



CliQ DIN Rail Power Supply 24V 480W 3Phase



Model No. DRP 024V 480W 3AA
 Weight: 1.71KG
 Size: 121 mm X 160 mm X 118.5 mm (H x W x D)

Features

- RoHS Compliant
- Over load protection
- Over voltage protection
- Over temperature protection
- Expected life time : 10 Years
- Power boost 150% for 3 seconds
- Compact design for easy handling
- Output terminals for fast wiring and easy installation
- With Conformal Coating (Class 1 Div 2 Hazard Loc)
- Redundancy : DRR-20A & DRR-40A or External ORing Diode

Description

The new CliQ DRP024V480W3AA is the latest offering from one of the World's No.1 Power Supply Company. The product offers a nominal output voltage of 24V, a wide temperature range from -20°C to 75°C and a minimum holdup time of >25ms. The state-of-the-art design is made to withstand harsh industrial environments. The rugged, compact design aluminium case is shock and vibration resistant according to IEC60068-2-6. The 480 watts CliQ DIN Rail power supply provides over voltage, overload and thermal protection. Due to the wide input voltage range from 320 to 575 Vac, the Delta's CliQ power supply is worldwide usable, multiple output terminals for fast wiring and easy installation.

INPUT SPECIFICATION

Input Voltage (Nominal)	400-500Vac
Input Voltage range	320-575Vac
Input Frequency (Nominal)	50 - 60Hz
Input Frequency range	47 - 63Hz
DC Input Voltage (Nominal)	565-700Vdc
DC Input Voltage Range	450-800Vdc
Input Current	< 1.60A @ 400Vac , <1.10A @ 500Vac
Efficiency	> 87.0% @ 3 x 400Vac & 3 x 500Vac
Inrush current (Cold Start)	<50A @ 3 x400Vac & 3 x 500Vac
Leakage Current	< 3.5mA @ 500Vac
Power Factor	Conform to EN61000-3-2

OUTPUT SPECIFICATION

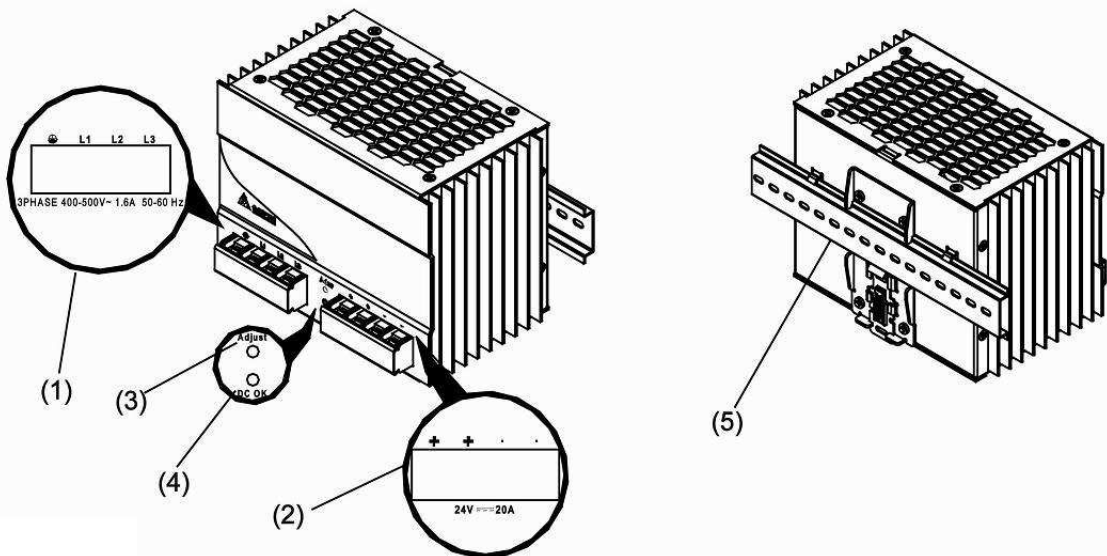
Output Voltage (Nominal)	24 Vdc
Output Voltage Tolerance	+/- 2% (Initial set point tolerance)
Output Voltage Adjust Range	22 – 28 Vdc
Line Regulation	< 0.5% Typical @ 320 to 575Vac input, 100% load
Load Regulation	< 1% Typical @ 320 to 575Vac input, 0 to 100% load
Residual Ripple (PARD), 20MHz BW	< 50mVpp / <240mVpp(25°C)
Output Current (Nominal)	20.0A
Power Derating above 50 °C	Derated Linearly 2.5% / °C
Rise Time	< 100ms @ nominal input, 100% load (25 °C)
Start-Up Time	< 1000ms @ nominal input, 100% load (25 °C)
Hold-Up Time	> 25ms @ 3 x 400Vac, > 50ms @ 3 x 500Vac (100% load, 25 °C)
Dynamic Response (Overshoot & Undershoot O/P Voltage)	+/-5% @ 0% - 100% load
Startup with capacitive loads	10,000µF @ nominal input & nominal O/P voltage 24V (25 °C)





