



# MIL COTS POWER

CONVERSION PRODUCTS COMMERCIAL OFF THE SHELF



# UNIQUELY QUALIFIED

## OVERVIEW

Military applications present challenges to power conversion products by the very nature of the harsh environment they must operate in. They are first required to demonstrate reliability during all test phases, but more importantly in the battlefield, performing in the demanding application itself- where it counts. Reliability is the key driver in mission critical applications and for over 50 years, AstrodyneTDI has demonstrated a solid history and reputation in the military marketplace, providing solutions for many of today's sophisticated weapon, command and control systems. These power systems are designed to meet stringent MIL STD specifications and endure the harsh environmental and electrical requirements of today's battlefields. Today, Astrodyne TDI COTS can assist in low and high power conversion of AC to DC, DC to AC, DC to DC as well as all EMI filter requirements in between.

**Power Supplies - Filters - Inverters - Converters - UPS - Systems  
Low Power - High Power - Filters - Ruggedized - Environmentally Sealed -  
Power Conversion Systems**

## BENEFITS OF COTS/MODIFIED COTS

Many military contractors worldwide are sensitive to costs, design cycles and performance. There are many applications with requirements that need to withstand the rigors and extremes of mother nature, where most off the shelf power products designed for commercial use would not endure. Many Astrodyne TDI power products were engineered specifically as platforms for industrial, automotive and military applications so the design effort using Astrodyne TDI COTS is greatly reduced not only internally, but also for contractors and integrators who need to qualify to MIL specifications to suit specific ruggedness and environmental requirements. The use of COTS results in overall reduction of cost and development time, faster deployment of solutions and shorter lead times versus a customized built-to-order solution.

**Reduce Cost - Reduce Development Time - Speed Time to Market -  
Shorter Lead Times - Low Risk**

Count on AstrodyneTDI for all of your military COTS and modified COTS requirements

## MANUFACTURING IN USA

Astrodyne TDI offers US manufacturing along with the benefits of global sourcing, when acceptable. Our manufacturing facilities are fully certified to ISO9001:2008 and ISO 14001:2004 RoHS.

### HASS:

Highly Accelerated Stress Screening (HASS) is performed on 100% of all Astrodyne TDI high power, production ready COTS products (each and every product produced). More stressful than Mil-Spec Environmental Stress Screening (ESS), HASS subjects units under test to a rigid temperature, shock vibration and electrical parameters profile.



### HALT:

Highly Accelerated Life Testing (HALT) is pre-production process performed to uncover limitations in product design, component selection and manufacturing that would not otherwise be found through conventional qualification methods. The process subjects the unit to progressively higher stress levels, incorporating thermal dwells, rapid temperature transitions, vibration, and a combination of temperature and vibration to precipitate inherent defects. Astrodyne TDI performs HALT on each and every high power design.

- 200,000 Sq. Ft.
- 6 SMT Lines
- PTH Assembly & Wave Solder
- PCB In-Circuit Test and Sub-Module Test
- HASS – Highly Accelerated Stress Test
- ISO 9001:2000, 14001:2004 RoHS
- Overseas locations share common manufacturing and test equipment and processes with USA
- Easy transition from pilot production to volume production
- Redundant manufacturing capability

100%  
HASS  
TESTED



**MODULAR  
FLEXIBLE  
SWAPPABLE  
PROGRAMMABLE**

## **VERSATILE AC-DC POWER**

### **MERCURY SERIES AIR COOLED SUPPLIES, SINGLE PHASE**

SWAPPABLE - SCALABLE - WIDE RANGE - DIGITAL CONTROL



*Mercury 2U modules with HOT-SWAP shelf*

The Astrodyne TDI 3.8kW Mercury-Flex is the perfect rectifier solution for applications that require a flexible digitally controlled industrial power supply with a universal 90 to 264VAC 50/60Hz single phase input, and a wide choice of DC output voltage ranges. Standard Mercury varieties of 28V, 56V, 85V, 125V and 400V are available.

Using digital CAN-Bus commands, Mercury-Flex can be field programmed to operate in a constant voltage, constant current, or constant power mode. The digital readback feature provides output voltage and current values, operating temperature, and protection alarm status.



