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IDC-100 USER MANUAL

DESCRIPTION, FEATURES & APPLICATIONS

IDC-100 is an Isolated DC-DC Converter series covering wide range of DC input voltages of 12V/24V/48V and outputs of 12V/24V. Design features include:

- Advanced Switch Mode Technology with fixed frequency PWM control for optimum efficiency and reliability and compact size
- Galvanic isolation between input and output sides with following benefits:
 - Noise on the input side is isolated from the output side for noise sensitive loads like radios, instrumentation, data processing etc.
 - Converts Positive voltage to Negative voltage with respect to common, non-insulated ground. For example, IDC-100C-12 can convert - 48VDC of telecom supply to +12VDC supply
 - Can be used to create either Negative isolated or Positive isolated Rail using single unit or dual Positive and Negative isolated Rails using 2 units in series.
- Protections against short circuit/overload, input over voltage/transients, output over voltage, over heating and reverse polarity;
- Compliance with European EMI/EMC and Automotive Standards

Applications include noise sensitive loads like radios, instrumentation and data processing for isolated input and output grounds and telecom, tractor trailers, buses, forklifts, heavy machinery, locomotive/railroad, marine and aviation for non-isolated, common input and output ground.

INSTALLATION & OPERATION

WARNING! This unit is NOT a Battery Charger. Please do not use to charge a battery.

General Installation Requirements

- The unit is cooled by convection. Install the unit in a cool, dry and well ventilated space. Do not block fan vent openings on the sides.
- Do not install the unit inside engine compartment.
- Do not connect/disconnect input and output connections when live voltages are present.

For more information on input / output grounding e.g. installation on Positive Grounding System, refer to www.samlexamerica.com under: Support → Application Notes → DC-DC Converters – Input and Output Grounding.

Fusing on the Input & Output Sides

The input side of the unit will be connected to the battery. A battery has the capacity to supply very large currents. In case there is a short circuit between the input side wiring, very heavy current will flow and will burn/melt the wiring and may be a fire hazard. To prevent this, use a suitable fast blow fuse (see Table 1) in line with the Positive input wire within 7" from the battery Positive terminal. The output side should be connected through a suitable fuse in line with the "Output +" terminal (see Table 2).

WARNING! The Warranty will be voided if proper fuse is not used as recommended.

Switching ON & Switching OFF Arrangement on the Input Side

There is no ON/OFF switch on the input side of the unit. An external ON/OFF switch may be used in series with the Positive input wire, if required.

Sizing of Input and Output Wiring

In order to prevent excessive voltage drop and consequent loss of current capacity and efficiency, use proper size of input and output wires. Please note that as the current/length of wiring are increased, the thickness of the wiring will also be required to be increased. The thickness of wires and cables is normally expressed in AWG (American Wire Gauge). Also, note that a lower AWG number denotes a thicker wire. Use multi-stranded copper insulated wiring rated for at least 90°C/194°F. Please refer to details of input/output wire sizes (Tables 1 and 2).

Type of Input and Output Connections

The unit has a terminal block with 4 male, quick connect flat blade type terminals (6.3 mm / ¼ in) for quick connection/disconnection (see Fig 2). Two blades are for input (Marked "Input +" and "Input -") and two are for output (Marked "Output -" and "Output +"). The wiring for connection to the terminals should be terminated with the corresponding female quick connect terminals meant for the above male 6.3 mm / ¼ in flat blade type terminal.

Making Input & Output Connections & Operation

CAUTION! Please ensure that the polarity of the input connection is not reversed. Connect the Positive of the battery to the Positive terminal and the Negative of the battery to the Negative. In case the input polarity is reversed, the unit will be damaged and **will not be covered under Warranty**.

