DC-TO-DC CONVERTER

1501-130-130-1.5	1502-130-130-1.5
1501-130-130-1.5-M1	1502-130-130-1.5-M1
1501-130-130-1.5-M2	1502-130-130-1.5-M2
1501-130-130-1.5-M3	1502-130-130-1.5-M3

USER'S INFORMATION

Wilmore

ELECTRONICS CO., INC.

SERIES 1500

130-VOLT TO 130-VOLT

DC-TO-DC CONVERTER

USER'S INFORMATION

This User's Information Manual is applicable for the following Models:

1501-130-130-1.5	1502-130-130-1.5
1501-130-130-1.5-M1	1502-130-130-1.5-M1
1501-130-130-1.5-M2	1502-130-130-1.5-M2
1501-130-130-1.5-M3	1502-130-130-1.5-M3

WILMORE ELECTRONICS COMPANY
P.O. Box 1329
Hillsborough, N.C. 27278

Telephone: (919) 732-9351
Fax: (919) 732-9359
www.wilmoreelectronics.com

SERIES 1500 DC-TO-DC POWER CONVERTER

USER'S INFORMATION

TABLE OF CONTENTS

I. General Description

II. Installation and Operation

III. Optional Features

IV. Maintenance Information

V. Warranty Statement

I. GENERAL DESCRIPTION

This dc-to-dc power converter provides an isolated, regulated and adjustable 130-Vdc output from 130-volt station batteries or other widely fluctuating 130-Vdc sources. The input voltage range is 105.0 to 140.0-Vdc, and the output voltage is adjustable ±5-Vdc around its 130-Vdc nominal value. The maximum rated output current is 1.5 amperes (continuous duty rating at 60ºC ambient temperature and free air convection cooling). The converter output is galvanically isolated from the input source and chassis and, therefore, may be connected as either a positive or a negative output.

This converter is electronically protected against overloads, short circuits, and converter-induced output overvoltages. Recovery to normal operating conditions is automatic upon removal of an overload or short-circuit fault. Following an overvoltage shutdown, input power to the converter must be removed for approximately 1 minute and then reapplied to resume converter operation. Protection against accidental reversal of the input-voltage polarity during installation is provided by a shunt diode working in conjunction with the front-panel circuit breaker.

The operating efficiency of this converter exceeds 80% for most of the output load range. An approximation of input current for a specific input voltage and output load current can be determined as follows:*

$$I_{input} = \frac{(V_{output})\ (I_{output})}{(0.80)\ (V_{input})}$$

Note that this converter is a constant-output-power device, i.e., with a constant load, the input current and input voltage are inversely proportional. This means that the maximum input current is drawn at the minimum input voltage.

*This approximation applies for output load currents equal to or greater than 15% of maximum rated load current. For loads less than 15% of the maximum rating, linearly decrease I_{input} from its calculated value at 15% load to 50 milliamperes at no load.

II. INSTALLATION AND OPERATION

Note: If this converter is equipped with standard options as described in the subsequent section titled "Optional Features", please read the applicable portion of that section AND the following information before installing the converter.

Connection and operation of Series 1500 converters are almost entirely self-explanatory from the front- and rear-panel markings on each unit. To access the rear panel, loosen (but do not remove) the four #6 panhead screws that secure the rear cover panel to the converter side panels and slide the cover panel rearward. The positive and negative terminals are clearly marked beneath each input and output terminal block, and deliberate caution should be exercised to avoid polarity mistakes. Both the input and the output of the converter are dc-isolated from the chassis and from each other.

The terminal block screws accept lugs for use with #12 hardware. Suggested wire sizes for input and output cabling are shown in the chart on the following page and are listed by model number. It is desirable that these cables be kept as short as possible, and, if their length must exceed 10 feet, it may be desirable to use larger wire.

During final test at the factory, the output voltage is preset to its nominal rating. If it becomes necessary to change this setting, this may be accomplished by loosening the locking nut on the front-panel potentiometer and adjusting the potentiometer.

Good installation practice for power conversion equipment dictates that an input fuse or circuit breaker should be located at the power-source end of the cables feeding the equipment. The type and rating of such devices are largely dependent on local and/or national codes and installation variables such as cable routing and wire gauge. Wilmore cannot anticipate these variables and consequently does not recommend specific fuse or circuit breaker values. However, it is important to note a few operating characteristics of this unit that may affect an installer's choice of protection devices.

1) As mentioned previously, this unit is a constant-power device; that is, it draws its maximum input current at its minimum input voltage.