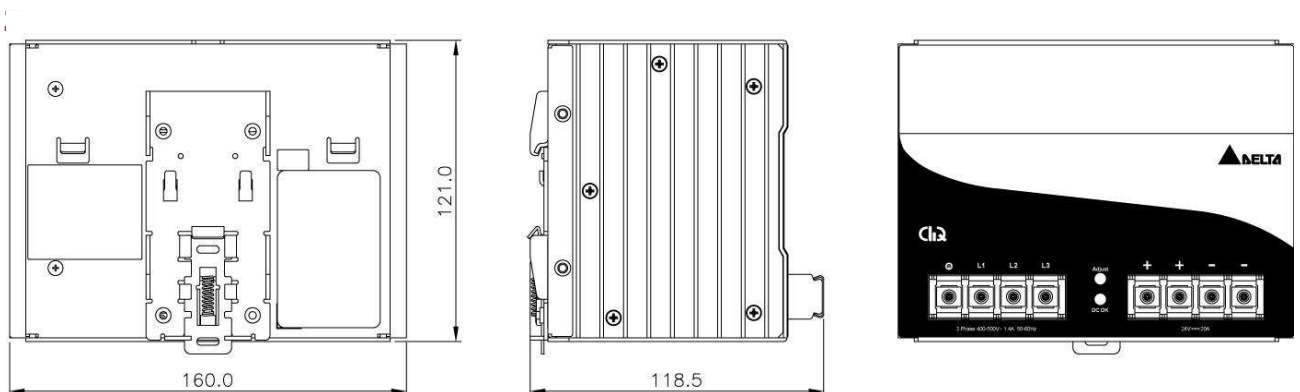
CliQ DIN Rail Power Supply 24V 480W 3Phase

Device Description:



- 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

Mechanical Drawing:



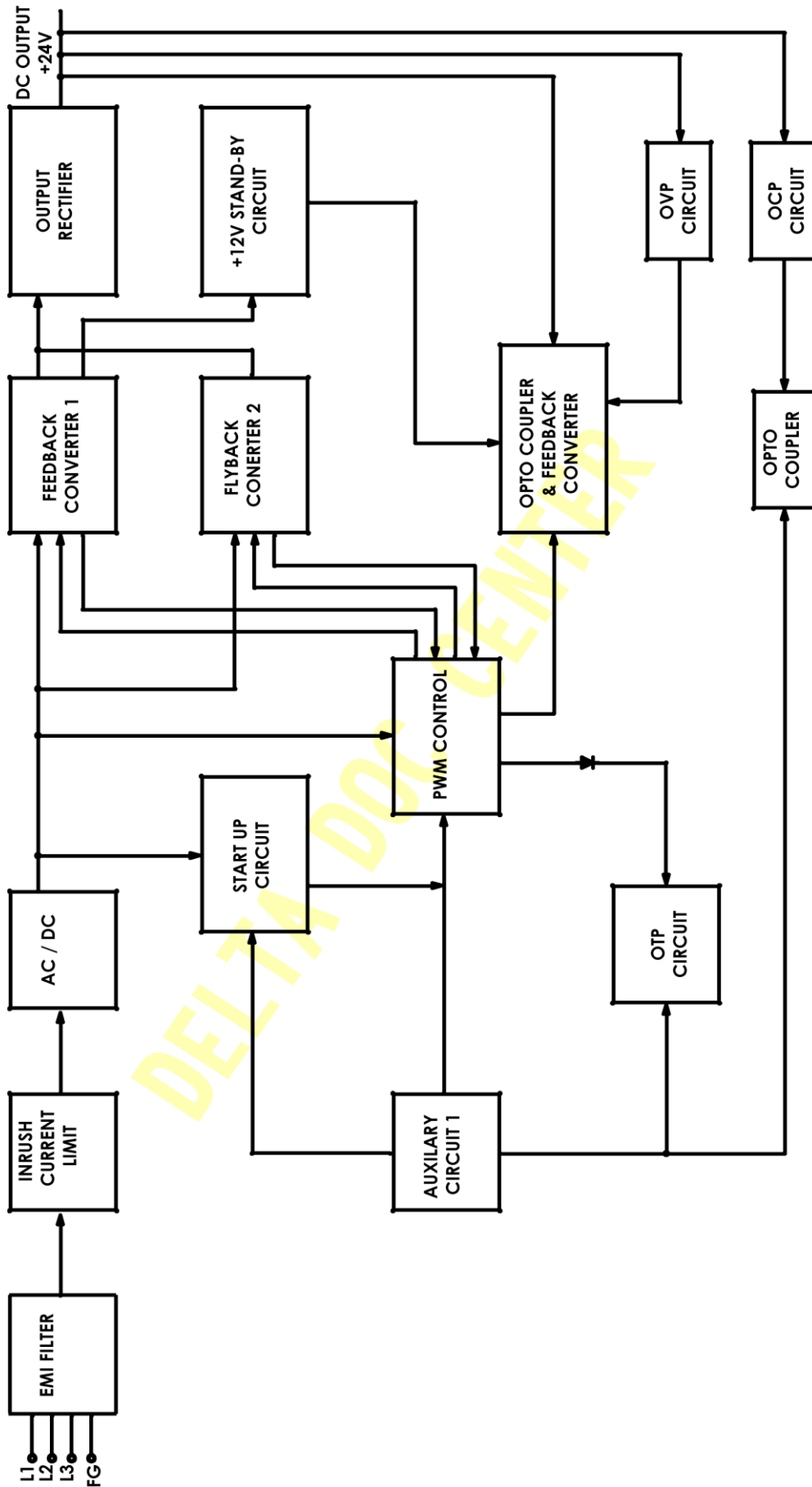
MECHANICAL SPECIFICATION

Dimension	121 mm X 160 mm X 118.5 mm (H x W x D)
Weight	1.71kg
Cooling System	Convection
Input Terminal	Terminal Block with screw M4x4 pins (rated 600V/20A)
Output Terminal	Terminal Block with screw M4x4 pins (rated 600V/20A)
Output Indicator	Green LED (DC OK)
Casing	Aluminum



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Block Diagram:





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PROTECTION

Over Voltage Protection	32V +10%/-10%, SELV output, Hicc-up Mode, Non-Latching (Auto recovery).
Over Load, Over Current Protection	> 150% of rated load current, Hicc-up Mode, Non-Latching (Auto recovery).
Over Temperature Protection	< 80 °C Ambient Temp@ 100% load. Non-Latching (Auto-recovery).
Short Circuit Protection	Hicc-up Mode, Non-Latching, (Auto-recovery when the fault is removed).

Over Load Protection

The Power Supply is provided with an overload protection (OLP/OCP) function which protects the power supply from possible damage by over current. Additionally power supply also has over temperature protection (OTP) in case the over load condition persists for a longer duration and is below the overload trigger point but > 100% load. Typically the over load current (I_{OL}) is > I_{SURGE} (150%) output voltage will start drooping down when the power supply reaches max power limit and will run into bouncing mode when the output reaches UVLO (under voltage point). The output voltage will recover automatically when the overload condition is removed.

Over Temperature Protection

Additionally power supply also has over temperature protection (OTP) as mentioned above this OTP comes into picture when the over load condition persists for a longer duration and the output current level is below the overload trigger point but > 100% load. Also in the event of a higher ambient operating condition with 100% load the power supply will run into OTP when the Ambient temperature is > 80 °C. The protection is self recoverable when activated output voltage bounces until the operating ambient temperature of the power supply is reduced or the power supply is used within its power derating curve.

Over Voltage Protection

The Power Supply is protected by Over voltage in the event that power supply feedback circuit fails the output voltage will not be >32V +10%/-10%, under any Line/Load and operating ambient conditions. The unique feature about this over voltage protection (OVP) is that power supply doesn't shut down but goes in 2nd level regulation which is 30-32Vdc. The Power supply will continue to deliver the power but due to high output voltage it will be operating > 100% load (32V x 20A = 640Watts) if this condition persists the power supply will sense OTP (Over Temperature Protection) and will go under bouncing mode. The power supply output voltage will recover back to 24Vdc once the fault condition is removed.

