



Application Manual

Mercury Power Supplies and Accessories



This equipment must be installed and serviced by a competent person, and must only be used within the operating limits in accordance with the instructions in this manual.

Part number: 142929 Revision A

Transistor Devices, Inc.

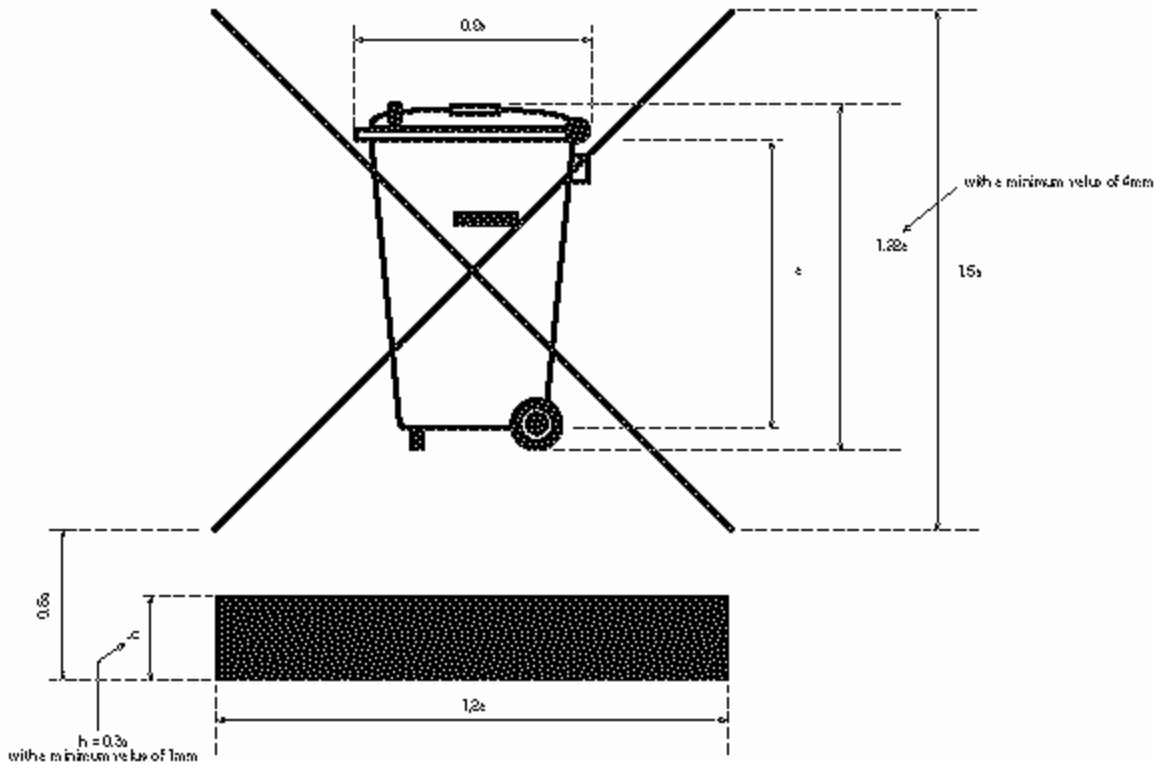
36 Newburgh Road
Hackettstown, NJ 07840

Phone: (908) 850-5088, Fax: (908) 850-1607

www.tdipower.com

Information to Users

Crossed Wheelie Bin, marking of electrical and electronic equipment



This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment. It is applicable to the EU Market as defined in EN 50419: 2005.

User Safety

An authorized, qualified and skilled electrical technician should only attempt installation, testing, fault location and repair.

This equipment carries dangerous voltages and stored electrical energy.

Before touching, or bringing metal objects i.e. tools, metal bracelets, watchbands into contact with items that normally carry electricity, carry out the following instructions:

- a. Isolate the AC Supply external to the equipment**
- b. Isolate the battery (if connected) and the Load external to the equipment**

- c. Allow all electrolytic capacitors to discharge**
- d. Check with a suitable scaled voltmeter, fitted with insulated test probes that the equipment does not carry any voltage at either input or output, before starting any work.**

The above instructions must always be followed before making any adjustments, and also before making any electrical connections to any part of the equipment for the purpose of servicing. Such connections should always be checked for safety before re-applying power.

This manual provides general information for the application and use of TDI's Mercury series of Power modules and accessories.

The latest version of this manual is available for download from the TDI web site at www.tdipower.com

Comments & Suggestions are welcome. Your feedback will be useful in improving this manual.

Please send your comments to Richard.Jones@tdipower.com

©2004 Transistor Devices, Inc
36 Newburgh Road
Hackettstown, NJ 07840

Phone 908-850-5088 • Fax 908-850-1607

Table of Content

DECLARATION OF CONFORMITY.....	7
TUV CERTIFICATE	8
INTRODUCTION TO THE MERCURY SERIES.....	10
KEY FEATURES.....	10
ELECTRICAL SPECIFICATIONS	12
MECHANICAL SPECIFICATIONS.....	14
ENVIRONMENTAL SPECIFICATIONS	14
COOLING	14
TEMPERATURE RANGE.....	14
HUMIDITY	15
VIBRATION.....	15
TRANSPORT SHOCK.....	15
ALTITUDE	15
AUDIBLE NOISE.....	15
REGULATORY AGENCY COMPLIANCE	15
SYSTEM DESCRIPTION	16
OPERATIONAL FEATURES.....	18
EFFICIENCY	18
FAULT ISOLATION / N+1 REDUNDANCY.....	19
IMMUNITY	20
INPUT PROTECTION.....	20
THERMAL PROTECTION	20
OUTPUT PROTECTION	20
CURRENT SHARING.....	21
REGULATION.....	22
RIPPLE AND NOISE.....	22
VISUAL FAULT INDICATORS	22
STANDARD ALARMS	22
ELECTRONIC CONTROL INPUTS.....	23
REMOTE SENSING (ACTIVE SHARE MODULES ONLY).....	26
TECHNICAL DESCRIPTION.....	27
RECTIFIERS	27
BOOST CONVERTER.....	28
DC-DC CONVERTER.....	29
INPUT / OUTPUT CONNECTIONS	30
INPUT / OUTPUT CONNECTORS	32
RECTIFIER SHELVES	34
REMOTE SENSING (ACTIVE SHARE MODULES ONLY).....	34
CURRENT SHARE	35
ALARM CONNECTIONS.....	35
CONTROL INPUTS.....	36
CONFIGURATION AND INSTALLATION	40
AC INPUT SELECTION	40
20-AMPERE TERMINAL BLOCK.....	41
RECTIFIER SHELF MOUNTING	41
ALARM SELECTION.....	42
AC SERVICE CONFIGURATION	42

DC OUTPUT 44

24HR SERVICE HOT-LINE 45

RMA PROCEDURE 45

TDI CUSTOMER SERVICE PORTAL 46

APPENDIX A: RECTIFIER, CONVERTER, SHELF PART NUMBERING SCHEME..... 48

APPENDIX B: RECTIFIER / SHELF OUTLINE DRAWINGS 49

REVISION HISTORY 51

List of Tables

Table 1 - Program Voltage Range and Nominal Control Voltage	24
Table 2 - SW1 and SW2 switch positions required for TDI controller or Remote Program Voltage and Remote Sense	25
Table 3 - Rectifier Connector 51939-005 J1 Pin Assignments	31
Table 3A - Rectifier Connector 51939-065 J1 Pin Assignments.....	32
Table 4 - Rectifier and Shelf Connector Part Numbers	32
Table 5 - Connector J6 (1U Shelf)	36
Table 6 - Connector J1 (2U 50A Per Module Shelf)	37
Table 6A - Connector J1 (2U 100A Per Module Shelf).....	37
Table 6B - Connector J1 (2U DC-DC Converter Shelf)	38
Table 7 - Connector J2 (1U Shelf)	38
Table 8 - Connector J2 (2U Shelf)	39
Table 8A - Connector J2 (2U DC-DC Converter Shelf)	40
Table 9 - AC Input Option Selection	41
Table 10 - 20 Ampere Terminal Block Wire Size Options	41
Table 11 - Rack Mounting Options.....	41
Table 12 - Alarm Options	42

List of Figures

Figure 1 – 2U Shelf showing location of DIPswitches SW1 (Right) and SW2 (Left)	27
Figure 2 – 1U Shelf showing location of DIPswitches SW1 (Right) and SW2 (Left)	27
Figure 3 – 2U 100A Shelf without DIPswitches SW1 and SW2.....	27
Figure 4 - Rectifier Block Diagram	33
Figure 5 - AC Options “A” or “E” with a Phase to Neutral AC Supply.....	43
Figure 6 - AC Option “B” with a Phase to Phase AC Supply	43
Figure 7 - AC Option “C” with a Phase to Phase AC Supply	44
Figure 8 - 1U Rectifier Outline Drawing	49
Figure 9 - 2U Rectifier Outline Drawing	49
Figure 10 - 1U Shelf Outline Drawing	50
Figure 11 - 2U Shelf Outline Drawing	50

Declaration of Conformity



Declaration of Conformity

Manufacturer's Name	Transistor Devices Inc.
Manufacturer's Address	36 Newburgh Road Hackettstown, N.J. 07840 USA
Type of Equipment	Switching Power Supplies & Shelves
Model Numbers	(MeR or SSR prefix) MeR 12WRA Series, MeR12WRB Series, MeR 15HIA Series, MeR27HIA Series, MeR27HIB Series, MeS050A Series, MeS050B Series, MeS100A Series MeS100B Series, 706269 Series, 706290 Series, SPS5728, SPS5728-1
Applicant of Council Directives	93/68/EEC
Standards to which conformity is declared:	
Safety	EN 60950 (2000)

We hereby declare under our sole responsibility that the product specified above conforms to the above mentioned Directives and Standards.

Hackettstown, N.J. 10/28/03
Place and Date of Issue

John Paulini
Signature of Authorized Person

TUV Certificate

ZERTIFIKAT • CERTIFICATE • 認証証書 • CERTIFICADO • CERTIFICA



America

CERTIFICATE

No. B 06 04 48614 041

Holder of Certificate: Transistor Devices, Inc.

36 Newburgh Road
Hackettstown, NJ 07840
USA

Certification Mark:



Product:

**Power supplies
Power Supply for Building-in, Switch Mode
Type**

The product was tested on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. See also notes overleaf.

