DIGITAL SWITCHING POWER AMPLIFIERS

ets solutions

ADVANCING TECHNOLOGY IN DYNAMIC TESTING

MPA100 Series
MPA400 Series
MPA700 Series
MPA3000 Series

The MPA Series
Digital Switching Power Amplifier Family

The ETS Solutions MPA series amplifier family is a wide frequency band digital switching (Class D) Power Amplifier designed with latest state-of-the-art technology. A number of built-in features in the amplifier allow vibration testing to be simple and easy. The MPA amplifier series are made for continuous operation with each configuration adaptable to any existing or new air-cooled / water cooled electro-dynamic shaker. Amplifier outputs range from 1 kVA to 300 kVA.

Performance

High conversion efficiency (greater than 90%) for energy saving.
High modulation switching frequency
Low total harmonic distortion (< 0.5% at typical testing frequency)
High signal to noise ratio (> 65%)
Exceeds ISO Peak current rating of 4-Sigma

User Interface

Intelligence microprocessor logic control and monitoring system
Interactive system interface
Green back lit LCD for system status and diagnostic messages
Auxiliary Interlock Unit (AIU) for additional safety interlock I/O points (Optional)
Remote control panel via RS485 communication (Optional)

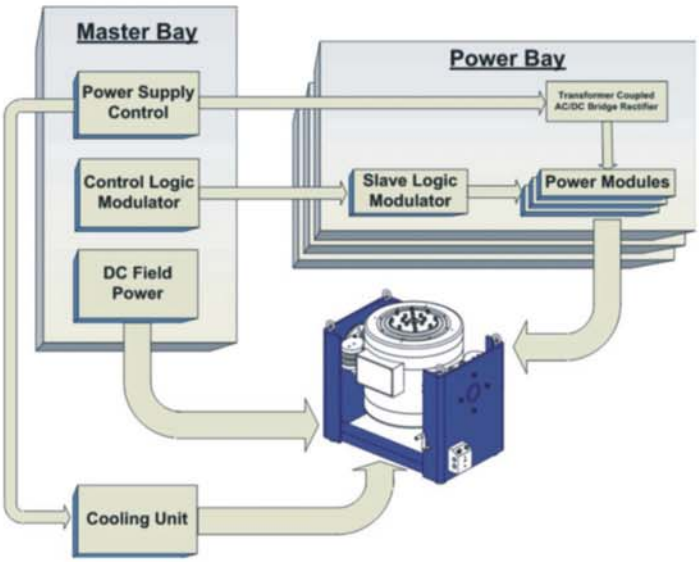
Safety and Reliability

Soft-Start and Soft-Stop circuits
Detailed scope of system interlock protections
International compliance to safety and EMC standards
Totally air cooled amplifier designed for continuous and safe thermal operation
All-encompassing fuse protection for high current system components
Designed to reduce reliance on mechanical switch gears with CPU logic controlled
Complies with USA, European and International safety and EMC regulations

System Maintenance

12 kVA power modules configured with two self-reliant sub 6 kVA modules
Interchangeable compact size power modules
Space saving compact size designs
Easy maintenance and rapid servicing
Worldwide spare parts support

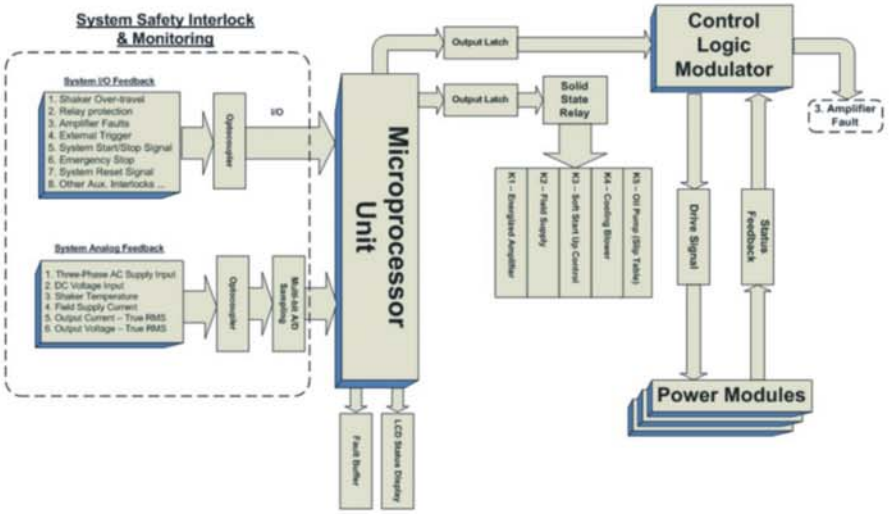
MPA3000 Series Amplifier



High performance MPA3000 Series amplifier has full power output of up to 300 kVA. Designed for use with ETS Solutions 'H' Series water cooled shakers and configurable to couple with any large sized water cooled shaker system. The power supply for the field coil, cooling unit, hydraulic unit or other ancillary units are provided by the amplifier. Integrated ancillary units can be part of the start-up and stop sequences.

