

CliQ DIN Rail Power Supply

24V 48W 1 Phase / DRP-24V48W1AZ



Highlights & Features

- Universal AC input voltage range
- Power will not de-rate for the entire input voltage range
- Rugged and compact design (Vibration 5G, Shock 30G)
- Conforms to harmonics current IEC/EN 61000-3-2, Class A
- Wide operating temperature range -20°C to 70°C
- Overvoltage / Overcurrent / Over Temperature / Short Circuit Protections
- Certified according to IEC/EN/UL 62368-1

Safety Standards



CB Certified for worldwide use

Model Number: DRP-24V48W1AZ
Unit Weight: 0.22 kg (0.49 lb)
Dimensions (L x W x D): 100 x 32 x 100.6 mm
 (3.94 x 1.26 x 3.96 inch)

General Description

The DRP-24V48W1AZ has a power rating of 48W with 24V output voltage. Its rugged plastic casing has a compact body at only 32mm wide and operates within a wide temperature range from -20°C to 70°C. Like its CliQ predecessors, the DRP-24V48W1AZ comes with universal AC input and complies with major industrial standards like UL 508 (Safety for Industrial Control Equipment), EMI according to EN 55011 (Industrial, scientific and medical (ISM) radio-frequency equipment) and EMS according to EN 61000-6-2 (Immunity for industrial environments). For broader application compatibility, the product is also certified for ITE (Information Technology Equipment) standard according to IEC/EN/UL 60950-1 and IEC/EN/UL 62368-1 Audio/video, Information and Communication Technology Equipment.

Model Information

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Model Number	Input Voltage Range	Rated Output Voltage	Rated Output Current
DRP-24V48W1AZ	85-264Vac (120-375Vdc)	24Vdc	2.00A

Model Numbering

DR	P –	24V	48W	1	A	Z
DIN Rail	Power Supply	Output Voltage	Output Power	Single Phase	CliQ Series	Plastic Case

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Specifications

Input Ratings / Characteristics

Nominal Input Voltage	100-240Vac
Input Voltage Range	85-264Vac
Nominal Input Frequency	50-60Hz
Input Frequency Range	47-63Hz
Nominal DC Input Voltage	125-250Vdc
DC Input Voltage Range*	120-375Vdc
Input Current	< 1.40A @ 115Vac, < 0.70A @ 230Vac
Efficiency at 100% Load	> 87.0% @ 115Vac & 230Vac
Max Power Dissipation	0% load < 0.3W @ 115Vac & < 0.5W @ 230Vac
	100% load < 7.0W @ 115Vac & 230Vac
Max Inrush Current (Cold Start)	< 28A @ 115Vac, < 56A @ 230Vac
Leakage Current	< 1mA @ 240Vac

*Fulfills tested conditions

Output Ratings / Characteristics**

Nominal Output Voltage	24Vdc
Factory Set Point Tolerance	24Vdc \pm 1%
Output Voltage Adjustment Range	22-26Vdc
Output Current	2.00A (48W max.)
Output Power	48W
Line Regulation	< 1.0% (@ 85-264Vac input, 100% load)
Load Regulation	< 1.0% (@ 85-264Vac input, 0-100% load)
PARD*** (20MHz)	< 480mVpp
Rise Time	< 50ms @ nominal input (100% load)
Start-up Time	< 3,000ms @ nominal input (100% load)
Hold-up Time	> 10ms @ 115Vac, > 60ms @ 230Vac (100% load)
Dynamic Response (Overshoot & Undershoot O/P Voltage)	\pm 5% @ 85-264Vac input, 10-100% load (Slew Rate: 0.1A/ μ s, 50% duty cycle @ 5Hz to 1KHz)
Start-up with Capacitive Loads	1,000 μ F Max

