ARTESYN™
EMBEDDED TECHNOLOGIES

Healthcare **POWER Supplies**

Recall: Is it worth the risk?

Are you at risk of product recall because of your power supply selection?

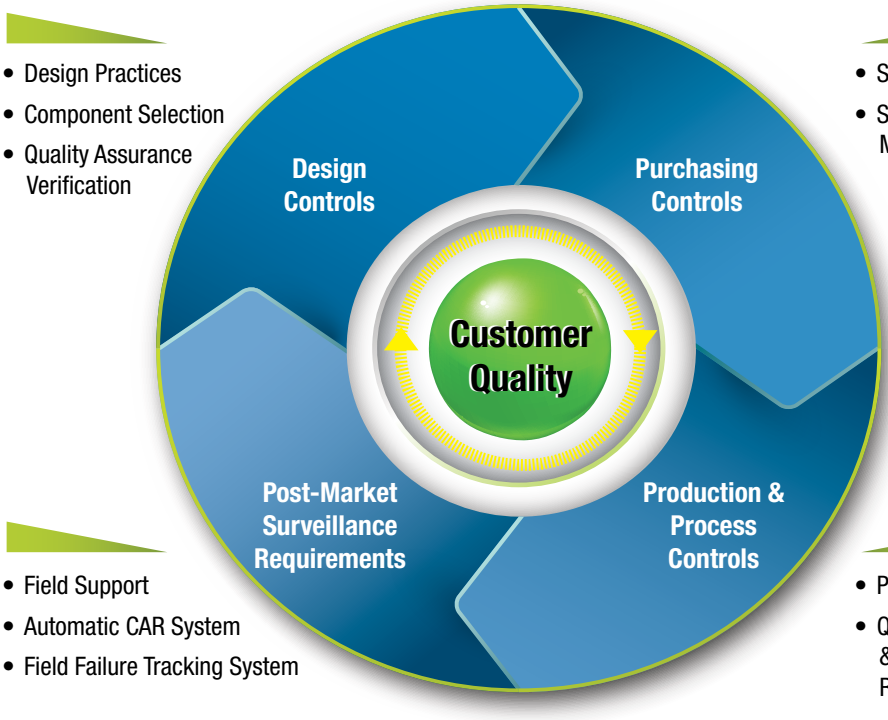
The FDA reports medical device recalls every year. A large part of the recalls were due to supplied components. Many of these incidents are related to power supplies.

The reasons more and more medical device manufacturers are selecting Artesyn Embedded Technologies as their trusted power supply partner include:

1. *Experience in the medical industry and expertise in power supplies*
2. *Highly developed quality systems focused on the customer*
3. *Processes that are developed to conform to the requirements of international standards and Current Good Manufacturing Practices (cGMP)*

Healthcare equipment manufacturers ensure that their healthcare devices are integrated with the power supply and other components that comply with the FDA's cGMP/Quality System Regulation (QSR). Though they retain this responsibility independently of their suppliers, Artesyn's focus on manufacturing its components to QSR and other applicable international standards, such as ISO 13485, helps facilitate manufacturers' compliance with QSR requirements.

Quality System Requirements



- Design Practices
- Component Selection
- Quality Assurance Verification

- Supplier Qualification
- Supplier Quality Management

- Field Support
- Automatic CAR System
- Field Failure Tracking System

- Process Control
- Quality Assurance & Ongoing Reliability Testing

Bio Life Sciences
Dental
Imaging
Laboratory
Medical

Healthcare Sub-Segments

At Artesyn, our engineers have been designing and developing power supply products for the healthcare industry, including Imaging, Analytical Laboratory, Clinical & Molecular Diagnostics, Dental, Ophthalmic and Surgical/Medical environments for over 38 years.

Bio Life Sciences

- Immunoassay Systems
- In-Vitro Diagnostics
- Microbiology
- Centrifuges
- Clinical Chemistry
- Osmometers
- PCRs

Dental

- Gamma Imaging Systems
- CAD/CAM Systems
- Oral Care Equipment
- Digital Radiography
- X-Ray Machines

Imaging

- Ultrasound Scanners
- Computed Tomography (CT) Scan
- Positron Emission Tomography (PET)
- Magnetic Resonance Imaging (MRI)
- Nuclear Medicine
- X-Ray Machines

Laboratory

- Chemical Analysis Equipment
- Mass Analyzers
- Lab Automation
- Sterilization
- Electron Microscopes

Medical

Ophthalmic Equipment

- Surgical Systems
- Ophthalmoscopes

Surgical/Medical Devices

- Surgical Equipment
- Patient Monitoring
- Patient Therapy

Healthcare equipment manufacturers trust Artesyn's commitment to the best quality, efficiency and reliability that can be achieved. With approved medical safeties, Artesyn's power supply products can help to pave the way for advancements in a variety of healthcare applications by optimizing or eliminating process steps which accelerate time to market and lower R&D costs.