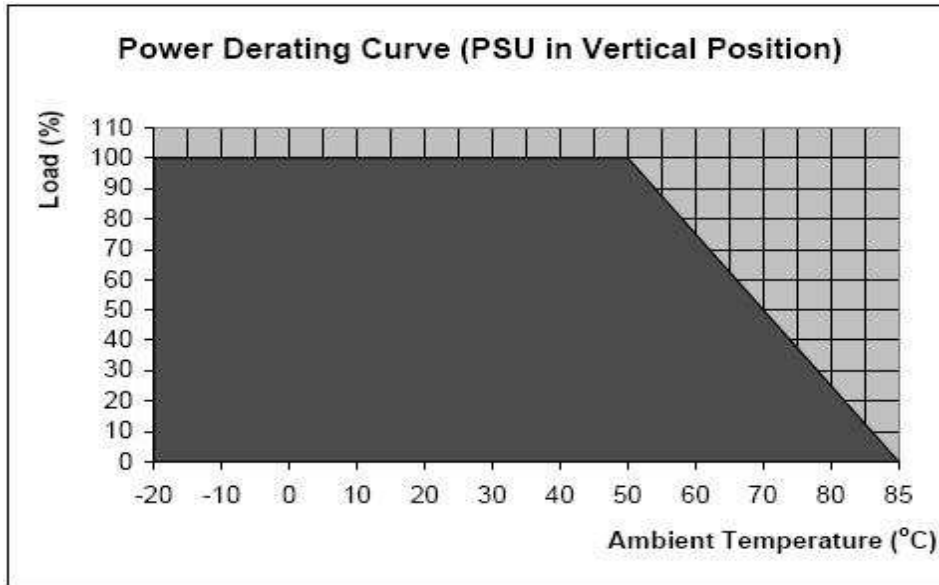
Short Circuit Protection

The Power Supply also has a short circuit protection which is in line with the overload protection and activates whenever there is a short across the output voltage, output goes in bouncing mode and remains until the fault is removed.



CliQ DIN Rail Power Supply 24V 480W 3Phase

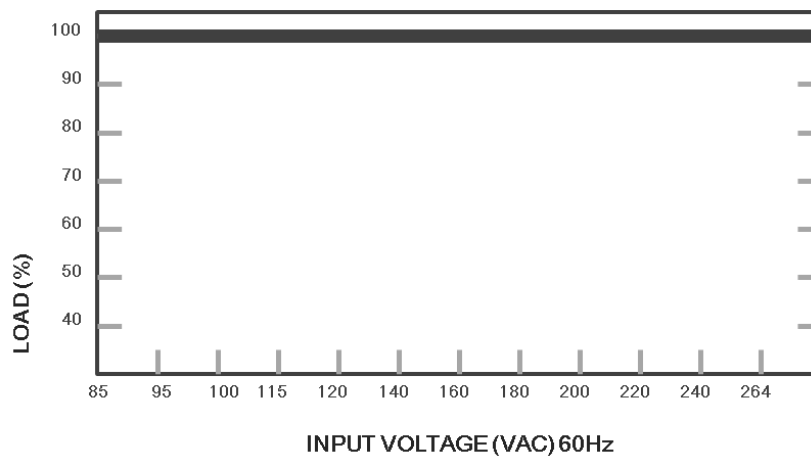
Derating Curve



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. For the power derating refer above graph ambient temperature > 50°C, the output capacity has to be reduced by 2.5% per Celsius increase in temperature. If the output capacity is not reduced when Amb > 50°C device will run into thermal protection by switching off i.e. device will go in bouncing mode and will recover when Amb is lowered or load is reduced as far as necessary to keep device in working condition.
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 20mm. from other equipments.
5. Depending on the ambient temperature and output capacity of the device, the device housing can be very hot!