**For power de-rating from 50°C to 70°C, see power de-rating on page 3.

***PARD is measured with an AC coupling mode, 5cm wires, and in parallel with 0.1 μ F ceramic capacitor.

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Mechanical

Case Cover / Chassis	Plastic	
Dimensions (L x W x D)	100 x 32 x 100.6 mm (3.94 x 1.26 x 3.96 inch)	
Unit Weight	0.22 kg (0.49 lb)	
Indicator	Green LED	DC OK
Cooling System	Convection	
Terminal	Input / Output	5 Pins (Rated 300V/15A)
Wire	AWG 20-14	
Mounting Rail	Standard TS35 DIN Rail in accordance with EN 60715	
Noise (1 Meter from power supply)	Sound Pressure Level (SPL) < 25dBA	

Environment

Surrounding Air Temperature	Operating	-20°C to +70°C
	Storage	-25°C to +85°C
Power De-rating	Vertical Mounting	-20°C to -10°C de-rate power by 1% / °C, -10°C to 0°C de-rate power by 2% / °C, > 50°C de-rate power by 2.5% / °C
	Horizontal Mounting	
Operating Humidity	5 to 95% RH (Non-Condensing)	
Operating Altitude	0 to 2,000 Meters (6,560 ft)	
Shock Test	Non-Operating	IEC 60068-2-27, 30G (300m/S for a duration of 18ms, 1 times per direction, 2 times in total)
Vibration	Non-Operating	IEC 60068-2-6, 10Hz to 150Hz @ 50m/S ² (5G peak); 90 min per axis for all X, Y, Z direction
Bump Test	Operating	IEC 60068-2-29, Half Sine Wave: 10G for a duration of 11ms, 1,000 times per direction, 6,000 times in total
Over Voltage Category	III	According to IEC/EN 62477-1 / EN 60204-1 (clearance and creepage distances)
Pollution Degree	2	

Protections

Overvoltage	< 32.4V, SELV Output, Latch Mode
Overload / Overcurrent	> 105~180% of rated load current, Hiccup Mode, Non-Latching (Auto-Recovery)
Over Temperature	< 75°C Surrounding Air Temperature @ 100% load, Latch Mode
Short Circuit	Hiccup Mode, Non-Latching (Auto-Recovery when the fault is removed)
Internal Fuse at L pin	T3.15AH
Protection Against Shock	Class I with PE* connection

*PE: Primary Earth

Reliability Data

MTBF	> 500,000 hrs. as per Telcordia SR-332 I/P: 115Vac, O/P: 100% load, Ta: 25°C
Expected Cap Life Time	10 years (115Vac & 230Vac, 50% load @ 40°C)

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Safety Standards / Directives

Electrical Equipment of Machines		EN 60204-1 (over voltage category III)
Electrical Equipment for Use in Electrical Power Installations		IEC/EN 62477-1
Safety Entry Low Voltage		PELV* (EN 60204-1), SELV (EN 60950-1)
Electrical Safety	SIQ Bauart	EN 60950-1, EN 62368-1
	UL/cUL recognized	UL 60950-1 and CSA C22.2 No. 60950-1 (File No. E191395) UL 62368-1 and CSA C22.2 No. 62368-1 (File No. E191395)
	CB Scheme	IEC 60950-1, IEC 62368-1
Industrial Control Equipment	UL/cUL listed	UL 508 and CSA C22.2 No. 107.1-01 (File No. E315355)
	CSA	CSA C22.2 No. 107.1-01 (File No. 181564)
CE		In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU
Galvanic Isolation	Input to Output	3.0KVac
	Input to Ground	1.5KVac
	Output to Ground	0.5KVac

*Output must be earthed in the final unit in order to comply with PELV requirements according to standard EN 60204-1.