Test report no.:

DI601978-101

Date, 2006-04-06

Page 1 of 7



TÜV AMERICA INC. • TÜV SÜD Group • Certification Body • 5 Cherry Hill Drive • Danvers MA 01923 USA

ZERTIFIKAT • CERTIFICATE • 認証証書 • CERTIFICADO • CERTIFICA



America

CERTIFICATE

No. B 06 04 48614 041

Model(s):

Rectifiers
 MeR12WRA Series
 MeR12WRB Series
 MeR15HIA Series (48 V to 56 V only)
 MeR27HIA Series
 MeR2/HIB Series
 Rectifiers (custom)
 1) MeR14HIB-P27D01
 2) MeR12WRB-P56D01
 3) MeR12WRB-N54D01
 4) MeR27HIB-N54D01
 Shelves
 MeS050A Series
 MeS100A Series
 MeS050B Series
 MeS100B Series
 706269 Series
 706290 Series
 Shelves (custom)
 1) MeS056HIC-P27CAF01
 2) MeS050B-60BBE01
 3) MeS050B-60BBE02
 4) MeS100B-60BBE01
 5) MeS050B-60GAA01
 6) MeS050B-60BBE03
 7) SPS5728, SPS5728-1
 All Model Numbers may be followed by -LF
 to signify a lead-free product.

Parameters:

Rectifiers (McR or SSR Prefix)
 12WRA Series, 12WRB Series
 90-275 VAC, 47-63 Hz, 16 A

 (See attachment for additional model ratings)

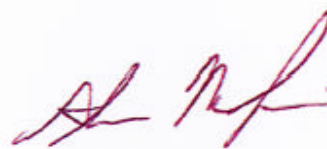

Tested according to:

EN 60950:2000

Production Facility(ies):

49825, 48614, 49768

Page 2 of 7

Introduction to the Mercury Series

Key Features

- Extended / Wide Range AC Input (up to 300VAC)
- Hot-Bus Plug In Modules
- Parallelable for N+1 Redundancy, redundant OR'ing diode / FET installed
- Power Factor Correction
- Droop or active current sharing available
- MTBF (demonstrated) >500,000 Hours
- Lowest Profile, Highest Density
- Full Power & Performance from -20 to +55°C, will turn-on at -40°C
- High Efficiency
- Dual Package Design for Maximum Flexibility (1U, 2U)
- Dual Power Ranges in the same Physical Package

The Mercury series of rectifiers and shelves have been specifically designed to meet the powering needs of both communications and industrial type applications. They have the ability to function both as rectifiers in battery charging applications and as stand-alone power supplies / AC front ends in OEM applications.

Within the Mercury family there are two series of the rectifier available:

The **MER1200** wide range input version that is rated at 1200W and available with nominal output voltages of 12V / 24V / 27V / 48V and 54V. When used in a High AC line environment only, the 48V and 54V units can be up-rated to 1500W.

The **MER2700** is a High AC line only version rated at 2700W and available with nominal output voltages of 24V / 27V / 48V and 54V.

The rectifiers can be configured for either positive or negative grounded operation making them suitable for use in the -48V telecom environment where the positive output is grounded as well as in negative or floating ground applications.

A special feature of the Mercury 1200W and 2700W Series rectifiers is the availability of the rectifiers in both 1U and 2U form factors. Both the 1U and 2U formats are supported with standard mating shelves that offer basic input and output connectivity for AC, DC and limited signals and controls.

The 1U form factor offers exceptional power density as it allows two rectifiers to be installed in a 1U shelf offering true N+1 redundancy in a single rack unit.

Custom shelves and fully integrated power systems complete with microprocessor controls and distribution are also available.

The ability of the Mercury Series rectifier to meet all specifications with or without a battery installed allows OEM users to easily offer a battery back up option within a standard product.

Although classified as a commercial product with a de-rating formula for operation at temperatures above 55°C, the Mercury series rectifiers can if required operate without de-rating at these higher temperature limits for extended periods of time, and with the understanding that the effective life of the rectifier may be shortened due to the additional stress. For those applications where the rectifier may only have to operate in these conditions in the event of an environmental control failure, a power system based on the Mercury family of products may be a cost effective solution.

Electrical Specifications

Note: The specifications and operating characteristics detailed in this manual, unless specifically indicated, apply when the rectifiers are operated either singly or in parallel in shelves and housings designed by TDI.

AC Input		
Input Voltage	1200W series	90-300 volts AC, 47-63Hz, single phase (operational) 90-275 volts AC (Agency rating)
	2700W series	176-275 volts AC (High AC line)
Input Current	1200W series	16A, 90 VAC, full load
	2700W series	16A, 176VAC, full load
Peak Inrush Current	36A peak input current	
Power Factor	0.99 typical	
Input Leakage Current	< 3.5mA at 275VAC, 47 - 63Hz	
Efficiency	Greater than 90% with 208VAC input at 50% to full load (including OR'ing diode) (2700W Series)	
Hold-Up Time (From loss of AC)	20mS, minimum at any input voltage within the input range 10mS (2700W Series)	
Input Under Voltage	The unit will not be damaged while operating at input voltages below the minimum input voltage.	
Input Over Current	The input is fused to protect against input over current.	
Harmonics:	Compliant to EN61000-3-2 Electromagnetic compatibility, Limits for harmonic current emissions.	
Input to Output Isolation:	3000 volts AC RMS	
Input to Ground Isolation:	1500 volts AC RMS	
Output to Ground Isolation:	500 VAC	
Accuracy	± 50 mV	
Ripple & Noise	1% V P-P Measured with 20 MHz Bandwidth	
Line Regulation	Less than ±0.25%	
Load Regulation	±1.0% from no load to full load (droop load share)	
Parallelability	May be paralleled with other like units for increased system output, isolation device included.	
Current sharing	Slope program current share, (droop)	
Temperature coefficient	< ±0.02% per °C	

DC Output							
		1200 Watt Nominal			2700 Watt Nominal		
Output Voltage		24VDC	48VDC	54VDC	24VDC	48VDC	54VDC
Output Current	90 -176 VAC	50A	25A	22A	High AC Line Operation Only		
	176 - 275 VAC	50A	31A	27A	100A	50A	50A
Output Power	90 -176 VAC	1200 W			High AC Line Operation Only		
	176 - 275 VAC	1200 W	1500 W		2400W		2700W

<p>Protection</p> <p>Input Over-current Input Over-voltage Output Over-voltage Output Short Circuit Over temperature</p>	<p>Environmental</p> <p>Cooling: internal fan Operating Temp: -20° to +55°C High Temperature Operation: derate 10% per °C, 55 to 65°C Storage/Transportation Temp: -40° to +75°C Humidity: 0-95% non-condensing</p>
<p>Reliability</p> <p>MTBF: exceeds 500,000 hours</p>	<p>Agency Compliance</p> <p>Safety Agency: UL, c-UL, TUV, CE EMI (conducted): FCC Part 15, Sub-part J, Class A, and EN55022 Class A EMI (radiated): Stand alone module tested to EN55022 Class B Safety: UL60950, EN60950, IEC60950 CE Marked: Low Voltage Directive only</p>

Mechanical Specifications

Rectifier Dimensions

Form Factor	1U	2U
Height	43.6mm (1.72")	86.9mm (3.42")
Width	213.8mm (8.42")	108mm (4.25")
Depth	353.8mm (13.93")	374.7mm (14.75")
Weight	2.73kg (6lbs)	1200W = 2.73kg 2700W = 3.64kg(8lbs)

Standard Rectifier Shelf Dimensions

Form Factor	1U	2U
Height	44.1mm (1.737")	87.9mm (3.46")
Width	482.6mm (19")	482mm (18.98')
Depth	474.6mm (18.684")	449.3mm (17.69")
Weight	4.99kg (11lbs)	6.36kg (14lbs)

Environmental Specifications

Cooling

The rectifiers include one or more integral fans that draw air in through the front panel and exhaust it out the rear of the unit.

Temperature Range

Operating (at full power).	Standard OEM unit: -20 to +55°C
Start-up temperature	-40°C
Start-up operating temperature	-40°C after warm-up
Storage	-40°C to +85°C

The calculated MTBF (MIL HDBK 217F) 217,000 hrs for the Mercury Rectifier is based on the rectifiers being operated within the stated parameters.

As part of TDI's reliability growth process, TDI has recorded a demonstrated MTBF of the Mercury rectifiers at 637,000hrs based on fielded units.

If operation from 55°C to 75°C is required while maintaining the stated MTBF, the rectifiers will have to be operated at a reduced level of output power calculated at 2% per degree C

above 55°C. Alternatively, the unit may be operated at higher powers with a reduced lifetime.

Humidity

The rectifiers and shelves can be operated or stored at humidity levels of 0% - 95% non-condensing in the temperature range -10 to 50°C.

Vibration

The unit will operate normally when subjected to Test 3 - Office Vibration Test Method of Telcordia NEBS, Paragraph 5.5.9 using the alternate test procedure.

The packaged unit is designed to withstand, without damage, two complete cycles of the following transport vibration simulation:

From 5Hz to 100Hz to 5Hz: 0.5 g at 0.1 octaves/min.

From 100Hz to 500Hz to 100Hz: 1.6 at 0.25 octaves/min.

Transport Shock

The rectifiers and shelves when packed in their standard shipping containers are designed to withstand a transportation drop / shock test consisting of a 0.93M (3ft) drop test on all faces and all corners.

Altitude

The rectifiers and shelves can be operated without restrictions at altitudes of -60 to +4000M (-200 to +13,000 ft). For operation outside these limits, please contact a factory representative for any de-rating requirements.

Transportation and Storage at altitudes up 9,250M (30,000 ft) can be carried out without restriction.

Audible Noise

The audible noise from any individual rectifier will be less than 55 dBA at 2 meters.

Regulatory Agency Compliance

To ensure World Wide acceptability the rectifiers and shelves meet or exceed the following regulatory requirements.

Telcordia Network Equipment Building System (NEBS)

GR-1089-CORE EMI & ESD.

GR-63-CORE Physical Protection

Conducted EMI

Conducted noise on the input of a single rectifier complies with FCC Part 15, Sub-part J, class A, and EN55022, class A.

A rack/shelf loaded with four (4) rectifiers complies with the class A requirements.

Radiated EMI

The radiated noise from a single rectifier or multiple rectifiers in a manufacturer-designed shelf complies with EN55022, class A

Safety

The rectifiers and shelves are approved to UL60950, EN60950 and IEC60950.

CE Mark

The rectifiers and shelves are approved and comply with the European Union Low Voltage Directive.

System Description

The Mercury Series of modular DC solutions includes both rectifiers and shelves suitable for rack or cabinet mounting.