Output Derating VS Input Voltage

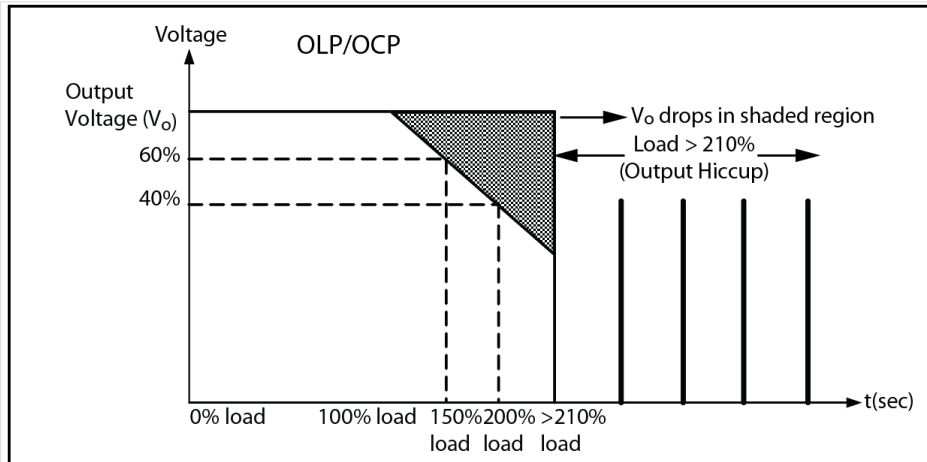


**No output power derating for all range of input*



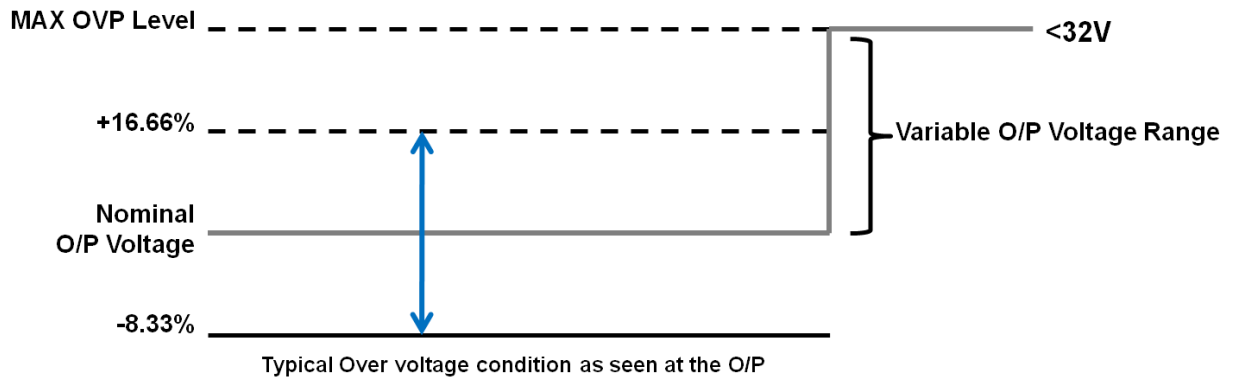
CliQ DIN Rail Power Supply 24V 480W 3Phase

Over Load Protection



*Typically the over load current (I_{OL}) is $> I_{SURGE}$ (150%) output voltage will start dropping when the power supply reaches max power limit.

Over Voltage Protection



* The Power supply will continue to deliver the power but due to high output voltage it will be operating $> 100\%$ load ($32V \times 20A = 640Watts$) if this condition persists the power supply will sense OTP (Over Temperature Protection) and will go under bouncing mode. The power supply output voltage will recover back to 24Vdc once the fault condition is removed.



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ENVIRONMENT

Ambient temperature (Operating)	-20 °C to +50 °C, with operation to 70 °C possible with a linear derating to half power from 50 °C to 70 °C.
Operating humidity	< 95%RH
Ambient temperature (Storage)	-25 °C to 85 °C
Altitude (Operating)	2,000 Meters
Shock Test	IEC60068-2-27, 30G (300m/s ²)
Vibration (Non-Operating)	IEC60068-2-6, 10Hz to 150Hz @ 50m/s ² (5G peak) for all X, Y, Z direction
Bump	IEC60068-2-29, 11ms/ 10gn
MTBF	> 300,000 hrs, as per BELL CORE STD or IEC61709 Tested at 115Vac & 230Vac input, 100% load, 25 °C ambient
Expected Cap Life Time	10 years (115Vac & 230Vac, 50% load and 40 °C ambient).
Material and Parts	RoHS directive, WEEE directive
Degree of protection	IPX0
Class of protection	Class I with PE connection
Pollution degree	2

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 up time is the time when the AC input collapses and output voltage retains regulation for a certain period of time is called as hold up time. See in the picture 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 95% of its set value.

Output Voltage Adjust

The 24 VDC connection is made using the "+" and "-" screw connections. At the time of delivery, the output voltage is 24 V DC. The output voltage can be set from 22 to 28 VDC on the potentiometer seen as Adjust on the front panel of each power supply..

Surge Load

Typical surge load capability of the power supply, the PSU is capable of delivering 3 Sec. of Surge load about 150% of I_o max the output voltage can be out of regulation limits of $\pm 5\%$.

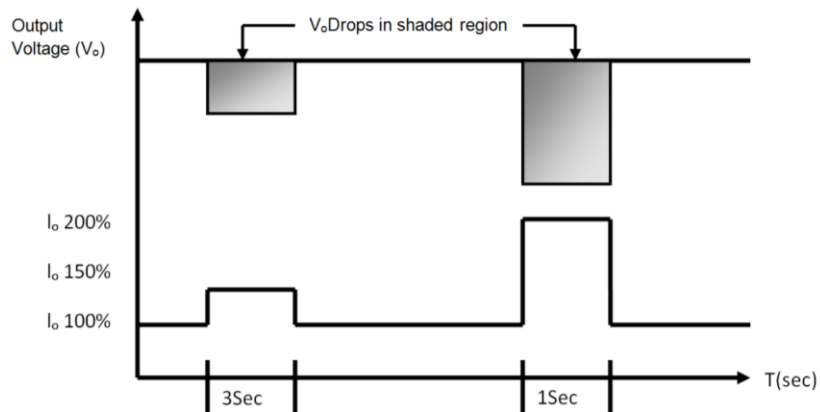
Dynamic Load

Additionally power supply is capable of dynamic change of load from 0% to 100% with output voltage within $\pm 5\%$ of regulation limits. See below the dynamic behavior of the PSU.