EMC

Emissions (CE & RE)		Generic Standards: CISPR32, EN 55032, CISPR11, EN 55011, FCC Title 47: Class B
Immunity		Generic Standards: EN 55024, EN 61000-6-2
Electrostatic Discharge	IEC 61000-4-2	Level 3 Criteria A ¹⁾ Air Discharge: 8kV Contact Discharge: 6kV
Radiated Field	IEC 61000-4-3	Level 3 Criteria A ¹⁾ 80MHz-1GHz, 10V/M, 80% modulation (1KHz) 1.4GHz-2GHz, 3V/M, 80% modulation (1KHz) 2GHz-2.7GHz, 1V/M, 80% modulation (1KHz)
Electrical Fast Transient / Burst	IEC 61000-4-4	Level 3 Criteria A ¹⁾ 2kV
Surge	IEC 61000-4-5	Level 3 Criteria A ¹⁾ Common Mode ²⁾ : 2kV Differential Mode ³⁾ : 1kV
Conducted	IEC 61000-4-6	Level 3 Criteria A ¹⁾ 150kHz-80MHz, 10Vrms
Power Frequency Magnetic Fields	IEC 61000-4-8	Criteria A ¹⁾ 30A/Meter
Voltage Dips and Interruptions	IEC 61000-4-11	100% dip; 1 cycle (20ms); Self Recoverable
Low Energy Pulse Test (Ring Wave)	IEC 61000-4-12	Level 3 Criteria A ¹⁾ Common Mode ²⁾ : 2kV Differential Mode ³⁾ : 1kV
Harmonic Current Emission		IEC/EN 61000-3-2, Class A
Voltage Fluctuation and Flicker		IEC/EN 61000-3-3

1) Criteria A: Normal performance within the specification limits

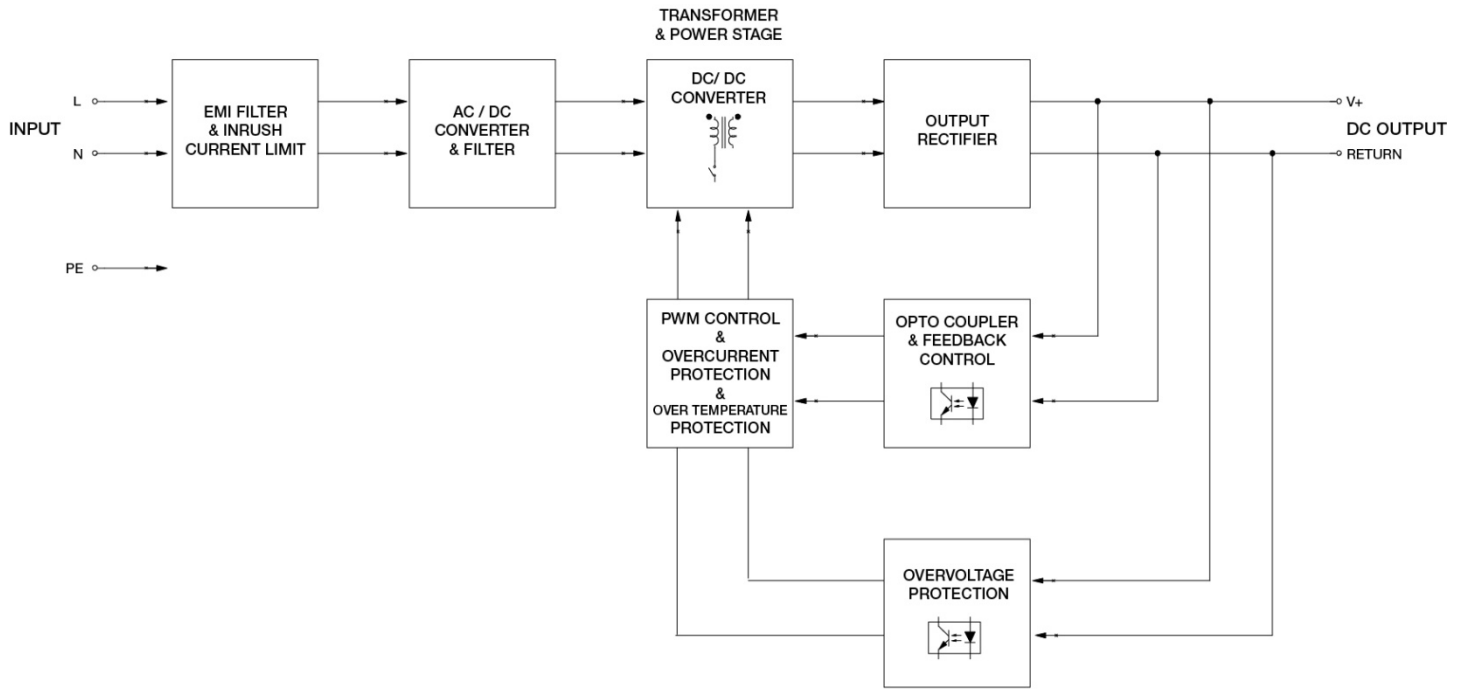
2) Asymmetrical: Common mode (Line to earth)

