

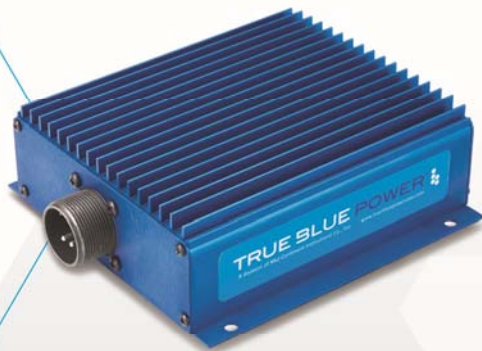
Installation Manual and Operating Instructions

TRUE BLUE POWER

TC280 SERIES

STATIC ELECTRICAL
POWER CONVERTER

Manual Number
9018530



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FOREWORD

This manual provides information intended for use by persons who, in accordance with current regulatory requirements, are qualified to install this equipment. If further information is required, please contact:

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We welcome your comments concerning this manual. Although every effort has been made to keep it free of errors, some may occur. When reporting a specific problem, please describe it briefly and include the manual part number, the paragraph/figure/table number and the page number. Send your comments to:

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REVISION HISTORY

Rev	Date	Detail	Approved
A	11/04/2015	Initial release	WVC
B	01/18/2016	Updated Section 5 to include certification updates; Table 1.1 minor revisions; Section 3.3.2 minor revision	WVC
C	05/07/2020	Updated style and brand to meet Marketing and Engineering guidelines.	DLR

SECTION 1 GENERAL DESCRIPTION

1.1 INTRODUCTION

The model TC280 Series Static Electrical Power Converter is a lightweight power converter that translates an alternating current (AC) input of 115 volts at 350-800 Hertz to a 28 volt direct current (DC) output.

The wide input operating voltage and frequency make the TC280 suitable for nearly any common business or commercial aircraft which provides 100-125 VAC between 350-800 Hertz. The output of 10 amps @ 28 VDC produces 280 watts of power to supply avionics, instrumentation, personal charging, lighting, and many other applications. The TC280 Series Static Converter is FAA certified to TSO-C71 and tested to rigorous environmental standards and levels of RTCA DO-160G. The small size and light weight in conjunction with its installation flexibility (inside or outside the pressure vessel) make it an ideal choice for aircraft power needs while reducing the challenges associated with other similar products.

Highlighted features include short circuit protection, overload capability, low voltage shut-down, temperature monitoring, a self-resettable over-temperature disable and a remote on/off function. The TC280 Series has a robust Military-rated circular connector and a rugged aluminum extrusion case dissipates heat and provides excellent mechanical strength. It is engineered to run cooler and requires no active cooling, featuring a fanless design, which saves energy, reduces weight and allows flexible installation locations. At only 2.0 pounds, it is lighter and smaller than any other certified solution in the aviation market today.

1.2 TECHNICAL SPECIFICATIONS

Electrical Attributes	
Input Voltage:	Rated 115VAC nominal, 350-800 Hz.
Input Current (full load):	2.8 Amps nominal; 4.4 Amps max
Input Current (unit off):	400 milliamps
Recommended Input Circuit Breaker:	5 Amps
Output Voltage:	28VDC \pm 0.5 VDC
Output Power:	280 watts (28VDC @ 10 Amps rated)
Efficiency:	88% nominal
Total Harmonic Distortion (THD):	Less than 3%

Table 1.1

Physical Attributes	
Weight:	2.0 lbs (1 kg)
Dimensions: (not including connector mate)	6.7 inches long x 6.0 inches wide x 2.0 inches high (171 mm long x 152 mm wide x 51 mm high)
Mating Connector (and cable clamp):	MS3106A-18-9S (MCI P/N 9016905-1, -2)
Mounting:	Base mount – orientation not critical

Table 1.2

Qualifications	
Certification:	FAA TSO-C71
Environmental Qualification:	RTCA DO-160G Environmental Category; See Section 5.2
Altitude:	-15,000 feet to +55,000 feet
Temperature:	-55°C to +70°C (-67°F to +158°F)

Table 1.3

SECTION 2 PRE-INSTALLATION CONSIDERATIONS

2.1 COOLING

The TC280 Series does not require external cooling or contain internal active cooling. Cooling of the unit occurs exclusively through passive conduction through the base or radiated cooling across the metal case. Additional cooling can be realized through convection (exposure to free moving air) or conduction (mounting to a thermally conductive metal surface). These methods are not required to achieve rated performance but can help prevent potential overheating and extend life when the unit is operated at full power or during overload conditions. Specifically, mounting the unit to a metal surface is preferred, but not required.

