

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series



PLEASE READ AND FULLY UNDERSTAND THIS APPLICATION NOTE BEFORE UNPACK AND INSTALL THE POWER SUPPLY

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series



### Highlight & Features

- Up to 700W in 3.5" x 8.5" x 1.63" Package
- Up to 14.5W/inch<sup>3</sup> Power Density
- Full Power up to 50°C Ambient
- 3 Slots Modules Configurable
- 2xMOPP Isolation for Medical Application
- Output selectable from 2V to 60V
- Current sharing for single slot modules
- Class B Conducted and Radiated EMI
- IEC 60601-1-2 4th edition immunity compliance
- Normal and Reversed Option for Global Remote On/Off
- Analog Voltage Trimming

## 1 General Safety Information

In the user manual, contains four kinds of safety tips: DANGER, WARNING, CAUTION and NOTE. Before reading this manual, you must have a fully understanding of these safety tips.

Safety tips are defined as follows:



If described event is unavoidable, it will cause serious physical injury or death to service engineer, operator, patient, or other personnel.



If described event is unavoidable, it will be occurred serious physical injury for service engineer, operator, patient or other personnel, or catastrophic damage for the power supply or any electronic devices connected to the power supply, or to lose important data or system operation chaos.



If described event is unavoidable, it will be occurred physical injury for service engineer, operator, patient or other personnel, or damage the power supply or any electronic devices connected to the power supply, or to lose data or system operation chaos.



If described event is unavoidable, it will be provided to alert relevant personnel who can contact with the power supply that serious injury will result if the hazard identified is ignored.

# Medical / Industrial AC-DC Configurable Power Supply

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### 1.1 Safety Instructions

#### Installation:

Requirements of IEC60601-1 3rd+A1/EN 60601-1: 2006+A11+A12+A1 shall be observed during the installation in the final system. The products are intended for build in use in the final Class I system and to avoid risk of electric shock, products must only be connected to a supply mains with protective earth. The PSU has double fuses on line and neutral input, rating is 16A/250Vac for MEG-700A series.

#### Servicing:

Instructions or reference information for repair of equipment parts are provided by the manufacturer. Please contact us for this information. Do not modify the product without authorization from Delta.

#### Critical Components:

These products are not authorized for use as critical components in nuclear control systems, life support systems or equipment for use in hazardous environments without the express written management approval from Delta.

#### Product Usage:

These products are designed to apply in medical, industrial, commercial and IT equipment which need to use DC voltages.

#### Environmental:

These products are IPX0, and therefore chemical/solvents, cleaning agents and other liquids must not be used. They shall be operated in dry locations to protect from moisture and are not suitable for using in an oxygen rich environment.

#### Environment:

This power supply is a switch mode power supply for use in applications within a Pollution Degree 2, overvoltage category II environment. Material Group IIIb PCB is used. The maximum operating altitude is 5000m. The working/storage environment is listed below.

Surrounding Air Temperature	Operating	Absolute Maximum/Minimum Rating. -20°C to +70°C. Refer to detailed linearly power de-rating curves on page 29&30.
	Storage	-40°C to +85°C
Operating Humidity		5-95% RH (Non-Condensing)

#### Input Parameters:

This product must be operated within the input parameters stated in the product limitations in this user manual.

#### Output Loading:

The power supply output power taken must not exceed the rating that is stated on label of the power supply, except as stated in the product limitations in this user manual.

#### Repair/ Maintenance:

Instructions or reference information for repair of equipment parts are provided by the manufacturer. Please contact us for this information.

#### End of Life Disposal:

The power supply contains components that require special disposal. The instructions shall be according to IEC60601-1:2005, clause 7.9.2.15 and 7.9.3.1. For end of life cycle, make sure that the power supply doesn't throw into general trash, and it must be handed over to the local recycle system.

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### 1.2 Warning

<b>NOTE</b>	There's no practical design can incorporate protection for operators or service personnel who do not take adequate safety precautions. <b>Only authorized, qualified, properly trained personnel and operating personnel are allowed to work with the power supply.</b> The appropriate personnel must be aware of the inherent dangers / hazardous associated with the servicing of power supply contains hazardous high voltage.
<b>CAUTION</b>	There are double pole/neutral fusing inside the power supply
<b>CAUTION</b>	The power supply has sharp metal edge, pay attention to this before installation to avoid injury.
<b>WARNING</b>	It is the power supply user's responsibility to use and operate the power supply in proper way for functionality and safety. Although Delta Electronics provides information for the power supply and potential hazards, but Delta Electronics assumes no responsibility for use and operating the power supply after sale. Delta Electronics assumes no responsibility if the power supply is not installed according this manual. Delta Electronics assumes no responsibility if the power supply is not correctly maintained according this manual. Delta Electronics assumes no responsibility for any if the power supply is modified in any way after sale.
<b>WARNING</b>	It is not allowed to disassemble the power supply without Delta's technical support or authorization, to avoid the injury by high voltage.
<b>WARNING</b>	Please take all required preventive measures with related hazards if any cover must be removed. When the need of removal is completed, please replace the covers immediately.
<b>DANGER</b>	Hazardous voltage exists inside the power supply whenever the AC main power is connected to the power supply. Moreover, hazardous voltage will continue to exist even after the power supply is disconnected from the AC input voltage after a certain period of time. This hazardous voltage exists in but not limited to following parts: Fuse, Fuse holder, Main Relay, Bridge rectifier, Bulk Capacitors, Main Power Circuits, Associated circuits on power input board, etc. Although bleeding resistors are added for energy stored capacitor to discharge after AC off, due to the possibility of component fault, the bleeding functionality may not work. Calibrated measurement equipment, for example, voltage meter, must be used to measure voltage to confirm it is within safe voltage range before access the parts.

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### 2 General Overview

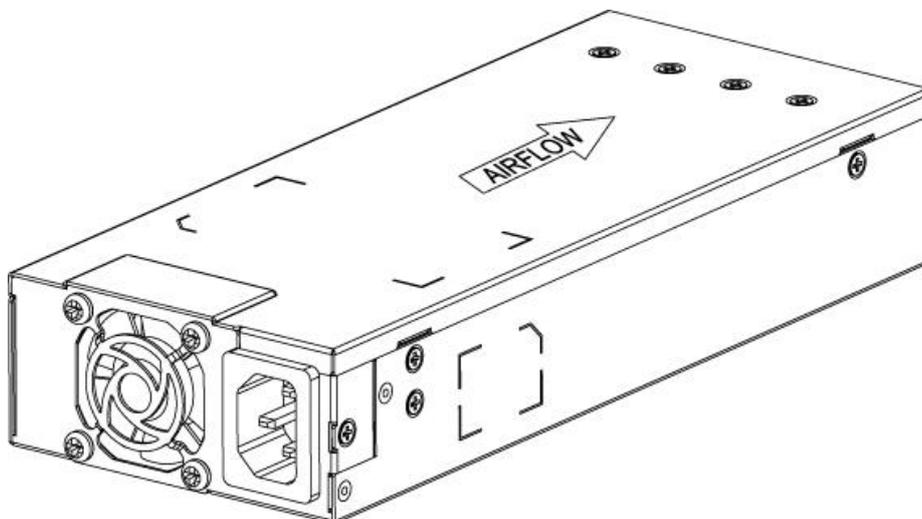
#### 2.1 General Description

The MEG-700A series of internal built power supplies come with universal AC input range from 90Vac to 264Vac. It can configure multiple outputs using series of different output models in one package and fast deliver to end user, let user to focus on the end device design rather than designing the power supply. Other features include low leakage, and electric shock protection compliance with 2 x MOPP medical isolation requirements. The MEG-700A series is certified for EMC standards according to EN 55011 for industrial, scientific and medical (ISM) radio-frequency equipment; and, EN 55032 for Industrial Technology Equipment (ITE) radio-frequency equipment. In addition, only recognized Japanese capacitors are used to ensure long product life.

The MEG-700A series comes with both medical and ITE safety approvals, including UL/CE, and CB certification. Designs are compliant with RoHS Directive 2011/65/EU for environmental protection, to avoid risk of opening of a branch circuit breaker, the product is tested on a 50A type D branch circuit, if used on a different branch circuit, additional testing may be necessary.

The MEG-700A series are also compliant with SEMI F47 tests to immunity voltage sag for semiconductor processing, metrology, and automated test equipment.

