

# 60W 1Phase CliQ II DIN Rail



## Features:

- Ease of wire connection to terminals
- Comes with detachable connectors
- Overload, Overvoltage & Thermal protection
- Efficiency > 89%
- Power boost 150% for 3 seconds
- Expected life time: 10 years
- Redundancy: Yes (with external ORing diode)
- RoHS & IP20 compliant
- Meet Energy Star Level 5
- 3 years warranty

## DRP024V060W1BA

### Summary

The new CliQ II DRP024V060W1BA is the latest offering from one of the world's largest power supply manufacturers - Delta. The product offers a nominal output voltage of 24 V, a wide temperature range from -20°C to +80°C and a minimum holdup time of 20 ms. The state-of-the-art design is made to withstand harsh industrial environments. The rugged, ultra-compact metal case is shock and vibration resistant according to IEC60068-2.

The 60 watts DIN Rail power supply provides overvoltage, overload and thermal protection. Due to the wide input voltage range from 85 to 264 VAC, the Delta's CliQ II power supply is worldwide usable.

It also comes with multiple output terminals for fast wiring and easy installation.

## Technical Data

60W1Ph	
<b>Input Data (1)</b>	
Nominal input voltage and frequency	100-240VAC / 50-60Hz
Voltage range	85-264VAC (120 – 375 VDC)
Frequency Range	47-63Hz
Nominal current	1.5A max @115VAC, 1.0A max @230VAC
Inrush current limitation. I <sub>2t</sub> (+25°C) typ.	< 35A @ 230VAC
Mains buffering at nominal load (typ.)	> 20ms @ 115VAC, > 125ms @ 230VAC
Turn-on time	< 3.0sec.
Internal fuse	T 3.15 AH / 250V
Recommended backup fuse: Power circuit-breaker characteristic	6A, 10A or 16A : B
Leakage current	< 1mA
Energy Star Level	V

<b>Output Data (2)</b>	
Nominal output voltage U <sub>N</sub> / tolerance	24VDC±2%
Setting range of the output voltage	24-28VDC
Nominal current	2.5A
De-rating above +50°C	> 50°C (2.5% / °C)
Startup with capacitive loads	Max 8,000µF at 25°C
Max. power dissipation idling / nominal load approx.	7.4W
Efficiency	> 89% typical.
Residual ripple / peak switching (20 MHz) (at nominal values)	< 50mV / < 150mVpp.
Can be connected in parallel for redundancy and increased capacity	YES with ORing Diode or Redundancy module
Surge voltage protection against internal surge voltages	YES

<b>Certification/Standards</b>	
Electrical equipment of machines	IEC60204-1 (overvoltage category III)
Safety transformers for switched-mode power supply units	
Electrical safety (of information technology equipment)	TUV BAUART to EN60950-1, UL/C-UL recognized to UL60950-1, CSA C22.2 No. 60950-1, CB scheme to IEC60950-1
Industrial Control Equipment	UL / C-UL Listed UL508 and CSA C22.2 No. 107.1-01, CSA to CSA C22.2 No.107.1-01 (file no. 181564)
Electronic equipment for use in electrical power installations	EN50178 / IEC62103
Safety entry low voltage	PELV (EN60204), SELV (EN60950)
Safe isolation	DIN.VDE 0100-410
Protection against electric shock	DIN 57100-410
Protection against shock currents, basic requirements for protective separation in electrical equipment	VDE 0106-101
Limitation of mains harmonic currents	DIN57100-410