The rectifiers are available in both 1200-watt and 2700-watt versions and are designed for use in “Hot Plug” applications.

The rectifiers are available in two form factors:

1U – This rectifier and its matching shelf requires 1U (44.5mm) vertical rack space with positions for two 1200W or 2700W rectifiers in a 482.6mm (19inch) rack

2U – This rectifier and its matching shelf requires 2U (89mm) vertical rack space with positions for four 1200W or 2700W rectifiers in a 482.6mm (19inch) rack.

The rectifier shelves described in this document provide the basic mounting and interface capabilities to install the rectifiers within a rack or cabinet. The interface connections include:

AC Input – AC Connection options include separate three pole IEC connectors, or screw terminal blocks for each rectifier or a single terminal block for each shelf.

DC Output – The output connections, ¼” – 20 studs spaced on 25.4mm (1”) centers, are intended to be used with two hole compression lugs. No separate over current or isolation means are included in the standard shelves. If the application requires distribution to multiple loads a separate distribution module is required.

Alarms and Controls – Individual AC Fail and Rectifier Fail alarms for each rectifier, remote adjust, remote sense and the active current share connection are all extended to connectors on the rear of the shelves.

Operational Features

Efficiency

1200W units, -54Vdc typical

Input Voltage	Power in	A draw	Power out	% Output	Eff %	Iout	Vout
115VAC	342.00	2.97	278.11	23%	81%	4.96	56.07
	660.20	5.74	562.35	47%	85%	10.06	55.90
	974.70	8.48	836.51	70%	86%	15.01	55.73
	1,292.00	11.23	1,106.24	92%	86%	19.90	55.59
	1,432.00	12.45	1,210.77	101%	85%	21.80	55.54
208.00	337.90	2.94	280.30	23%	83%	5.00	56.06
	644.70	5.61	562.81	47%	87%	10.07	55.89
	951.60	8.27	839.85	70%	88%	15.07	55.73
	1,372.00	11.93	1,210.77	101%	88%	21.80	55.54
230.00	335.70	2.92	280.30	23%	83%	5.00	56.06
	641.30	5.58	561.14	47%	87%	10.04	55.89
	944.50	8.21	840.41	70%	89%	15.08	55.73
	1,255.00	10.91	1,134.04	95%	90%	20.40	55.59
	1,375.00	11.96	1,224.44	102%	89%	22.05	55.53
264.00	334.20	2.91	281.37	23%	84%	5.02	56.05
	635.50	5.53	558.90	47%	88%	10.00	55.89
	939.40	8.17	836.51	70%	89%	15.01	55.73
	1,245.00	10.83	1,128.48	94%	91%	20.30	55.59
	1,366.00	11.88	1,222.77	102%	90%	22.02	55.53

2700W units, -54Vdc typical

Input Voltage	Power in	A draw	Power out	% Output	Eff %	Iout	Vout
180.00	637.40	3.66	550.08	20%	86.3%	9.99	55.04
	1,516.50	8.49	1,365.73	50%	90.1%	24.98	54.66
	2,107.00	11.77	1,904.39	70%	90.4%	35.00	54.40
	3,020.00	16.84	2,702.16	100%	89.5%	50.04	54.00
208.00	634.90	3.22	549.98	20%	86.6%	9.99	55.04
	1,525.80	7.33	1,365.97	50%	90.6%	24.99	54.67
	2,088.00	10.11	1,904.39	70%	91.2%	35.00	54.41
	2,990.00	14.44	2,701.57	100%	90.4%	50.03	54.00
275.00	627.10	2.93	549.97	20%	87.7%	9.99	55.04
	1,489.20	5.74	1,366.10	50%	91.8%	25.00	54.66
	2,061.00	7.75	1,904.14	70%	92.4%	35.00	54.40
	2,943.00	10.84	2,702.11	100%	91.8%	50.04	54.00

Fault Isolation / N+1 Redundancy

A typical user application will use an N+1 rectifier configuration for maximum reliability. In this type of configuration “N” represents the number of rectifiers, operating in parallel, that are required to power the load and if required to charge the batteries. The “+1” indicates that the system will have one additional rectifier operating in parallel to provide the current required if one of the “N” rectifiers should fail.

To facilitate this type of configuration the Mercury series rectifiers have a number features built in:

OR’ing Circuit - An OR’ing circuit in the output circuit of the rectifier will allow the rectifier to be removed and replaced in an active system, without causing the system output voltage to deviate outside the stated regulation parameters. This ability to remove and replace system components is known as “Hot Plug” or “Hot Swap” and is a standard feature in any system built using Mercury Series components. The OR’ing circuit will also ensure that the rectifier cannot draw excessive current from the system output bus in the event of an internal circuit failure such as a shorted semiconductor.

DC Output Sequencing – To ensure a transient free “Hot Plug” operation it is important that the Load and Control connections of the rectifier be completed before the DC Output is enabled.

This is achieved using a long pin / short pin combination on the output connector of the rectifier which ensures that the DC Output is not powered up before all connections are made.

Immunity

To ensure that equipment with electronic circuitry will continue to operate when subjected to an electrostatic discharge or a high level magnetic field they must be tested to ensure they meet certain standards. The rectifiers and shelves have been tested and comply with:

EN61000-4-2, 1995 Electrostatic Discharge Level 3 stand-alone

EN61000-4-3, 1996 Electromagnetic Immunity (error-free), Level 2 stand-alone

Input Protection

To protect the rectifiers from the high voltage transients that can occur on the AC utility the input circuit incorporates Metal Oxide Varistors (MOV) across the AC Line and from each Line to Ground. The voltage limiting characteristics of the MOV effectively reduces the Line to Line or Line to Ground transients.

The protection circuit is designed to withstand the input transients as defined by:

EN61000-4-4 1995 Electrical Fast Transient/Burst - Severity Level 3 (2 KV)

EN61000-4-5 1995 Surge - Severity Level 4 (4KV)

Thermal Protection

To prevent component failure due to excessive heat within the power conversion circuits, the rectifier incorporates a temperature monitor on the main heat sink assembly. Should the rectifier be operated at an elevated temperature for an extended period, and the temperature of the heat sink assembly exceeds a predetermined value the power conversion circuitry will be shut down and will not restart until the temperature of the heat sink assembly has dropped to a safe level. The restart process is totally automatic and is not limited in the number of On / Off cycles that are allowed.

Output Protection

The rectifier includes a number of protection features in the design of the output circuitry to protect the rectifier itself and to ensure that the system voltage remains within the required parameters:

Over Voltage – Should the output voltage of the rectifier exceed the preset limits detailed in the Electrical Specifications section of this document the rectifier will be shutdown. An automatic reset circuit will cycle the rectifier a number of times to check if the over-voltage indication may have been a transient condition. If the condition remains the rectifier will be placed in a latched shut down condition that will require the AC supply to be removed and reapplied before the rectifier can be restarted.

Over Current – Should the rectifier be subjected to a very low resistance or a short circuit load the rectifier control circuits will limit the current available, protecting the internal components of the rectifier. The rectifier can sustain this condition indefinitely if required and resumption of normal operation will be automatic when the load causing the problem is removed.

Current Sharing

The Mercury Series rectifiers when connected to a common output bus without any additional interconnection between the rectifiers operate in a current sharing mode using slope compensation more commonly known as droop.

Rectifiers designed with slope compensation have additional circuitry that adjusts the output voltage above or below their preset level based on the level of current being drawn. This technique ensures that all the rectifiers will effectively balance themselves within reasonably close limits.

For those applications where even closer current sharing is required the Mercury Series rectifiers can operate with active current share. This is a factory set option that requires the current share pins on all the rectifiers to be linked together. This will then cause the output voltage of all rectifiers to be adjusted using the rectifier with the highest voltage (the reference rectifier) as the standard. In the event that the reference rectifier fails or is removed from the system the rectifier with the next highest voltage will automatically become the reference without any voltage transition on the common output bus.

If the system output voltage is not being set by an external voltage but relying on the nominal setting of the individual rectifiers, the active current sharing circuitry has the capability to adjust the output voltage of any rectifier that has been set within two percent of the final system voltage as determined by the reference rectifier.

Regulation

Regulation is a general term that defines the maximum voltage change that will be seen at the output terminals in relation to changes that occur either in the input voltage or to the system load.

Line Regulation - Less than $\pm 0.25\%$ is the maximum variation that will be seen for changes to the AC input voltage that remain within the specified operating limits.

Load Regulation - $\pm 0.5\%$ is the maximum variation that will be seen for a system operating with a steady state load, at any point from no load to full load with the active current sharing. (Note that with 'droop' current share the regulation bands will be wider)

Output Dynamic Regulation - $< \pm 2\%$ recovery within 500uS. Unlike line and load regulation, which are measured under steady state conditions, dynamic regulation defines the response to a step load change (50 to 100% step load). It is specified as the maximum change that will be seen and the time taken to recover to within normal operating parameters.

Temp. Coefficient - Less than $\pm 0.02\%$ per $^{\circ}\text{C}$. Temperature coefficient is the maximum change that will be seen for changes in the ambient operating temperature.

Ripple and Noise

This defines the level of AC ripple and the High Frequency Electrical Noise that is present on the DC output of the rectifier

For the Mercury rectifier this is less than 1% P-P measured with 20MHz bandwidth.

This level is in compliance with the requirements of Telcordia GR-1089-CORE and ETS300132-2

The unit also meets the requirements for use on analog voice circuits with a psophometrically weighted noise level of less than 32dBmC.

Visual Fault Indicators

A front panel Green "Output OK" LED will be lit if the units' output is within the acceptable range.

Standard Alarms

The rectifiers generate a number of alarms that appear at the rear connector J1 as the open collector output of an opto-isolator. To interface with these opto-isolators requires an

external pull up of 12V maximum and the transistors within the Opto-isolator can sink 1ma maximum. If the pull-up is 5 volts (assumed), then TTL compatible signals are generated.

These electronic alarms are accessible via I/O connector J1.

AC OK	A digital signal indicating the state of AC input
Output OK	A digital signal indicating the state of the DC

Electronic Control Inputs

Remote Inhibit: Application of input signal will cause the power to shut down and a summary fault alarm will be issued. TTL High = Inhibit. Pull up power must be externally provided.

Unit Present: When the unit is plugged into its mating connector; it connects the "unit present" signal to fault/signal return.