Fig. 1: MEG-700A series



# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

### 2.2 Order Information

<b>MEG</b>	-	<b>700</b>		<b>A</b>		<b>3</b>		<b>X</b>		<b>Y-Y-Y-Y</b>		<b>ZZZZZ</b>
<b>ME: Delta Medical Power Supply</b> G: Configurable		<b>Max Wattage in Product Series</b> 700: 700W		<b>Family Code</b> A series		<b>Slot Number</b> 3: 3 slots		<b>Inlet Type</b> T: US Terminal E: EU Terminal C: C14		<b>Output Configurations</b> See below		<b>PSU Configuration</b> See below

	Power supply category	ME: Delta Medical grade power supply G: Configurable power supply
	Max Deliverable Power	700: 700W max power delivery capability
	Family Code	
	Model Slots number	3: configurable power supply can use up to 3 slots max for configuration
	Inlet Type	T: US Terminal E: EU Terminal C: C14 Socket  Note: see mechanical drawing for detail
	Output configuration	For single output module, output module code combined with a voltage code and a current code. For dual output module, output module code is combined with two voltage code. Please check Table 1 for all available combinations.  <b>For example:</b> J1: 12V, 25A, single slot, single output module. O2: 24V, 29.2A, triple slot, single output module. OJ: Dual output module, one 24V/3.7A output, one 12V/5A output. Split the modules with a "-". If any slot to be left empty, use code "NU".
	PSU configuration	1 <sup>st</sup> digit Parallel code, see Table 2 for detail  2 <sup>nd</sup> digit Control Code 0: Normal Logic & Normal Fan Direction 1: Reversed Logic & Normal Fan Direction  3 <sup>rd</sup> digit Communication code 0: Default N/A  4-5th digit CC revision code Use AA for standard default

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

### 2.2.1 Output Modules

Table 1. Voltage Code

Voltage Code		Current Code					
		Single Slot Module		Triple Slot Module <sup>1)</sup>		Single Slot Dual Output Module <sup>1)</sup>	
		1		2			
Code	Voltage	Current	Power	Current	Power	V1 or V2 Current	V1 or V2 Power
A	2.0V	45.0A	90W	-	-	-	-
B	2.4V	45.0A	108W	-	-	-	-
C	3.0V	45.0A	135W	-	-	-	-
D	3.3V	45.0A	149W	-	-	5.0A	16.5W
E	5.0V	45.0A	225W	-	-	5.0A	25W
F	5.5V	45.0A	248W	-	-	5.0A	27.5W
G	6.0V	42.0A	252W	-	-	5.0A	30W
H	8.0V	25.0A	200W	78.7A	630W	5.0A	40W
I	10.0V	25.0A	250W	70.0A	700W	5.0A	50W
J	12.0V	25.0A	300W	58.3A	700W	5.0A	60W
K	14.0V	21.4A	300W	50.0A	700W	5.0A	70W
L	15.0V	20.0A	300W	46.7A	700W	5.0A	75W
M	18.0V	16.7A	300W	38.9A	700W	5.0A	90W
N	20.0V	15.0A	300W	35.0A	700W	4.5A	90W
O	24.0V	12.5A	300W	29.2A	700W	3.7A	90W
P	28.0V	10.7A	300W	25.0A	700W	3.2A	90W
Q	30.0V	10.0A	300W	23.3A	700W	3.0A	90W
R	32.0V	9.4A	300W	21.9A	700W	-	-
S	36.0V	8.3A	300W	19.4A	700W	-	-
T	42.0V	7.1A	300W	16.7A	700W	-	-
U	48.0V	6.3A	300W	14.6A	700W	-	-
V	54.0V	5.5A	300W	13.0A	700W	-	-
W	60.0V	5.0A	300W	11.7A	700W	-	-



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Series	Voltage	Output Min.	Output Max.	Current	Power	No. of O/P	Customer Code
Single Slot Module	2.0V	2.00V	2.20V	45.0A	90W	S:Single	A1
	2.4V	2.16V	2.70V	45.0A	108W	S:Single	B1
	3.0V	2.70V	3.30V	45.0A	135W	S:Single	C1
	3.3V	2.97V	4.00V	45.0A	149W	S:Single	D1
	5.0V	4.00V	5.50V	45.0A	225W	S:Single	E1
	5.5V	4.95V	6.05V	45.0A	248W	S:Single	F1
	6.0V	5.40V	7.00V	42.0A	252W	S:Single	G1
	8.0V	7.00V	9.00V	25.0A	200W	S:Single	H1
	10.0V	9.00V	11.0V	25.0A	250W	S:Single	I1
	12.0V	10.8V	13.2V	25.0A	300W	S:Single	J1
	14.0V	12.6V	14.0V	21.4A	300W	S:Single	K1
	15.0V	13.5V	16.5V	20.0A	300W	S:Single	L1
	18.0V	16.2V	19.8V	16.7A	300W	S:Single	M1
	20.0V	18.0V	22.0V	15.0A	300W	S:Single	N1
	24.0V	21.6V	26.4V	12.5A	300W	S:Single	O1
	28.0V	25.2V	28.0V	10.7A	300W	S:Single	P1
	30.0V	27.0V	33.0V	10.0A	300W	S:Single	Q1
	32.0V	28.8V	35.2V	9.40A	300W	S:Single	R1
	36.0V	32.4V	39.6V	8.30A	300W	S:Single	S1
	42.0V	37.8V	42.0V	7.10A	300W	S:Single	T1
48.0V	42.0V	52.8V	6.30A	300W	S:Single	U1	
54.0V	48.6V	59.4V	5.50A	300W	S:Single	V1	
60.0V	54.0V	60.0V	5.00A	300W	S:Single	W1	

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Series	Voltage	Output Min.	Output Max.	Current	Power	No. of O/P	Customer Code
Triple Slot Module	8.0V	7.0V	10.0V	78.7A	630W	S:Single	H2
	10.0V	10.0V	11.0V	70.0A	700W	S:Single	I2
	12.0V	10.8V	13.2V	58.3A	700W	S:Single	J2
	14.0V	12.6V	14.0V	50.0A	700W	S:Single	K2
	15.0V	14.0V	16.5V	46.7A	700W	S:Single	L2
	18.0V	16.2V	20.0V	38.9A	700W	S:Single	M2
	20.0V	20.0V	22.0V	35.0A	700W	S:Single	N2
	24.0V	21.6V	26.4V	29.2A	700W	S:Single	O2
	28.0V	25.2V	28.0V	25.0A	700W	S:Single	P2
	30.0V	28.0V	33.0V	23.3A	700W	S:Single	Q2
	32.0V	28.8V	35.2V	21.9A	700W	S:Single	R2
	36.0V	32.4V	39.6V	19.4A	700W	S:Single	S2
	42.0V	37.8V	42.0V	16.7A	700W	S:Single	T2
	48.0V	42.0V	52.8V	14.6A	700W	S:Single	U2
	54.0V	48.6V	59.4V	13.0A	700W	S:Single	V2
60.0V	54.0V	60.0V	11.7A	700W	S:Single	W2	

Series	Voltage	Output Min.	Output Max.	Current	Power	No. of O/P	Customer Code
Single Slot Dual Output Module	3.3V	2.97V	4.00V	5.0A	16.5W	D: Dual	D
	5.0V	4.00V	5.50V	5.0A	25.0W	D: Dual	E
	5.5V	4.95V	6.05V	5.0A	27.5W	D: Dual	F
	6.0V	5.40V	7.00V	5.0A	30.0W	D: Dual	G
	8.0V	7.00V	9.00V	5.0A	40.0W	D: Dual	H
	10.0V	9.00V	11.0V	5.0A	50.0W	D: Dual	I
	12.0V	10.8V	13.2V	5.0A	60.0W	D: Dual	J
	14.0V	12.6V	15.4V	5.0A	70.0W	D: Dual	K
	15.0V	13.5V	16.5V	5.0A	75.0W	D: Dual	L
	18.0V	16.2V	19.8V	5.0A	90.0W	D: Dual	M
	20.0V	18.0V	22.0V	4.5A	90.0W	D: Dual	N
	24.0V	21.6V	26.4V	3.7A	90.0W	D: Dual	O
	28.0V	25.2V	30.0V	3.2A	90.0W	D: Dual	P
30.0V	27.0V	30.0V	3.0A	90.0W	D: Dual	Q	

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### 2.2.2 Parallel Code

Parallel feature is available for the same output modules. Select parallel code, Delta will parallel the outputs before shipping to customer. Parallel feature is designed for single slot modules and only two modules can be paralleled. Triple slot modules and dual output module cannot support this option. Please notes that trimming the paralleled output voltage through potentiometer is forbidden on customer side. If customers need to adjust output voltage after paralleling modules, please consult Delta for support.

Table 1. Parallel Code

Code	1	2	3
0			
A			
B			

### 2.2.3 Order Examples

#### MEG-700A3T J1-J1-O1 A00AA

3 Slots, US Terminal type input, two 12V modules in parallel, one 24V module

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

### 2.3 Installation Instruction

**The Installer Requirement:**

- Must have necessary electric knowledge and understand the risks of electric shock;
- Must read the safety warning from section 1.1-1.2 carefully
- Must fully understand the connections in 2.2 before installation.