3) Symmetrical: Differential mode (Line to line)

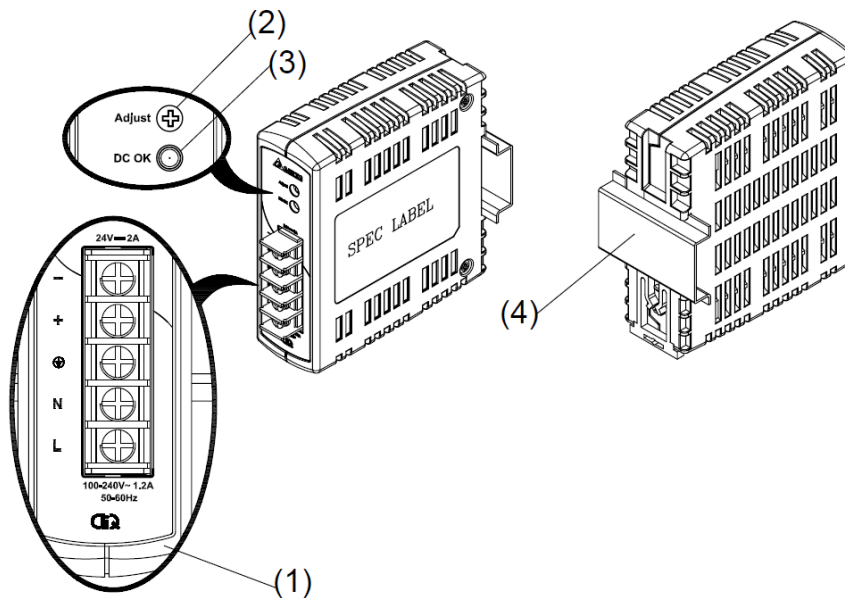
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Block Diagram



Device Description



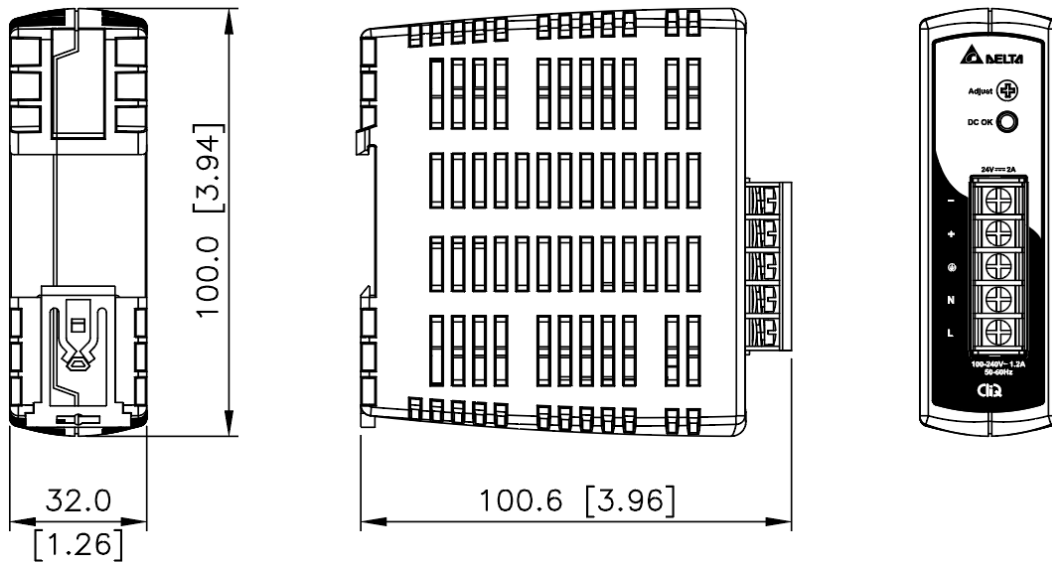
- 1) Input & Output terminal block connector
- 2) DC Voltage adjustment potentiometer
- 3) DC OK control LED (Green)
- 4) Universal mounting rail system