Remote Program: A 0-5V signal adjusts output voltage at a rate of 4V/V on -48, -54.5, and -56 volt modules and 2V/V on +24 and +27 volt modules, 1V/V on the +13.625 volt module, and 0.8V/V on the +12 volt module. Nominal control voltage for nominal output is 4.096V, resulting in a typical output control range of 40V – 61V with a 0-5V control input on a 56 volt nominal output. See the Table 1 below for the "calculated control limits" based on +9% and -27% of the output voltage set-point for other configurations. The control signal must be externally provided and referenced to the most negative output of the rectifier.

Module set point, V dc	Program Voltage Range		Nominal Control Voltage	Volts / Volt
	0V (Voutput -27%)	5V (Voutput +9%)		
+12 (Front End)	10	14	2.5	0.8
+13.625	9.35	14.5	4.096	1
+24 (Front End)	17.52	26.16	4.096	2
+27.25	19.89	29.70	4.096	2
-48 (Front End)	35.04	52.32	4.096	4
-54.5	39.78	59.4	4.096	4
-56	40.88	61.0	4.096	4

Table 1 - Program Voltage Range and Nominal Control Voltage

1. The limits indicated in the Table 1 above are approximate for the nominal voltages shown. TDI manufactures many different models in the Mercury range with various output set-points, and characteristics that will affect the actual performance seen.
2. Contact your local TDI representative or the factory for information of the actual model design limits.
3. Please ensure that if you add a control loop to the modules that a feedback of the actual voltage is also monitored since the table represents nominal output voltages under a given load.
4. Front End refers to non-battery charging applications.

The following Table shows the proper settings of shelf switches SW1 and SW2 when a TDI Controller, Remote Program Voltage and Remote Sense are used.

Shelf type	TDI Controller installed or	SW1 (Open/Up,	SW2 (Open/Up, Closed/ Down)

	Remote Program Voltage in use (Y/N)	Closed/ Down)	
MES050A or MES050B	N	Open/Up	Open/Up Local Regulation of Voltage by the Module. Used when the load is close to shelf.
MES050A or MES050B	N	Open/Up	Closed/ Down Remote Regulation of Voltage by the Module. Used when load is far away from shelf.
MES050A or MES050B	Y	Closed/ Down	Open/Up Controller or Remote Program Voltage will adjust the system voltage.
MES100A or MES100B	N	N / A	N / A
	Y	N / A	N / A

Table 2 - SW1 and SW2 switch positions required for TDI controller or Remote Program Voltage and Remote Sense

Description: DIP switch SW1 is a four-position switch that connects the remote program lines to the common pin J2-23 on the ribbon cable header.

Setting with controller attached: With the switches turned on, this allows a controller to access and adjust the program voltage of the rectifier.

Setting when no controller is attached: All 4-switch positions should be opened so that they do not connect the program lines together.

Problem scenarios: If switch SW1 are closed (Down) without a controller (driving the voltage adjust signal) the system will operate correctly when one module is inserted into the shelf. As the second (and subsequent) modules are inserted into the rack, the output voltage dips momentarily, due to a parallel path to an unpowered op amp. This temporarily lowers the output voltage (to 22-23V for 27V modules or 40-42V for 54V modules) until the bias comes up in the rectifier. While not causing any damage, this is usually not desirable

from the Load/ application perspective. In some no load conditions, the rectifier may be driven to an under voltage condition and shut down; DIPswitch SW1 will need to be returned to the default Open state (Up Position). See Figures 1 and 2 for location of switch SW1.

Remote Sensing (Active Share Modules only)

Remote sensing is used to allow the module to regulate its nominal output voltage at a remote point. This is often required to compensate for loads that are located some distance from the power systems such as battery plants or in high current applications where the resistance of the interconnect can become a factor.

If remote sensing is required the “remote sense return” should be connected to the polarity designated as the “DC Power Output return” and the “remote sense” to the opposite polarity connection.

When multiple shelves are operated in parallel the remote sense leads on each shelf need to be connected to the same point.

Description: DIPswitch SW2 is an eight-position switch on 2U shelves and a four-position switch on 1U shelves that connects the remote sense lines from each rectifier to the DB9 connector pins 2 & 3 for remote sense applications. This is only required for active share units, so the normal position of these switches is open. The sense lines should NOT be connected for droop share modules. See Figure 1 and 2 for location of switch SW2.

Problem scenarios: If SW1 is Closed/ Down, controller present, and SW2 is Closed/ Down and remote sense wires are connected, the rectifier will try to adjust its own output voltage and the controller will also try to adjust the output voltage. This will result in oscillation on the output as both the module and controller try to regulate the output.

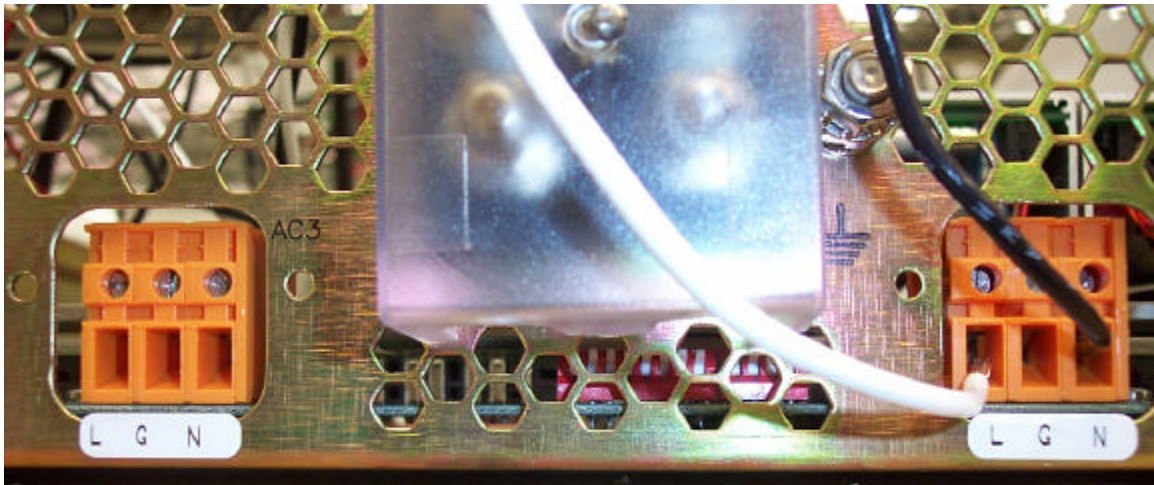


Figure 1 – 2U Shelf showing location of DIPswitches SW1 (Right) and SW2 (Left)

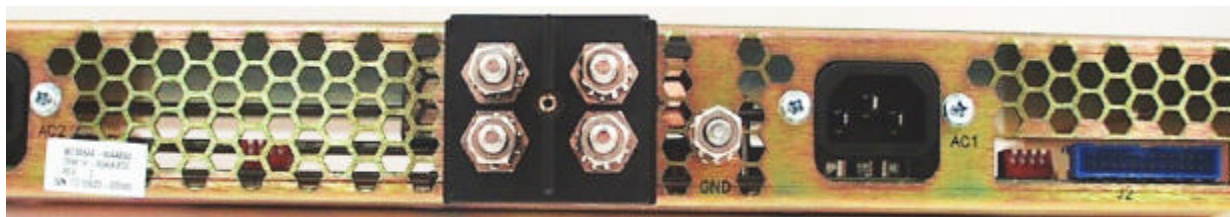


Figure 2 – 1U Shelf showing location of DIPswitches SW1 (Right) and SW2 (Left)

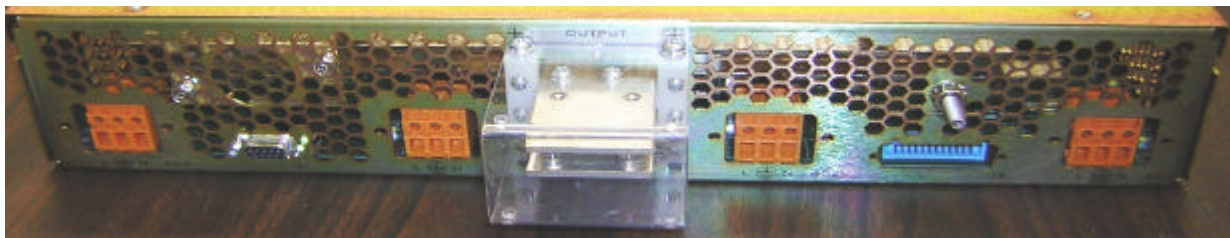


Figure 3 – 2U 100A Shelf without DIPswitches SW1 and SW2

Circuitry was added to the +27V 100A modules to internally disconnect the voltage line so that SW1 and SW2 are not required in the 2U 100A shelf.

Technical Description

Rectifiers

A functional block diagram of the Mercury rectifier is shown in Figure 4; a brief description of the individual circuit elements follows below.

Boost Converter

The boost converter takes the AC supply and converts it to a semi regulated high DC voltage. The boost converter consists of the following elements:

Input EMI Filter

The characteristics of this filter are designed to protect the rectifier from input AC utility transients and to ensure that the switching transients of the power conversions circuits are not transferred back to the AC utility as noise.

Inrush Control

A characteristic of all switch mode rectifiers is the high inrush current drawn by the rectifier when AC is first applied due to the high level of capacitance in the input circuit. To minimize this effect, the Mercury Series Rectifiers incorporate a current limiting resistor in the AC input circuit. Once the input capacitance is charged the resistor is bypassed by a relay contact. The time that the current limiter is in circuit is typically less than two seconds.

PFC Module

Due to the high current pulses drawn by the output DC-DC switching regulator, if connected directly to the AC supply through a simple diode rectifier, the rectifier would look as if it had a power factor of 0.6 or less. It would also impress an unacceptable level of harmonic distortion on the AC Supply.

In order to meet the International specifications for Harmonic Distortion it is necessary to introduce a second level of conversion to isolate the output circuit from the AC supply. This circuitry is known as the Power Factor Correction Module. The output of the PFC module is a semi regulated high voltage DC that is passed to the output DC-DC converter.

AC/DC Control

The AC/DC control circuit is responsible for the following:

- ❑ Control and Monitoring of the PFC Module
- ❑ Enabling the DC/DC module when the rectifier is installed in a shelf and the PFC module is producing High Voltage DC.
- ❑ Generating an AC fail signal for external use

DC-DC Converter

The DC-DC converter takes the high voltage from the PFC module and converts it to a highly regulated high current DC output.

DC/DC Power Module

To achieve the optimum balance of size to efficiency, the output circuit of the Mercury Rectifiers uses a technique known as Zero Voltage Switching (ZVS). The use of ZVS allows the designer to increase the operating frequency and reduce the size of the magnetic components and at the same time not increase the switching losses normally associated with a higher switching frequency.

