MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

INVENSYS TRICONEX

8310

120 VAC/VDC POWER MODULE

Used with the applicable Tricon v9-v10 system configuration.

REFERENCE PACKAGE

Selected official pages follow this cover with source pagination retained.

OFFICIAL DOCUMENT

Invensys 9700077-012, February 2009

Power Modules

Each Tricon Chassis is equipped with two Power Modules—either one is fully capable of running the controller at full load and rated temperature. Power Modules convert line power to DC power appropriate for all Tricon modules. Any combination of Power Module models can be used in Tricon systems.

For more information, see Planning Power for a Tricon System on page 166

Model	Power Module
8310	120 VAC/DC Power Module
8311	24 VDC Power Module
8312	230 VAC Power Module

The Power Modules, located on the lower left side of the chassis, convert line power to DC power appropriate for all Tricon controller modules. Two terminal strips on the backplane are used to select controller grounding options, and for incoming power and alarm connections.

Each Power Module provides an in-line, slow-blow fuse for each external power source, mounted inside the module. The module can be replaced without disconnecting any wiring by removing the module from the chassis. The fuse on the Model 8311 24 VDC Power Module is not removable. If this fuse fails, you must return the module to Triconex for fuse replacement.

Each Tricon controller Power Module is a field-replaceable unit that uses high-efficiency DC-DC converters. All models of Power Modules are protected against reverse connection of the DC inputs.

Figure 13 shows the terminal strip and front panel for the Power Modules. The figure does not show the covers on the terminals for alarm applications, which are required for hazardous locations.

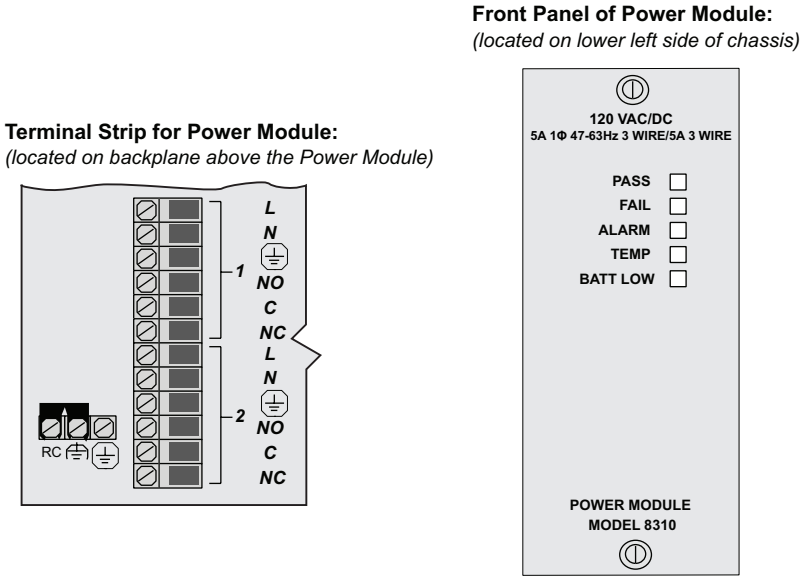

Figure 13 Power Module Terminals and Front Panel

120 Volt Power Module Specifications

This table lists the specifications for model 8310, which is a 120 VAC/VDC Power Module.

Table 4 8310 Power Module Specifications

Feature	Description
Isolation	1000 VAC or 1500 VDC, Input to Output
Recommended input voltage range	120 VAC/VDC (-15% to +10%)
Extended input voltage range	85–140 VAC, 95–180 VDC
Low line on/off hysteresis	15 VAC/VDC
Input power required	240 W (2.75 amps) minimum per power source
Input frequency	47–63 Hz
Power factor	0.70 typical
Crest factor	2.5 typical
Input current	
Steady-state	0.75 amps, typical; 2.75 amps, maximum
In-rush (1/2 AC cycle)	18 amps maximum @ 120 VAC/DC
Input fuse rating and type	5 amps, time-delay
Output voltage	6.5 VDC, ±1%
Output current	27 amps minimum at 140° F (60° C) ambient, which is the air temperature measured at the bottom of the chassis
Output power	175 watts at 140° F (60° C) ambient
Output hold time @ 0 volts input	20 ms minimum 80 ms typical
Output over-voltage protection	115% typical, recycle power to restart
Output over-current limit	135%, typical, auto restart
Over-temperature warning sensor	Temperature monitor trips when the internal power module temperature is greater than 181° F (83° C). Typically, this occurs at an ambient temperature of 140° F (60° C) or higher.