#### 2.3.1 Mounting Orientations

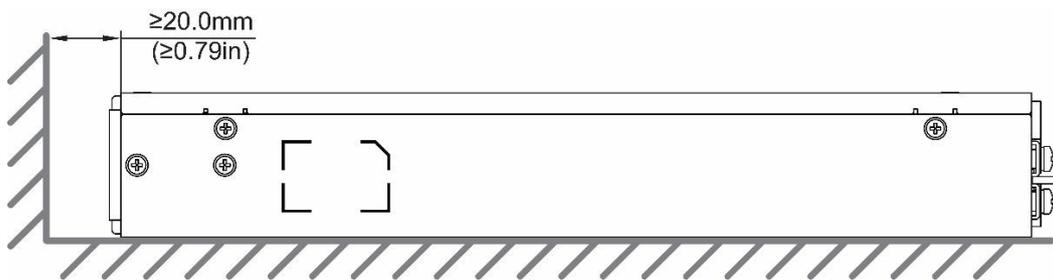


Fig. 2: Standard mounting orientation

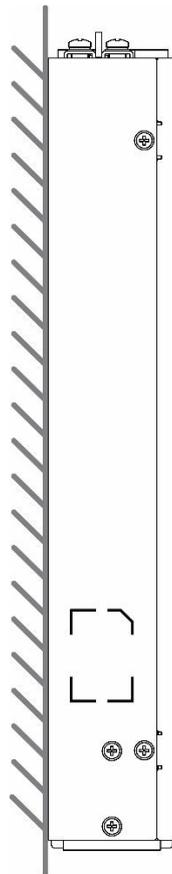


Fig. 3: Vertical mounting

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

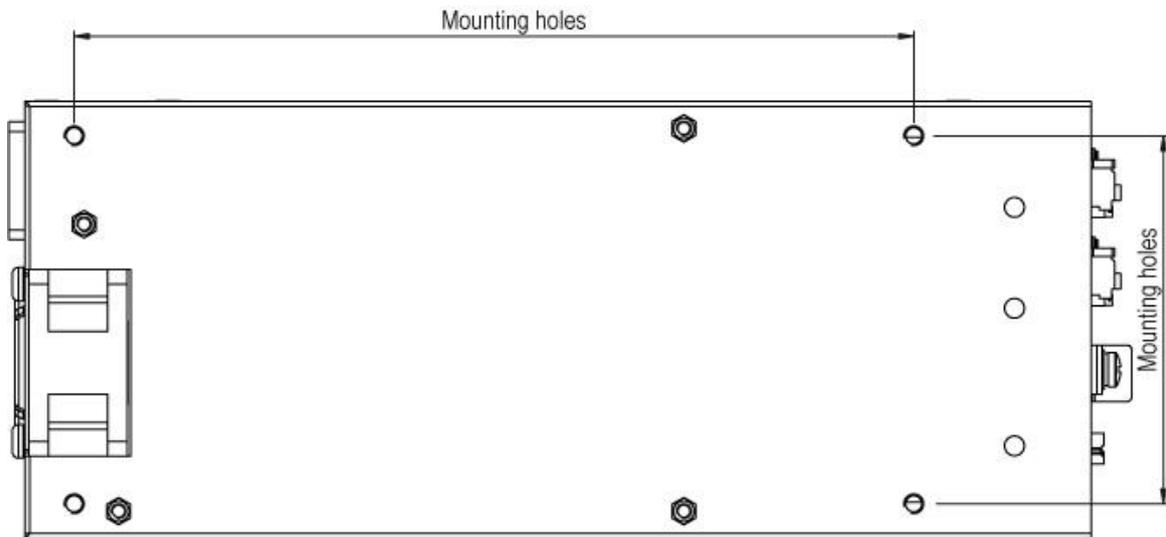


Fig. 4: Position of mounting holes

**Note:** Always keep  $\geq 20$  mm (0.79 in) space on the fan side and on the connector side to ensure proper airflow.

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

### 2.3.2 MEG-700A Series Mechanical Outlines

Case Size: 8.5" x 3.5" x 1.63" (215.9mm x 88.9mm x 41.5mm)

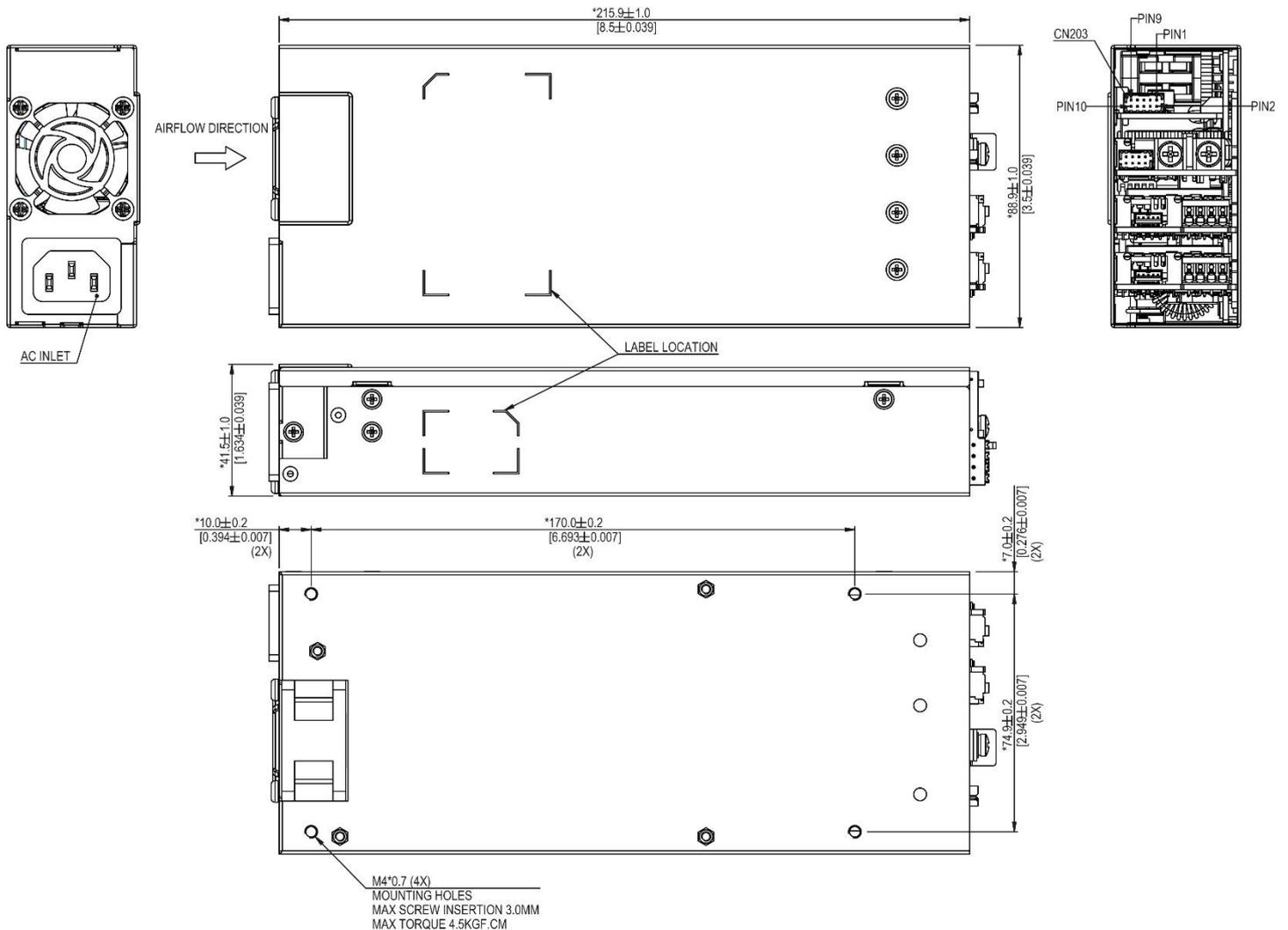


Fig. 5: Dimensional drawing MEG-700A

#### Note:

1. Output Module Connectors: All single O/P modules are M4 x 8 mm screws, tighten between 7.0 to 10.0 kgf.cm (6.08 to 8.68 lbf.in); Dual O/P module is PUSH IN conductor connector; Wire Strip Length: 0.315" - 0.354" (8.0 - 9.0 mm).
2. Case Material: SGCC (conductive).
3. Customer Mounting: Screw M4-type mounting holes; Max. Penetration is 3.0 mm (0.118"); Max. Torque: 4.5 kgf.cm (3.91 lbf.in)
4. Adjustable VR clockwise is to increase the output voltage.
5. All dimensions are in millimeters and inches.