General Data		
Isolation voltage:		
Input / output	type test/routine test	4 KVAC / 3 KVAC
Input / PE	type test/routine test	1.5 KVAC / 1.5 KVAC
output / PE	type test/routine test	1.5 KVAC / 500 VAC
Degree of protection		IP20
Class of protection		Class I with PE connection
MTBF		> 1,000,000hrs.
Type of housing		Aluminium (Al5052)
Dimensions (L / W / H)		121mmx32mmx125mm
Weight		0.37Kg
STATUS Indicator		
LED (6) DC OUTPUT OK		YES (GREEN LED)
Climatic Data		
Ambient temperature (Operating)		-20°C to 80°C (> 50°C de-rating)
Ambient temperature (Storage)		-25°C to 85°C
Humidity at 25°C, non-condensing		< 95% RH
Vibration (Non-Operating)		10Hz to 500Hz @ 30 m/S <sup>2</sup> (3G peak); displacement of 0.35mm; 60min per axis for all X, Y, Z direction. in acc. with IEC 68000-2-6.
Shock (in all directions)		30G (300m/S <sup>2</sup> ) in all directions according to IEC60068-2-27
Pollution degree		2 according to EN50178
Climatic class		3K3 according to EN 60721
<b>CE</b> In conformance with EMC guideline 89/336/EEC and low voltage directive 73/23/EEC		DINRAIL 1AC / 24V DC / 2.5A (EOE11010248)
EMC (electromagnetic compatibility)		
Immunity to interference according to EN 61000-6-2		
• EN 61000-4-2 <sup>1)</sup> Discharge of static electricity (ESD)	Housing Contact discharge: Air Discharge:	LEVEL 4 8 KV 15 KV
• EN 61000-4-3 <sup>1)</sup> Radiate Field Immunity	Housing Frequency/Field intensity:	LEVEL 3 80MHz - 1GHz / 10V/M with 1kHz tone / 80% modulation
• EN 61000-4-4 <sup>1)</sup> Fast transients (Burst):		2KV <sup>4)</sup>
• EN 61000-4-5 <sup>1)</sup> Surge voltage Immunity (Surge):		2KV <sup>3)</sup> / 2KV <sup>4)</sup> (Level 3)
• EN 61000-4-6 <sup>1)</sup> Conducted Immunity	I/O: Frequency / U <sub>0</sub> :	Level 3 0.15MHz - 80MHz / 10Vrms.
• EN 61000-4-11 <sup>2)</sup> Voltage dips		Input: Main Buffering > 20ms.
Noise emission according to EN 61000-6-3		
• Emitted radio interface		EN55011 (EN55022) CLASS B <sup>5)</sup>
• Radio interference voltage		EN55011 (EN55022) CLASS B <sup>5)</sup>
EN55011 corresponds to CISPR11 / EN55022 corresponds to CISPR22 / EN 61000 corresponds to IEC 61000 1) Criterion A: Normal operating behavior within the defined limits. 2) Criterion B: Temporary impairment to operational behavior that is corrected by the device itself. 3) Symmetrical: Conductor to conductor. 4) Asymmetrical: Conductor to ground. 5) Class B: Area of application industry and residential.		

## Numbering for DIN Rail Power Supply

For example: **DRP024V060W1BA**

**XX** X XXXX XXXX X XX

**XX.....Product Type**

DR	DinRail
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XX **X** XXXX XXXX X XX

**X.....Model**

P	Power Supply
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XX X **XXXX** XXXX X XX

**XXXX.....Voltage**

024V	24 Voltage
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XX X XXXX **XXXX** X XX