2.2 EQUIPMENT LOCATION

The TC280 Series is designed for mounting flexibility, allowing for installation inside or outside the pressure vessel with no requirement for temperature control. In addition to altitude and temperature resistance, the unit is also designed to withstand high levels of condensing humidity. However, installation locations where the unit could be subject to standing or direct water exposure should be avoided. The unit can be mounted in any orientation. Clearance should be provided for the mating connector and may require as much as five inches past the unit connector to allow for back shell access to the connector.

2.3 ROUTING OF CABLES

The wires and cable bundle associated with the unit are heavy gauge wire and carry significant power. Be aware of routing cables near other electronics or with other wire bundles that may be susceptible to high energy flow.

Avoid sharp bends in cabling and routing near aircraft control cables. Also avoid proximity and contact with aircraft structures, avionics equipment, or other obstructions that could chafe wires during flight and cause undesirable effects.

2.4 LIMITATIONS

The TC280 contains an internal DC-to-DC conversion function to produce the rated output as specified. This function meets the requirements of FAA TSO-C71. The TC280 also creates an initial translation of an alternating current (AC) input to the intermediate DC voltage, which then gets converted to the rated output. This initial translation of AC-to-DC power is considered a non-TSO function. This is due to the lack of an available AC-to-DC Technical Standard Order. However, the AC-to-DC function is fully tested and verified per the equipment requirements and design as well as the stated environmental requirements. The data to support the non-TSO function have been submitted to and reviewed by the FAA along with the TSO-C71 requirements and functionality.

The conditions and tests for TSO approval of this article are minimum performance standards. Those installing this article, on or in a specific type or class of aircraft, must determine that the aircraft installation conditions are within the TSO standards. TSO articles must receive additional installation approval prior to being operated on each aircraft. The article may be installed only according to 14 CFR Part 43 or the applicable airworthiness requirements.

SECTION 3 INSTALLATION

3.1 GENERAL INFORMATION

This section contains interconnect diagrams, mounting dimensions and other information pertaining to the installation of the TC280 Series Static Converter. After installation of cabling and before installation of the equipment, ensure that power is applied only to the pins specified in the interconnect diagram.

3.2 UNPACKING AND INSPECTING EQUIPMENT

When unpacking this equipment, make a visual inspection for evidence of any damage that may have incurred during shipment. The following parts should be included:

A. Static Converter	MCIA P/N 6430280-()
B. Mating Connector (& cable clamp)	MCIA P/N 9016905-1 and 9016905-2
C. Installation Manual	MCIA P/N 9018530

Equipment not provided:

A. Mounting Hardware	Four 10-32 pan head screws #10 lock washers (optional)
B. Cable Harness Wire	See Section 3.3 for specifications

3.3 CABLE HARNESS

Construct the cable harness with regards to the instructions below, and using Figures 3.3 – 3.5, and Wiring Diagram of Table 3.3.

Refer to Section 2: Pre-Installation Considerations in regards to routing precautions.

3.3.1 Wire Gauge Selection

Use of PTFE, ETFE, TFE, Teflon, or tefzel insulated wire is recommended for aircraft use. Use the following wire gauges for each of the pins in the connector:

Pins A and D – 12-14 AWG stranded or solid
Pins B and C – 18-20 AWG stranded or solid
Pins E and G – 18-24 AWG stranded or solid

3.3.2 Pin Assignment Information

CONVERTER INPUT POWER:

Positive AC input – 115 VAC. Connect to the aircraft 115 VAC bus using a 5 Amp circuit breaker.

Negative AC input – Connect to aircraft ground.

Note: Two common practices for the connecting the -28V output power devices in aircraft are:

1. The negative lead connects from the device to the negative power bus.
2. The negative lead connects from the device to the negative power bus, and a second lead connects to the aircraft structure close to the power device.

The TC280 Series passes DO160G Section 21 Table 1.2.3 conducted emissions testing using both methods.