Medical Imaging

- Ultrasound Scanners
- MRI, CT, PET
- X-Ray

Surgical Devices

- Robotics
- Electro Surgery
- Laser Surgery

Medical Devices

- Patient Therapy
- Patient Monitoring
- Patient Transport

Dental Equipment

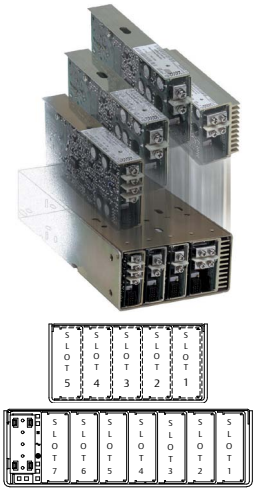
- Oral Care Systems
- CAD/CAM Systems
- Digital Radiography

Configurable Power Supplies

Designed for Maximum Flexibility

Artesyn's microMP, iMP™, and iVS™ series are configurable standard AC–DC power supplies that can provide limitless combinations across 1 to 24 separate outputs with voltage ranges from 2 V to 60 V and power from 400 watts to 4920 watts. Specifically, the iMP and iVS provide easy monitoring and control of the power supply via I2C communication. These standard platforms allow designers to customize their requirements and simulate performance quickly.

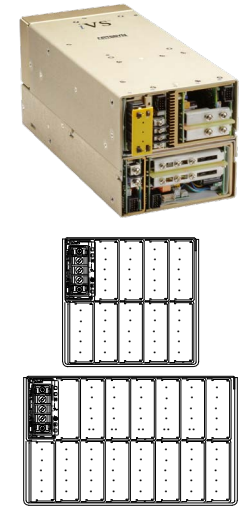
Intelligent MP Series



Module Code	1	2	3	4		5
Module Type	**Single**	**Single**	**Single**	**Dual**		**Triple**
Max output power	210 W	360 W	750 W	144 W		36 W
Max output current	35 A	60 A	150 A	10 A		2 A
Output voltages available*	2-60 V	2-60 V	2-60 V	6-15, 24-28; 6-15, 6-15; 6-15, 2-6; 2-6, 2-6; 24-28, 24-28; 24-28; 2-6		8-15, 8-15, 2-6; 8-15, 8-15, 8-15; 8-15, 8-15, 18-28; 8-15, 18-28, 2-6
Standard voltage increments	25	25	25	16		18
Remote sense	Yes	Yes	Yes	Yes	Yes	No
Remote margin	Yes	Yes	Yes	No	No	No
V-Program – I²C control	Yes	Yes	Yes	Yes	Yes	No
Active current share	Yes	Yes	Yes	Yes	No	No
Module inhibit – I²C control	Yes	Yes	Yes	Yes	Yes	Yes
Module inhibit – analog	Yes	Yes	Yes	Yes	No	No
Overvoltage/overcurrent protection	Yes	Yes	Yes	Yes	Yes	Yes
Minimum load required	No	No	No	No	No	No
Slots occupied in any iMP case	1	2	3	1		1

* Programmable

Intelligent VS Series



Module Code	1	2	3	5	4		
Module Type	**Single**	**Single**	**Single**	**Single**	**Dual**		**Triple**
Max output power	210 W	360 W	750 W	1500 W	144 W		36 W
Max output current	35 A	60 A	150 A	140 A	10 A		2 A
Output voltages available*	2-60 V	2-60 V	2-60 V	6-60 V	6-15, 24-28; 6-15; 6-15; 6-15; 2-6; 2-6, 2-6; 24-28, 24-28; 24-28; 2-6		8-15, 8-15, 2-6; 8-15, 8-15, 8-15; 8-15; 8-15, 8-15, 18-28; 8-15, 18-28, 2-6
Standard voltage increments	25	25	25	18	16		18
Remote sense	Yes	Yes	Yes	Yes	Yes	Yes	No
Remote margin*	Yes	Yes	Yes	Yes	No	No	No
V-Program – I²C control*	Yes	Yes	Yes	Yes	Yes	Yes	No
Active current share	Yes	Yes	Yes	Yes	Yes	No	No
Module Inhibit – I²C control*	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Module Inhibit – Analog	Yes	Yes	Yes	Yes	No	No	No
Overvoltage/overcurrent protection*	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Minimum load required	No	No	No	No	No	No	No
Slots occupied in any iVS case	1	2	3	4	1		1