**XXXX.....Watt**

060W	60 Watt
120W	120 Watt
240W	240 Watt
480W	480 Watt

XX X XXXX XXXX **X** XX

**X.....Phase**

1	1 Phase
3	3 Phase

XX X XXXX XXXX X **XX**

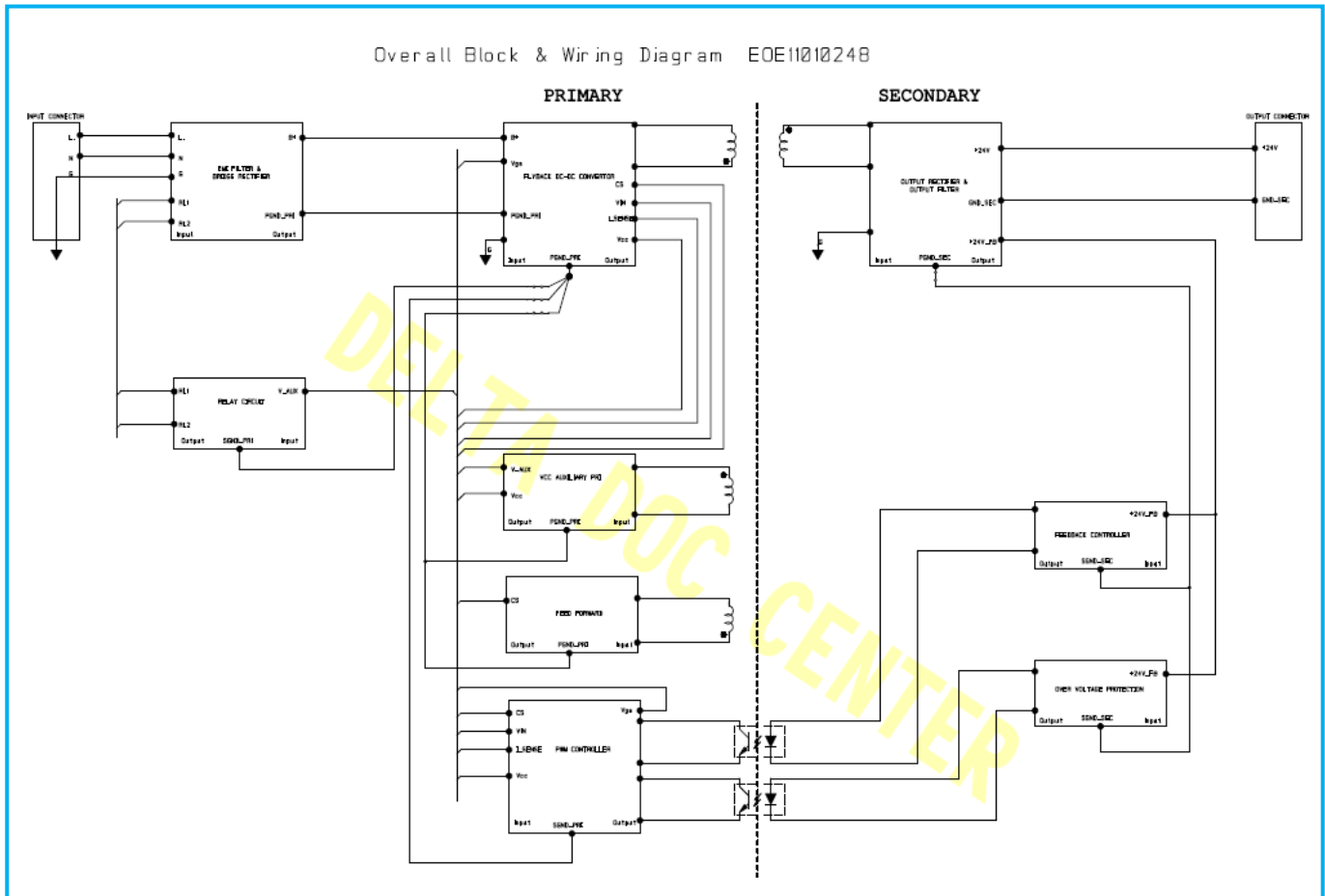
**XX.....Variation (Eg, Customer, material,Etc.)**

BA	Delta standard – metal case
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# Block Diagrams/Connections:

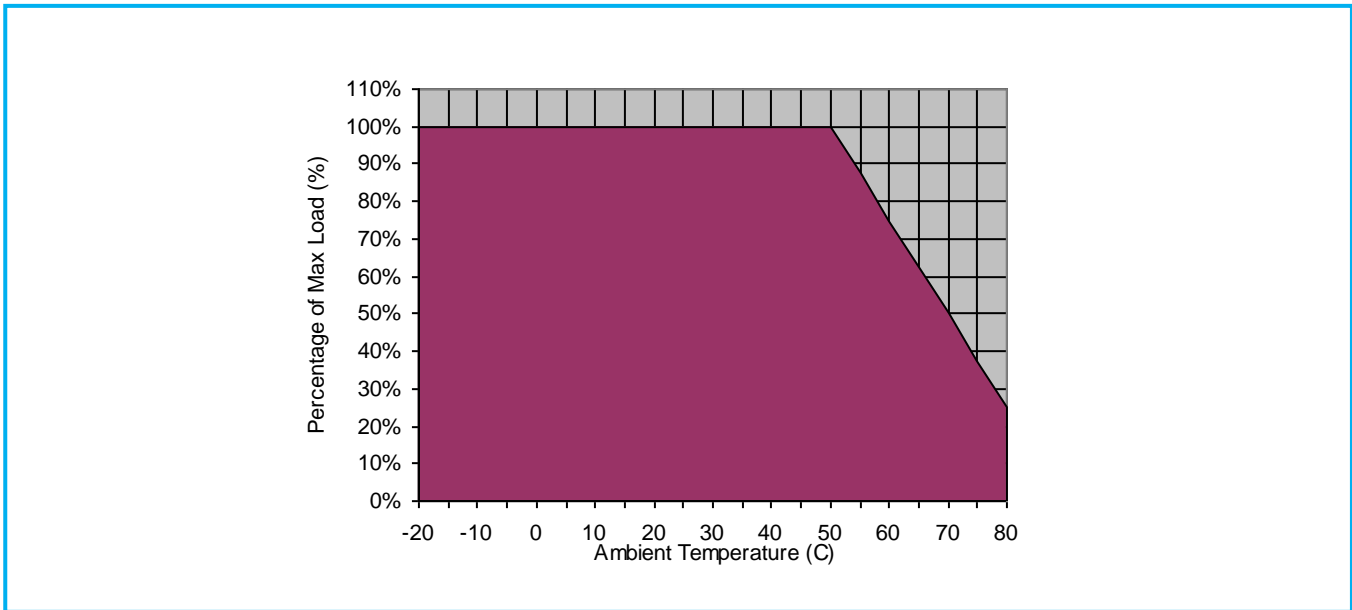
Block Diagram of Power Supply,

- DRP024V060W1BA



## Engineering Data

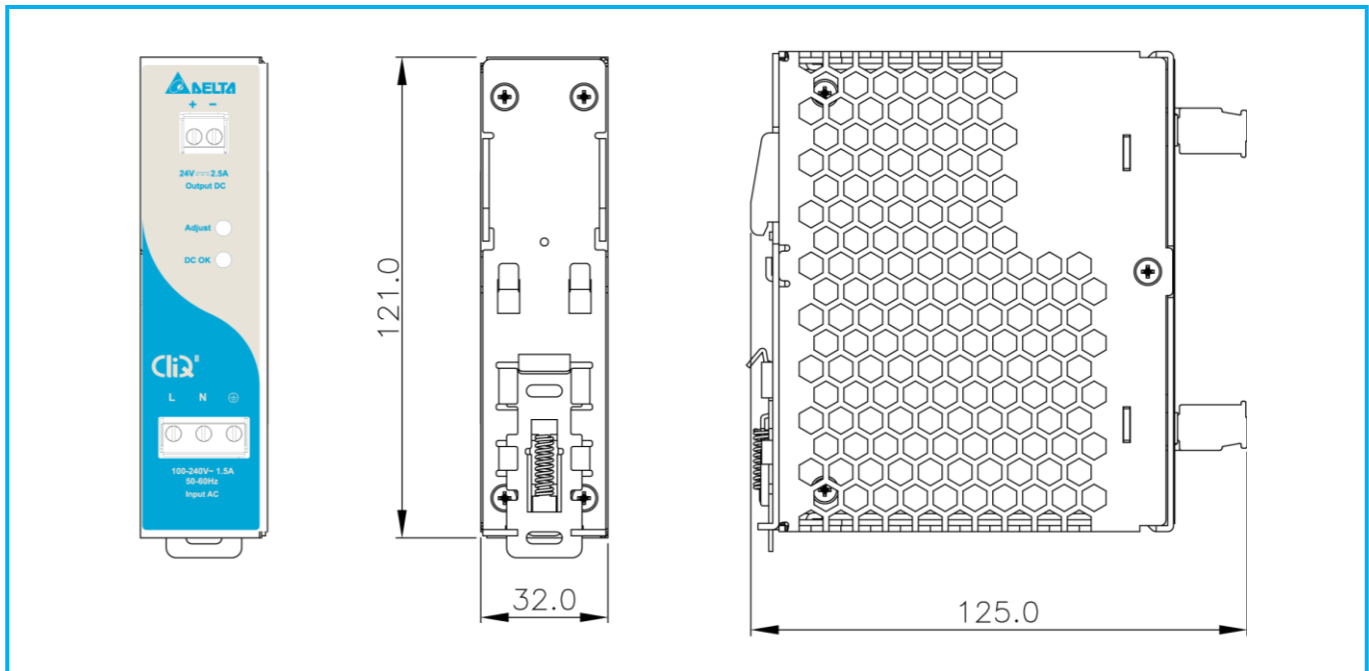
- **Derating Curve (Both of Horizontal and Vertical)**
- **Model: DRP024V060W1BA**



Note:

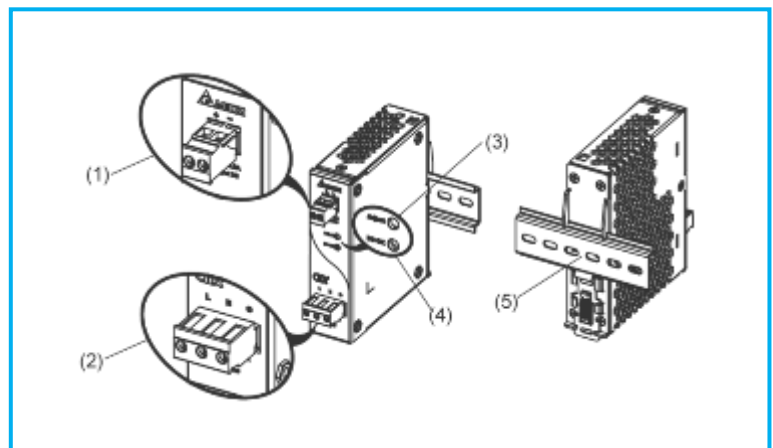
1. Do not use the device in areas outside of the shaded portion shown in the above graph. Internal parts may gradually deteriorate and become damaged.
2. Based on the above graph, if the ambient temperature is greater than 50°C, the output capacity has to be reduced by 2.5% per Celsius temperature increase. If not, the device will go into over-temperature protection by switching off i.e. device will go into bouncing mode. It will recover when ambient temperature drops to 50°C or output capacity is reduced as recommended in the graph.
3. If the device has to be mounted in any other direction, please contact your service provider for more details.
4. In order for the device to function in the manner intended, it is also necessary to observe a lateral spacing of 2cm from other equipments.
5. Depending on the ambient temperature and output capacity of the device, the device housing can be very hot!