- Input and output connections should not be made when live voltages are present.
- Switch OFF the load that is required to be powered from the converter.
- Connect the output wires to the load and then to the output side of the unit through the external fuse. **OBSERVE CORRECT POLARITY.**
- Switch OFF the external inline input side switch (if used) and also remove the external inline fuse in the Positive input wire.
- Connect the input side wires to the converter's input side first. **OBSERVE CORRECT POLARITY.**
- Connect the input wires to the battery.
- Insert the external inline input side fuse in the Positive input wire. **NOTE:** If an ON/OFF switch is not used in series with the Positive input wire or if a switch has been used and has not been switched OFF, a spark may be observed when inserting the fuse due to the initial inrush current to charge the input side capacitors inside the converter.
- Switch on the input power to the unit (if an external switch has been used). Output voltage will now be available on the output side of the unit.
- Switch ON the load.

Protections

Overload/Short Circuit: Overloading beyond the maximum output current value (8A for IDC-100x-12 and 4A for IDC-100x-24) will produce voltage drop on the output side. The output will recover automatically once the overload condition is removed. Under short circuit conditions on the output side, the voltage will drop to a very low value, output current will rise beyond the rated value and external fuse will blow if short circuit condition persists for longer duration. There is automatic reset if the short circuit condition is removed before the fuse blows.

Reverse Polarity / Over Voltage on the Output Side: In case of (i) overvoltage on the outside (18V for 12V and 30V for 24V) or (ii) reverse polarity on the output side, internal Zener Diode across the output terminals will conduct and blow the external fuse on the output side.

Over Voltage/Transients on the Input Side: A Metal Oxide Varistor (MOV) across the input terminals provides protection against high voltage transients by blowing the input side fuse. **NOTE:** This protection is not available in IDC-100C / IDC-100D.

Reversal Of Polarity on the Input Side Connection: IDC-100A / IDC-100B: In case of reversal on input side polarity, internal diode connected across the input terminals will conduct and will blow the input side fuse. **IDC-100C / IDC-100D:** Internal diode in series with the Positive input line will block Negative input voltage.

Cooling: The unit is cooled by convection (there is no internal cooling fan). Ensure that the unit is located in an open area with availability of cool air changes for adequate cooling by convection.

Over Temperature: In case of higher ambient temperature or blockage of fan suction / exhaust openings, the temperature of the internal hot spot may rise beyond permissible limits. At >70°C, the output voltage will start dropping to reduce the output current. If the temperature still continues to rise, the output will be shut down at 80°C. The unit will reset automatically when the unit cools down to 70°C.

Output Current De-rating at Ambient Temperature > +30°C: The unit is designed to provide the full rated output current up to ambient temperature of +30°C. The output current will be required to be reduced (de-rated) linearly from the full rated Amps at +30°C to 0 Amps at +70°C.

For example, IDC-100A-12 will provide full rated current of 8A till +30°C. The load current should be linearly reduced to 0A at +70°C (At +70°C, over temperature protection will be initiated and the output voltage will drop). This means that the output current capacity should be reduced linearly at the rate of 0.2A/°C for every 1°C rise higher than +30°C. At say +50°C, the maximum permissible output current should be reduced to 4A [8A – {(50C – 30C) x 0.2A /°C}].

SPECIFICATIONS

MODEL NO.	INPUT VOLTAGE RANGE (VDC)	MAX INPUT CURRENT (A)	OUTPUT VOLTAGE (VDC)	OUTPUT CURRENT (A)
IDC-100A-12	9 - 18	<15	12.5	8
IDC-100B-12	20 - 35	<7.5	12.5	8
IDC-100C-12	30 - 60	<5	12.5	8
IDC-100D-12	60 - 120	<2.5	12.5	8
IDC-100A-24	9 - 18	<15	24.5	4
IDC-100B-24	20 - 35	<7.5	24.5	4
IDC-100C-24	30 - 60	<5	24.5	4
IDC-100D-24	60 - 120	<2.5	24.5	4
NO LOAD CURRENT DRAW		< 25 mA		
INPUT TO OUTPUT ISOLATION		Yes. > 400V RMS		
OUTPUT RIPPLE & NOISE		< 50 mV RMS		
PEAK EFFICIENCY		85%		
COOLING		By convection		
OPERATING TEMPERATURE AND DE-RATING		-20 to +30°C / -4°F to 86°F (De-rate linearly to zero at 70°C / 158°F)		
HUMIDITY, NON-CONDENSING		Max 95%		
PROTECTIONS		Overload / short circuit on the output side; Over voltage on the output side; Over voltage / transients on the input side; Reverse polarity on the input side; Over heating		
SAFETY AND EMC STANDARDS		EN55014-1 EN55014-2 AUTOMOTIVE DIRECTIVE UN Regulation ECE R10-4		
INPUT / OUTPUT CONNECTIONS		Quick Connect ; Male, 6.3 mm / 1/4" flat blade		
DIMENSIONS (W x D x H)		88.0 x 150.4 x 50 mm / 3.5 x 5.9 x 1.9 in		
WEIGHT		0.5 Kg / 1.2 lb		