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Dimensions

L x W x D: 100 x 32 x 100.6 mm (3.94 x 1.26 x 3.96 inch)



Engineering Data

Output Load De-rating VS Surrounding Air Temperature

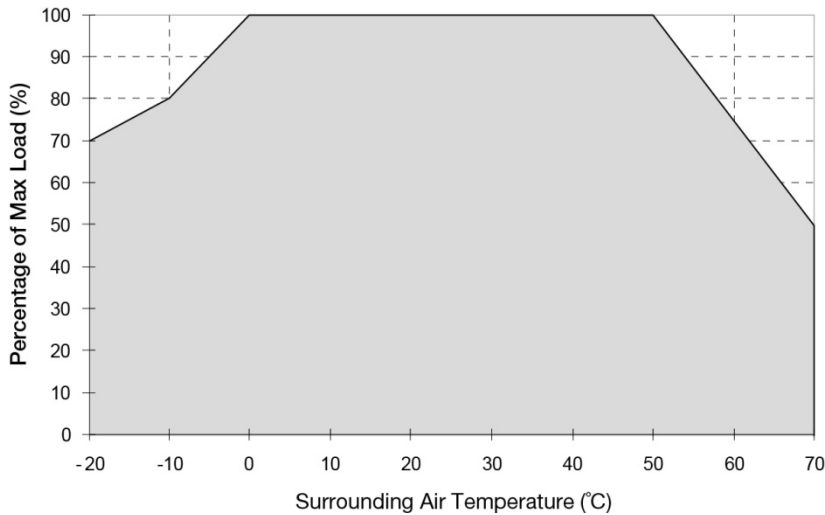


Fig. 1 De-rating for Vertical and Horizontal Mounting Orientation

-20°C to -10°C de-rate power by 1% / °C,
 -10°C to 0°C de-rate power by 2% / °C,
 > 50°C de-rate power by 2.5% / °C

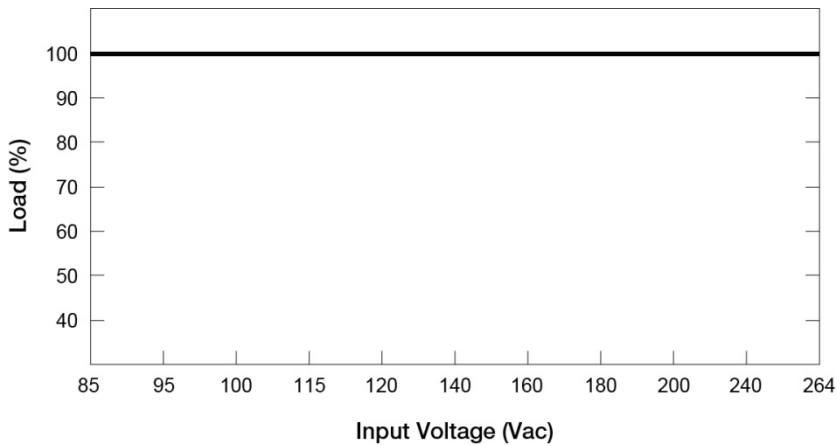
Note

1. Power supply components may degrade, or be damaged, when the power supply is continuously used outside the shaded region, refer to the graph shown in Fig. 1.
2. If the output capacity is not reduced when the surrounding air temperature exceeds its specification as defined on Page 3 under "Environment", the device may run into Over Temperature Protection. When activated, the output voltage will go into latch-off mode until the component temperature cools down and the AC power is recycled.
3. In order for the device to function in the manner intended, it is also necessary to keep a safety distance as recommended in the safety instructions while the device is in operation.
4. Depending on the surrounding air temperature and output load delivered by the power supply, the device can be very hot!
5. If the device has to be mounted in any other orientation, please contact info@deltapsu.com for more details.

