

# IHP CONFIGURABLE INTELLIGENT HIGH POWER SYSTEM

Advanced Energy's Artesyn iHP is a configurable intelligent high power system for a wide range of medical and industrial applications.



## Overview

Designed for a wide range of medical and industrial applications, the Artesyn iHP configurable intelligent power system provides accuracy, resolution, and stability as either a programmable voltage or current source. It provides up to 24 kW in 3 kW increments and can be configured for up to eight outputs using a wide variety of plug-in modules that address a large range of voltages and currents.

Safety approvals secured by Advanced Energy eliminate the need for an isolation transformer in medical equipment. The iHP power system also has industrial safety approvals and meets the SEMI F47 voltage sag tolerance standard for semiconductor processing equipment.

The iHP power system offers developers either an analog or digital interface to their system supporting standard communications protocols, while a software graphical user interface (GUI) allows for easy configuration.

## Features

- Up to 24 kW
- 0 to 1000 V
- Up to 1600 A
- Up to eight outputs
- Versatile input range from 180 to 528 VAC single- or three-phase
- Applicable to all high power applications
- User configurable input
- Programmable load optimization via GUI
- Active PFC typically >0.9 with full medical approval
- High efficiency (92% typical)

## Applications

- Medical
- LED Lighting
- Chemical Processing
- High Power Lasers
- Lab Power
- SPE
- Electroplating and Etching

# CONFIGURABLE INTELLIGENT HIGH POWER SYSTEM

## Powerful Possibilities

Artesyn iHP series is the only configurable high power system with medical and industrial safety approvals that offers ground-breaking control and flexibility. The iHP system consists of a power case and up to eight output modules. It has been designed to meet the needs of a wide variety of applications, some of which are shown below:

- **Medical** — Eliminates the need for an isolation transformer, and the multi-output modular structure provides all system power in a single unit.
- **LED Lighting/Horticulture** — Bulk high voltage current sources eliminate the need for individual LED array drivers and reduce installation and operating costs.
- **High Power Lasers** — Standard modules provide a wide range of bulk power as input to laser drivers.

- **Chemical Processing/Water Treatment** — Compact size and multi-rack paralleling accommodate large installations up into the Megawatt range. GUI can be programmed to run sophisticated process flows.
- **Lab Power** — Precision modules in development provide low noise and accurate control of voltage and current source with built-in wireless communication to remote control panel.
- **Semiconductor Processing Equipment** — Meets the SEMI F47 standard and a provision for EtherCAT communication is planned.
- **Electroplating and Etching** — Modules in development will provide enhanced programmable rise and fall times coupled with high-level GUI that can be tailored to exact process requirements.

## Power Rack

The power rack houses EMC filtering and digital front-end power factor correction (PFC) circuits, input/output connectors and related hardware. The iHP power system offers efficient PFC and low total harmonic distortion (THD) over wide range of loads. It uses a multi-phase continuous mode boost PFC architecture, resulting in ripple current cancellation that offers lower EMI and extends the life of electrolytic capacitors. The user can configure the iHP system for single-phase or three-phase input. The rack also houses a communications board which provides various electrically isolated



user interfaces and also handles internal communication between the intelligent PFC and the modules.

## Control and Communication

Artesyn offers various options for analog and digital interfaces, including CANbus, Ethernet and RS485.

Digital control enables the use of Artesyn's high level **PowerPro** configurable GUI to control and monitor all functions on one or multiple iHP systems. The PowerPro GUI resides in the cloud so it is not sensitive to any particular platform and can be operated on any device connected to the internet. The PowerPro GUI also incorporates graphical script creation that allows users to write their own process control routines.

The iHP series employs average current mode (ACM) control, which has distinct advantages over peak current mode control where fast transient response and tight regulation is required. ACM control offers excellent stability over a wide load range, even when the converter transitions from discontinuous mode in to continuous mode due to high current loop gain. It directly controls the output inductor current and provides excellent line and load regulation.



Typical Dashboard. User configurable with drag and drop widgets assignable to any device, script timer or variable.



The PowerPro GUI incorporates a powerful script creator function that allows users to write their own process control routines.

## Output Modules

The outputs can be configured as voltage or current sources and customized to the application's requirements from a range of standard modules provided by Artesyn. These modules can be connected in series or parallel, while achieving high accuracy voltage and current sharing. The voltage and current ramp time, as well as loop compensation, are also programmable.



### OUTPUT – MODULE IN CURRENT SOURCE MODE

Current Source – Programmable load compensation available for resistive and inductive loads; capacitive load applications; and LED drive applications								
MODULE CODE	SL	SQ	ST	SW	S8	S1	SA	S2
Nominal Output (V)	12	24	32	48	80	125	200	250
Setting Range (A)	0.0 to 200 A	0.0 to 120 A	0.0 to 90 A	0.0 to 62.5 A	0.0 to 37.5 A	0.0 to 24 A	0.0 to 15 A	0.0 to 12 A
RMS Ripple (mA)	200	120	90	62.5	37.5	24	15	12
Line Regulation (mA)	200	120	90	125	93.75	48	50	24
Load Regulation (mA)	800	480	375	250	150	96	56	48
P-P Ripple (mA)	N/A							
Drift (Temp Stability)	±0.05% of I <sub>out</sub> Rated over 8 hours, after 30 minute warm up, constant Line, Load and Temp							
Temp Co-efficient (PPM/°C)	SL, SQ = 300 PPM; All other modules are 200 PPM. Temp Coefficient at rack level is [Temp Coefficient (module level)] + [4500 PPM of I <sub>out</sub> -max]							
Pgm Accuracy (A)	0.7% digital, 1.3% analog of rated output max							
Pgm Resolution (mA)	79.2	26.4		13.2	10	5.2	2.6	2.6
Meas Accuracy	0.7% + 0.7% of Rated Output Max							
Meas Resolution	79.2	26.4		13.2	10	5.2	2.6	2.6
Transient Response	0-63% output current change in 7.5 mSec, residual value 1%, settling time 35 mSec							
Current Sense Method	Internal Shunt / External Shunt							
Current Source – Programmable load compensation available for resistive and inductive loads; capacitive load applications; and LED drive applications								
MODULE CODE	TW			T3				
Nominal Output (V)	50			300				
Setting Range (A)	0 to 270			0 to 50				
RMS Ripple (mA)	270			50				
Line Regulation (mA)	270			100				
Load Regulation (mA)	1200			200				
Pgm Resolution (mA)	20			TBA				
Meas Resolution (mA)	TBA			TBA				
Pgm Accuracy (A)	Digital: 0.7% of Rated Output Max / Analog: 1.3% of Rated Output Max (1% to 100% O/P Current adjustability)							
Meas Accuracy	0.7% + 0.7% of Rated Output Max							
Drift (Temp Stability)	±0.05% of I <sub>out</sub> -max over 8 hours, constant line and load.							
Temp Coefficient – Module Level (PPM of I <sub>out</sub> -max / °C)	300			300				
Temp Coefficient – Rack Level	[Temp Coefficient (module level)] + [4500ppm of I <sub>out</sub> -max]							
Current Overshoot-Undershoot	±5% of I <sub>out</sub> -max (See Section 5.4.2 for the transient conditions)							
Transient Response Time	Recovery time of 35mS (See Section 5.4.2 for the transient conditions)							
Current Sense Method	Internal Shunt							



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## ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. We design and manufacture highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

PRECISION | POWER | PERFORMANCE

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