Output OR'ing Circuit

To allow the rectifiers to be operated in parallel the individual rectifiers are isolated from the output buss using a MOSFET based OR'ing circuit

Output EMI Filter

The EMI filter in the output of the rectifier is designed to ensure that the switching frequency of the DC/DC power module and any harmonics that may be present on the DC output are reduced to levels that meet the requirements for radiated and conducted electrical noise.

DC/DC Control

The DC/DC control circuit is responsible for the following:

- ❑ Control and monitoring of the DC/DC converter
- ❑ Adjusts the Output Voltage based on an external voltage between 0 and 5 Volts
- ❑ Trims the output voltage in response to the current share signals whether active or droop
- ❑ Generates Over Temperature, Under Voltage, Over Voltage alarms and an Output OK signal
- ❑ Accepts an external TTL signal to remotely switch the rectifier ON and OFF

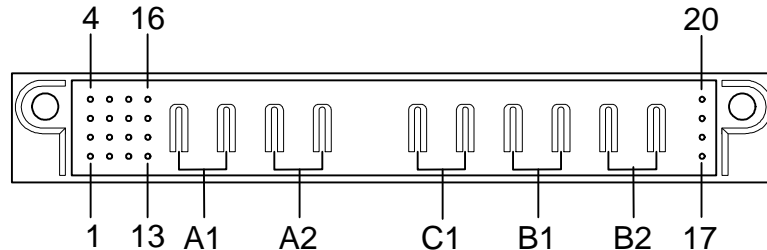
Option Card

In the 1200 watt version of the rectifier there is space for the installation of a customer options daughter board. Uses for this daughter board can include features such as a custom alarm / interface card or a networking card for CAN Bus. Connections to the option card are through the rectifier I/O connector.

This option card is not available on the 2700-watt version of the rectifier.

Input / Output Connections

Connector J1 provides all the connectivity between the rectifier and the rectifier shelf backplane. The pin allocations for 51939-005 J1 are listed in Table 3. The pin allocations for 51939-065 J1 are listed in Table 3A.



Pin #	Name	Description
A1	Output positive	DC Power Output Return (negative supplies) DC Power Output (positive supplies)
A2	Output negative	DC Power Output (negative supplies) DC Power Output Return (positive supplies)
C1	Earth Ground	Safety ground
B1	AC low (neutral)	AC Input
B2	AC high (line)	AC Input
1	(option)	Optional signal (goes to daughter card slot)
3	Fault/signal return	Return for all fault and status signals
4	AC OK	Opto-coupler open collector (low when AC input voltage is in spec)
5	(option)	Optional signal (goes to daughter card slot)
7	Unit present	Unit Present (connected to pin 3 when unit inserted into connector)
10	Output OK	Opto-coupler open collector (low when output voltage is in spec)
11	I share bus	bussed together on backplane (only used if active current share rectifiers used)
12	Remote sense return	Kelvin connection to output bus return
13	Output inhibit	>3V turns off output power (drives opto)
14	(option)	Optional signal (goes to daughter card slot)
15	Remote adjust	0-5V varies output -27% to +9%, ref. to most negative output terminal
16	Remote sense	Kelvin connection to output bus
19	Long pin	Used internally to sequence unit on after physical insertion
20	Short pin	Used internally to sequence unit on after physical insertion

NOTE: Pins 2, 6, 8, 9, 17, 18 are not currently used on this connector

Table 3 - Rectifier Connector 51939-005 J1 Pin Assignments

Pin #	Name	Description
A1-A4	Output positive	DC Power Output Return (negative supplies) DC Power Output (positive supplies)
A5-A8	Output negative	DC Power Output (negative supplies) DC Power Output Return (positive supplies)
B3	Earth Ground	Safety ground
B2	AC high (line)	AC Input
B1	AC low (neutral)	AC Input
1	(option)	Optional signal (goes to daughter card slot)
3	Fault/signal return	Return for all fault and status signals
4	AC OK	Opto-coupler open collector (low when AC input voltage is in spec)
5	(option)	Optional signal (goes to daughter card slot)
7	Unit present	Unit Present (connected to pin 3 when unit inserted into connector)
10	Output OK	Opto-coupler open collector (low when output voltage is in spec)
11	I share bus	bussed together on backplane (only used if active current share rectifiers used)
12	Remote sense return	Kelvin connection to output bus return
13	Output inhibit	>3V turns off output power (drives opto)
14	(option)	Optional signal (goes to daughter card slot)
15	Remote adjust	0-5V varies output -27% to +9%, ref. to most negative output terminal
16	Remote sense	Kelvin connection to output bus
19	Long pin	Used internally to sequence unit on after physical insertion
20	Short pin	Used internally to sequence unit on after physical insertion

NOTE:	Pins 2, 6, 8, 9, 17, 18 are not currently used on this connector
-------	--

Table 3A - Rectifier Connector 51939-065 J1 Pin Assignments**Input / Output Connectors**

The part numbers shown in Table 4 are for FCI Powerblade connectors. These connectors are stocked and may be purchased from TDI.

Rectifier Power and Current	Rectifier - J1 Connector	Shelf Connector
1200W 25A / 50A	51939-005	51915-011
2700W 50A	51939-005	51915-011
2700W 100A	51939-065	51915-028

Table 4 - Rectifier and Shelf Connector Part Numbers

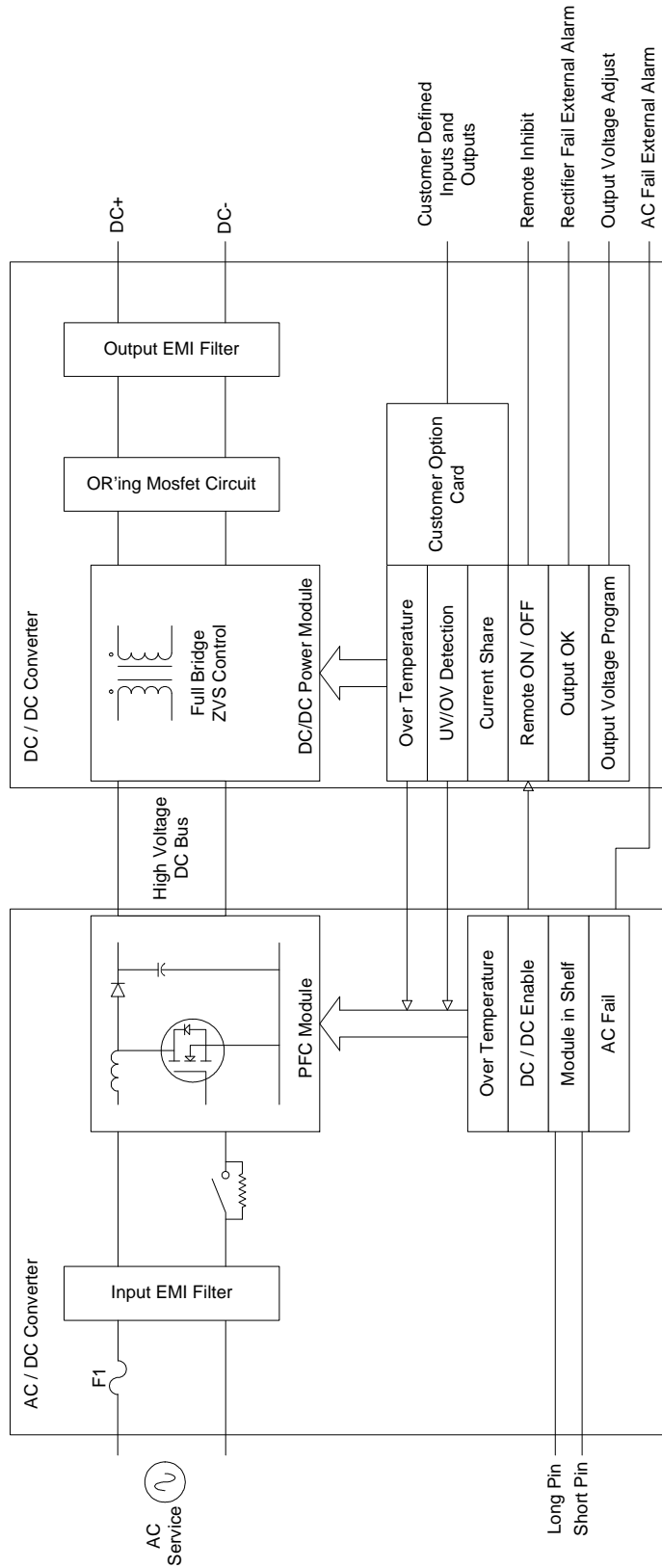


Figure 4 - Rectifier Block Diagram

Rectifier Shelves

The rectifier shelves are mechanical structures that allow multiple rectifiers to be installed within standard racks and cabinets. Each shelf also includes a backplane assembly that provides a mating socket for each rectifier and allows the rectifier's electrical interface to be consolidated and extended to connectors on the rear of the shelf.

In addition to the individual rectifier alarms extended through the backplane to the external connectors, the rectifier shelves also have an optional accessory board that consolidates the Output OK signals from each rectifier into a single summary alarm. This accessory card uses the module present signal from each rectifier to gate the Output OK signal to ensure that the summary alarm is not activated if a rectifier is not installed in a slot.

Remote Sensing (Active Share Modules only)

Remote sensing is used to allow the module to regulate its nominal output voltage at a remote point. This is often required to compensate for loads that are located some distance from the power systems such as battery plants or in high current applications where the resistance of the interconnect can become a factor.

If remote sensing is required the "remote sense return" should be connected to the polarity designated as the "DC Power Output return" and the "remote sense" to the opposite polarity connection.

When multiple shelves are operated in parallel the remote sense leads on each shelf need to be connected to the same point.

DIPswitch SW2 is an eight-position switch that connects the remote sense lines from each rectifier to the DB9 connector pins 2 & 3 for remote sense applications. This is only required for active share units, so the normal position of these switches is open. The sense lines should NOT be connected for droop share modules. See Figure 1 and 2 for location of switch SW2.