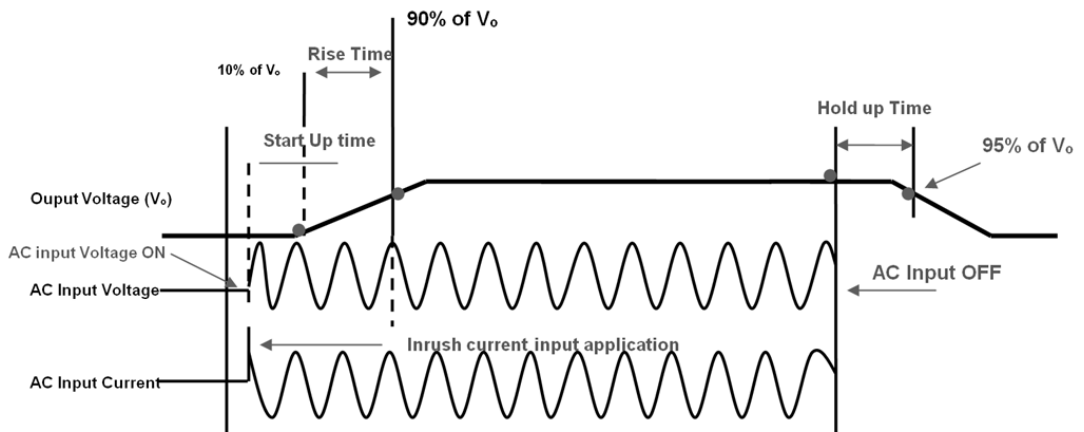
CliQ DIN Rail Power Supply 24V 480W 3Phase

Power Boost 150% for 3 Sec.



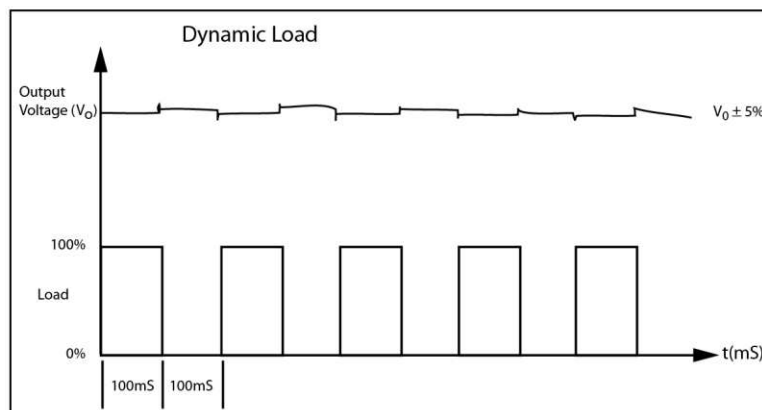
*Surge Load; typical surge load capability of the power supply, the PSU is capable of delivering 3 Sec

Hold Up Time



* 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.

Dynamic Load

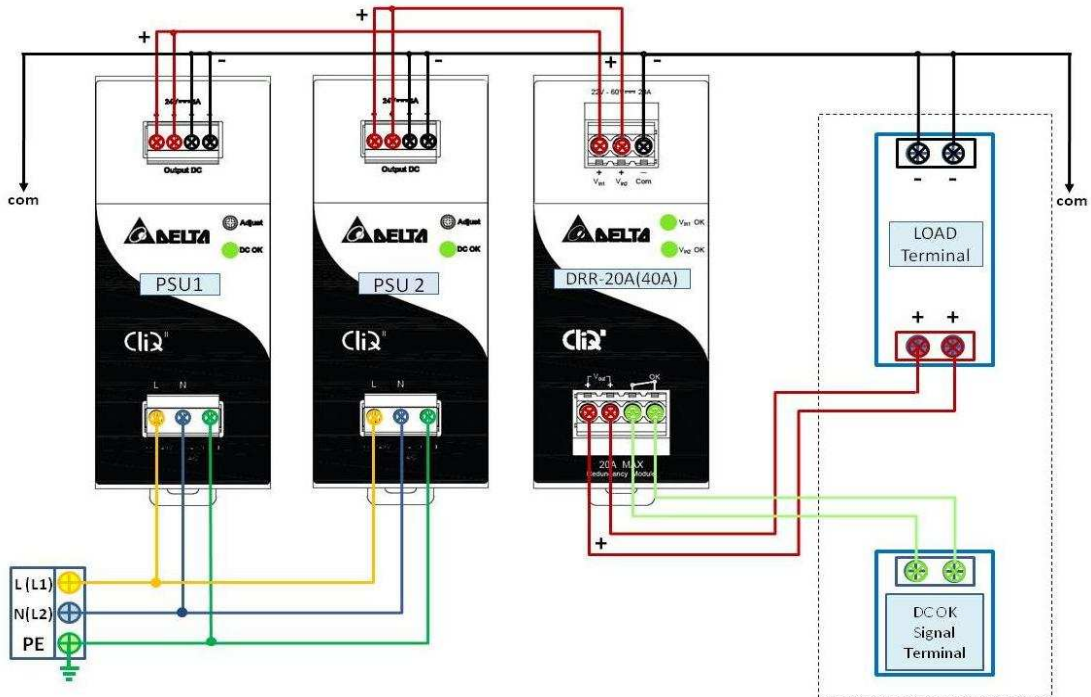


* The power supply is capable of dynamic change of load from 0% to 100% with o/p voltage within $\pm 5\%$ of regulation limits.