*LiquaBlade™ 1U Module*

## **LIQUABLADE™**

### **LIQUID COOLED SUPPLIES; UNIVERSAL THREE PHASE**

SWAPPABLE - SCALABLE - WIDE RANGE - DIGITAL CONTROL

The LiquaBlade™ Series are the latest breed of industrial grade, high power three phase AC-DC power supplies engineered by Astrodyne TDI. These rectifiers combine advanced DC power processing, the latest silicon carbide semiconductors, patented liquid cooling and sophisticated microprocessor controls, resulting in up to 16 kW per blade of power in a single 1U (1.75" height) rack style package. The high frequency switch-mode design employed in LiquaBlade™ offers full active power factor correction, near unity power factor and excellent output responsiveness. The wide AC input range of 380-480V 50/60Hz permits universal three phase usage without the need of an external step down transformer. LiquaBlade™ is fully programmable - the perfect flexible high power supply solution when noise needs to be kept at a minimum or where conductive air debris may be present.

## LIQUABLADE™ ACCESSORIES

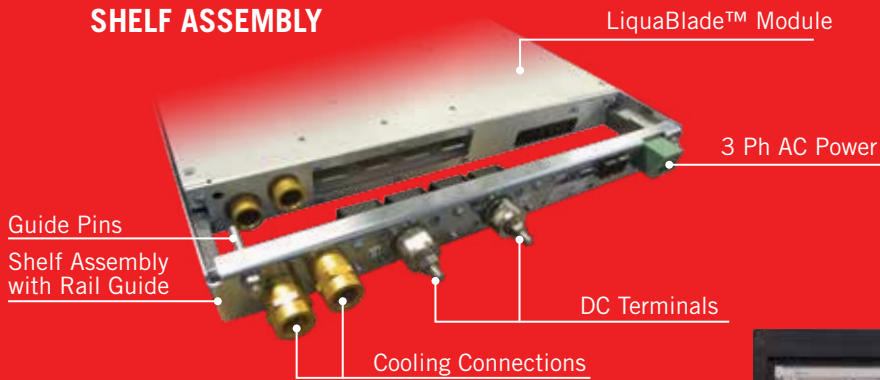


### SYSTEM CONTROLLER

*Monitor, Control and Administration*

- Interfaces to Liqueblade™ CAN Controlled Power Supplies / Rectifiers
- 1U Rack Height
- 10 Base T Ethernet Interface
- 6 Analog Interface D-Sub connectors for control of up to 6 “power zones”
- Configurable via the Ethernet Interface, 0-10V analog interface or both
- Integrated Web Server
- N+1 Redundancy Enabler for Liqueblade™ Modules

### LIQUABLADE™ WITH EASY SWAP SHELF ASSEMBLY



### RACK SYSTEMS

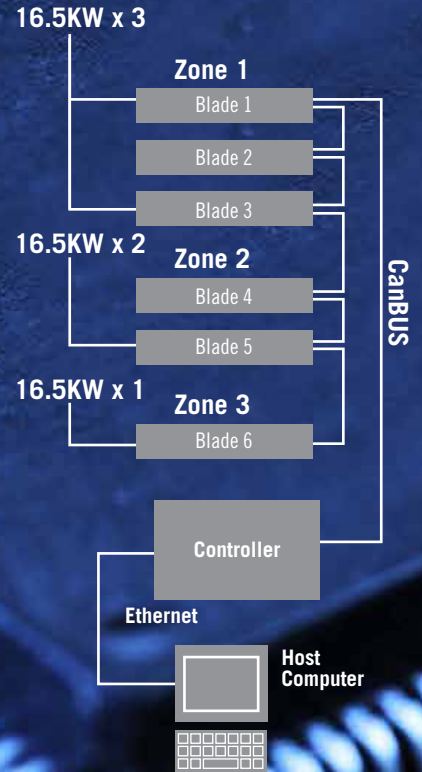
*Astrodyne TDI can offer engineered system solutions, when required.*

- Rack Assemblies with Complete Busing/Plumbing/Power Distribution
- AC Input Circuit Breaker Panel
- Multi-Zone System Controls
- Self-Contained Heat Exchange System
- Dew point Monitoring for Anti-Condensation Control



*Up to 500 kW in a single 52" rack system*

### EXAMPLE LAYOUT DEMONSTRATING (3) INDEPENDENT LIQUABLADE™ ZONES WITH VARIOUS POWER LEVELS



**1U HEIGHT  
ENABLES  
SIGNIFICANT  
SPACE SAVINGS**

## INDUSTRIAL DC-AC INVERTERS

SWAPPABLE - SCALABLE - 24V/48V and 120V/220VAC VERSIONS

LCE Shelf Assembly with back plane



The LCE inverter is parallelable, hot swap compatible and supports N+1 redundancy. The interlocking cam actuated handle turns power off before removal and power on after insertion for glitch-free hot swapping of inverter units. Cabinets, shelves and controllers are available for large and complex indoor and outdoor systems.