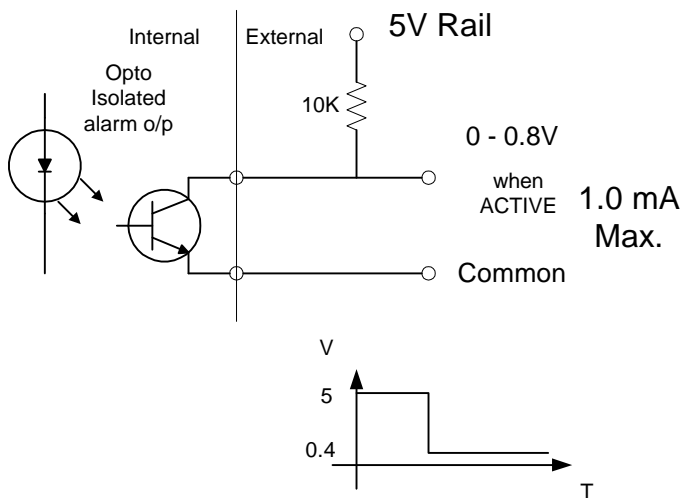
Current Share

When multiple shelves equipped with Active Current Share Modules are operated in parallel, the I share pins on each shelf need to be linked to each other. This connection is not required for Droop Current Share Modules.

Alarm Connections

The alarms that appear on the interface connector of each shelf all require an external pull up of 12V maximum and can sink 1mA maximum. If the pull-up is 5 volts (assumed), then TTL compatible signals are generated.

The TTL circuit required is detailed below. Each alarm output is rated for 1mA maximum.



AC OK

A TTL compatible signal indicating the state of AC input.

Normal Operation - A TTL-Low (0 to 0.6V) signal signifies AC voltage is within the required range to produce a reliable output.

Alarm Condition - A TTL-High (2 to 5V) signal signifies AC voltage is not within the required range to produce a reliable output.

Output OK

A TTL compatible signal indicating the state of the DC output

Normal Operation - A TTL-Low (0 to 0.6V) signal signifies DC output voltage is within 10% of the nominal.

Alarm Condition - A TTL-High (2 to 5V) signal signifies DC output voltage is not within 10% of nominal.

Summary Alarm (optional) - A TTL compatible signal that summarizes all the Output OK signals into a single alarm indication

Normal Operation - A TTL-Low (0 to 0.6V) signal indicates that all the rectifiers are operating and their outputs are within 10% of nominal.

Alarm Condition - A TTL-High (2 to 5V) signal signifies that one or more rectifiers have output voltages that are not within 10% of nominal.

Control Inputs

Remote Inhibit

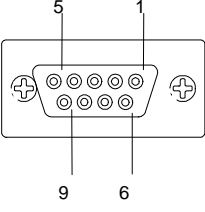
Application of input signal will cause the power to shut down and a summary fault alarm will be issued. TTL High = Inhibit. Pull up power must be externally provided.

Remote Program

0-5V signal adjusts output voltage at a rate of 4V per volt change in the control voltage. Nominal control voltage for nominal output is 4.096V, resulting in a typical output control range of 40V to 57.6V with a 0-5V control input on a 56 volt nominal output. The control signal must be externally provided.

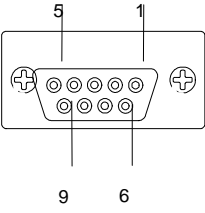
Pin #	Name	Description
1	I Share	Active current share
2	Remote Sense Return	Remote sense leads return
3	Remote Sense	Remote sense leads to battery or load bus
4	Inhibit Bay 1	Turns off output power
5	Inhibit Bay 2	Turns off output power
6	N/U	Not Used
7	N/U	Not Used
8	I Share	Active current share
9	N/U	Not Used

Table 5 - Connector J6 (1U Shelf)



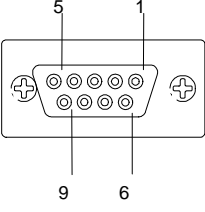
Pin #	Name	Description
1	I Share	Active current share
2	Remote Sense Return	Remote sense leads return
3	Remote Sense	Remote sense leads to battery or load bus
4	Inhibit Bay 1	Turns off output power
5	Inhibit Bay 2	Turns off output power
6	Inhibit Bay 3	Turns off output power
7	Inhibit Bay 4	Turns off output power
8	I Share	Active current share
9	N/U	Not Used

Table 6 - Connector J1 (2U 50A Per Module Shelf)



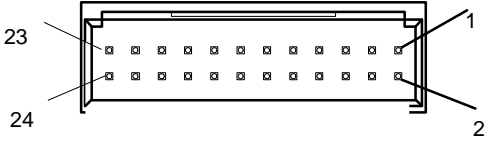
Pin #	Name	Description
1	I Share	Active current share
2	Remote Sense Return	Remote sense leads return
3	Remote Sense	Remote sense leads to battery or load bus
4	Inhibit Bay 1	Turns off output power
5	Inhibit Bay 2	Turns off output power
6	Inhibit Bay 3	Turns off output power
7	Inhibit Bay 4	Turns off output power
8	I Share	Active current share
9	Fault Return	Fault Return for Inhibit Bay 1, 2, 3, 4

Table 6A - Connector J1 (2U 100A Per Module Shelf)



Pin #	Name	Description
1	I Share	Active current share
2	Remote Sense Return	Remote sense leads return
3	Remote Sense	Remote sense leads to battery or load bus
4	Jumper to Pin 5	Cable Installed Jumper
5	Jumper to Pin 4	Cable Installed Jumper
6	Remote Sense	Remote sense leads to battery or load bus
7	Remote Sense Return	Remote sense leads return
8	I Share	Active current share
9	N/U	Not Used

Table 6B - Connector J1 (2U DC-DC Converter Shelf)



Pin #	Name	Description
J2: 1	Output OK	Rectifier 1 Fail Alarm
J2: 2	AC OK	Rectifier 1 AC Fail
J2: 4	Module Present	Rectifier 1 Present
J2: 5	Output OK	Rectifier 2 Fail Alarm
J2: 6	AC OK	Rectifier 2 AC Fail
J2: 8	Module Present	Rectifier 2 Present
J2: 20	Summary Fault Return	Output of the Summary Fault Daughter Board if fitted.
J2: 21	Summary Fault	Summary Fault
J2: 22	Fault/Signal Return	Return connection for all alarms and controls
J2: 23	Remote Adjust	Output Voltage programming voltage input
Pins, J2: 3, J2: 7, J2: 9 thru J2: 19 and J2: 24 are not used on this connector		

Table 7 - Connector J2 (1U Shelf)

Pin #	Name	Description
J2: 1	Output OK	Rectifier 1 Fail Alarm
J2: 2	AC OK	Rectifier 1 AC Fail
J2: 4	Module Present	Rectifier 1 Present
J2: 5	Output OK	Rectifier 2 Fail Alarm
J2: 6	AC OK	Rectifier 2 AC Fail
J2: 8	Module Present	Rectifier 2 Present
J2: 9	Output OK	Rectifier 3 Fail Alarm
J2: 10	AC OK	Rectifier 3 AC Fail
J2: 12	Module Present	Rectifier 3 Present
J2: 13	Output OK	Rectifier 4 Fail Alarm
J2: 14	AC OK	Rectifier 4 AC Fail
J2: 16	Module Present	Rectifier 4 Present
J2: 20	Summary Fault Return	Output of the Summary Fault Daughter Board if fitted.
J2: 21	Summary Fault	Summary Fault
J2: 22	Fault/Signal Return	Return connection for all alarms and controls
J2: 23	Remote Adjust	Output Voltage programming voltage input
Pins J2: 3, J2: 7, J2: 11, J2: 15, J2: 17, J2: 18, J2: 19 and J2: 24 are not used on this connector.		

Table 8 - Connector J2 (2U Shelf)

Pin #	Name	Description
J2: 1	Output OK	Converter 1 Fail Alarm
J2: 2	DC Input OK	Converter 1 DC Input Fail
J2: 5	Output OK	Converter 2 Fail Alarm
J2: 6	DC Input OK	Converter 2 DC Input Fail

J2: 9	Output OK	Converter 3 Fail Alarm
J2: 10	DC Input OK	Converter 3 DC Input Fail
J2: 13	Output OK	Converter 4 Fail Alarm
J2: 14	DC Input OK	Converter 4 DC Input Fail
J2: 20	Summary Fault Return	Output of the Summary Fault Daughter Board if fitted.
J2: 21	Summary Fault	Summary Fault Return
J2: 22	Fault/Signal Return	Return connection for all alarms and controls
J2: 23	Remote Adjust	Output Voltage programming voltage input
Pins J2: 3, J2: 4, J2: 7, J2: 8, J2: 11, J2: 12, J2: 15 thru J2: 19 and 24 are not used on this connector.		

Table 8A - Connector J2 (2U DC-DC Converter Shelf)

Configuration and Installation

When creating a part number for a rectifier shelf there is a number of options for which a code letter has to be selected the following is intended to help in identifying the correct code letter to select.

AC Input Selection

Both the 1U and 2U rectifier shelves offer a number of AC input options intended to match the rectifiers selected and the level of redundancy required. The IEC shelf is rated for 110 – 240Vac to UL60950. The Terminal Block shelf is rated for 90 – 275Vac.

Order Code	Description	Rectifier Supported	Notes
A	15A IEC Socket (1 per rectifier)	MER1200	(1)
B	20 Amp Terminal Block (TB), (1 per rectifier)	MER2700	(2)
C	65A Terminal Block (1 per shelf)	MER2700	(3)
E	20A IEC Socket (1 per rectifier)	MER2700	(4)
Notes:			
(1) Provides the ability to isolate each rectifier, 1200W rectifiers only, AC receptacles need to be within 1.8m (6ft) to use standard power cords.			
(2) Provides hard wired connection to each rectifier 20A capability allows user to install 1200W or 2700W rated rectifiers			
(3) Provides no AC input redundancy, recommended for multi shelf installations only.			
(4) Required if 2700W rectifiers are to be installed in the shelf. Cannot be used with standard utility sockets requires a minimum 20A service.			

Table 9 - AC Input Option Selection**20-Ampere Terminal Block**

The 20-Ampere terminal block vendor is Weidmuller, P/n 0289760000.

Wire size options are:

	UL	CSA	VDE
Rated Voltage	300 V	300 V	500 V
Rated Current	30 A	25 A	36 A
Wire Size	#22...10 AWG	#10 AWG	6.0 mm ²

Table 10 - 20 Ampere Terminal Block Wire Size Options**Rectifier Shelf Mounting**

To allow the rectifiers to be installed in either 482.6mm (19") or 584.2mm (23") racks the shelves can be fitted with different mounting ears.

Order Code	Rack Width	Notes
A	482.6mm (19")	
B	584.2mm (23")	

Table 11 - Rack Mounting Options

Alarm Selection

Within the list of alarms the user has the ability to select certain standard configurations.

Table 12 lists the available options.