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Output Load De-rating VS Input Voltage



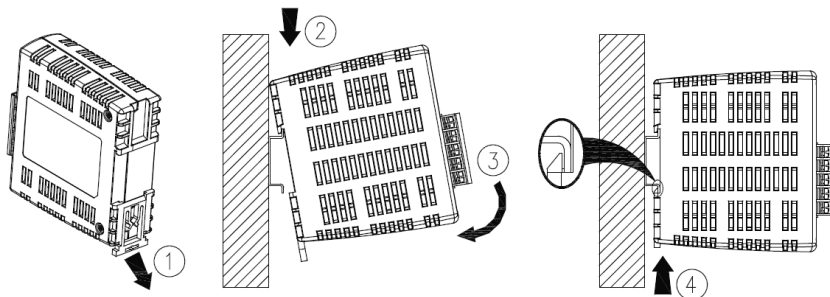
- No output power de-rating across the entire input voltage range

Assembly & Installation

The power supply unit (PSU) can be mounted on 35mm DIN rails in accordance with EN60715. For Vertical Mounting, the device should be installed with input terminal block at the bottom. For Horizontal Mounting, the device should be installed with input terminal block on the left side.

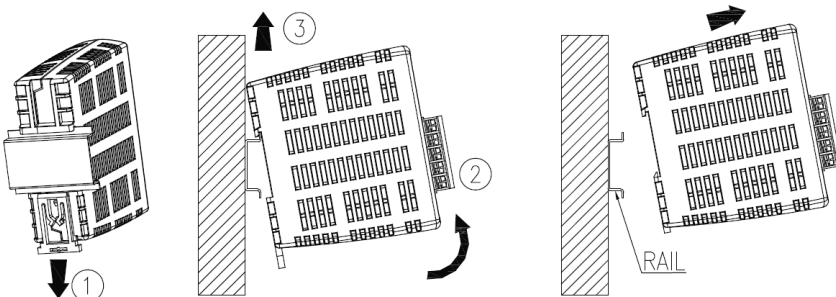
Each device is delivered ready to install.

Mounting



- Snap on the DIN rail as shown on the left:
1. Pull the unit's DIN rail latch OUT.
 2. Tilt the unit slightly upwards, hook the top end onto the DIN rail and push downwards until stopped.
 3. Position the bottom front end against the DIN rail.
 4. Push the unit's latch DIN rail IN to lock.

Dismounting



- To uninstall:
1. Pull the unit's DIN rail latch OUT.
 2. Tilt the bottom part of the unit out.
 3. Push the unit up and pull out from the DIN rail.

In accordance to EN 60950 / UL 60950 and EN 62368 / UL 62368, flexible cables require ferrules. Use appropriate copper cables designed to sustain operating temperature of at least 75°C or more to fulfill UL requirements.

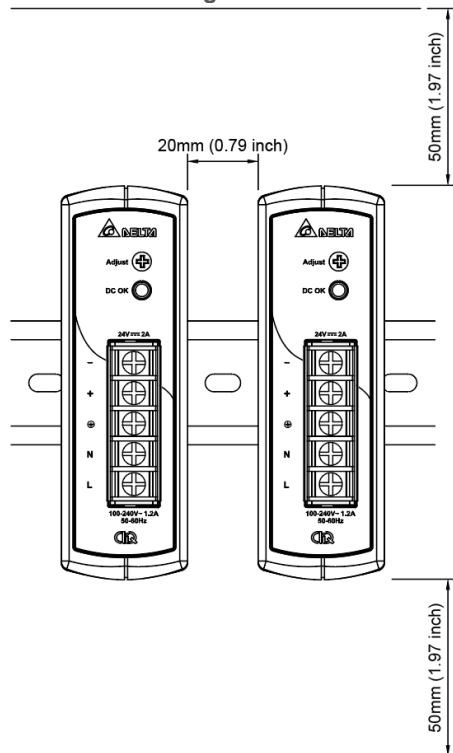
For stranded wires it is recommended to use suitable lug to crimp wires.