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

MEG-A300M Series - Single Slot Single Output Module

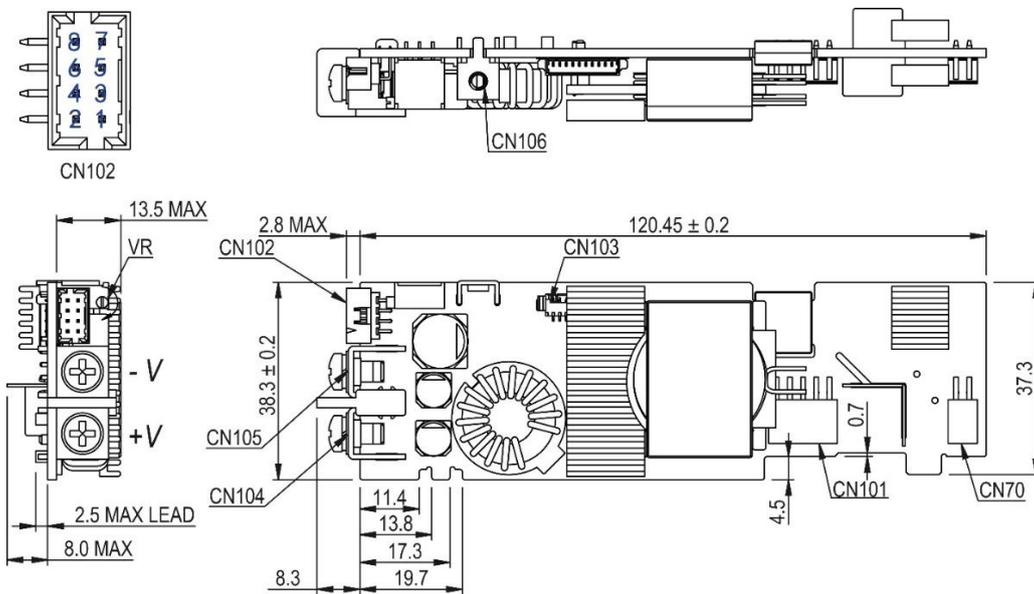


Fig. 7: Dimensional drawing Single Slot Module

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

### MEG-A1K2M Series - Triple Slot Single Output Module

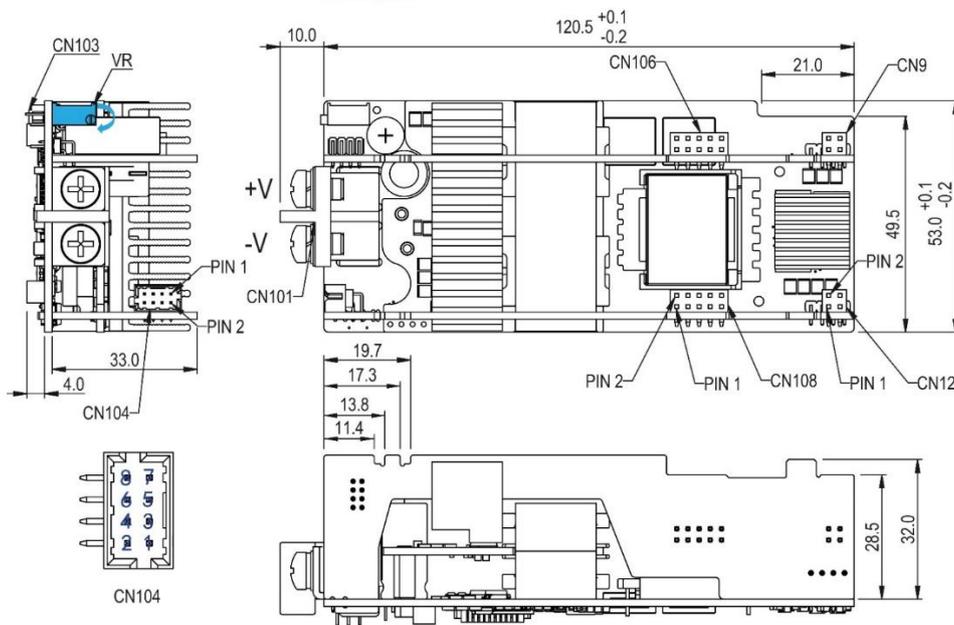


Fig. 8: Dimensional drawing Triple Slot Module

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

### MEG-A240M Series - Single Slot Dual Output Module

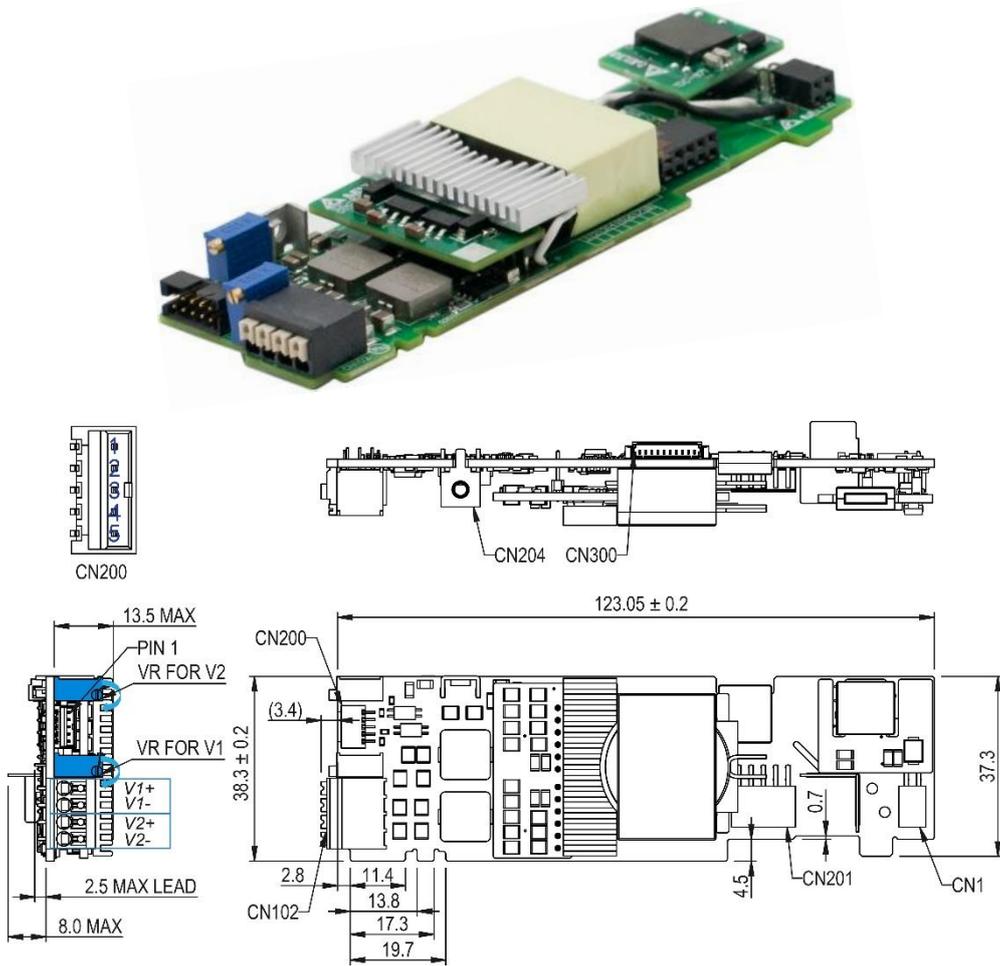


Fig. 9: Dimensional drawing Single Slot Dual Output Module

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

### 2.3.3 AC Inlet Type Option

“C” TYPE

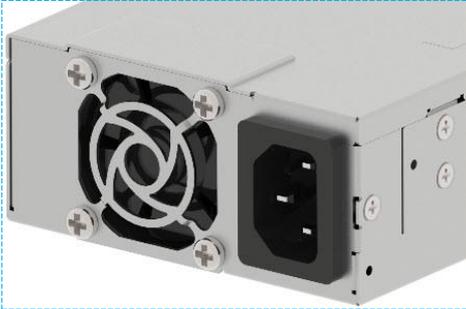


Figure 10. IEC320-C14  
CONDUCTOR SIZE: 14 AWG Max

“E” TYPE



Figure 11. European Terminal Block  
TIGHTENING TORQUE:2.4 Lbf.in

“T” TYPE

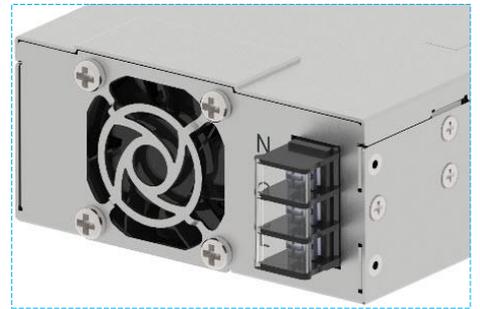
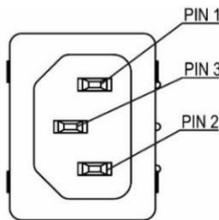
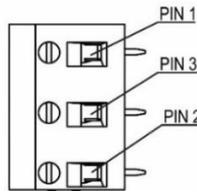


Figure 12. American Barrier Strip  
CONDUCTOR SIZE: 14 AWG Max.  
TIGHTENING TORQUE:8kgf.cm

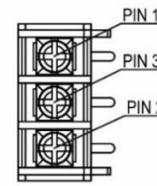
### 2.3.4 Connector Definitions – Frame



IEC Connector  
(IEC320-C14)



European  
Terminal Block



American  
Barrier Strip

Fig. 14: AC Input Connector

Pin	Function
PIN 1	AC Line (Phase)
PIN 2	AC Neutral
PIN 3	Chassis(Earth) Ground

Table 3. AC Input Connector - Pin Assignment

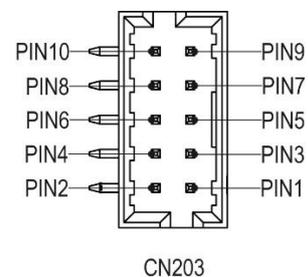
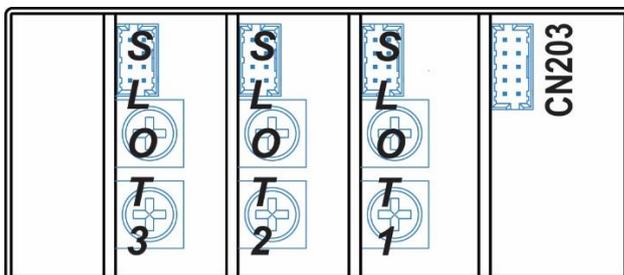


Fig. 15: Global Control Signals and Connector

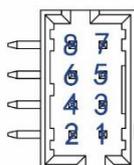
# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

Global control signals CN203 (Molex:87833-1031) Mating With Molex:51110-1051 or equivalent Terminal: 0503948052	
Pin	Function
1	Global DC_OK+
2	Global DC_OK-
3	5V+
4	5V+
5	GROUND
6	GROUND
7	Global Inhibit +
8	Global Inhibit -
9	No Connection
10	No Connection

Table 4. Global Control Signals (CN203) – Pin assignment

### 2.3.5 Connector Definitions – Single Slot Single Output Module



CN102

Pin	Function
V+	Output
V-	Output Return
Wire range: 8-20 AWG	
Screw torque: 7.0 to 10.0 kgf.cm (6.08 to 8.68 lbf.in)	
Screws are suitable for slotted and Phillips head screwdrivers.	

