

DC-DC CONVERTER HFBC100W/Ks,Ksl,Ksp

RAILWAY CONVERTER.

FOR CHASSIS MOUNTING



HIGHLIGHTS

- + Output Power up to 100 Watts
- + Efficiency up to 92 %
- + Ultra Wide Input Range
- + Wide Temperature Range
- + Hold-up-time >10 ms
- + RoHS compliance
- + According to EN50155

INPUT

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

OUTPUT

Output Voltage	12 V, 24 V (other voltages on request)
Initial Set Accuracy	<2 % (no load)
Minimum Load	No minimum load
Short circuit	Continuous short circuit proof
Line Regulation	<0,5 %
Load Regulation	<2 % (0 % - 100 % load),
Ripple & Noise	<1 % pk-pk, 20 MHz bandwidth
Start Time	<500 ms
Max. Output Capacitance	500 uF x I _{out max.} at high adjust : 150 uF max.
Temperature Coefficient	<0.01 %/°C

FEATURES

Active Reserve Polarity Protection	Max. 160 V
Active Inrush Current Limitation	Max. 20 A (at t >100us) <3 A²s
Hold-up-time	>10 ms at full load (Class S2)
Enable	See page 5
Tracking / Power Good	See page 5
Adjust	See page 5
Parallel Operation	See page 5

PROTECTION

Over Voltage Protection (OVP)	120 - 130 % V _{out nom}
Over Current Protection (OCP)	See table page 2
Over Temperature Protection (OTP)	Shutdown at +105 -110 °C PCB-temp. with about 5 °C hysteresis and auto recovery

GENERAL

Product Standard	EN 50155:2021
Isolation	2200 VDC Input to Output 2200 VDC Input to Case (PE) 750 VDC Output to Case (PE)
Pollution Degree	PD2 according to EN 50124-1:2017
Switching Frequency	Typ. 120 kHz
Dimensions [mm]	113,5 x 35 x 46 see page 3
Weight	approx. 320 g
MTBF / Useful Life	2.240.000 h acc. to MIL-HDBK-217F (GB, 25 °C) 568.000 h acc. to MIL-HDBK-217F (GF, 25 °C) L4 (20 years)
Fire & Smoke	EN 45545-2:2020, HL-HL2-HL3 (R24, R25)

ENVIRONMENTAL

Operating Ambient Temp.	-40 °C to +85 °C (Class OT6)**
Storage Temperature	-55 °C to +100 °C
Rapid Temperature Variation	Class H1
Altitude	Up to 5000 m
Vibration / Shock / Bump	EN 61373:2010, Cat. 1B

EMC

EMC Standard	EN 50121-3-2:2016
Conducted Emissions	EN 55011:2022-05, Class A*
Radiated Emissions	EN 55011:2022-05, Class A* EMV06 Rangierfunk 02 2019 Class S0
ESD Immunity	EN 61000-4-2:2009, level 3 (6 kV/8 kV), Criteria A
Burst	EN 61000-4-4:2012, level 3 (2 kV), Crit. A
Surge	EN 50121-3-2:2016, line to line ±1 kV, 42R, line to case ±2 kV, 42 R, Criteria A EN 61000-4-5:2014 +A1:2017 line to line ±0,5 kV, line to case ±1 kV, Criteria A
Conducted Immunity	EN 61000-4-6:2014, level 3 (10 V), Crit. A
Radiated Immunity	EN 61000-4-3:2020, 20 V/m, Criteria A
Safety Approvals	IEC 62368-1:2023

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

** baseplate temp. must not exceed +90 °C.

TECHNICAL DATA

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

SPECIFICATION Input 14,4 - 154 VDC

	TYPE		HFBC100-W/Ks		HFBC100-W/Ks (with pin cover)	HFBC100-W/Ksl		HFBC100-W/Ksp
	ORDER NUMBER		87 71 12 0322 8		87 71 12 0324 7			
	CHARACTERISTIC	Unit						
INPUT	Input Voltage Nominal	V	24	36	48	72	96	110
	Input Voltage Range	V	14,4...36	21,6...51	28,8...67,2	43,2...101	57,6...134,4	66...154
	Under Voltage Turn-on	V	14,5...16,0					
	Under Voltage Turn-off	V	12,0...14,0					
	Input Current @ Full Load	A	4,7	3,1	2,3	1,5	1,1	0,98
	Input Current @ No Load	A	0,18	0,12	0,09	0,06	0,05	0,04
	Input Current Disabled Mode	mA	0,5	0,5	0,5	0,6	0,6	0,6
	Recommended External Fuse	A	8,0 T					
OUTPUT	Output Voltage Nominal	V	12					
	Output Current Nominal	A	8,3					
	Output Power	W	100					
	Efficiency @ Full Load (typical)	%	88	90	90	91	91	92
	Output Current limit	A	8,5...11					
	Short Circuit Current (typical)	A	25 (pulse approx. 2Hz)*					
	Transient Response 25 % / 75 % Load Step Recovery Time < 1 ms	mV	±250					