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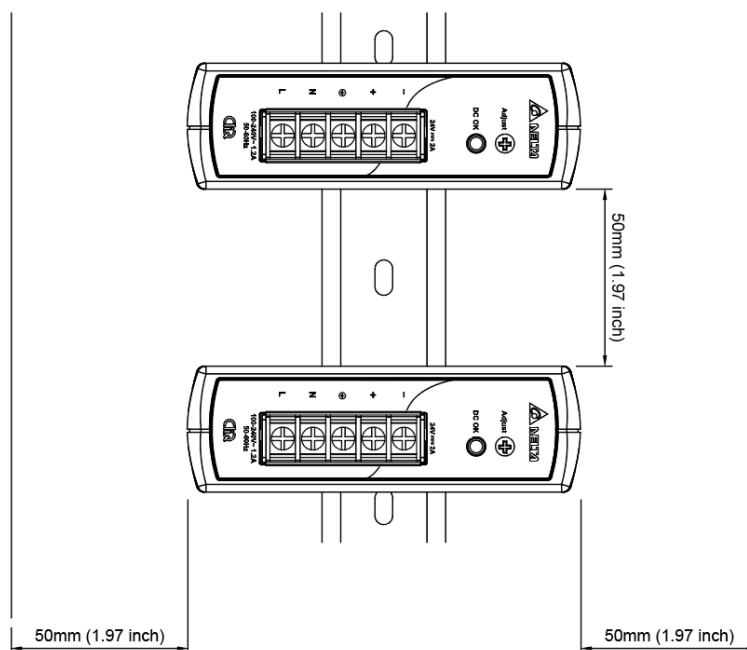
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Safety Instructions

■ Vertical Mounting



■ Horizontal Mounting



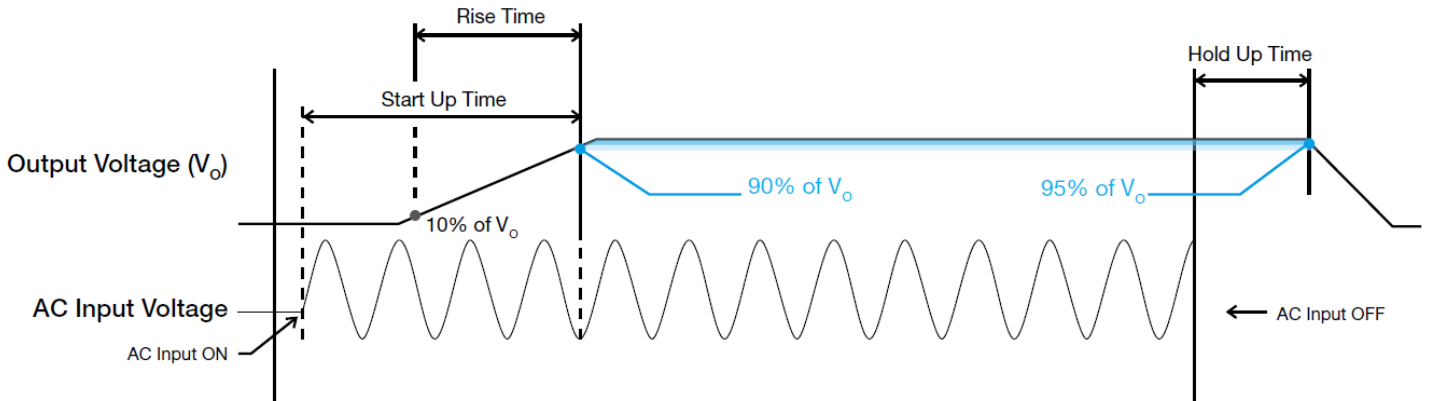
- ALWAYS switch mains of input power OFF before connecting and disconnecting the input voltage to the unit. If mains are not turned OFF, there is risk of explosion / severe damage.
- **To guarantee sufficient convection cooling, please refer to the following instructions to ensure sufficient clearance around the device.**
- **Vertical Mounting:** 50mm (1.97 inch) above and below the device as well as a lateral distance of 20mm (0.79 inch) to other units.
- **Horizontal Mounting:** 50mm (1.97 inch) above and below the device as well as a lateral distance of 50mm (1.97 inch) to other units.
- Note that the enclosure of the device can become very hot depending on the surrounding air temperature and load of the power supply. Risk of burns!
- The main power must be turned off before connecting or disconnecting wires to the terminals!
- DO NOT insert any objects into the unit.
- Hazardous voltages may be present for up to 5 minutes after the input mains voltage is disconnected. Do not touch the unit during this time.
- The power supplies unit should be installed in minimum IP54 rated enclosure.
- The power supplies are built in units and must be installed in a cabinet or room (condensation free environment and indoor location) that is relatively free of conductive contaminants.