NOTE: Specifications are subject to change without notice

TABLE 1.
EXTERNAL INPUT SIDE FUSE & WIRING

MODEL NAME	FUSE SPECS	WIRE SIZE (Up to 6 Ft From Battery) (SEE NOTE 1 BELOW)
IDC-100A-12, 24	32 VDC, 15A	AWG#12
IDC-100B-12, 24, 48	58 VDC, 7.5A	AWG#18
IDC-100C-12, 24, 48	80 VDC, 5A	AWG#22
IDC-100D-12, 24	125 VDC, 2.5A	AWG#28

TABLE 2.
EXTERNAL OUTPUT SIDE FUSE & WIRING

MODEL NAME	FUSE SPECS	WIRE SIZE (Up to 6 Ft From Battery) (SEE NOTE 1 BELOW)
IDC-100A-12	32V, 10A	AWG#14
IDC-100B-12	32V, 10A	AWG#14
IDC-100C-12	32V, 10A	AWG#14
IDC-100D-12	32V, 10A	AWG#14
IDC-100A-24	32V, 4A	AWG#20
IDC-100B-24	32V, 4A	AWG#20
IDC-100C-24	32V, 4A	AWG#20
IDC-100D-24	32V, 4A	AWG#20

NOTES FOR TABLE 1 AND 2:

- Wire sizes shown are based on 90°C / 194°F wire temperature rating and 2% voltage drop over distance of up to 6' from battery or load for current = Amp rating of the fuse.
- For distances > 6', use thicker wires to limit voltage drop to <2% for current = Amp rating of the fuse.

TERMINATION OF CONNECTING WIRES:

- Use 6.3mm / 1/4" "Quick Connect", Female mating terminal on the connecting wiring. This type of terminal is available for maximum wire size of AWG #10.

DIMENSIONS & LAYOUT

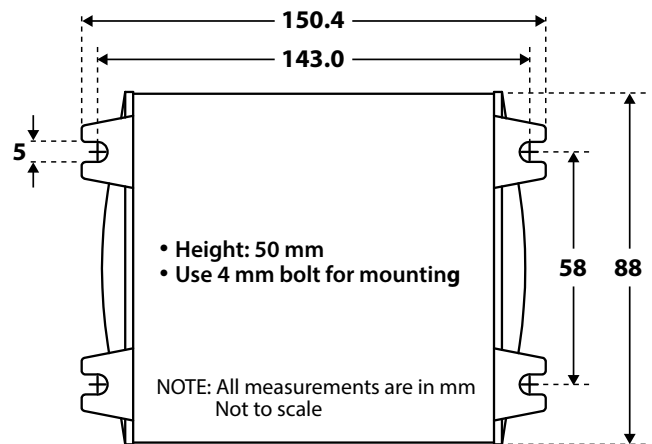


Fig 1. Dimensions (Bottom View)

