000-4-6:2014, level 3 (10 V), Criteria A
<b>Radiated Immunity</b>	EN 61000-4-3:2006+A1:2007+A2:2010, 20 V/m, Criteria A
<b>Safety Approvals</b>	Designed to meet IEC 62368-1:2014 + AC:2015

\* +70 °C continuously, +85 °C max. 10 minutes at full load (baseplate temp. must not exceed +90 °C).

\*\* In built-in condition the devices may show different EMC properties.

# TECHNICAL DATA

For  $T_{amb} = 25^{\circ}\text{C}$ ,  $V_{in\ nom}$ ,  $I_{out\ nom}$ , unless otherwise specified

## SPECIFICATION Input 14,4 - 154 VDC

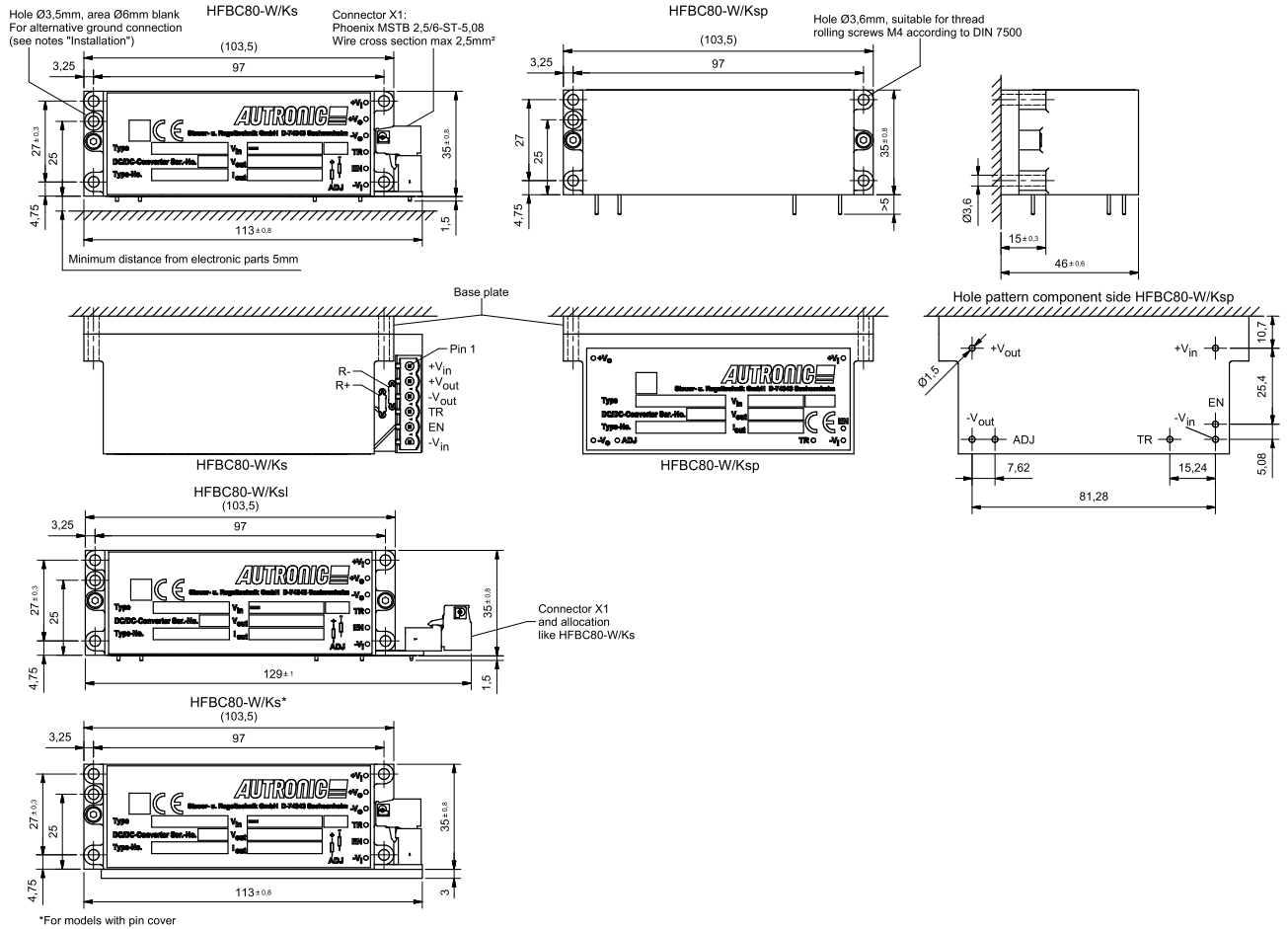
	TYPE		HFBC80-W/Ks	HFBC80-W/Ks (with pin cover)	HFBC80-W/Ksl	HFBC80-W/Ksp
	ORDER NUMBER		87 71 12 0222 6	87 71 12 0229 7	87 71 12 0223 1	87 71 12 0227 8
	CHARACTERISTIC	Unit				
INPUT	Input Voltage Nominal	V	24	36	48	110
	Input Voltage Range	V	14,4...36	21,6...51	28,8...67,2	43,2...101
	Under Voltage Turn-on	V	<14,3...16,8			
	Under Voltage Turn-off	V	<12,0...14,0 (14,4 V < $V_{in}$ < 16,8 V at $t > 1$ sec.)			
	Input Current @ Full Load	A	3,8	2,5	1,9	1,24
	Input Current @ No Load	A	0,07	0,05	0,04	0,03
	Recommended External Fuse	A	6,0 T			
OUTPUT	Output Voltage Nominal	V	12,0			
	Output Current Nominal	A	6,67			
	Output Power	W	80			
	Efficiency @ Full Load (typical)	%	87	88	89	90
	Output Current limit	A	7...9,5			
	Short Circuit Current (typical)	A	23 (pulse approx. 2Hz)			
	Transient Response 25 % / 75 % Load Step Recovery Time < 1 ms	mV	±200			