A master bay contains the main logic commands and power supply control. Multiple units of power bays with either full or partial complement of power modules are configurable to the required power output. Each power bay accommodates a transformer coupled power supply, a slave logic module and a maximum of 84 kVA power output. Parallel connected power bay current sharing differential is less than 1%. There is no risk of failures due to unbalance load between each power bay even under shock test conditions.

Standard power modules from the MPA Series amplifier family are used in the MPA3000 amplifier. The modular, interchangeable power units allow fast replacement and minimum downtime with other amplifiers within the same family.



Logic Control Unit

Managed by high-speed microprocessor logic unit, the intelligence logic control system assures high output power with maximum safety protection. High switching frequency delivers low distortion with full power output over a broad frequency band.

Control logic modulator handles generation of pulse-width modulated driving commands to the power output modules. System digital and analog feedbacks are optically isolated and processed by the high speed microprocessor unit. System status and fault indications are real-time displayed on the green back lit LCD panel. Fault occurrences are relayed as interactively on the LCD panel with alarm indication. Solid state relay ensures reliable electrical power control. Power modules operating status are on-line monitored by the control logic modulator. Any over-current, short-circuit or over-temperature situation will prompt an instantaneous system halt.

An optional remote control panel can be connected to the logic module via RS485 communication port. The remote control panel allows full system control at a distance control room of up to 500m.

Power Output Module

Modular and compact sized power output modules are designed with the latest solid state MOSFET technology to ensure optimum performance reliability and overall system efficiency (> 90%). Pulse-width modulated commands from the logic module drive the power modules conversion of DC power rectified from AC line power into variable amplitude and frequency driving power for the shaker. Switching command signals are optically isolated and routed via a ribbon cable. Ample heat sinking and cooling fans are incorporated to allow continuous safe thermal operation.

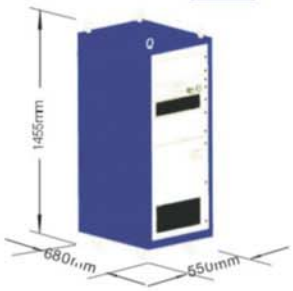
Output driven at rated 120 V rms voltage and 50 A current per module with reserve capacity to provide peak currents of at least 3 times the RMS levels.

Designed to reduce the loss of power during a failed component, the 12 kVA power module is made up of two self reliant 6 kVA sub modules. Each sub module operates independently in the event when the other is out of action. Built-in operation and fault LED lights provide a quick source to identify the failed sub module.

Amplifier MPA Series	Amplifier Max. Power Output (KVA)	RMS Current Output (Arms)	No. of Cabinets	Air Flow (CFM)
MPA100	12	100	1	200
MPA400	48	400	1	300
MPA700	84	700	1	450
MPA3000	360	3000	6	600

* Power requirement has included supplies to blower unit

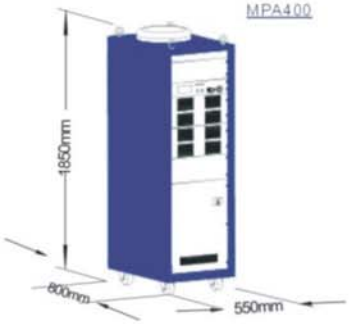
MPA100



Amplifier MPA Series Characteristics

Interlocks:
Microprocessor continuously monitors standard operating conditions such as:
Shaker Over-travel
Relay Protection
Amplifier Fault
External Trigger
System Start/Stop Signal
Other Aux. Interlocks

MPA400



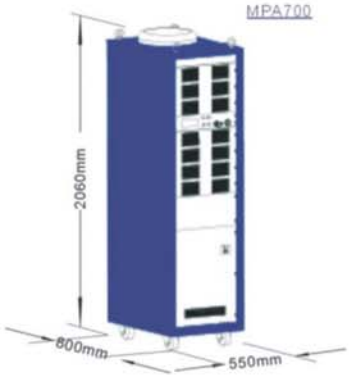
Input Sensitivity:
1.5 V rms for full output of 120 V rms

Input Impendence:
10kΩ for direct couple single and connection
Output load connections are isolated from ground

EMC Emissions:
In compliance with EN61000-6-2Emission, EN61000-6-4Immunity for both conducted and radiated emissions.