CliQ DIN Rail Power Supply 24V 480W 3Phase

Redundancy operation with DRP 20A- (40A)



Parallel Operation

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

Step1. Measure the output voltages at no load from Anode1 to Ground i.e. Voltage Anode1 to Ground of PSU1 and Voltage Anode2 to Ground of PSU2. If the voltages are not the same, follow Step 2. If they are the same, skip to Step 3.

Step2. 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.

Step3. Connect the Power Supply to the end system load and measure the output voltages from A1 to Ground i.e. Voltage Anode 1 to Ground of PSU1 and Voltage Anode 2 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

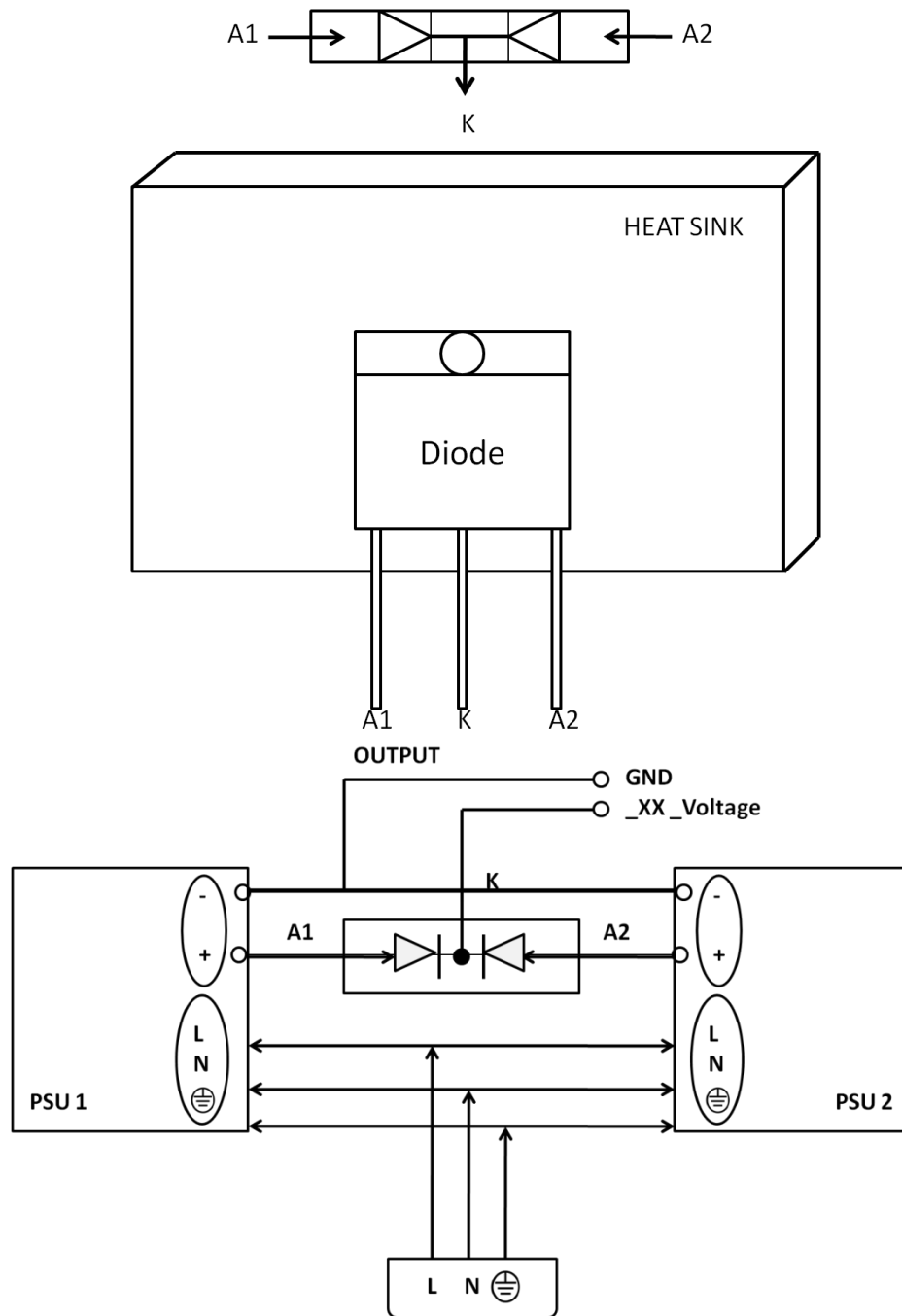
- 1) If the output voltage of any Power Supply is higher, it will take the initial load and share the maximum load.
- 2) If the output voltages are the same, then an equal load current sharing between the 2 Power Supplies can be achieved.
- 3) The ORing diode must be of an appropriate rating. The rating 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: DRP-20A