Table 5. DC Output Port - Pin Assignment

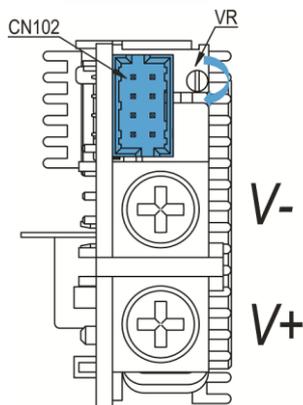


Fig. 16: -x1 Module connector

Control Connector CN102 (Molex: 87833-0851) Mating With Molex: 51110-0851 or equivalent , Terminal: 0503948052	
Pin	Function
1	Remote On_Off/Inhibit +
2	Remote On_Off/Inhibit -
3	Remote Sense +
4	Remote Sense -
5	Power Good- "Collector"
6	Power Good- "Emitter"
7	Current Share
8	Reserve/No Connection

Table 6. Control Signals Connector - Pin Assignment

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

### 2.3.5 Connector Definitions – Triple Slot Single Output Module

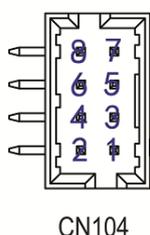
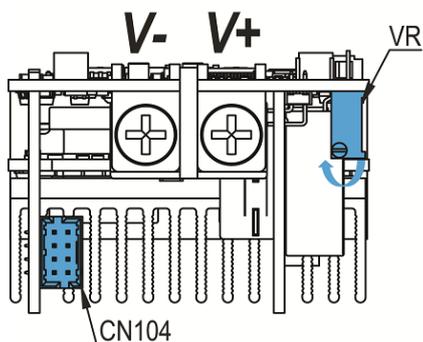


Fig. 17: -x2 Module connector

Pin	Function
V+	Output
V-	Output Return

Wire range: 2-16 AWG  
Screw torque: 15.0 to 20.0 kgf.cm (13.02 to 17.36 lbf.in)  
Screws are suitable for slotted and Phillips head screwdrivers.

Table 7. DC Output Port - Pin Assignment

Control Connector CN104 (Molex: 87833-0851) Mating With Molex: 51110-0851 or equivalent Terminal: 0503948052	
Pin	Function
1	Remote On_Off/Inhibit +
2	Remote On_Off/Inhibit -
3	Remote Sense +
4	Remote Sense -
5	Power Good- "Collector"
6	Power Good- "Emitter"
7	Reserve/No Connection
8	Reserve/No Connection

Table 8. Control Signals Connector - Pin Assignment

### 2.3.6 Connector Definitions – Single Slot Dual Output Module

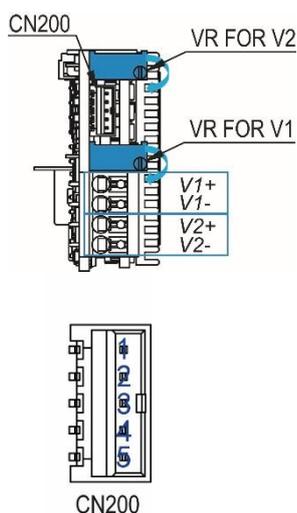


Fig. 18: -x3 Module connector

Pin	Function
V1+	V1 Output
V1-	V1 Output Return
V2+	V2 Output
V2-	V2 Output Return

Wire range: 28-16 AWG

Table 9. DC Output Port - Pin Assignment

Control Connector CN200 (Molex: 87438-0563) Mating With Molex: 87439-0500 Terminal: 874210102	
Pin	Function
1	Remote Inhibit 2 +
2	Remote Inhibit 2 -
3	NC
4	Remote Inhibit 1 +
5	Remote Inhibit 1 -

Table 10. Control Signals Connector - Pin Assignment

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### 3 Electrical Functions of Main Output

Please be noted the function description is applicable for all the modules unless specifies.

#### 3.1 Start-up Timing

Start-up time is defined as the time duration from when the AC is applied with remote on\_off signal enabled to the output voltage reaching to higher than 90% of its final steady value. MEG-700A series power supply can provide 2s max start up time to meet the fast power up requirement.

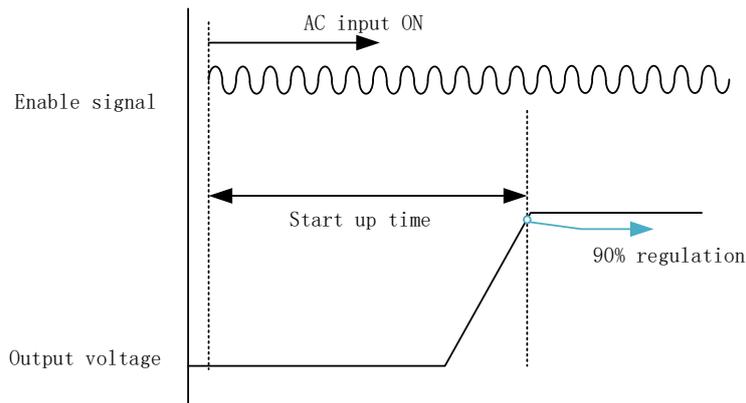


Fig. 19: Start-up timing sequence

The standard product sets the remote on\_off signal to be enabled as default, if customer is choosing the reverse logic version, then remote on\_off signal is required to enabled before powering up the power supply, otherwise the startup time is determined by the time when the remote on\_off signal is set to be enable.

When the power supply is originally disabled and then enabled by the remote on\_off control signal, the enable time is 100ms max, this includes the output rise time to 90% regulation.

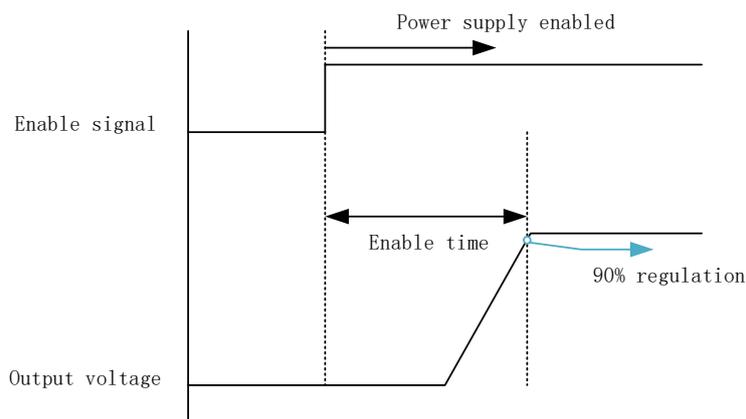


Fig. 20: Enable timing sequence

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

### 3.2 Rise Time

Rise time is defined as the time from when the output voltage is higher than 10% regulation voltage to the point when the output voltage reaches 90% output regulation level. The rise time provided by MEG-700A series is 100ms max.

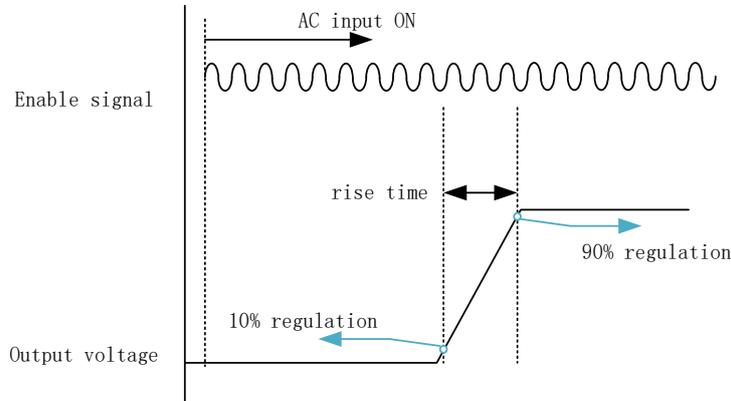


Fig. 21: Rise time sequence

### 3.3 Hold up Time

Hold up time provide the system the necessary back up time from when AC is collapsed to the output voltage falls below 90% regulation value. As when AC input is off, it is depending on the internal power reserved in the power supply to support the output power, different output level will bring different hold time. MEG-700A series defines the hold time with rated load, as long as the input voltage is within the normal input value, the hold time can be 12ms min.