The LCE series is fully scalable, permitting multiple modules to be paralleled in single phase (up to 36KVA) or three phase applications (up to 20KVA per phase). Full power can be provided over an ambient temperature range of -20 to +55°C.

**For low power inverters (500VA),  
look to the LPE Series (1U height)**



*e-link  
controller*

## UPS AND BATTERY BACKUP

The LCE and Mercury Series are field proven in MIL applications such as UPSs and backup power in both ground and sea. Utilizing Mercury power supplies, LCE Inverters and E-Link Controllers for status reporting and remote administration, Astrodyne TDI has a library of system offerings to match your UPS and backup requirements. For battery backup, Astrodyne TDI also offers blind Mate /hot plug battery backup units (500W-Hr per U of rack space) for easy installation/removal and expansion.



*Blind mate/hot plug  
battery backup unit*

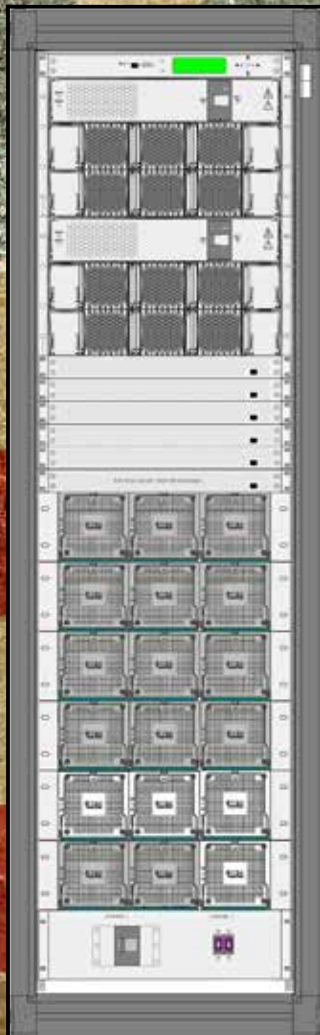


- Designed for standard 19" equipment racks
  - 220/230VAC 1-ph or 3-ph Input Power
  - 120/240VAC Output Power
- Scalable and Expandable
- Hot swappable
- "Mercury" Rectifier based AC-DC Power Supply
- LCE (or LPE) Inverters DC-AC Conversion
- "eLink" Monitoring and SNMP Reporting Module
- 1U Lithium Ion battery box with charge management(500W-Hr per U)

**Astrodyne TDI**  
Now you have power.



*Example of  
10kW UPS System with  
Lithium Ion Battery Backup*



*Example of  
20 kW UPS System with  
Lithium Ion Battery Backup*

## SPECIALIZED PRODUCTS

### ICCP: IMPRESSED CURRENT CATHODIC PROTECTION RECTIFIER SYSTEMS



**2.5kW, field serviceable system**  
with convection cooled ESPM sealed rectifier, encapsulated in either silicon RTV or oil



**15kW, field serviceable system**  
with on-board liquid cooled rectifier, heat exchange system with pump and reservoir, IP65 grade

**AN APPROVED  
MILITARY  
SUPPLIER**



### PORTABLE POWER DISTRIBUTION

AC-DC Supplies with DC-AC inverter plus circuit breakers and local indication in MIL transit case



### ELECTRIC AND HYBRID VEHICLE

LiquaCore Series Liquid Cooled DC DC Converters for electric vehicle applications; 400 to 12VDC, 400 to 24VDC or 700 to 24VDC varieties available



### STATIONARY DC POWER SYSTEM

440/480VAC 3-Phase, 3-Wire Input, 15kW DC output with Mercury rectifiers, circuit breakers and metal case for 19" rack assembly



# EMI FILTERS

## EMI FILTERS

Astrodyne TDI has over two decades of experience in design, development and manufacturing of a complete range of AC and DC EMI/ RFI/ EMC filters for military and aerospace applications. Our standard line of military EMI Filters provide off-the-shelf performance for MIL-STD-461 and RTCA/DO-160 applications. Our standard offerings are also complemented by a diverse capability to design and build customized and custom filters and configurations.

Most MIL-COTS EMI filters are designed for ambient temperature of  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$  to  $+158^{\circ}\text{F}$ ) and operate in this range without any de-rating. Some of our single phase rugged COTS EMI filters are designed for an extended ambient temperature of  $-40^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$  to  $+176^{\circ}\text{F}$ ). All Military EMI Filters have operating temperature range up to  $100^{\circ}\text{C}$  ( $212^{\circ}\text{F}$ ) and storage temperature down to  $-55^{\circ}\text{C}$  ( $-131^{\circ}\text{F}$ ).