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Redundancy Operation with ORing Diode



**See the figure for a typical Redundant/Parallel operation of PSU using CliQ series power supplies. The 2 power supplies PSU1 & PSU 2 are connected thru a twin diode where Anode1 A1 is connected to the +Ve i.e. 24V of PSU1 and Anode2 A2 is connected to the +Ve i.e. 24V of PSU2 and the output ground GND are shorted together. The output of these 2 power supplies PSU1 & PSU2 is drawn from the Cathode K of the twin diode thus making the power supply work in Redundant/Parallel operation.*



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SAFETY STANDARDS /EMC

SAFETY STANDARD	CSA C22.2 No.107.1-01	Canadian Standard : CSA C22.2 No.107.1-01 Rectifying equipment, commercial & industrial Power supplies
	UL 508	Industrial control equipment
	IEC/EN/UL 60950-1	Safety of information technology equipment
	IEC 62103:2003/EN 50178	Electronic Equipment in power installations
	IEC60204-1: 1998	
	EN-60204-1	
	CE	EMC and Low Voltage directive
	GS	
	CB Scheme	
	CCC prepared VDE0160, VDE0805	
cCSAus to CSA C22.2 No.213-M1987		
ANS/ ISA 12.12.01:2007	Class 1 Div 2 T4 Hazardous Location	
ATEX		

EMI CISPR22, EN55022, EN55011, FCC Title 47 : Class B

EMS

• EN 61000-4-2 ¹⁾	LEVEL 4 Criteria A
Electrostatic Discharge Standard (ESD)	Air Discharge : 15 KV Contact discharge : 8 KV
• EN 61000-4-3 ¹⁾	LEVEL 3 Criteria A
Radiate Field Immunity	80MHz - 1GHz / 10V/M with 1kHz tone / 80% modulation.
• EN 61000-4-4 ¹⁾	LEVEL 3 Criteria A
Fast transients (Burst Immunity)	2 KV ⁴⁾
• IEC 61000-4-5 ¹⁾	LEVEL 3 Criteria A
Surge voltage Immunity	Common Mode : 2 KV ³⁾ Differential Mode : 1 KV ⁴⁾
• EN 61000-4-6 ¹⁾	LEVEL 3 Criteria A
Conducted Immunity	150KHz - 80MHz / 10Vrms.
• EN 61000-4-8 ¹⁾	LEVEL 3 Criteria A
Power frequency magnetic field	10A/Meter
• EN 61000-4-11 ²⁾	Input 100% dip 1 cycle, Main Buffering > 20ms, Self Recoverable
Voltage dips	
• IEC 61000-4-12 ¹⁾	LEVEL 3 Criteria A
Low Energy Pulse Test (Ring Wave)	Common Mode : 2 KV ³⁾ Differential Mode : 1 KV ⁴⁾

Galvanic Isolation :

Input / output	
type test/routine test :	4.0 KV _{ac} /
Input / PE	
type test/routine test :	1.5 KV _{ac} /
output / PE	
type test/routine test :	1.5 KV _{ac} /

- 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.

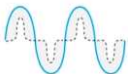
Delta RoHS Compliant



Restriction of the usage of hazardous substances

The European directive 2002/95/EC limits the maximum impurity level of homogeneous materials such as lead, mercury, cadmium, chrome⁶⁺, polybrominated flame retardants PBB and PBDE for the use in electrical and electronic equipment. RoHS is the abbreviation for "Restriction of the use of certain hazardous substances in electrical and electronic equipment". All items in the catalog conform to this standard.

PFC –Norm EN 61000-3-2



Line Current harmonic content

Typically, the input current waveform is not sinusoidal due to the periodical peak charging of the input capacitor. In industrial environment, complying with EN 61000-3-2 is only necessary under special conditions. Complying to this standard can have some technical drawbacks, such as lower efficiency as well as some commercial aspects such as higher purchasing costs. Frequently, the user does not profit from fulfilling this standard, therefore, it is important to know whether it is mandatory to meet this standard for a specific application.

Conformal Coating



The Protective Coating Technology

Delta Electronics Group has designed the perfect dipping technique which penetrates everywhere including under device, and prevents leakage. The conformal coating dipping can be applied to PCBs or circuit board. The coating preserve the performance of precision electronic primarily by preventing ionizable contaminants such as salt from reaching circuit nodes where the material slumps around sharp edges can be a problem especially in the highly conversing atmosphere.