* Note: Contact Factory for extended range down to 6V

Micro MP Series

Output Module Line-up		
Output Range (Vdc)	**Max Output (Amps)**	**Max Power (Watts)**
0.9 - 3.6	40	144
3.2 - 6.0	36	180
6.0 - 15.0	25	240
12.0 - 30.0	13	240
28.0 - 54.0	7	96
5.0 - 28.0	4	96

For complete product specifications, technical reference notes and available product options, go to **www.Artesyn.com/power**

Power Supply Design Controls

For Greater Quality & Reliability

Reliability Models and Predictions

- A prediction of design reliability in terms of Mean Time Between Failures (MTBF) using Telecordia, Bellcore or MIL-HDBK-217F
- Not intended as a measure of expected field performance, but for design trade-off analysis and review of part stress derating performance

Failure Modes and Effect Analysis

- An analytical technique to identify and review failure modes, their causes, mechanisms and effects
- Provides a formal risk assessment to reduce field failures at the customer site

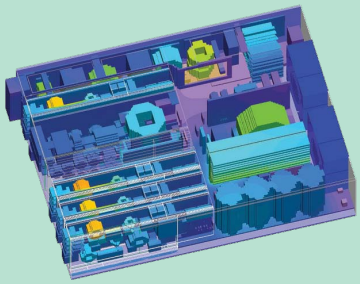
Component Selection

- Database warehouse of all component information
- Design engineers can only select components that are rigorously approved from suppliers that have undergone a strict qualification and auditing process

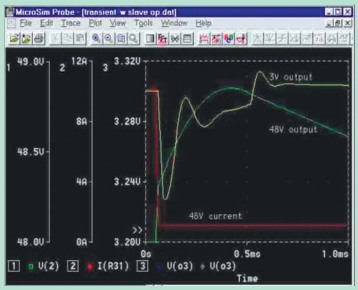
Derating Analysis

- Intended to reduce the failure rate of components Design for Manufacturability
- Design rules regarding manufacturability

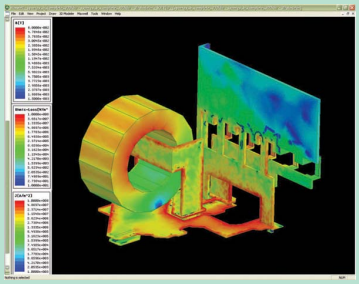
Simulation Analysis – Computer Aided Engineering Tools