- MIL-STD-461, RTCA/DO-160, MIL-STD-810
- EMI FILTERS
- EMP/HEMP FILTERS  
(MEET MIL-STD-188-125-1 POINT OF ENTRY REQUIREMENTS FOR SHORT/ INTERMEDIATE PULSES)
- FACILITY/SHIELDED ROOM POWER LINE FILTERS
- DATA/COMMUNICATION/ CONTROL LINE FILTERS
- TUBULAR FILTERS FEATURING HIGH QUALITY FEED-THROUGH CAPACITORS (14000 SERIES)
- FREQUENCIES RANGING FROM 47 TO 880 HZ



## ENCAPSULATED BRICK POWER MODULES

Encapsulated brick power modules are frequently chosen for use as components in commercial off-the-shelf military power system designs. Outstanding electrical performance, coupled with mechanical packaging features such as insulated metal substrates, planar magnetics and thermally conductive potting make RO the bricks of choice for high performance, high power density systems. Electrical performance features such as high efficiency and superior thermal design make the RO bricks easy to cool in closed box applications, where air flow is limited, or in any such applications where ambient temperatures are high.

### AC TO DC

#### PFC 180

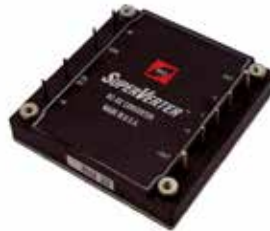
180W 1/4 Brick



### DC TO DC

#### SV24

24V Input 300-350W 1/Brick



#### PFC 375

375W 1/2 Brick



#### SV48

48V Input 300-350W 1/2 Brick



#### PFC 650

650W 3/4 Brick



#### nV300

300V Input 1/2 Brick 120W



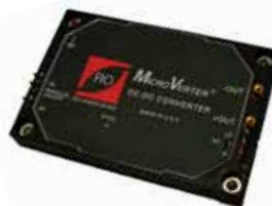
### SMV SERIES OF BOARD MOUNT

500W AC/DC with PFC Full Brick

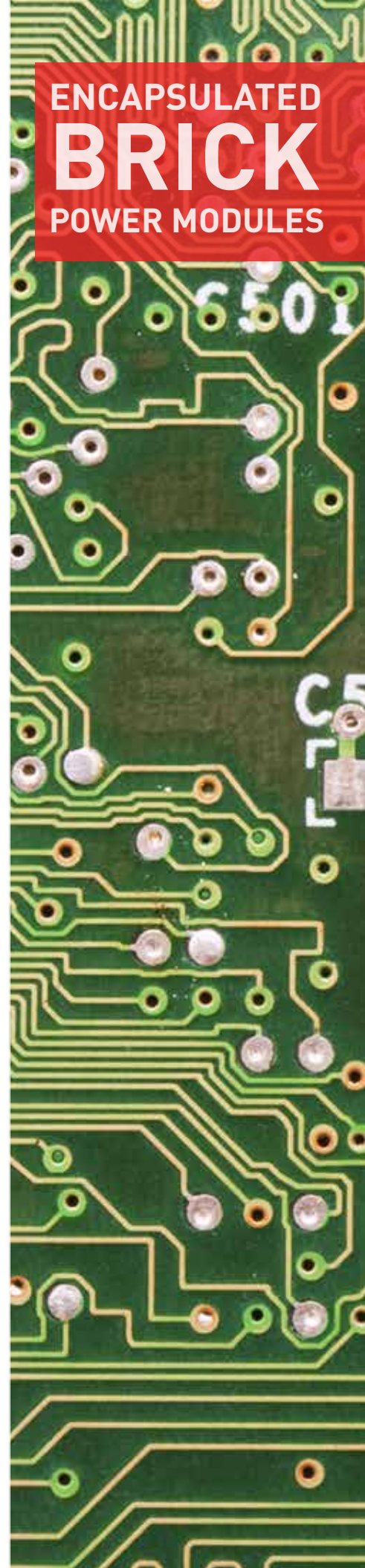


#### uV300-164

300V Input 3/4 Brick 300W



ENCAPSULATED  
**BRICK**  
POWER MODULES



# PROTECT AGAINST:

- CONDUCTIVE DEBRIS INFUSION
- HIGH TEMPERATURE & CONDENSING HUMIDITY
- INDUSTRIAL PROCESS BYPRODUCTS
- -IP67, NEMA-3, NEMA-4, NEMA-6 HAZARDOUS LOCATION