CONVERTER DC OUPUT:

DC Return – Used for powering devices where terrestrial/utility power designations are used, pin D can be connected as “Neutral”.

DC Output – Used for powering devices where terrestrial/utility power designations are used, pin A can be connected as “Line” or “Hot”.

Note: Use of a circuit breaker on the DC output is optional. For the full output of 280W, a 12 Amp circuit breaker is sufficient.

CONVERTER REMOTE ON/OFF CONTROL: (see section 4.2.1)

Remote ON/OFF Control (Pin E) – Connecting this pin to either DC Negative or to aircraft ground will enable the DC output of the Converter. By utilizing a switch between this pin and ground or negative, it will allow remote on/off control of the unit. When unconnected (output is OFF) this pin will have approximately 12 VDC present, internally limited to less than 3 mA. If the Converter is to be enabled at all times, pin E is to be connected to pin D.

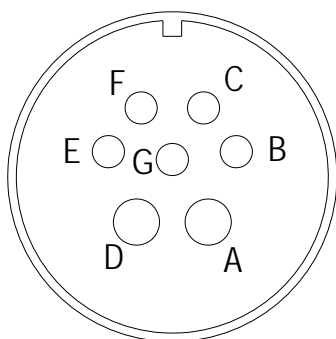


Figure 3.3
Pinout View of Unit Connector

Connector Pinout	
A	28 VDC Output
B	115 VAC Input
C	AC Return
D	DC Return
E	Remote On/Off
F	Reserved
G	Ground

Table 3.3
Connector Pinout

3.3.3 Example Wiring Diagrams

The Converter is flexible in the wiring installation allowing for it to be integrated into the aircraft according to the application needs. Examples are shown in Figures 3.4 and 3.5.

3.3.4 Harness Verification

With the TC280 Series Static Converter disconnected, activate the aircraft power bus that supplies the unit and use a multi-meter to verify that aircraft power and ground with appropriate voltage is on the pins within the mating harness.