Thermal Simulation

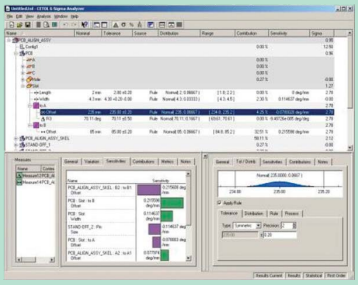


Circuit Simulation

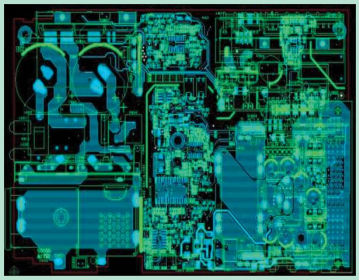


EMI Field Simulation

Detailed Mechanical Design



PCB Layout and Tracking



Structural Simulation

Standard AC–DC and DC–DC Power Supplies

IEC 60601-1 Safety Certified

Product Series	Descriptions	Output Power Watts		Outputs	Available Output Voltages	Dimensions	Protection Class	EMI Class
		Free Air	Forced Air					
AEE10-M	DC-DC module	10	10	1	5 V, 12 V, ±12 V, ±15 V	1.00” x 2.00” x 0.50”	–	–
DA12-M	External adapter (wall mount)	12	12	1	5 V, 12 V	2.36” x 1.10” x 2.40”	II	B
DA18-M	External adapter (wall mount)	18	18	1	12 V, 15 V	2.36” x 1.10” x 2.40”	II	B
NPS20-M	Open-frame	25	40	1	5 V, 12 V, 15 V, 24 V, 48 V	2.00” x 4.00” x 1.00”	I, II	B, A
DP40-M	External adapter	40	40	1	9 V, 12 V, 15 V, 18 V, 24 V, 48 V	4.88” x 2.40” x 1.55”	I	B
LPS40-M	Open-frame (opt. enclosure)	40	55	1	5 V, 12 V, 15 V, 24 V	5.00” x 3.00” x 1.20”	I	A
LPT40-M	Open-frame (opt. enclosure)	40	55	3	5 V, 12 V, -12 V, 15 V, -15 V, 24 V	5.00” x 3.00” x 1.20”	I	A
NPS40-M	Open-frame (opt. enclosure)	45	60	1	5 V, 12 V, 15 V, 24 V, 48 V	4.00” x 2.00” x 1.00”	I, II	B, A
NPT40-M	Open-frame (opt. enclosure)	45	55	3	5 V, 12 V, -12 V	4.00” x 2.00” x 1.00”	I, II	B
LPT50-M	Open-frame (opt. enclosure)	50	50	3	3.3 V, 5 V, 12 V, -12 V, 15 V, -15 V, 24 V	4.00” x 2.00” x 1.30”	I	B
DPS50-M	External adapter	60	60	1	5 V, 12 V, 15 V, 24 V, 48 V	5.24” x 2.39” x 1.62”	I	B
LPS50-M	Open-frame (opt. enclosure)	60	60	1	5 V, 12 V, 15 V, 24 V, 48 V	4.00” x 2.00” x 1.20”	I	B
NPS60-M	Open-frame	60	60	1	5 V, 12 V, 24 V	2.00” x 4.00” x 1.00”	I, II	B, A
LPS60-M	Open-frame (opt. enclosure)	60	80	1	12 V, 15 V, 24 V	5.00” x 3.00” x 1.65”	I	A
LPT60-M	Open-frame (opt. enclosure)	60	80	3	5 V, 12 V, -12 V, 15 V, -15 V	5.00” x 3.00” x 1.65”	I	A
NLP65 Medical	Open-frame	65	75	1	12 V, 15 V, 24 V	5.00” x 3.00” x 1.30”	I	A
NLP65 Medical (Dual)	Open-frame	65	75	2	5 V, 12 V, 24 V	5.00” x 3.00” x 1.30”	I	A
NLP65 Medical (Triple)	Open-frame	65	75	3	5 V, 12 V, -12 V, 15 V, -15 V	5.00” x 3.00” x 1.30”	I	A
LPT100-M	Open-frame (opt. enclosure)	80	130	3	3.3 V, 5 V, 12 V, -12 V, 15 V, -15 V, 24 V	4.00” x 2.00” x 1.28”	I	B
LPS100-M	Compact Open-frame (opt. enclosure)	100	150	1	5 V, 12 V, 15 V, 24 V, 48 V	4.00” x 2.00” x 1.29”	I	B
LPQ200-M	Open-frame	100	200	4	3.3 V, 5 V, 12 V, -12 V, 24 V	5.00” x 3.00” x 1.42”	I	B
LPS170-M	U-channel (optional cover)	110	175	1	3.3 V, 5 V, 12 V, 15 V, 24 V, 48 V	4.25” x 8.50” x 1.50”	I	B
LPS200-M	Compact open-frame (opt. enclosure)	125	250	1	5 V, 12 V, 15 V, 24 V, 48 V	5.00” x 3.00” x 1.29”	I	B
TLP150 Medical	Open-frame (opt. enclosure)	150	150	1	12 V, 24 V	5.00” x 3.00” x 1.25”	I	B
NLP250 Medical	U-channel (opt. cover)	175	250	1	12 V, 24 V	7.00” x 4.00” x 1.50”	I	B
NTS500-M	U-channel (opt. cover fan)	200	500	1	12 V, 24 V, 48 V	7.00” x 4.00” x 1.50”	I	B
LPS360-M	Open-frame (opt. enclosure)	200	360	1	12 V, 15 V, 24 V, 48 V	3.00” x 5.00” x 1.57”	I, II	B
LCC250	Convection/Conduction mounting	250	250	1	12 V, 24 V, 48 V	4.00” x 7.00” x 1.10”	I	B
LCM300	Bulk front end	300	300	1	12 V, 15 V, 24 V, 36 V, 48 V	1.61” x 4.00” x 7.00”	I	B
µMP04	Configurable	400	600	1 - 12	0.9-60 V/4-40 A	10.11” x 3.50” x 1.57”	I	B
LCC600	Conduction Cooled	600	600	1	12 V, 24 V, 28 V, 36 V, 48 V	4.00” x 9.00” x 1.57”	I	B
LCM600	Bulk front end	600	600	1	12 V, 15 V, 24 V, 36 V, 48 V	4.50” x 7.50” x 2.40”	I	B
iMP4	Configurable & intelligent	750	1100	1 - 21	2 - 60 V/2 - 150 A	10.00” x 5.00” x 2.50”	I	B
LCM1000	Bulk front end	1000	1000	1	12 V, 15 V, 24 V, 36 V, 48 V	2.50” x 5.20” x 10.00”	I	B
iMP8	Configurable & intelligent	1000	1200	1 - 21	2 - 60 V/2 - 150 A	10.00” x 7.00” x 2.50”	I	B
µMP10	Configurable	1000	1200	1 - 12	0.9 - 60 V/4 - 40 A	10.11” x 5.00” x 1.57”	I	B
µMP16	Configurable	1000	1800	1 - 12	0.9 - 60 V/4 - 40 A	10.11” x 5.00” x 1.57”	I	B
iMP1	Configurable & intelligent	1200	1500	1 - 21	2 - 60 V/2 - 150 A	11.00” x 8.00” x 2.50”	I	B
LCM1500	Bulk front end	1500	1500	1	12 V, 15 V, 24 V, 36 V, 48 V	2.50” x 5.20” x 10.00”	I	B
iVS1, iVS6	Configurable & intelligent	1500	3210	1 - 24	2 - 60 V/2 - 150 A	11.00” x 5.00” x 5.00”	I	B
iVS3, iVS8	Configurable & intelligent	1800	4920	1 - 24	2 - 60 V/2 - 150 A	11.00” x 8.00” x 5.00”	I	B