Order Code	Alarm Combinations	Notes
A	None	
B	TTL	See connector pin out for alarm details (Summary Alarm option pcb not fitted)
C	TTL + Summary	See connector pin out for alarm details (Summary Alarm option pcb fitted)
D	Form C	Option B shelf with Alarm Relay Module, 706162, provides Form C contacts and Summary Fault Alarms.

Table 12 - Alarm Options

AC Service Configuration

To ensure maximum reliability all the rectifiers in a shelf should not be powered from the same AC source. This is necessary to ensure that something as simple as a tripped circuit breaker does not cause a complete power system failure. Typical AC configuration diagrams for a 2U shelf fitted with the various AC Input options are shown in Figure 5 thru 8 and the same basic rules apply when configuring the 1U shelf or multiples of either shelf. When installing shelves with AC Options "A" or "E" the optimum configuration is shown In Figure 5.

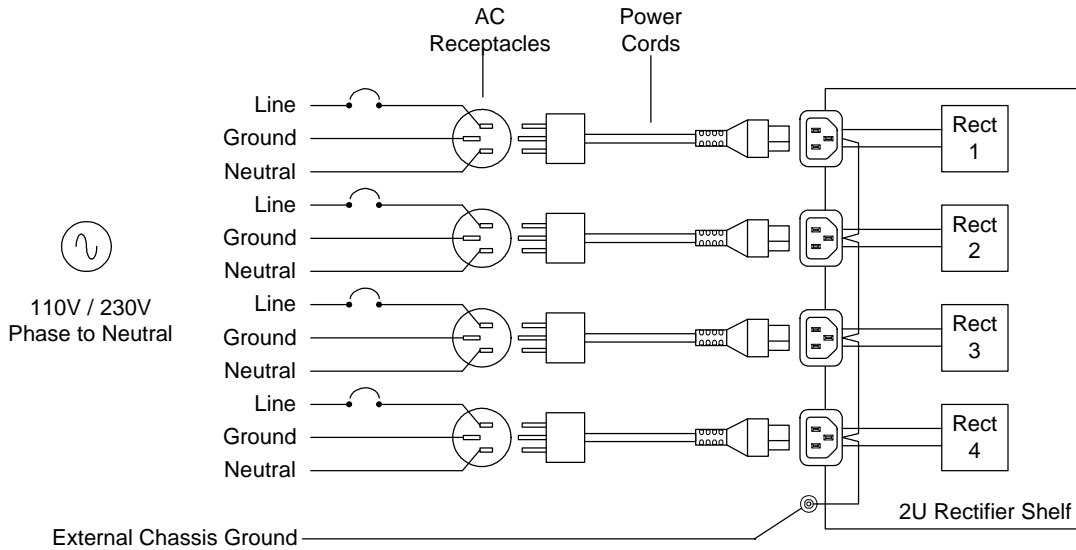


Figure 5 - AC Options "A" or "E" with a Phase to Neutral AC Supply

The optimum configuration for AC input option "B" is shown in Figure 6.

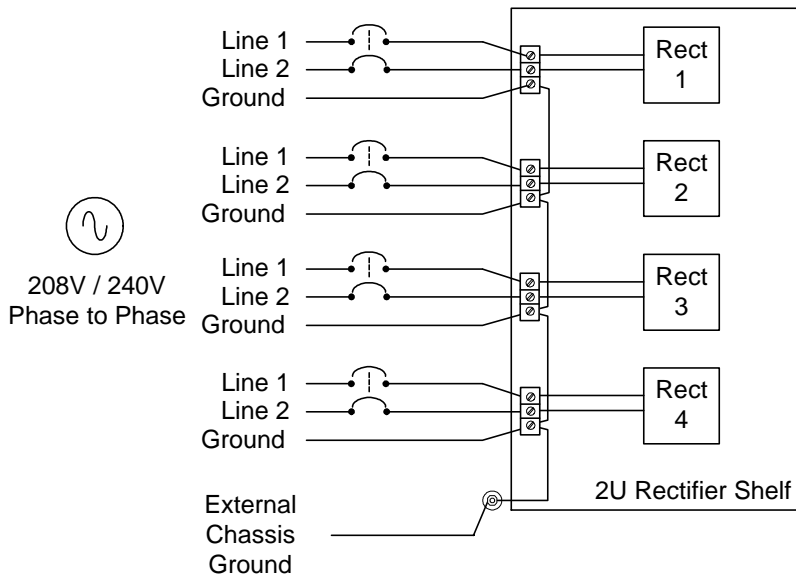
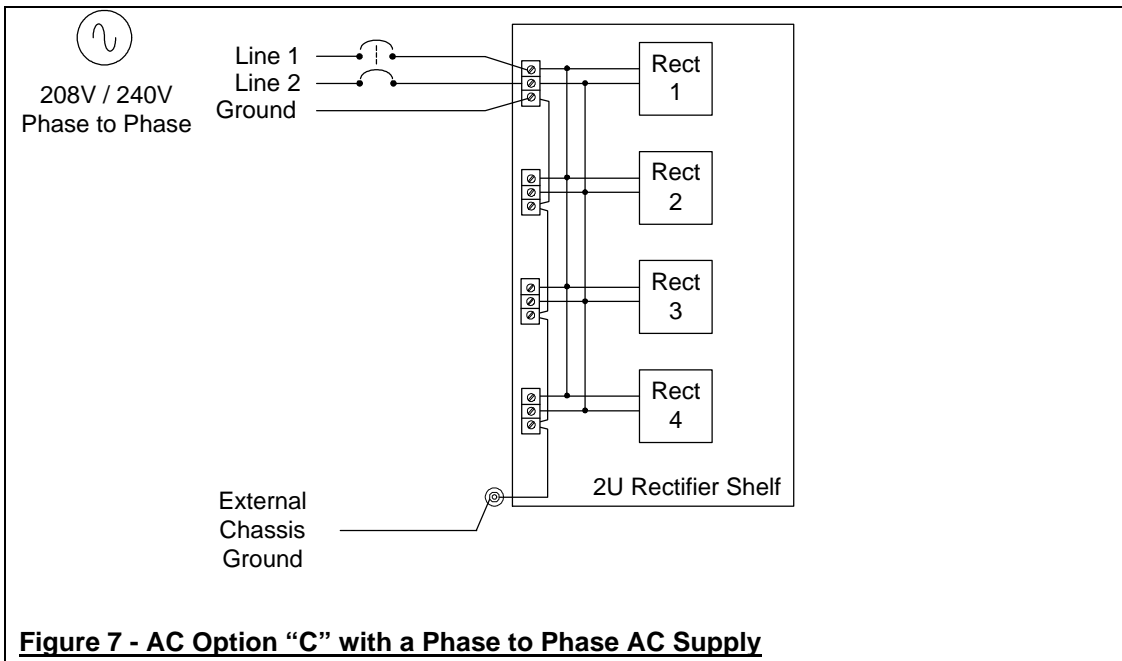


Figure 6 - AC Option "B" with a Phase to Phase AC Supply

AC input Option "C" is not recommended if only a single shelf is to be installed. This option should be used only when multiple shelves are to be installed supplying a common DC load.



DC Output

The DC output on both of the rectifier shelves is located at the center of the rear panel. It consists of four (4) $\frac{1}{4}$ " – 20 studs and is intended for use with two hole compression cable lugs. As the only over current protection for the output cables is the current limiting capability of the rectifiers. The cables have to be sized to carry the maximum current capable of being supplied by two or four rectifiers depending on the type of rectifier shelf installed.

24Hr Service Hot-line

TDI provides 24-hour response to your field service needs utilizing our infrastructure of offices and representatives strategically located throughout the United States. Should an emergency arise during normal business hours, please call (908) 979-0088 and request service or technical assistance.

If you are calling after our normal business hours, please use one of the following technical assistance numbers:

1-888-575-8875

Or when calling Internationally

1-973-283-7236

Your call will be returned as soon as possible by one of our field service technicians.

Please note: All components of the TDI DC power system are warranted (see TDI's General Terms and Conditions) to be free of defects in material and workmanship for a period of two (2) years from date of shipment to the original purchaser. In the unlikely event a component of the TDI DC power system should fail, the following procedures should be followed to expedite the repair and/or replacement of the failed module.

RMA procedure

In the event that your equipment requires service please use the TDI Customer Service Portal described in the next section or contact TDI's customer service group (T: 908 979 0088) initially you will be offered technical support if necessary you will be issued an RMA number.

In preparation for the call to Customer service please ensure you have the following information: model, serial number and some details of the fault condition (plus your contact details).

1. Contact the authorized TDI repair facility at the address and phone number shown below to obtain a Return Authorization Number for the failed unit.

Transistor Devices Inc.
Commercial Products Division
Customer Service
36 Newburgh Road
Hackettstown, NJ 07840
(908) 850-5088

2. Please have the following information available when you call:

- Description of component including serial no. (if available)

- In service date
 - Nature of the failure
3. The TDI authorized factory representative will determine the method of return/replacement based upon the information provided.
 4. Ship the failed unit back to the designated repair facility per the instructions from the authorized representative, transportation charges PREPAID.

Please note: Components that fail after the warranty period has expired, or which fail due to misuse or abnormal operating conditions, will be repaired at the purchaser's expense. In such cases, an estimate will be made and submitted prior to repair. In cases where it is determined that no fault or malfunction exists in the returned unit, there will be a nominal handling and verification charge.

TDI CUSTOMER SERVICE PORTAL

Transistor Devices, Inc. (TDI) is continuously seeking ways to improve our customer service performance. We are pleased to announce our Customer Service Portal located at www.tdipower.com. This *eTraveler* portal is designed to give our customers more service options and direct online access. Customers can now centrally track and manage their production orders through this new communication channel. You can also check on the status of your service returns and review repair/upgrade history.

Customers can obtain a Return Material Authorization (RMA) number to return a product to TDI for evaluation, repair or modification. You can also print a shipping label for your package. The information that you provide to us will automatically be logged into our *eTraveler* Service Return Log and forwarded to your TDI Customer Service Representative.

Contacting TDI is as easy as clicking "Send an Email to TDI". Escalated messages will be sent to the TDI Customer Service Representative's cellular phone for immediate action.

During major programs, you can collaborate with our project team through the *eTraveler* Issues Manager database that is accessible to all team members. The *eTraveler* Issues

Manager database not only serves as a communication tool; it is also a knowledge database to store important information related to your program. It enables the team to review published specifications, drawings agendas, program schedules, and follow up on action items made during online meetings.

All you need is a web browser to quickly and easily access the system. Please contact your TDI representative to obtain a customer ID and password to the portal.

Then simply click  .