SPECIFICATION Input 14,4 - 154 VDC

	TYPE		HFBC100-W/Ks		HFBC100-W/Ks (with pin cover)	HFBC100-W/Ksl		HFBC100-W/Ksp
	ORDER NUMBER		01 58 02 0011 4 / 87 71 24 0322 4		87 71 24 0324 3			87 71 24 0327 6
	CHARACTERISTIC	Unit						
INPUT	Input Voltage Nominal	V	24	36	48	72	96	110
	Input Voltage Range	V	14,4...36	21,6...51	28,8...67,2	43,2...101	57,6...134,4	66...154
	Under Voltage Turn-on	V	14,5...16,0					
	Under Voltage Turn-off	V	12,0...14,0					
	Input Current @ Full Load	A	4,7	3,1	2,3	1,5	1,1	0,99
	Input Current @ No Load	A	0,09	0,06	0,04	0,03	0,02	0,02
	Input Current Disabled Mode	mA	0,5	0,5	0,5	0,6	0,6	0,6
	Recommended External Fuse	A	8,0 T					
OUTPUT	Output Voltage Nominal	V	24					
	Output Current Nominal	A	4,2					
	Output Power	W	100					
	Efficiency @ Full Load (typical)	%	88	90	90	90	91	92
	Output Current limit	A	4,3...5,5					
	Short Circuit Current (typical)	A	21 (pulse approx. 2Hz)*					
	Transient Response 25 % / 75 % Load Step Recovery Time < 1 ms	mV	±250					

* Pulsating current time duration 70 ms

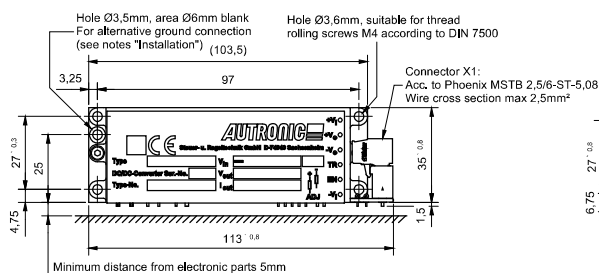
TECHNICAL DATA

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

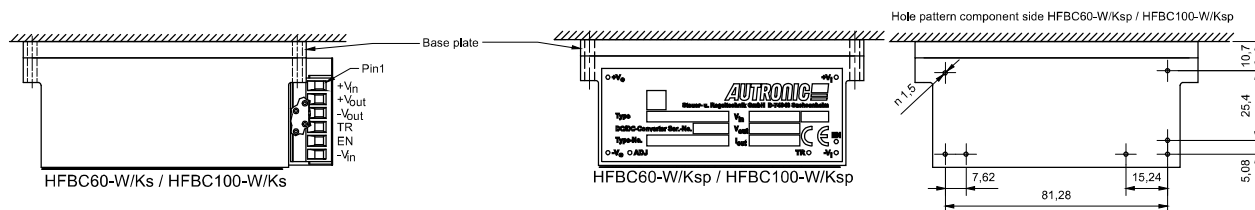
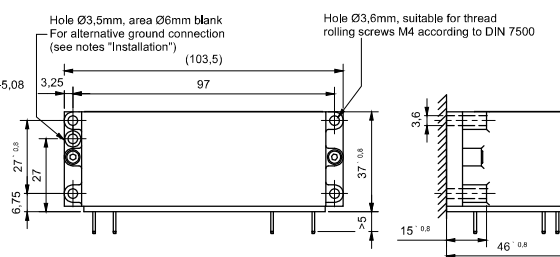
MECHANICAL DETAILS

