

# INSTALLATION INSTRUCTION

## HP Series

### 120 - 192 Watt 10:1 DC-DC Converters

#### OPERATION RANGE

Refer to product rating label for input and output ratings.

#### INSTALLATION

Connection to the system shall be made via the female connector H15 (standard); see Accessories datasheet: [Cassette Style Mating Connectors \(BCD20022\)](#). Other installation methods may not meet the safety requirements. Check for hazardous voltages before altering any connection. Pin no. 26 (PE) is a leading pin and is reliably connected to the case. For safety reasons it is essential to connect this pin to the protective earth.

No fuse is incorporated in the converter. An external circuit breaker or a fuse in the wiring to one or both input pins  $V_{i+}$ ,  $V_{i-}$  (pin no. 30 and/or pin no. 32) are necessary to ensure compliance with local requirements.

##### Notes:

- Do not open the converters, or warranty will be invalidated.
- PUL (programmable input undervoltage lockout – pin no.28) – utilize of function PUL according to the [Product datasheet](#)
- The outputs of units can be connected in parallel with outputs of other units with equal nominal output voltage - at compliance condition of parallel-connecting of units according to the [Product datasheet](#).
- Any output of unit can be connected in series with any other outputs. The maximum output current of series-connected outputs is limited by the output with the lowest current limit.
- If a tracking output (output  $V_{o4}$  or  $V_{o3}$ ) is not used, connect it in parallel to the respective regulated main output (output  $V_{o4}$  parallel to the output  $V_{o1}$ , or output  $V_{o3}$  parallel to the output  $V_{o2}$ ).

For more details view the [Product datasheet](#) / Accessories datasheets (application notes) at [belfuse.com/power-solutions](http://belfuse.com/power-solutions) and go to the respective Product or family part number listing.

#### PROTECTION DEGREE AND CLEANING LIQUIDS

The all DC-DC convertors except convertors with V option correspond to protection degree IP40, provided the female connector is fitted to the converter. Since the converters are not hermetically sealed. In order to avoid possible damage, any penetration of liquids shall be avoided. Convertors with V option correspond to protection degree IP20.

#### SENSE LINES

Important: Sense lines should be connected! Incorrectly connected sense lines may activate the overvoltage protection resulting in a permanent short-circuit of the output.

For more details view the [Product datasheet](#) / Accessories datasheets (application notes) at [belfuse.com/power-solutions](http://belfuse.com/power-solutions) and go to the respective Product or family part number listing.

#### CAUTIONS

The converters are components, intended exclusively for inclusion within other equipment by an industrial assembly process or by a professionally competent person. Installation must strictly follow the national safety regulations in respect of the enclosure, mounting, creepage, distances, clearances, markings and segregation requirements of the end-use application.

This is a Class A product. In a residential environment this product may cause radio interference in which case the user may be required to take adequate measures.

#### SAFETY OF OPERATOR-ACCESSIBLE OUTPUT CIRCUITS

If the output circuit of a DC-DC converter is operator accessible, it shall be an SELV circuit according to the IEC 60950-1 related safety standards. It is the sole responsibility of the installer to ensure the compliance with the relevant and applicable safety regulations.

If several outputs are connected in series, the resulting voltage may exceed the SELV level and require additional safety measures in order to comply with international safety standards.

## ISOLATION AND PROTECTIVE EARTHING

Pin no. 26 (⊕) is connected with the case. For safety reasons it is essential to connect this pin reliably to protective earth.

The electric strength test is performed in the factory as routine test in accordance with EN 50514 and IEC/EN 60950. The company will not honor any warranty claims resulting from incorrectly executed electric strength tests. The resistance between earth connection and case (<0.1 Ω) is tested as well.

## FUSING

Reverse polarity protection is provided by antiparallel diodes across the input, causing the external circuit breaker or fuse to trip. A suppressor diode protects against voltage spikes  $V_{\text{laps}}$ . The converter is designed for an extremely wide input voltage range, allowing for connection to all common railway batteries. No fuse is incorporated in the converter. Consequently, an external circuit breaker or fuse at system level should be installed to protect against severe defects.

*PUL specification (typ.) and recommended external fuse depending on the nom. battery voltage*

Battery	$V_{\text{imin}}$ (on/off)	unit without „U” and „V” option $R_{\text{PUL}}$ - connected between pins 28 - 32	unit with “U” option	unit with “V” option - position rotary switch	Fuse recommended
24 V	14.9 V / 12.5 V <sup>4</sup>	∞	U14	A	25 A fast, Littlefuse 314 <sup>1</sup>
36 V	21.3 V / 17 V	75 kΩ	U21	B	16 A fast, Schurter SP <sup>2</sup>
48 V	25.4 V / 20.2 V	47 kΩ	-	-	12.5 A fast, Schurter SP <sup>2</sup>
72 V	43 V / 34 V	6.9 kΩ	U42	C	8 A fast, Schurter SP <sup>2</sup>
96 V	59.5 V / 48 V	10 kΩ	-	-	8 A fast, Schurter SP <sup>2</sup>
110 V	71 V / 56 V	7.5 kΩ	U70	D <sup>5</sup>	6.3 A slow, BEL fuse MRT <sup>3</sup>
all		< 100 Ω - unit disabled	connected PUL to $V_{\text{i}}$ - unit enabled		-

<sup>1</sup> size 6.3 x 32 mm

<sup>2</sup> size 5 x 20 mm

<sup>3</sup> 8.35 x 7.7 mm

<sup>4</sup> for  $\leq 2$  s

<sup>5</sup> factory setting

**Note:** An internal  $R_{\text{PUL}}$  is fitted in models with options U or V in order to provide compatibility with the converter series BP - EP.

## SERVICING

The product(s) must be returned to the Authorized Bel Service Center for repair with a pre-assigned RMA number

## LIMITED WARRANTY

For all models the company warrants each power supply of its manufacture for a period of five years from the date of original shipment. This warranty applies to defects in materials and workmanship that result in non-performance to published specifications. The product(s) must be returned to the Authorized Service Center for repair with a pre-assigned RMA number.

The company assumes no liabilities for consequential damages of any kind through the use or misuse of its products by any user. No other obligations are expressed or implied.

Please note that the specifications, terms, and conditions stated are subject to change without notice.

## INPUT AND OUTPUT CONNECTOR DETAILS

Refer to the [Product datasheet](http://belfuse.com/power-solutions) at [belfuse.com/power-solutions](http://belfuse.com/power-solutions).

## MECHANICAL DIMENSIONS AND MOUNTING REQUIREMENTS

Refer to the [Product datasheet](http://belfuse.com/power-solutions) at [belfuse.com/power-solutions](http://belfuse.com/power-solutions).

## ALLOWED MOUNTING POSITION

Make sure that there is sufficient airflow available for convection cooling. This should be verified by measuring the case temperature  $T_{\text{c}}$  at the specified measuring point, when the converter is operated in the end-use application:  $T_{\text{cmax}}$  should not be exceeded. Ensure that a failure of the converter does not result in a hazardous condition; See Thermal Considerations in the datasheet at [belfuse.com/power-solutions](http://belfuse.com/power-solutions).

## NUCLEAR AND MEDICAL APPLICATIONS

These products are not designed or intended for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems.

## TECHNICAL REVISIONS

The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.



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