2) As with essentially all electronic equipment with significant input capacitance, the unit will draw an initial peak current many times its normal operating current for a very brief period (a few milliseconds or so) when power is initially applied. Consequently, instantaneous-trip circuit breakers or non-time-delay fuses may be activated by normal power-up events and are not recommended.

3) Following the brief capacitor-charging current described above, the unit will exhibit a "soft-start" characteristic that limits its input current to approximately that

of its full load current (see Section I for specific load current information) as the circuit reaches its normal operating mode. Consequently, and even though the user's application may only require a fraction of the unit's power rating, the input circuit breaker or fuse must be sized to accommodate the full-load input current to avoid nuisance tripping.

WIRE CHART

Model	Input Cable (AWG)	Output Cable (AWG)
15xx-24-13-30	8	8
15xx-24-13-15	10	10
15xx-24-24-16	8	10
15xx-24-24-8	10	14
15xx-24-48-8	8	14
15xx-24-48-4	10	16
15xx-24-130-1.5	10	16
15xx-48-13-30	10	8
15xx-48-13-15	14	10
15xx-48-24-16	10	10
15xx-48-24-8	14	14
15xx-48-48-8	10	14
15xx-48-48-4	14	16
15xx-48-130-3	10	16
15xx-48-130-1.5	14	16
15xx-130-13-30	14	8
15xx-130-13-15	16	10
15xx-130-24-16	14	10
15xx-130-24-8	16	14
15xx-130-48-8	14	14
15xx-130-48-4	16	16
15xx-130-130-3	14	16
15xx-130-130-1.5	16	16

III. OPTIONAL FEATURES

Series 1500 dc-to-dc power converters can be provided with several standard factory-installed options. The presence of one or more of these options is indicated by an "M" suffix in the converter model number, which is silk-screened on the rear panel directly above the output terminal block. The options are available in three standard configurations, designated M1, M2 or M3. If a designation other than M1, M2 or M3 appears as part of the model number, this indicates a non-standard factory modification to the converter - please consult the factory. A brief description of these standard option configurations follows.

M1: Paralleling Diode and Auxiliary Contacts

This configuration is provided for applications in which the outputs of two converters are paralleled to provide redundant power to a load capable of being powered by a single converter. A power diode is wired in series with the converter's positive (+) output terminal. In the event of a loss of output from one converter, the remaining converter continues to power the load without potential adverse effects from the diode-isolated nonfunctioning converter. For system wiring flexibility, access to the positive (+) output of the converter is provided both before and after the paralleling diode (see Figure 1). An internal output-sense circuit monitors the converter's output preceding the paralleling diode and indicates output status via a single-pole, double-throw contact arrangement brought out to a three-position terminal block at the bottom center of the rear panel. For system wiring flexibility, access to both normally-open and normally-closed contacts is provided (see Figure 2).

CAUTION: PARALLELING DIODE HEATSINK ON REAR PANEL IS AT OUTPUT POTENTIAL. This heatsink is common with the cathode of the diode and position 1 of the output terminal block. Care should be exercised when installing and routing interconnection cables. Be sure to replace rear cover panel when installation is completed to avoid inadvertent contact with terminal connections and diode heatsink.

M2: Proportional Load Sharing

This configuration is provided for applications in which the outputs of two or more converters are paralleled to provide load currents in excess of a single converter's rating and where converter redundancy is NOT required. Other than the input and output power connections, no converter interconnection scheme is required to allow two or more converters with M2 configurations to share equally the system load current. The following

initial set-up procedure should be used when installing converters with the M2 configuration.

1. After connecting converter power cables but before replacing rear panel covers, turn any one converter ON with no load on its output.

2. Using a digital voltmeter with 3-digit or better accuracy, measure the output voltage at the converter's terminal block and adjust the front panel potentiometer to the desired output voltage.

3. Turn the converter OFF.

4. Repeat steps 1 through 3 with each individual converter, setting each one's output voltage alike.

5. Replace rear panel covers.

Converters with the M2 configuration, adjusted in this manner, will proportionally share the system load current. A slight degradation in output-voltage regulation with respect to variations in load current may occur.

M3: Paralleling Diode, Auxiliary Contacts, and Proportional Load Sharing

This configuration combines the options in M1 and M2 for applications in which converters are paralleled for additional load current AND redundancy. For example, three M3-type converters can be paralleled to power a load capable of being powered by only two converters. The three converters will share equally the load current, and if any one converter becomes inoperable, the two remaining converters will power the load.