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

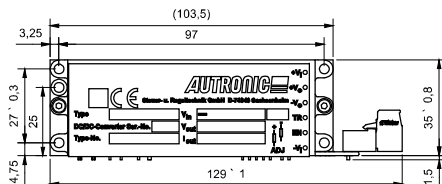
HFBC60-W/Ks / HFBC100-W/Ks



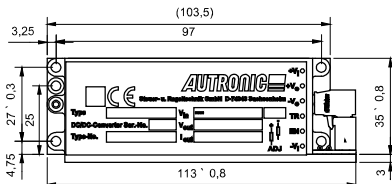
HFBC60-W/Ksp / HFBC100-W/Ksp



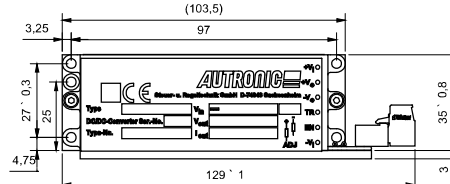
HFBC60-W/Ksl / HFBC100-W/Ksl



HFBC60-W/Ks* / HFBC100-W/Ks*



HFBC60-W/Ksl* / HFBC100-W/Ksl*



* For models with pin cover

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), coating may show differences to requirements

Protection degree: IP00

TECHNICAL DATA

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

PINNING

Pin	Function
X1-1	$+V_{in}$
X1-2	$+V_{out}$
X1-3	$-V_{out}$
X1-4	TR / PG
X1-5	EN
X1-6	$-V_{in}$

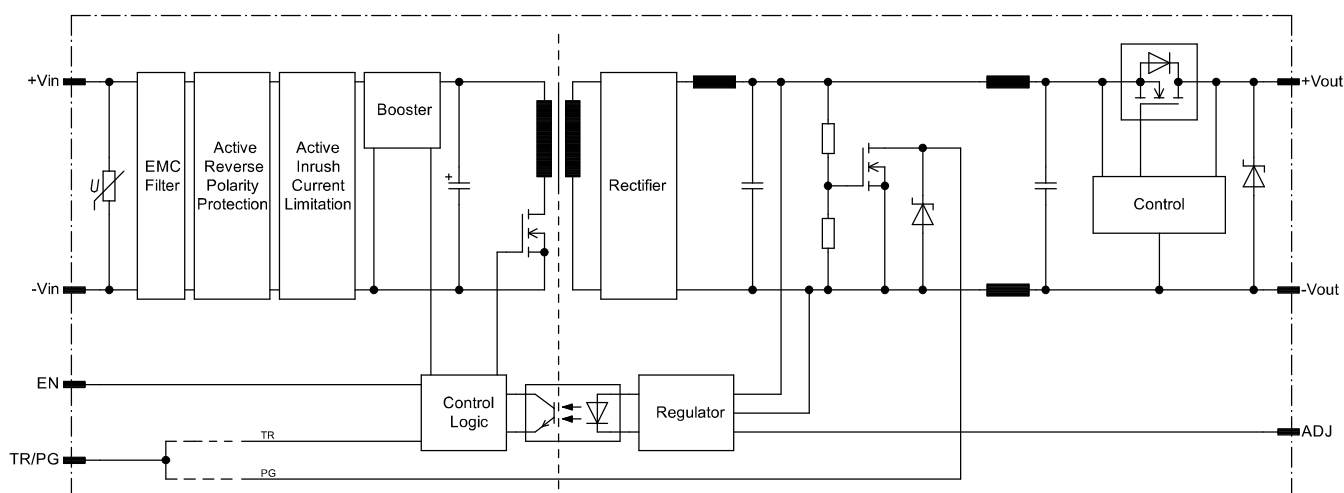
NOTES

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 $+90\text{ °C}$). The base plate has to be grounded and the converter has to be mounted 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

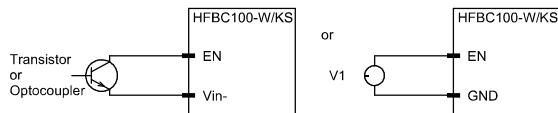


APPLICATION NOTES

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 $\leq 600 \mu\text{A}$

Min. $V_{\text{CEO}} \geq 20 \text{ V}$

V1:

3,5...10 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 16 %. Intermediate values are obtained by means of a resistor. Adding a resistor for "R-" ensures that the output may be lowered by max. 18 %.

When not in use, leave Adjust 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.

TRACKING / POWER GOOD

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.

There are also versions available with an ideal-diode output circuit for redundancy operation. For these versions the TR / PG pin is used for power good indication. It is an active low open collector output with respect to -Vout. The signal becomes active when the internal connected converter output voltage is above 80 % of $V_{\text{out nom}}$.

CHANGE HISTORY

Revision	Date	Author	Modification
a00	2024-12-02	Eigner	First edition
a01	2025-07-15	Eigner	Mechanical drawing
a02	2026-05-19	Eigner	Updated safety approval, added variants, mechanical drawing