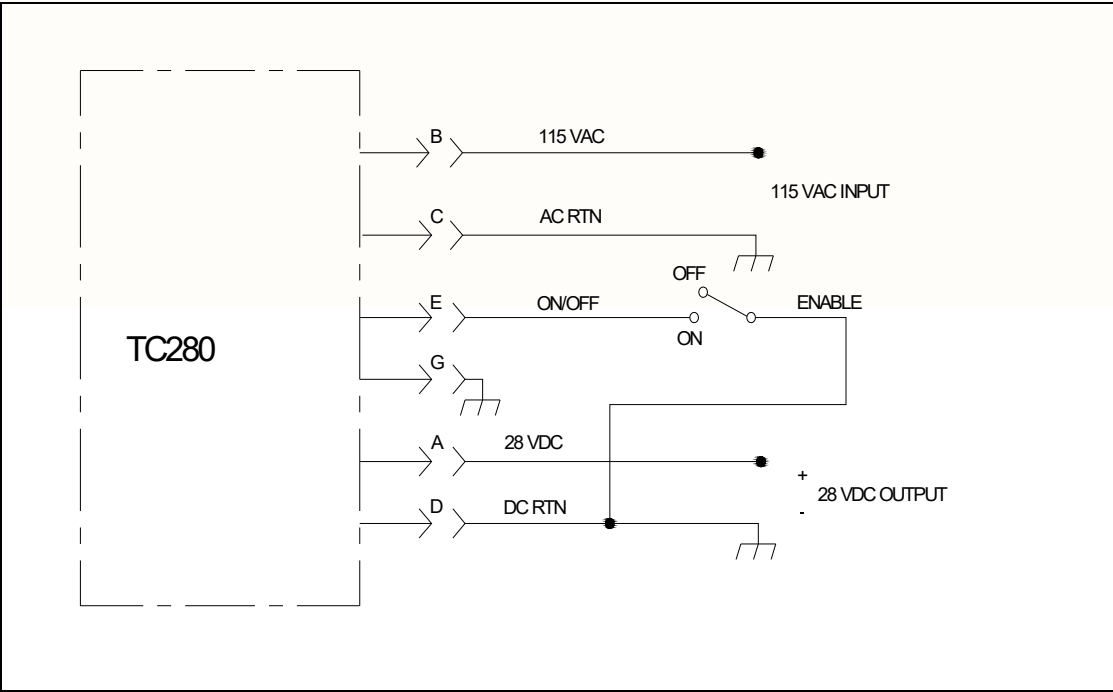


Figure 3.4: Typical TC280 Aircraft Wiring Installation – Remote On/Off

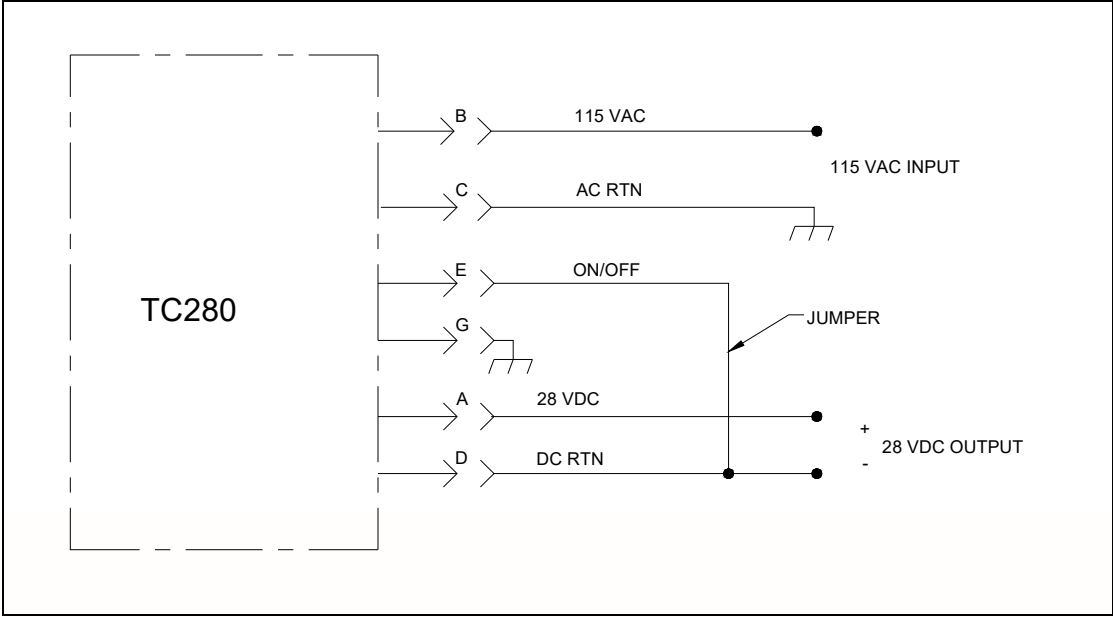


Figure 3.5: Typical TC280 Aircraft Wiring Installation – Constant On

3.4 MOUNTING

Refer to Section 2: Pre-Installation Considerations in regards to equipment location.

The TC280 Series Static Converter is designed for base mounting only. Four 10-32 mounting holes should be provided in the aircraft in accordance with Figure 3.6. Secure the unit with four 10-32 pan head screws, or equivalent. A lock washer under the head of each screw is recommended.