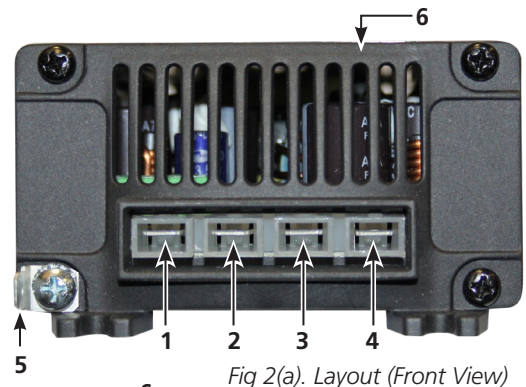


Fig 2(a). Layout (Front View)

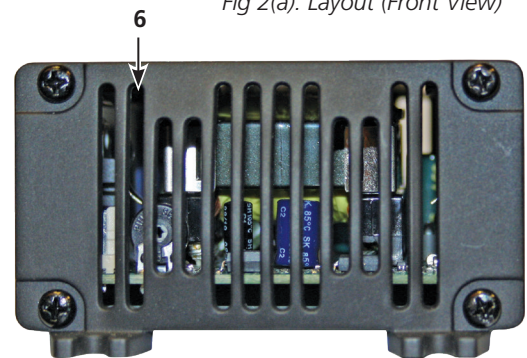


Fig 2(b). Layout (Back View)

LEGEND [For Figs. 2(a) and 2(b)]

- | | |
|----------------------|---|
| 1. Input + Terminal | } • Quick Connect Male Terminals
• 6.3 mm / 0.25" flat blade |
| 2. Input - Terminal | |
| 3. Output - Terminal | |
| 4. Output + Terminal | |
| 5. Chassis Ground | |
| 6. Ventilation slots | |

When using wires thicker than AWG #10, you may terminate the wire as follows:

- Use 6.3mm / 1/4" "Quick Connect" Female mating connector (AWG #10 size)
- Use around 2" piece of AWG #10 wire and crimp the connector to one end Solder / splice the other end of AWG #10 wire to wire the thicker wire

Use of short length of 2" of smaller AWG #10 wire will not increase voltage drop appreciably.

2 YEAR LIMITED WARRANTY

IDC-100 manufactured by Samlex America, Inc. (the “Warrantor”) is warranted to be free from defects in workmanship and materials under normal use and service. The warranty period is 2 years for the United States and Canada, and is in effect from the date of purchase by the user (the “Purchaser”).

Warranty outside of the United States and Canada is limited to 6 months. For a warranty claim, the Purchaser should contact the place of purchase to obtain a Return Authorization Number.

The defective part or unit should be returned at the Purchaser’s expense to the authorized location. A written statement describing the nature of the defect, the date of purchase, the place of purchase, and the Purchaser’s name, address and telephone number should also be included.

If upon the Warrantor’s examination, the defect proves to be the result of defective material or workmanship, the equipment will be repaired or replaced at the Warrantor’s option without charge, and returned to the Purchaser at the Warrantor’s expense. (Contiguous US and Canada only)

No refund of the purchase price will be granted to the Purchaser, unless the Warrantor is unable to remedy the defect after having a reasonable number of opportunities to do so. Warranty service shall be performed only by the Warrantor. Any attempt to remedy the defect by anyone other than the Warrantor shall render this warranty void. There shall be no warranty for defects or damages caused by faulty installation or hook-up, abuse or misuse of the equipment including exposure to excessive heat, salt or fresh water spray, or water immersion.

No other express warranty is hereby given and there are no warranties which extend beyond those described herein. This warranty is expressly in lieu of any other expressed or implied warranties, including any implied warranty of merchantability, fitness for the ordinary purposes for which such goods are used, or fitness for a particular purpose, or any other obligations on the part of the Warrantor or its employees and representatives.

There shall be no responsibility or liability whatsoever on the part of the Warrantor or its employees and representatives for injury to any persons, or damage to person or persons, or damage to property, or loss of income or profit, or any other consequential or resulting damage which may be claimed to have been incurred through the use or sale of the equipment, including any possible failure of malfunction of the equipment, or part thereof. The Warrantor assumes no liability for incidental or consequential damages of any kind.

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www.samlexamerica.com

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