## PERFORMANCE

With proper implementation, Astrodyne TDI COTS Power modules and filters have demonstrated typical performance specifications of:

**TEMPERATURE:**  
-40°C to +65°C

**HUMIDITY:**  
100%RH

**SALT SPRAY:**  
MIL-STD-810F, Method 509.4-1

**FUNGUS:**  
MIL-STD-810F, Method 508.5-1

**SAND AND DUST:**  
MIL-STD-810F, Method 510.4-1

**ALTITUDE:**  
10,000 ft., MIL-STD-810F, Method 500.4-1

**SHOCK:**  
MIL-STD-810F, Method 516.5, Para. 2.2.2, Procedure 1, Functional Shock

**VIBRATION:**  
MIL-STD-810F, Method 514.5A, Para. 2.4.1, Category 24 - All material - minimum integrity test

**EMI:**  
MIL-STD-461

As an approved military supplier to the US Department of Defense, Astrodyne TDI is compliant to the regulatory requirements as mandated by all defense branches.

### HINGED OUTDOOR ENCLOSURES

solar and rain resistant



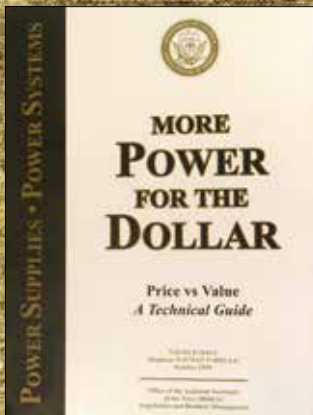
### OIL FILLED ENCLOSURES

for saturated or dust environments



### PORTABLE ENCLOSURES

shock resistant, water tight



Electrical De-rating  
Guidelines per  
NAVSOP-3641A

## DC ELECTRONIC LOADS

Driven by the need to test our DC supply designs, Astrodyne TDI developed our own line of electronic loads based on a paralleled power MOSFET architecture, analog and/or digital signal processing feedback loop control, extensive measurement functions, thermal management and synchronized master/slave paralleling control mode technology. Astrodyne TDI gained extensive and valuable knowledge in developing rugged and reliable products, where today we retain a leadership role in the DC load market for the military segment. Astrodyne TDI Dynaload® high power density DC electronic loads are used for a wide variety of power source test requirements ranging from DC power supplies to fuel cells to batteries, and more. Product offerings range from single channel air or liquid cooled loads, to multi-channel loads to multi-channel systems to suit your specific requirements.



- Single channel air cooled
- Multi-channel air cooled
- Single channel water cooled
- Master/Slave functionality
- Rack Systems air cooled and water cooled (120kW and higher)

## KEY FEATURES

- Ultra fast slew rate
- Flexible duty cycle
- Full scale range switching (three selectable)
- Assortment of performance indicators
- Exceptional self-protection circuitry
- Over voltage (OV)
- Over current (OC)
- Reverse polarity
- Thermal protection (with auto-disconnect)
- Simultaneous LED display of voltage current and power
- 10+ Memory Presets for Saving Load Profiles
- Remote voltage sense
- 120V/230VAC 50/60Hz
- Ethernet, IEEE488 GBIP, RS232 plus 0-10V analog control
- Labview drivers



**HIGH  
POWER  
DENSITY**



CONTACT ASTRODYNE TDI TODAY  
WITH YOUR SPECIFIC REQUIREMENTS.

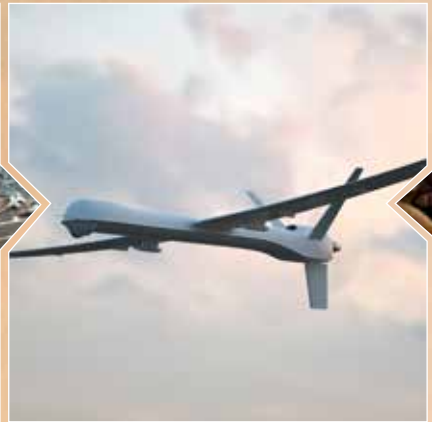


[www.AstrodyneTDI.com](http://www.AstrodyneTDI.com) | +1 908-850-5088

# POWER. EVERYTHING DEPENDS ON IT.

When the need for power conversion is at its most demanding...its most critical... for over 50 years, the solution has been Astrodyne TDI. Today, our unmatched experience across multiple industries enables us to deliver a wide range of power-based technology solutions for some of the most well-known companies in the world. From off the shelf standard power supplies and electronic loads to complete customized power systems, the solution is always as close as Astrodyne TDI.

**NOW YOU HAVE POWER.**



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