Inrush Current Limiting:
Soft start with current sensing and fault detection

MPA700



Stability:
Less than 0.05% variation of full output voltage with a 10% change in line voltage

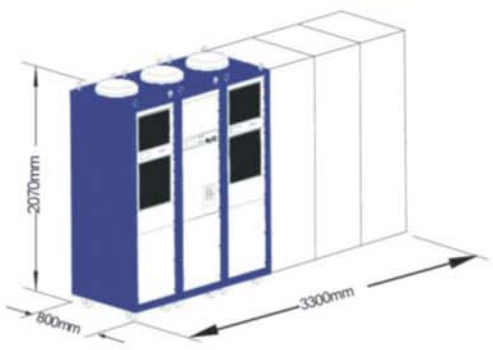
Options:
The following optional unit could incorporate into MPA series to complete the system configurations:
Variable field power supplies
Servo Control Console(SCC-1 Unit)
Auxiliary Interlock Unit(AIU)
Remote Control Panel(RCP)

Total Harmonic Distortion (At Rated Output):
From DC(0.1 Hz) to 500 Hz less than 0.5%; From 500 Hz to 5,000 Hz less than 1.0%

Switching Frequency:
112 kHz

Signal-Noise-Ratio:
More than 65 dB at 100 V rms output, 10 KΩ input termination with rated resistive load

MPA3000



DC Stability:
Less than 0.05% of full output voltage with 10% change in line voltage

Input Drive:
1.5 V rms into 10K Ohms for full output (120 V rms)

Amplifier Frequency response :
From DC(0.1 Hz) to 4,500 Hz: ±3 dB; From 10 Hz to 3,000 Hz: ±1 dB

Rated Output Voltage:
120 V rms

Max. Output Current Per Module (Continuous) :
50 A rms

Max. Output Current Per Module (Transient) :
150 A rms

Amplifier Efficiency:
> 90%

Input Voltage (Standard):
380 VAC, 50 Hz, 3 Phase

Amplifier MPA Series	L	W	H
MPA100 Series	550 mm	680 mm	1455 mm
MPA400 Series	550 mm	800 mm	1850 mm
MPA700 Series	550 mm	800 mm	2060 mm
MPA 3000 Series (Per Bay)	550 mm	800 mm	2070 mm

Upgrading Your Old Amplifier

Join the ETS Solutions Replacement Amplifier program.
Many customers have benefited by replacing older technologies with our latest amplifier designs. Older shaker systems are revived and the equipments useful life is extended.
Cost savings result from a reduction in:

- Investment for new system
- Service and Maintenance Fees
- Energy cost
- Equipment downtime

By upgrading from older inefficient amplifiers to the new MPA Series Power Amplifiers, operators can gain from the other benefits that the latest technology can offer. User friendly operations and interactive interface with the intelligence microprocessor control system.

The MPA Series amplifier operates at over 90% efficiency; nearly double that of older amplifiers at only 50%. Other benefits can include space savings as the amplifiers are smaller in size, heat loss into the test area, all air cooled so no water cooling circuits required.

The biggest savings are in power consumption and the associated cost from this. Electricity bills can be dramatically reduced on larger systems by operating at these higher efficiency levels.

Over the years, we have sucessfully perform amplifiers replacement the following old vibration testing systems, air cooled and water cooled systems from various manufacturers:

Shaker Make	Model	Amplifier Rating	Type
UD	TC-208	25 kVA	Air Cooled
UD	T-1000	120 kVA	Water/Air Cooled
UD	T-4000	300 kVA	Water/Air Cooled
LDS	LDS 640	2 kVA	Air Cooled
LDS	V730	10 kVA	Air Cooled
LDS	LDS V805	18 kVA	Air Cooled
LDS	LDS 964	120 kVA	Water Cooled
LDS	V825	25 kVA	Air Cooled
Ling Electronics	A395	30 kVA	Air Cooled
Ling Electronics	D390	15 kVA	Air Cooled
Ling Electronics	E390	10 kVA	Air Cooled
Ling Electronics	395	30 kVA	Air Cooled
Ling Electronics	540	60 kVA	Air Cooled
Ling Electronics	612	30 kVA	Air Cooled
Ling Electronics	335	75 kVA	Water Cooled
Ling Electronics	4022	200 kVA	Water Cooled
Ling Electronics	4022 LX	240 kVA	Water Cooled
MB	C50	30 kVA	Air Cooled
Thermotron	DS 4001	20 kVA	Air Cooled
Thermotron	939	40 kVA	Air Cooled
Derritron	VP600	40 kVA	Oil Cooled

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