Appendix A: Rectifier, Converter, Shelf Part Numbering Scheme

Rectifier Example MR12WRB-P27D00

ME R 12 WR B - P 27 D 00

Mercury Family	Type		Power Rating		Input Range		Module Size		- To separate the base number from the variable	Output Polarity		Output Voltage	Current Share		Options	
	R	Rectifier	12	1200 Watts	WR	Wide Range	A	1U		P	Positive	12	A	Active	00	None
	R	Rectifier	27	2700 Watts	HI	230V	B	2U		N	Negative	24	D	Droop		
	C	Converter	12	1200 Watts	N4	-48Vdc						27				
												48				
												54				

Shelf Example MES050B-60AAB00

ME S 050 B - 60 A A B 00

Mercury Family	Type		PSU Rating		Chassis Height		- To separate the base number from the variable	Max Volts	Input Connector		Width		Alarms		Options	
	S	Shelf	050	25A & 50A	A	1U			A	15A IEC connector (1 per rectifier)	A	19"	A	None	00	None
	S	Shelf	100	100A	B	2U			B	20A Terminal Block (1 per rectifier)	B	23"	B	TTL		
									C	65A Terminal Block (1 per shelf)			C	TTL+Sum		
									D	DC Bus (1 per shelf)			D	Form C		
									E	20A IEC connector (1 per rectifier)						

Appendix B: Rectifier / Shelf Outline drawings

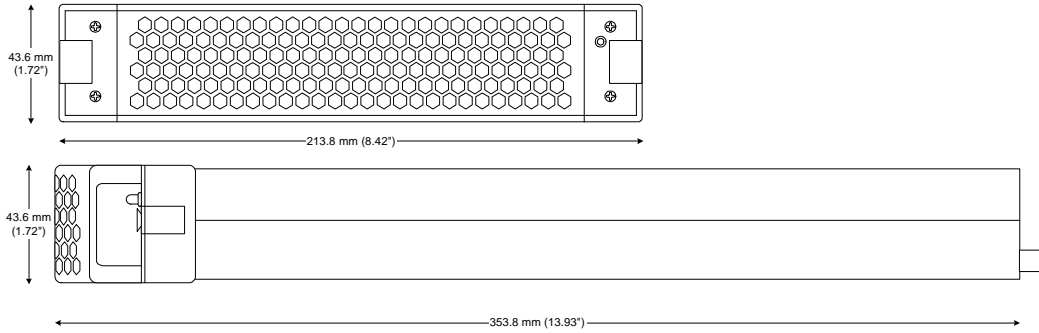


Figure 8 - 1U Rectifier Outline Drawing

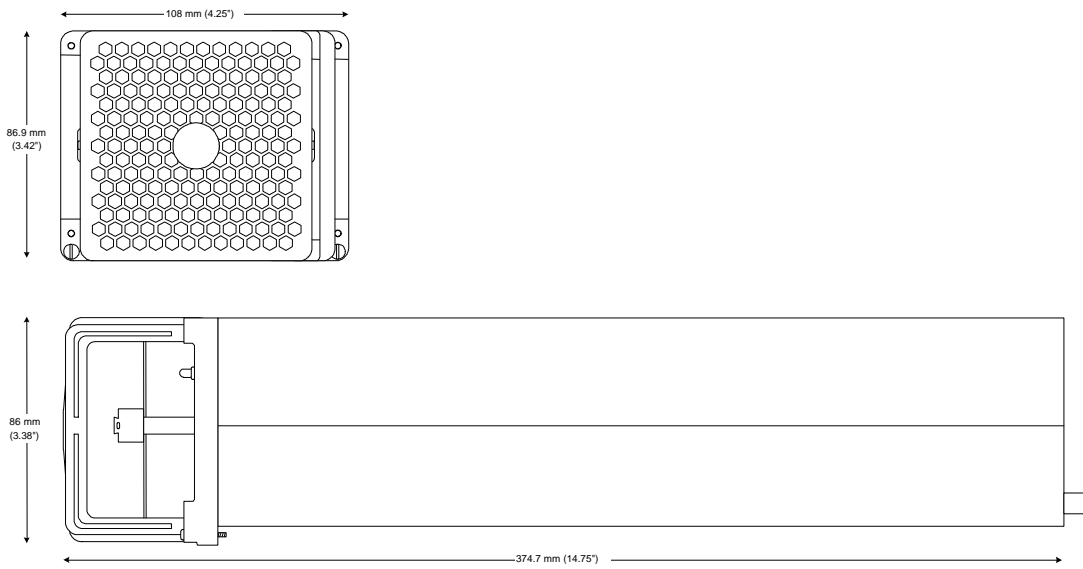


Figure 9 - 2U Rectifier Outline Drawing

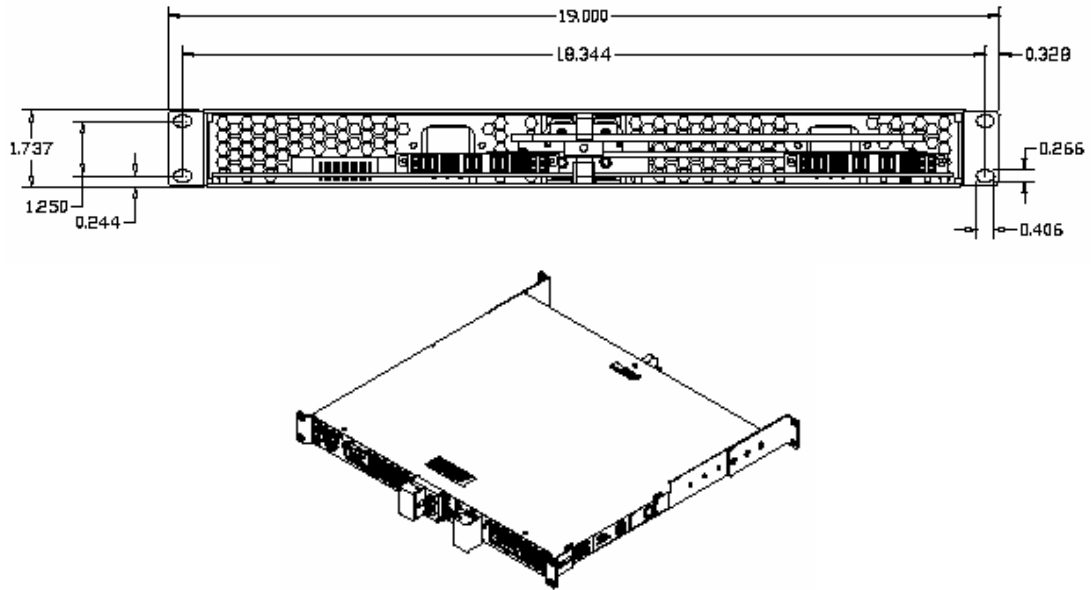


Figure 10 - 1U Shelf Outline Drawing

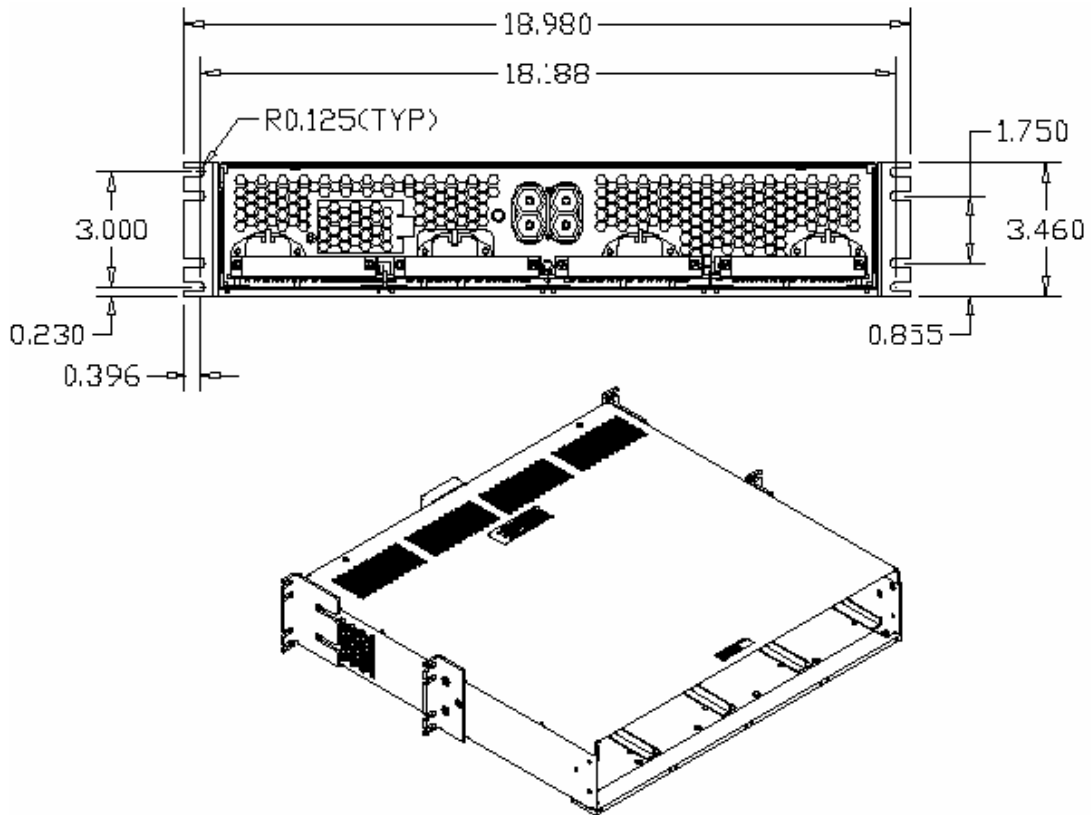


Figure 11 - 2U Shelf Outline Drawing

Revision History

Revision	Description	Comments	Date
A		Reorganized and renumbered Figures, 1 to 4, 2 to 5, 3 to 6, 4 to 7, 5 to 8, 6 to 9, 7 to 10, 8 to 11, 9 to 1 and added new Figures 2 and 3. Reworded text to reflect Figure number changes. Updated Declaration of Conformity on Page 7 and TUV Certificate on Pages 8 and 9. On page 13, in the section titled "Agency Compliance", added "IEC60950" in the Safety section. On page 16, under the word "Safety", added "IEC60950". Also on page 16, under "CE Mark", replaced "..... are designed for Compliance" with "..... are approved and comply with the" . Changed AC-DC Converter to Boost Converter on Page 28. Added Table 3A on Page 32 under the Input / Output Connections section to cover the 100A Rectifier connector. Added TDI Customer Service Portal Information on Page 46.	09/20/06