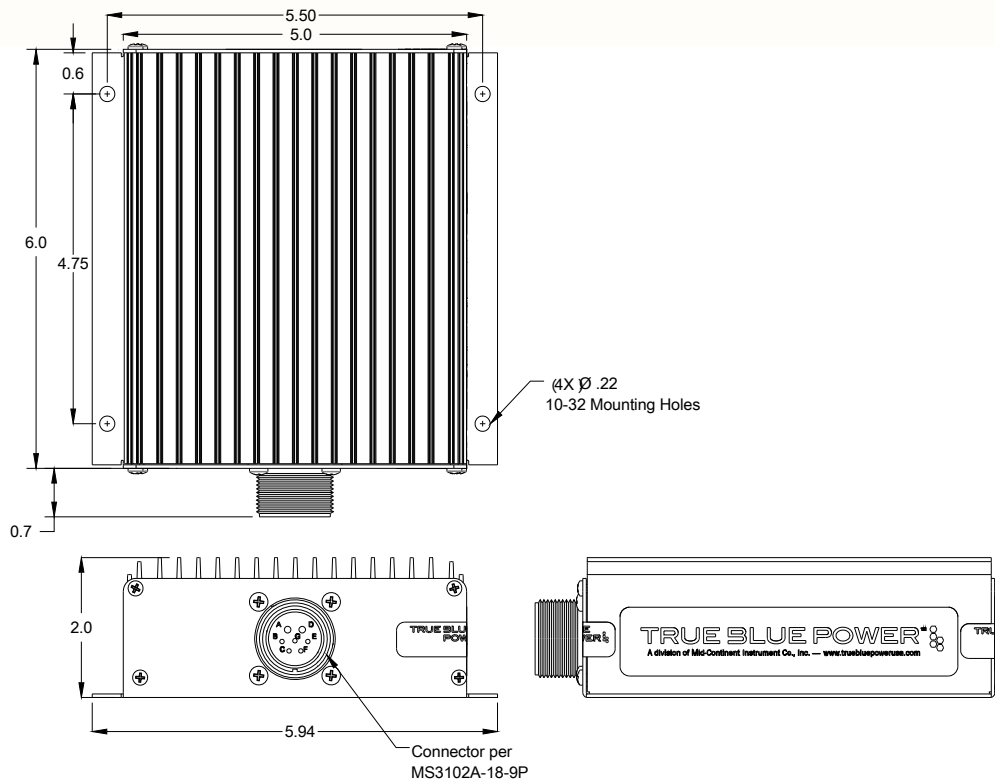


Figure 3.6

TC280 Series Static Converter Outline Drawing

3.5 INSTALLATION COMPLETION

Prior to operating the unit in the aircraft, it is recommended to verify the output and functionality of the unit. In order to prevent accidental damage to other systems, it is best not to attach the output to other equipment or power busses prior to verification. Verify the output of the unit at the terminating end of the cable with a multi-meter to ensure proper voltage and polarity. Once verified, installation can be completed and functionality of the remote on/off feature (if used) should be checked.

3.6 INSTALLATION CAUTION

Do not connect the output of the TC280 Series Static Converter to the output of any other Converter or damage will result. Under no circumstance allow the output of the Converter to be connected to ground utility AC power or damage will result.

SECTION 4 OPERATION

4.1 ELECTRICAL PERFORMANCE

The TC280 Series Static Converter converts an alternating current (AC) voltage input to a regulated VDC output. See Table 4.1 specific output and input frequency.

Model	Input	Frequency	Output
TC280	115 VAC	350-800 Hz	28 VDC

Table 4.1

TC280 Series Electrical Performance

The unit is capable of providing 280 watts to power a variety of aircraft accessories including lights and onboard systems.

The unit is designed as a two-stage, solid-state switch-mode power supply. The power transformation utilizes a first-stage boost methodology followed by an H-bridge DC forming second stage. The first stage boost forms an intermediate DC voltage from the rectified AC input. The secondary stage utilizes ‘current-mode’ control providing instantaneous load protection as an advantage over legacy designs that incorporate ‘voltage-mode’ controllers.

4.2 PROTECTIVE FEATURES

4.2.1 Remote On/Off

The TC280 Series Static Converter incorporates a remote on/off feature that allows the user to enable or disable the output of the unit. By providing a ground on the appropriate pin (See Table 3.3) the user, via a remote mounted switch, can enable the output of the unit. The unit can be similarly disabled by removing the ground signal (open circuit) to the same pin.

4.2.2 Over-Voltage

If the output voltage exceeds 32VDC the unit senses an over-voltage condition and disables the output.

4.2.3 Over-Temperature

The TC280 Series Static Converter incorporates an internal temperature sensing device that continually provides monitoring and feedback to the control circuits. When the unit senses an internal condition that exceeds maximum temperature ratings, the output is disabled. The Converter will continue to remain shut-down until the temperature returns to within acceptable limits. This over-temperature reset occurs automatically without external intervention required.

4.2.4 Short Circuit and Over-Current

The TC280 Series Static Converter is capable of surviving a short circuit or over-current event without permanent damage or effect to long-term reliability. The unit can provide over its rated power output up to 308 watts for over 30 minutes (until over-temperature shutdown occurs).

The Converter monitors the DC output on a pulse-by-pulse scenario to determine a short-circuit or over-current situation. If detected, the output is limited by limiting the current output to less than 15 A. If the short-circuit or over-current situation is removed, the unit will return to normal operation.