# TECHNICAL DATA

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## MECHANICAL DETAILS

1. Dimensions are in mm
2. Unless otherwise specified, general tolerances  $\pm 0,5$  are for values in brackets (XX)  
Values not in brackets are according to ISO-2768-1m



Coating: Lackwerke Peters ELPEGUARD SL 1307-FLZ/2

Resin compound: Polyurethane blue, UL94-V0, EN45545-2:2016-02 - HL3 (R24)

Production acc. to IPC-A-610 (exception bonding)

# TECHNICAL DATA

For  $T_{amb} = 25^{\circ}\text{C}$ ,  $V_{in\ nom}$ ,  $I_{out\ nom}$ , unless otherwise specified

## PINNING

Pin	Function
X1-1	+V <sub>in</sub>
X1-2	+V <sub>out</sub>
X1-3	-V <sub>out</sub>
X1-4	TR
X1-5	EN
X1-6	-V <sub>in</sub>

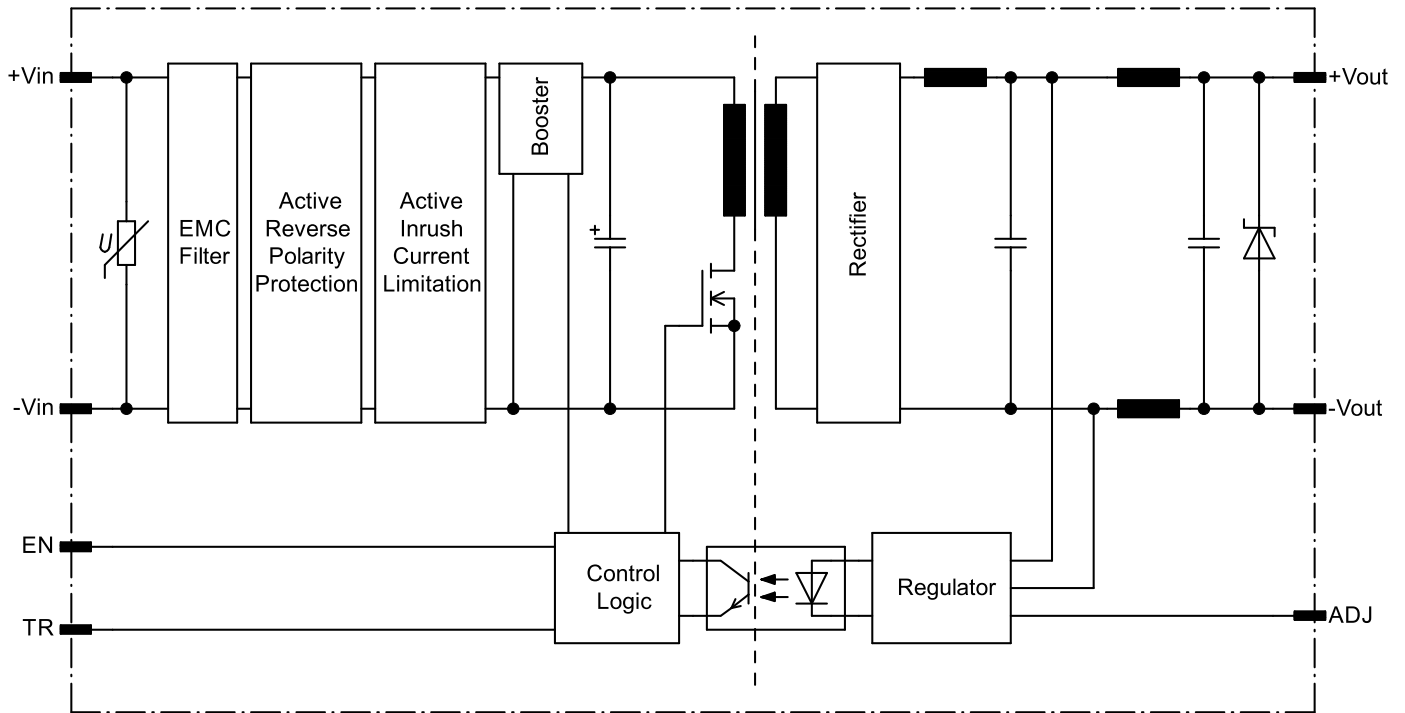
## NOTES

Installation instructions:

The converters have to be installed according to the guidelines currently in force, like other open electronic component assemblies. Attention must be paid to sufficient ventilation, carry off heat, fastening and protection against accidental contact. Plug in not under voltage. The mounting surface must be flat and able to remove the thermal energy of the baseplate (baseplate temperature must not exceed +90°C). The base plate has to be grounded by using thread rolling screws M4 according to DIN 7500. An alternative connection to protective earth can be realized by a special mounting hole, which is free of anodizing surface.

Fault protection: For input protection a time-lag fuse corresponding to IEC 60127-2 must be installed. For recommended rating of the fuse refer to specification table above. Pay attention on sufficient current source in case of short circuit. In some applications 2 fuses would be necessary, one in each input line.