# Mechanical drawing



## Device description (Fig. 1)

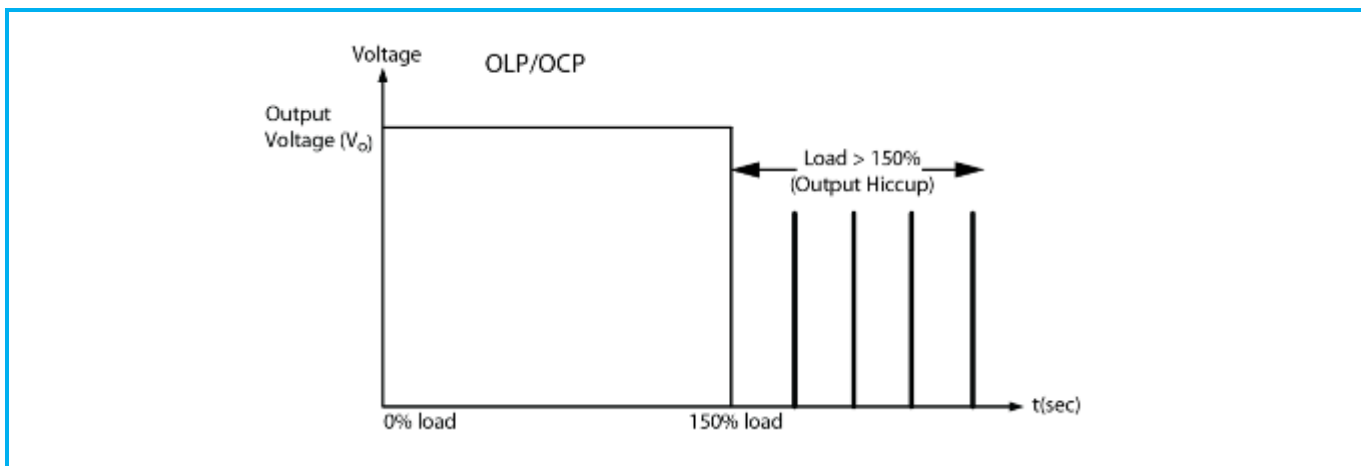
- (1) Input terminal block connector
- (2) Output terminal block connector
- (3) DC voltage adjustment potentiometer
- (4) DC OK control LED (green)
- (5) Universal mounting rail system



- **Overload Protection**

The Power Supply is provided with an overload protection (OLP) function which protects the power supply from possible damage caused by excess current. The Power Supply also has an over temperature protection (OTP) in case overload condition persists for an extended duration and is below the overload trigger point but  $> 100\%$  load.

Typically the overload current ( $I_{OL}$ ) is  $> I_{SURGE}$  (150%) output voltage will start dropping when the power supply reaches max power limit. It will go into bouncing mode when the output reaches UVLO (under voltage point). The output voltage will recover automatically when the overload condition is removed.



- **Short Circuit Protection**

The Power Supply has a short circuit protection which is in line with the overload protection and activates whenever there is a short across the output voltage. It will go into bouncing mode and recovers automatically when the fault is removed.

- **Over Temperature Protection**

The Power Supply has an 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.