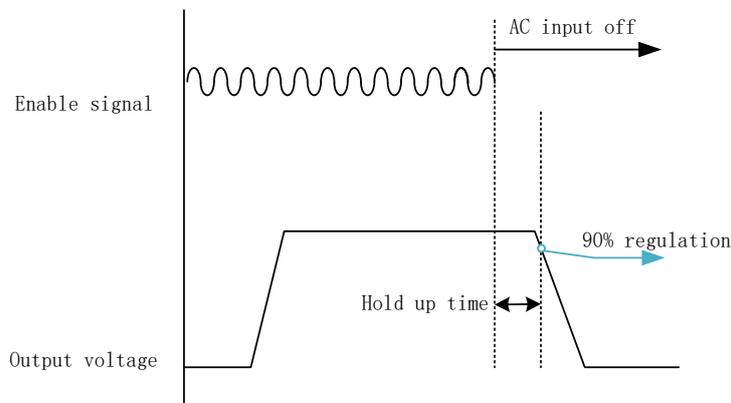


Fig. 22: Hold up time sequence

### 3.4 Ripple & Noise Measurement

When measuring output ripple and noise, it is recommend that use an X1 probe in parallel with a 0.47uF ceramic chip capacitor and a 10uF aluminum electrolytic capacitor, and the bandwidth should be set to 20MHz.

Below is a typical connection of the ripple & noise measurement.

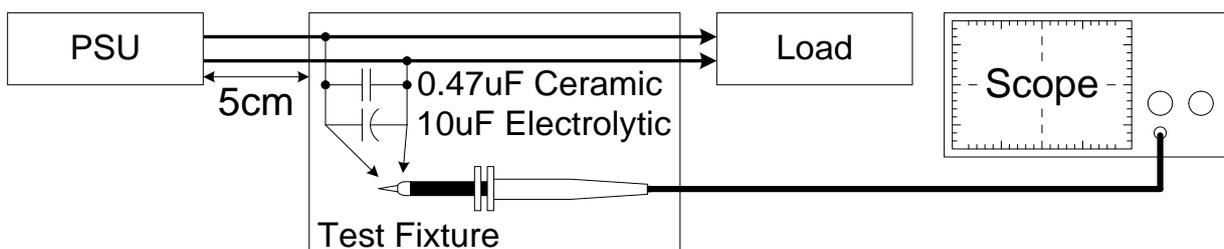


Fig. 23: Ripple and noise measurement circuit

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

### 3.5 Protections

#### 3.5.1 Over Voltage Protection (OVP)

When the output voltage sees unusual high peak or the internal feedback control loop fails to lead the output voltage to be unusually high, power supply can sense the output voltage, if the output voltage is higher than certain limit (130% regulation max), the power converter will be disabled with latch mode, the way to release the latch protection is removal and re-application of the AC input voltage.

#### 3.5.2 Over Load and Over Current Protection (OLP/OCP)

Each output will enter auto-recovery mode when the output current reaches over current protection set point. The output can hold to 950W typical for 5 second before tripping protection. The power supply will recover once the fault condition causing the OLP and OCP is removed and  $I_o$  is back within the specified limit. The time interval between each auto re-start during protection is 4s typical.

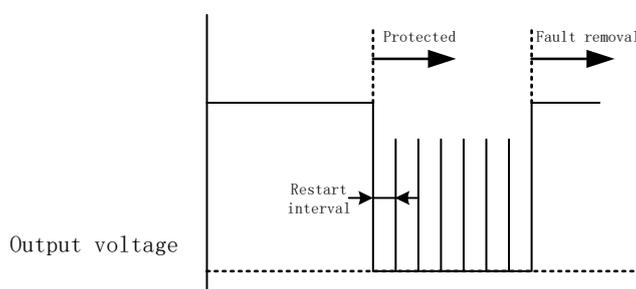


Fig. 24: Auto restart hiccup during OLP/OCP

#### 3.5.3 Short Circuit Protection (SCP)

The power supply's output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate in "Hiccup mode", as shown in the illustration in the OLP/OCP section on this page. The power supply will return to normal operation after the short circuit is removed.

#### 3.5.4 Over Temperature Protection

As mentioned above, the power supply also has Over Temperature Protection (OTP). This is activated when the overload condition persists for an extended duration and the output current is below the overload trigger point but >100% load. In the event of a higher operating temperature condition at 100% load, the power supply will run into OTP when the surrounding air temperature is higher than the operating temperature. When activated, the output voltage will go into latch mode.

To re-enable the power supply output, it needs to,

- A. Turn off the AC input
- B. Remove the fault temperature ambient condition
- C. Let power supply cool down
- D. Turn on the AC again

#### 3.5.5 Fan Fault Protection

Each output module and PFC module sense each module operation temperature. Any output module temperature is higher than the over temperature protection set point, all the modules will be shut down latched.

An AC recycle is required to reset the power supply to normal operation.

### 3.6 Remote On\_Off Control

Remote On\_Off control allows customer to easily control the power supply from system level point of view, MEG-700A series uses an isolated diode located within the power supply. The remote control signal can be used to enable or disable only the main output. When the main output is disabled, the +5V Standby output will continue to operate. Every module has its own remote on/off control signal pin, and can work independently from each other.

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

Below is a suggested connection to use the remote on\_off signal, system can use a switch to conduct through this diode to disable the main out. The signal can be floated (no connection to the signal), in order to enable the main output

It is easily to know that conduct the diode to disable the power supply and left the diode to be open to enable the output, so customer can design its own control circuit to use this signal to realize different logic control.

If customer wants a reversed control logic of the diode to enable/disable the output, please consult with Delta.

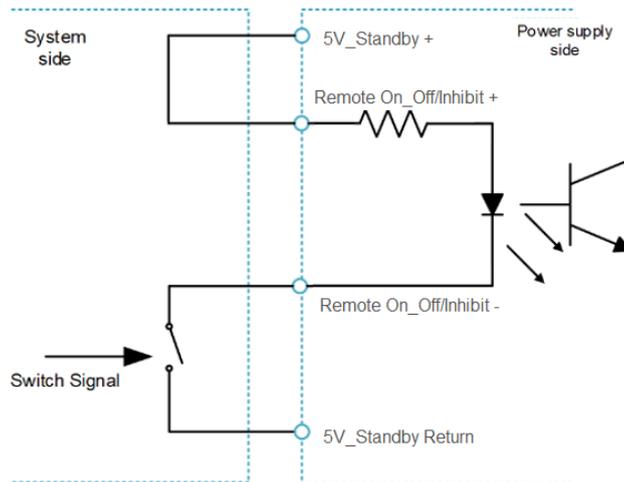


Fig. 25: Remote On\_off connection

### 3.7 Power Good Signal

Power Good+/- pin on every module's control connector is an isolated open collector transistor (80V/50mA rating). A resistor (suggested value 10Kohm, 1/8W) can be added between Power Good- pin and DC RTN, Power Good+ pin can be connected to 5V standby (or, other available pull-up voltage that is no greater than the transistor rating). Value of resistor may have to be adjusted, depending on voltage used, and other end-use conditions of the Power Good+ pin connection to the product.

When AC input is on, Power Good Signal (Shown in below figure) generated will be high. When AC input is off, Power Good Signal generated will be low. There will be a minimum of 5 milliseconds between the time the Power Good Signal goes to low level, and the time when the output reaches 90% of its rated value.

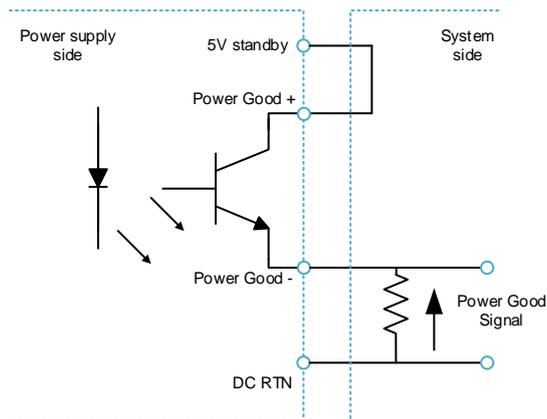


Fig. 26: Power good signal connection

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

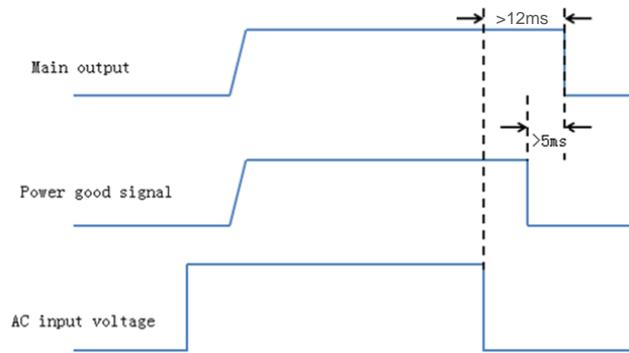


Fig. 27: Power good signal sequence

### 3.8 Voltage Adjustment

The power supply provides a potentiometer for user to adjust the output voltage. The output voltage is designed to be able to adjust up to  $\pm 10\%$  of rated voltage, when the output is adjusted below nominal value, the maximum output current is the same as the nominal output, when the output is adjusted above nominal value, the output power cannot exceed the nominal maximum power (the maximum output current will be reduced accordingly).