- Replace the module, while it is online, with one that has been operated without the OVDs disabled.
- Reserve a slot in a chassis as an OVD test slot and rotate modules through the OVD test slot every three months.

For information on OVD enabling, see Enabling "Disabled" Output Voter Diagnostics on page 218.

Checking Controller Power Sources

Typically, Tricon controllers use redundant sources to power the controller and field circuitry. Under normal operating conditions, the required power is shared between the two power sources. Under abnormal conditions, one of the power sources may be required to provide 100 percent of the controller power.

To verify the integrity of the power source and the Power Modules, you must periodically test each power source for its ability to provide power for the entire system when the redundant source is disabled.

This table describes the maximum recommended interval between proof tests of Model 8310 Power Modules.

Table 82 Model 8310 Power Module Proof Test Intervals

Year Shipped	For an RRF > 1000, the maximum recommended interval between proof tests is...	For an RRF > 100, the maximum recommended interval between proof tests is...
1996–1998	2 years	5 years
1999	1 year	2 years
2000–2005	5 years	—

This table describes the maximum recommended interval between proof tests of Model 8311 or 8312 Power Modules.

Table 83 Model 8311 or 8312 Power Module Proof Test Intervals

Year Shipped	For an RRF > 1000, the maximum recommended interval between proof tests is...	For an RRF > 100, the maximum recommended interval between proof tests is...
All years	2 years	5 years

Note RRF = Risk Reduction Factor. Although this is a simple economic calculation, an RRF of > 1000 is roughly equivalent to the risk reduction required for SIL3 safety applications. An RRF of > 100 is required for SIL2 applications.

Note Overall, the reliability of the 1996-1998 modules has proven to be approximately equal to the original design estimate, with a MTBF (mean-time-between-failure) of approximately 1 failure per million hours of operation. Later units have proven to be very reliable, with actual MTBF of > 8 million hours.

Replacing Power Modules

This procedure explains how to replace a Power Module. Before taking any action, keep in mind that the alarm contacts on the lower left side of the backplane may be wired to a beacon or audible alarm to alert maintenance personnel that a problem has arisen.

When servicing or replacing a single Power Module, you do not need to interrupt the control process.

Incoming power should be rated for a minimum of 240 watts per power source. The minimum power consumption of a Tricon controller chassis with three Main Processors and one Power Module is 50 watts. Additional power consumption is based on the I/O and communication modules installed in the chassis.

Wiring should be sized according to applicable local electrical codes, taking into account the current ratings, temperatures, wiring lengths, and other applicable considerations. For specifications, see Power Modules on page 33.

WARNING

- If a power module fails in an ATEX application, you *must* replace it immediately. If you cannot replace the failed module, you must shut down the Tricon. A Tricon with a failed power module can be running *only* in a location that is known to be free of ignitable gas concentrations.
  Power module failure is indicated on the Tricon by fault indicators (LEDs). Failure information is available at the operator workstation in the form of system variables and Triconex diagnostics information.
- Do not use alarm contacts in hazardous locations.
- Do not remove a power module unless incoming power is disabled and secondary power is performing normally.

CAUTION

If a Power Module has been removed for any reason, do not attempt to re-install for at least 60 seconds.

For fault indicators, see Power Module Status Indicators on page 235.

Procedure

1. Before beginning, ensure you have a 1/4-inch flat-bladed screwdriver.
2. Verify that the secondary Power Module is connected to an active power source.
3. Use the screwdriver to undo the retractable fasteners of the faulty Power Module. Grasp the fasteners firmly, and slide the module out of the chassis.
4. Carefully slide the replacement Power Module into position, then push firmly to seat the module in the bus and tighten the fasteners.

   If the module is not properly seated and its fasteners are not adequately tightened, the module may not operate properly.

   The Status indicator should go on as soon as Power Module is inserted.
5. For the faulty module, identify the model and serial numbers. Contact the IPS Global Client Support (GCS) center to obtain a Returned Material Authorization (RMA) number. Then return the module to Triconex for repair.