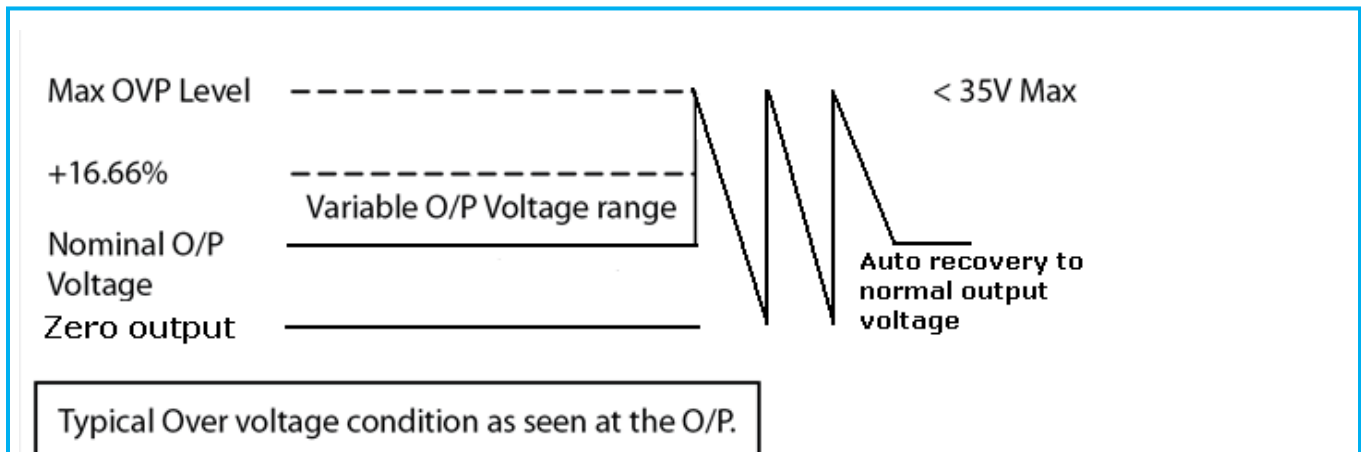
In the event of a higher ambient operating condition at 100% load, the Power Supply will run into OTP when the ambient temperature is  $> 55^\circ\text{C}$ . When activated, the output voltage will go into bouncing mode until the operating ambient temperature drops to  $50^\circ\text{C}$  or output capacity is reduced as recommended in the graph.



- **Overvoltage protection**

The Power Supply has an overvoltage protection (OVP) and is activated when the power supply feedback circuit fails. The output voltage will not be  $> 35\text{V}$  under any Line/Load and operating ambient temperature.

The Power Supply does not shut down but goes into Hiccup mode (Auto-Recovery). The output voltage will recover back to  $24\text{VDC}$  once the fault is removed.



- **Inrush Current, Start-up Time, Output Hold-up Time**

#### **Inrush Current,**

Inrush current is the first surge current seen on the input side when AC input is applied to the Power Supply. It is the first pulse captured. See below for the Inrush current in a typical Power Supply.

#### **Start-up Time,**

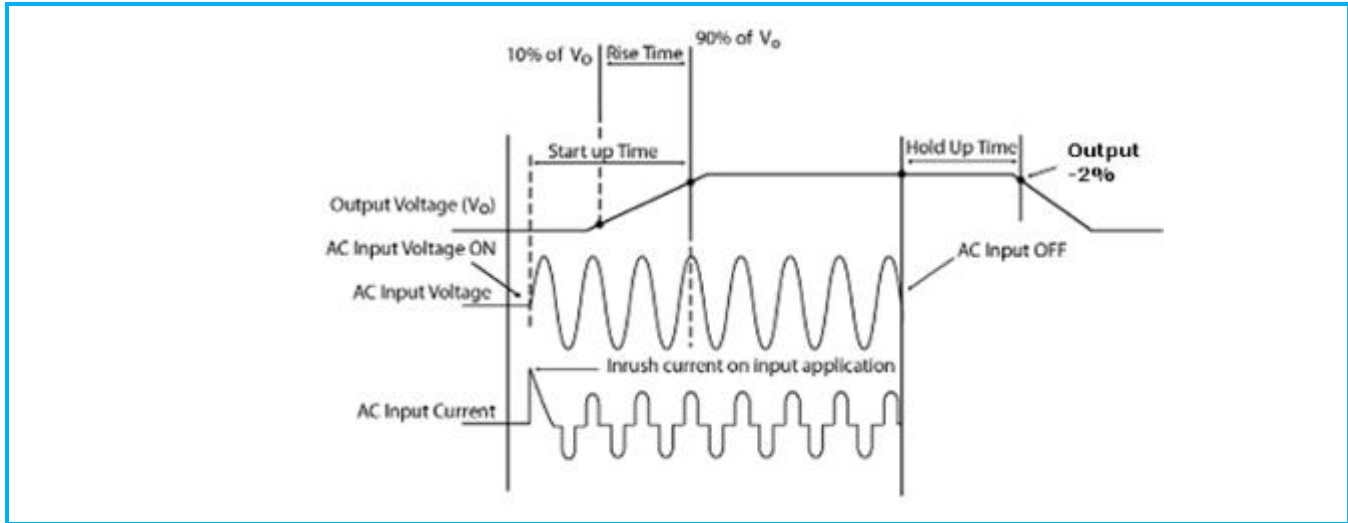
Start-up time is measured from the point AC input is applied to the point output voltage reaches within 90% of its set value. See below for a typical start-up time characteristic.