### 3.9 Remote Sense Connection

Remote sense feature can be used to compensate for the extra voltage drop on output wires that are connected from the main output terminals, to the load. With wires connected from the remote sense pins, at the same locations as the wires from the main output.

Note that line drop (voltage drop due to wiring) compensation voltage range must be such that the output voltage is

within the output voltage adjustment range and that the voltage to compensate must be within 0.5V (in the connection picture,  $V_o - V_{o\_load}$  must be less than 0.5V, or  $DC\_RTN\_load - DC\_RTN$  be less than 0.5V).

Consider power loss due to line drop and use this unit within the maximum allowable output power. Reduce the effect of noise induced into the remote sensing lines by using shielded lines, a twist pair, or a parallel pattern, etc.

MEG-700A series also provides the protection mode if the remote sense wire connection is fault made, the power supply will not be damaged if the remote sense pins are shorted, or if a reverse/inverted polarity connection is made to the load, this gives more reliable operation in real application. To be noted, if misconnect the remote sense wires, the power supply will be protected and can not normally operate, please check the wire connection carefully before power up the product in this case.

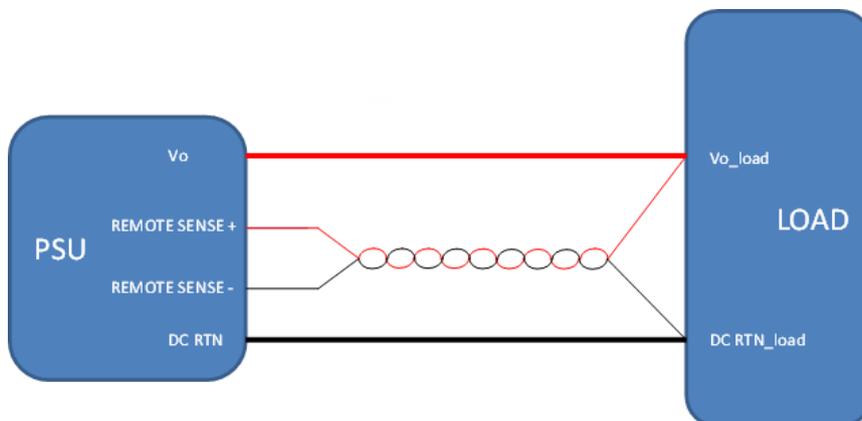


Fig. 28: Remote sense connection

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

### 3.10 Remote Sense Connection Under Parallel Operation

The single slot single output series has an active current sharing circuit for the main output; it can realize the output current to be balanced when customer is using only two modules in parallel to achieve higher output power. Please contact Delta for assistance if more than two modules are paralleled together for higher output power.

A one wire current share bus is used to achieve current sharing between units, the current share bus must be connected together among different units (pin 7 of CN102, refer to power supply structure and pin assignment in section 2.3).

The paralleled units can be connected with or without remote sense function, below is a typical connection of the parallel connection.

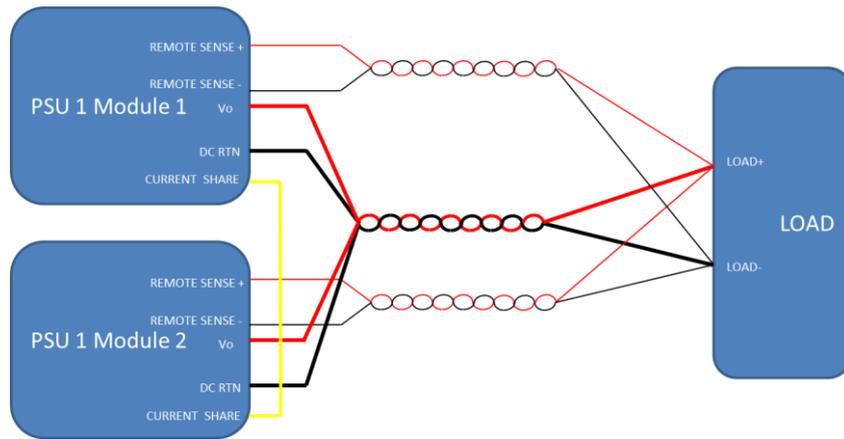


Fig. 29: Parallel connection with remote sense

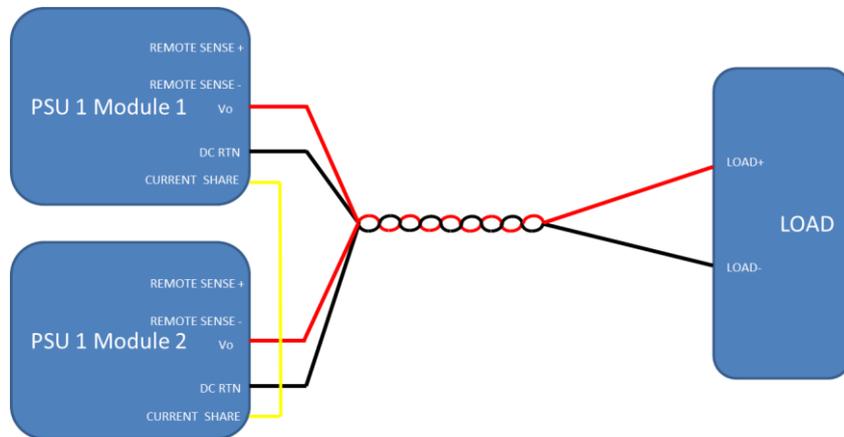


Fig. 30: Parallel connection without remote sense

Normally Delta will ship the assembled configurable power supply with parallel code from customer, and connect the current share pin. Option can be left for customer to make current share and parallel working too of two same modules are working together. An external Or-ing circuit is also needed to form a redundant connection.

# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

### 3.11 Series Operation

It is possible to connect two or more modules in series to increase output voltage. The module's output voltage can be the same or different. However, it is highly recommend that the series modules have the same voltage and current rating, so that it can be shut down synchronously in OCP and SCP conditions.

There will need to have an external schottky diode in parallel with each output to prevent reversed voltage, and this diode need to select and verify by customer. The recommend rating for this diode is twice of the selected modules' maximal output.

When series total output voltage exceeds 60V SELV, all safety concerned items must be verified at final equipment side.

Below is a typical connection of two modules in series together.

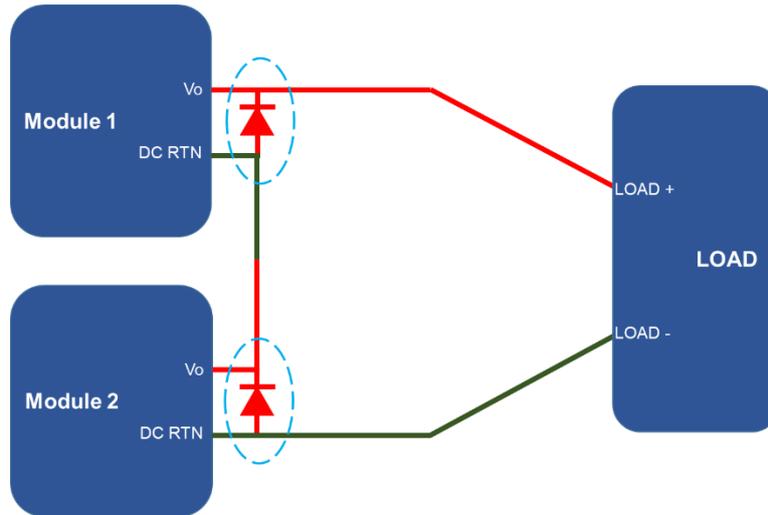


Fig. 31: Series connection with external reversed diode

### 3.12 Global Remote On\_off/Inhibit

Global Remote On\_off control on the control board allows customer to control all the modules at the same time, MEG-700A series uses an isolated diode located within the power supply. The remote control signal can be used to enable or disable all the main output.

Below is a suggested connection to use the global remote on\_off signal, system can use a switch to conduct through this diode (suggested pull up resistor to 5V standby with 510ohm resistor) to disable the main out. The signal can be floated (no connection to the signal), in order to enable the main output.

It is easily to know that conduct the diode to disable the power supply and left the diode to be open to enable the output, so customer can design its own control circuit to use this signal to realize different logic control.

If customer wants a reversed control logic of the diode to enable/disable the output, please consult with Delta.