The following initial set-up procedure should be used when installing converters with the M3 configuration:

1. After connecting converter power cables and auxiliary alarm circuits but before replacing rear cover panels, turn any one converter ON with no load on its output. **CAUTION: PARALLELING DIODE HEATSINK ON REAR PANEL IS AT OUTPUT POTENTIAL** (see previous discussion and warning in the section describing configuration M1).

2. Load converter to approximately 50% of its rating, and let it warm up for five minutes. Using a digital voltmeter with 3-digit or better accuracy, measure the output voltage after the paralleling diode (i.e. its

cathode-see Figure 1) and adjust the front panel potentiometer to the desired output voltage.

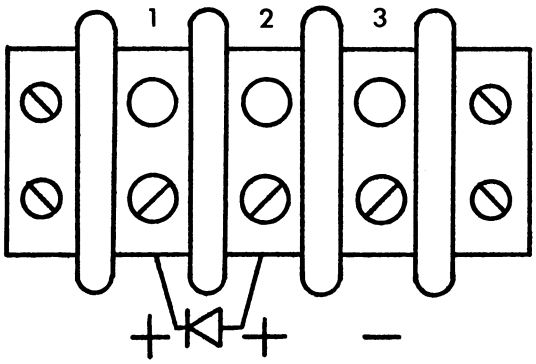
3. Turn the converter OFF.

4. Repeat steps 1 through 3 with each individual converter, setting each one's output voltage alike.

5. Replace rear panel covers.

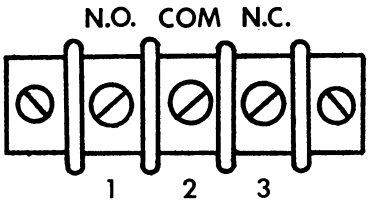
Converters with the M3 configuration, adjusted in this manner, will proportionally share the system load current and provide redundancy when properly sized for the system load current. A slight degradation in output-voltage regulation with respect to variations in load current may occur.

FIGURE 1. OUTPUT TERMINAL BLOCK



For non-redundant operation, positive (+) output connection should be made to anode side of rectifier symbol (position 2). For parallel-redundant operation of two or more converters, positive (+) output connection should be made to cathode side of rectifier symbol (position 1).

FIGURE 2. AUXILIARY CONTACT TERMINAL BLOCK



Convention: “Normal” condition means that converter is ON, with proper output voltage present and auxiliary contact relay coil energized.

IV. MAINTENANCE INFORMATION

Other than preventing dust accumulation on internal components and external surfaces of the converter, no periodic maintenance should be required.

A damaged or malfunctioning unit should be returned to Wilmore for repair. Multiple-component cascade failures in power conversion circuitry can greatly complicate trouble-shooting procedures, and factory technicians familiar with the circuitry can locate the problem quickly, explore adjacent circuitry for stressed or damaged components, and subject the converter to a thorough retest.

Wilmore maintains a **Return Material Authorization** system in order to efficiently track your inbound shipment and expedite its repair and return to you. Before shipping material for repair to Wilmore, please call (919) 732-9351 or email *info@wilmoreelectronics.com* and request an **RMA Number** for your shipment. If possible, please provide the complete model number of the equipment, its serial number, and a brief description of the problem. Place this **RMA Number** on the outside of the package and ship prepaid to:

WILMORE ELECTRONICS CO., INC.

607 U.S. 70A East

P.O. Box 1329

Hillsborough, NC 27278

LIMITED WARRANTY

Wilmore Electronics Company, Inc. warrants this product to be free from defects in material and workmanship for one (1) year after delivery to the original purchaser. During this period, a defective product for which an authorization to return the product has been given, shall be returned to Wilmore freight prepaid. The products will be repaired, replaced, or credit allowed only if the defect, after examination by Wilmore, is determined to be a defect in material or workmanship. If this returned product is determined by Wilmore to have suffered from user misuse or abuse or to have been opened or modified without written instructions from Wilmore, or if the date of receipt of a request for return authorization exceeds the 1-year warranty period, the warranty is null and void. In such cases, Wilmore will determine the cost of repair, quote this price to the purchaser, and continue as advised by the purchaser.

The sole obligation of Wilmore and the purchaser's exclusive remedy under this or any other warranty, expressed or implied, is the repair or replacement of a defective product as provided above, or the issuance of credit in an amount not to exceed the contract price for the product deemed to be defective. Wilmore makes no warranty of merchantability or fitness for a particular use. Wilmore shall not be responsible for incidental or consequential damage, whether or not foreseeable, caused by defects in this product. There are no other warranties which shall extend the description above.