#### **Rise Time,**

Rise time is measured from the point output voltage rises from 10% to 90% of its set value. See below for a typical rise time measurement.

## Hold-up Time,

Hold time is the time when the AC input collapses and o/p voltage retains regulation for a certain period of time is called as hold up time. See in the picture below a typical hold up time characteristic of a power supply. The hold time is measured until the output voltage remains in regulation hence it measured until the output voltage reaches minimum regulation -2% of its set value.

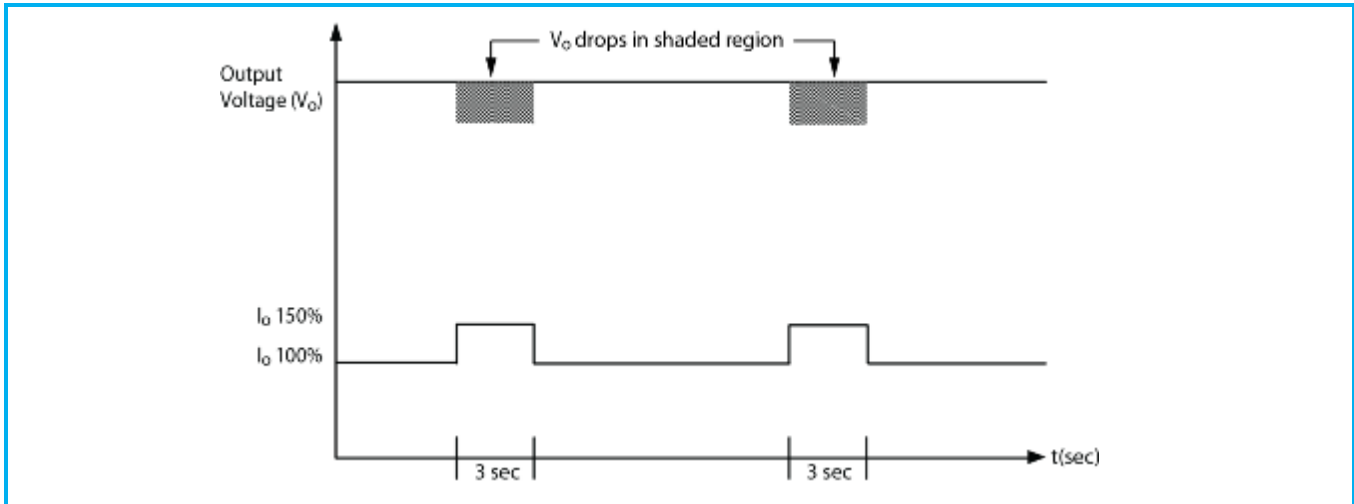


- **Output Voltage Adjust**

The 24VDC connection is made using the "+" and "-" screw connections. At the time of delivery, the output voltage is 24VDC. The output voltage can be set from 24 to 28VDC on the potentiometer seen as Adjust on the front panel of each power supply.

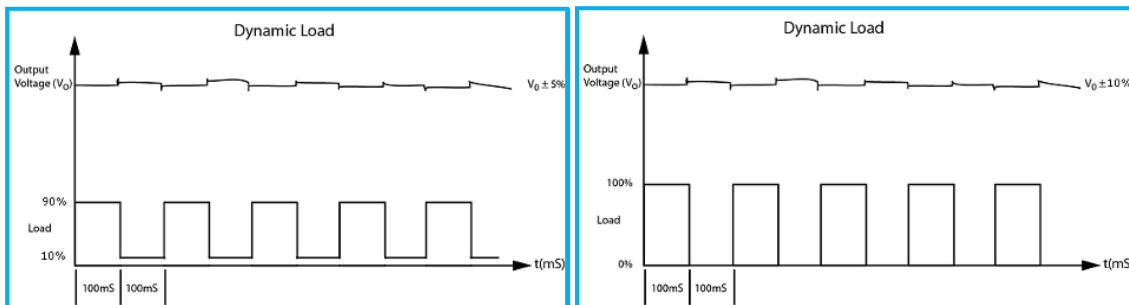
- **Surge Load**

See below typical surge load capability of the power supply, the PSU is capable of delivering 3 secs of Surge load about 150% of  $I_o$  max the o/p voltage can be out of regulation limits of  $\pm 5\%$ .



- **Dynamic Load**

The Power Supply is capable of dynamic output voltage load change from 10% to 90% within  $\pm 5\%$  of regulation limits, and from 0% to 100% within  $\pm 10\%$  of regulation limits. See picture below on the dynamic behavior of the Power Supply.