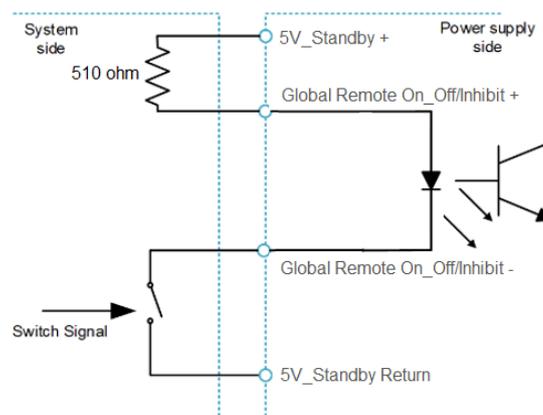


Fig. 32: Global Remote On\_off connection

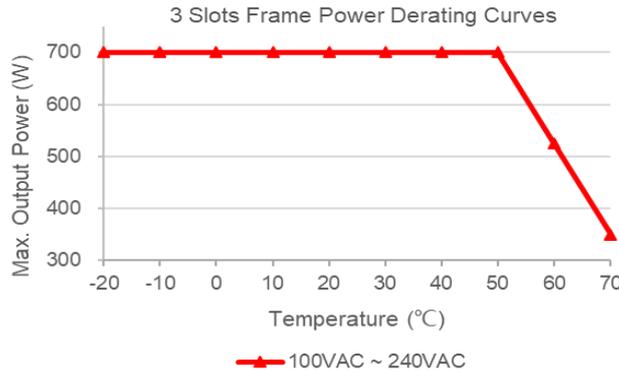
# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

### 3.13 Global DC\_OK

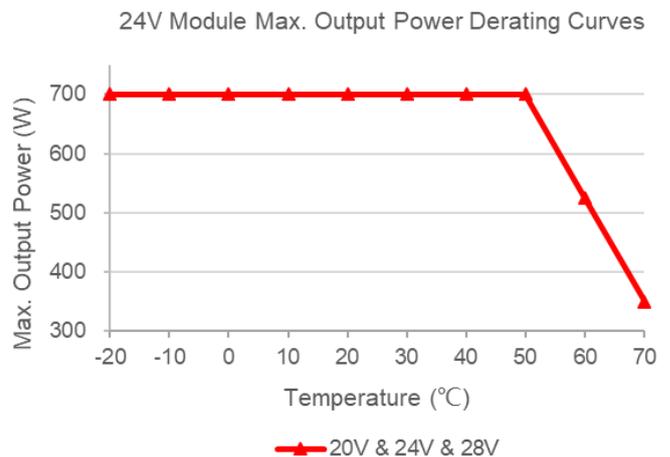
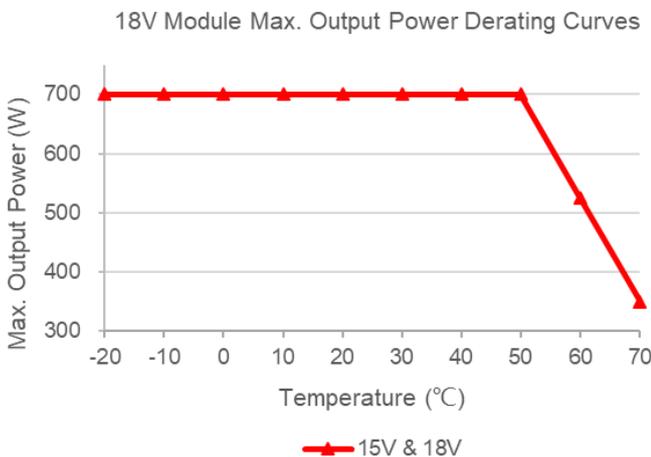
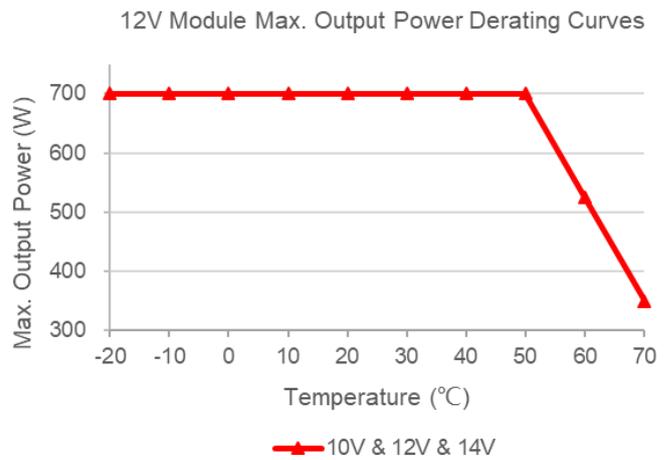
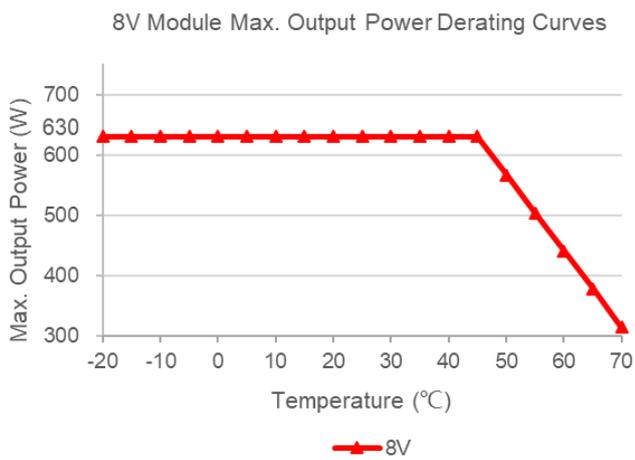
Global DC\_OK indicate the module output information. DC\_OK pin is an open collector type output (80V/50mA rating). DC\_OK signal connection can refer to power good signal. When all module outputs are on, DC\_OK pin will be high. When one of the outputs is off, DC\_OK pin will be pulled low .

## 4 Power Derating



### Power Derating – Triple Slot Modules

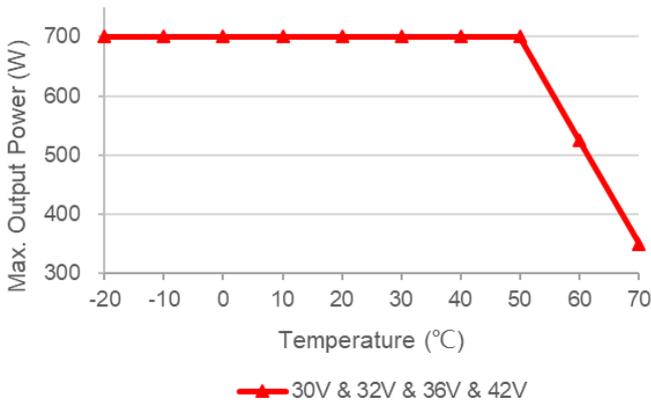
No air flow direction power derating unless specifically identified.



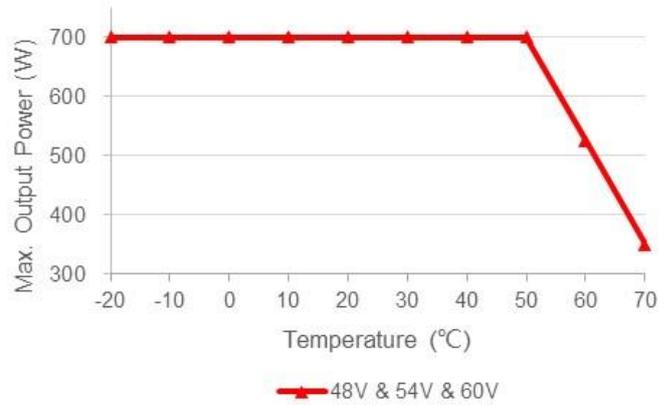
# Medical / Industrial AC-DC Configurable Power Supply

## MEG-700A series

36V Module Max. Output Power Derating Curves

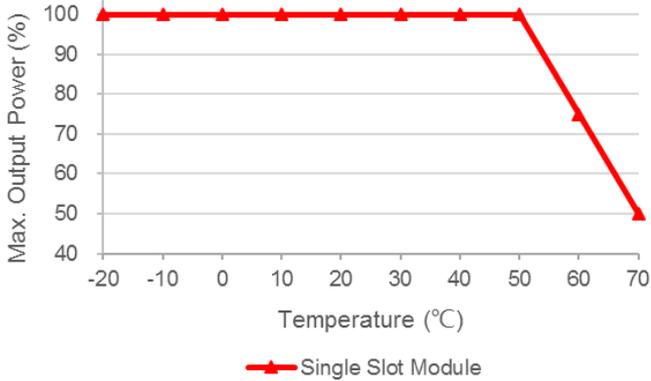


48V Module Max. Output Power Derating Curves

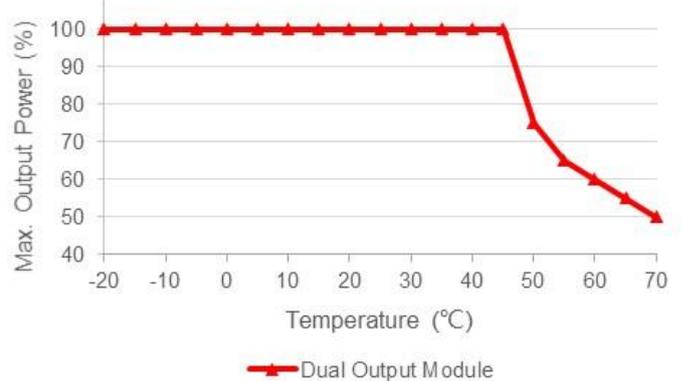


### Power Derating – Single Slot Modules & Dual Output Modules

Max. Output Power Derating Curves



Max. Output Power Derating Curves



## 5 EMC Performance Guidelines

All configurable modules are designed to comply with EN55032/CISPR32/FCC47 part 15 Class B limits. However, the EMC performance is critically dependent on customer system. So it is recommended that the performance should be finally evaluated with customer environment. A high flux and low magnetic permeability ( $\mu=125$ ) common inductor may be needed in the power supply input to guarantee system compliance. The recommend inductance is about 7uH.