All products comply with the international standard IEC 60601-1 for medical devices, defined as Medical Electrical Equipment and Systems.

For complete product specifications, technical reference notes and available product options, go to **www.Artesyn.com/power**

Standard Products

AC-DC and DC-DC Power Conversion Solutions

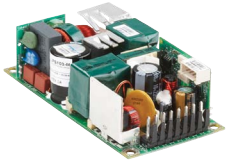
AC–DC Power Supplies

External Power Adapters*

- 3 - 100 W
- 1 - 3 Outputs
- 2- or 3-pin ac input receptacle
- Built-in EMI filtering

High Power*

- 1000 - 4920 W
- 1 - 24 Outputs
- 2 - 60 Vdc
- 3 phase available
- Intelligent control



Low Power*

- 25 - 500 W
- 1 - 4 Outputs
- High reliability
- Industry leading power density

Micro Medium Power*

- Up to 1800 W Peak
- 12 Outputs
- Fully configurable
- High power density

Bulk Power*

- 300, 600, 1000, 1500 W
- Single output
- Low cost
- Optional 5.0 V standby

Fanless – Conduction Cooled*

- Conduction mounting for sealed box/ no airflow application
- IP64 ingress protection
- -40 to 85 °C Operating baseplate temperature

Medium Power*

- 400 - 1500 W
- 1 - 21 Outputs
- Feature-rich configurable power system
- Intelligent control

DC–DC Converters

Low Power Industrial Converters

- 6 - 50 W product offering
- Industry form factors
- Wide selection of input and output voltages
- 10 W 1” x 2” module with UL60601-1 UL certificate

* Note: Many of these products are IEC 60950-1 safety certified and applicable to in-vitro diagnostic applications.

About Artesyn Embedded Technologies

Artesyn Embedded Technologies is a global leader in the design and manufacture of highly reliable power conversion solutions for a wide range of industries including communications, computing, medical, aerospace and industrial automation.

Artesyn is one of the world's largest and most successful power supply companies and embraces the well-known Astec® brand. The company's extensive standard ac-dc product portfolio covers a power range of 3 watts to 5 kilowatts and includes open-frame and enclosed models, highly configurable modular power supplies, rack-mounting bulk front end units, DIN rail power supplies, external power adapters and power supplies for LED lighting. Many of these products are available in medically approved versions and a large number of the higher power models feature extensive built-in intelligence.

Widely acknowledged as an industry leader in distributed power applications, Artesyn produces an exceptionally wide range of dc-dc power conversion products. These include isolated dc-dc converters, covering industry-standard sixteenth- to full-brick form factors and power ratings from 6 watts to 800 watts, and three application-optimized families of non-isolated dc-dc converters. The company also produces non-isolated memory power and voltage regulator modules (VRMs) for processors.

For more than 40 years, customers have trusted Artesyn to help them accelerate time-to-market and shift development efforts to the deployment of new, value-add features and services that build market share.

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