## • Redundancy & Parallel Operation with ORing Diode

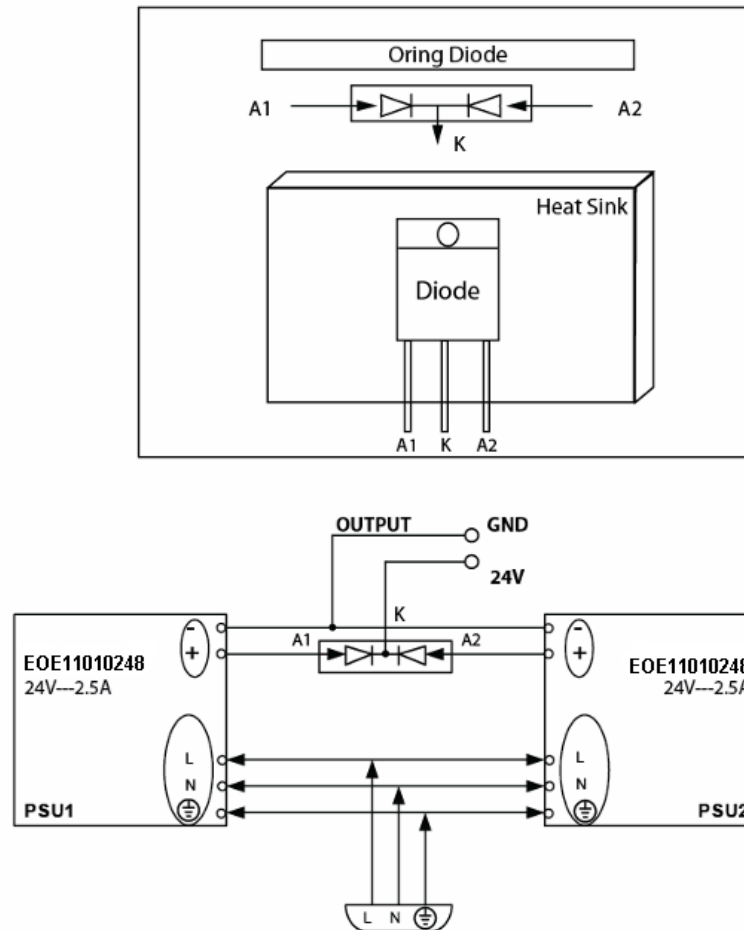
See picture below for a typical Redundant/Parallel operation using CliQ II Series Power Supplies. Power Supply Unit 1 (PSU1) and Power Supply Unit 2 (PSU2) are connected through a twin diode where Anode 1 (A1) is connected to the +Ve of PSU1 and A2 is connected to the +Ve of PSU2 and both output ground are shorted together.

The output of PSU1 and PSU2 is drawn from the Cathode K of the twin diode, making the Power Supply work in Redundant/Parallel operation.

### Redundant Operation:

When 2 Power Supplies are connected in parallel, the Power Supply with the higher output voltage will take the maximum load while the other will operate in standby mode (at no load). In case the first Power Supply fails, the second will take over the load and supplies the required power to the end system.

Redundance / Parallel Operation with External Oring Diode



**Parallel Operation:**

When 2 Power Supplies are connected in parallel, they can share the load if the following steps are taken.

**Step 1:**

Measure the output voltages at no load from A1 to Ground i.e. VA1 to Ground of PSU1 and VA2 to Ground of PSU2. If the voltages are not the same, follow Step 2. If they are the same, skip to Step 3.

**Step 2:**

Adjust the output voltages, with the help of VR on the Power Supply front panel marked as ADJUST, to the same level. For e.g. if PSU1 is measuring 24.15Vdc and PSU2 is measuring 24.25Vdc, adjust the output voltage of one to be the same as the other.

**Step 3:**

Connect the Power Supply to the end system load and measure the output voltages from A1 to Ground i.e. VA1 to Ground of PSU1 and VA2 to Ground of PSU2. Ensure that the output voltages are the same even after the 2 Power Supplies are connected to load. If not, adjust them with the VR available on the front panel. A tolerance of +/-25mV would be acceptable.

Note:

1. If the output voltage of any Power Supply is higher, it will take the initial load and share the maximum load.
2. If the output voltages are the same, then an equal load current sharing between the 2 Power Supplies can be achieved.
3. The ORing diode must be of an appropriate rating. The rating must be at least 4 times of the output load current and at least reverse voltage rating of 20Vrr.
4. The use of a heat sink is advised to ensure the ORing Diode does not overheat.
5. Recommended Redundancy Module: DRR-20A

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