## BLOCK DIAGRAM

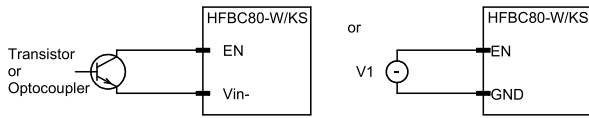


# DESCRIPTION OF FEATURES

## ENABLE SIGNAL

The module may be disabled by pulling EN low with respect to the –Input.

This may be done with an open collector transistor, relay, optocoupler or an external control voltage (V1).



Open-collector:  
Leakage current  $\leq 100 \mu\text{A}$   
Min.  $V_{\text{CEO}} \geq 20 \text{ V}$

V1:  
3,5...5 V (Enable active)  
0...0,8 V (Enable inactive)

When not in use, leave Enable pin not-connected.

## ADJUST

Inserting a wire to "R+" increases the output voltage of about 7 %. Intermediate values are obtained by means of a resistor. Adding a resistor for "R-" ensures that the output may be lowered by max. 10 %.

When not in use, leave Adjust pin not-connected.

## TRACKING

If the TR pins of two or more converters are connected together, the output voltages in case of short-circuit or overload go synchronously down.

The module may be disabled by pulling TR below 0,8 V with respect to the –Input.

This may be done with an open collector transistor, relay, optocoupler or an external control voltage (V1).

When not in use, leave Tracking pin not-connected.

## PARALLEL OPERATION

Up to three converters with up to 240 % load can be connected in parallel. The TR signals from every device have to be connected together.

Please contact Autronic for more details.

## CHANGE HISTORY

Revision	Date	Author	Modification
a00	2021-11-02	Eigner	First edition