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Functions

- Graph illustrating the Start-up Time, Rise Time, and Hold-up Time



Start-up Time

The time required for the output voltage to reach 90% of its final steady state set value, after the input voltage is applied.

Rise Time

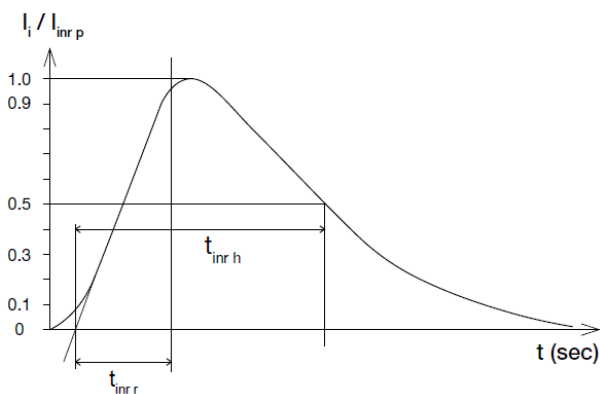
The time required for the output voltage to change from 10% to 90% of its final steady state set value.

Hold-up Time

Time between the collapse of the AC input voltage, and the output falling to 95% of its steady state set value.

Inrush Current

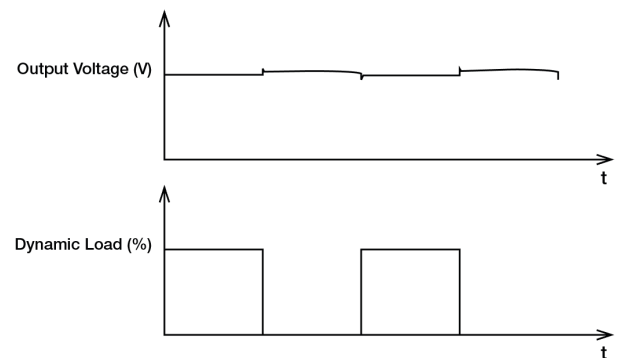
Inrush current is the peak, instantaneous, input current measured and, occurs when the input voltage is first applied. For AC input voltages, the maximum peak value of inrush current will occur during the first half cycle of the applied AC voltage. This peak value decreases exponentially during subsequent cycles of AC voltage.



Dynamic Response

The power supply output voltage will remain within $\pm 5\%$ of its steady state value, when subjected to a dynamic load from 10% to 100% of its rated current.

- 50% duty cycle / 5Hz to 1KHz

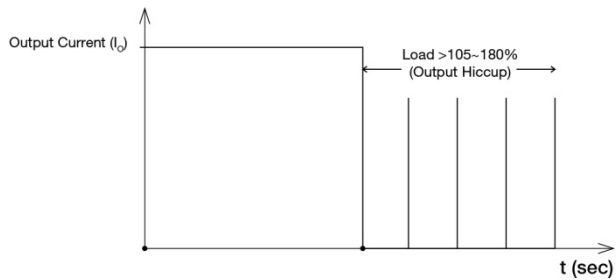


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Overload & Overcurrent Protections (Auto-Recovery)

The power supply's Overload (OLP) and Overcurrent (OCP) Protections will be activated when output current exceeds 105~180% of I_o (Max load). In such occurrence, the V_o will start to droop and once the power supply has reached its maximum power limit, the protection is activated and the power supply will go into "Hiccup mode" (Auto-Recovery). The power supply will recover once the fault condition of the OLP and OCP is removed and I_o is back within the specifications.



Additionally, if the I_o is <105-180% but >100% for a prolonged period of time (depending on the load), the Over Temperature Protection (OTP) will be activated due to high temperature on critical components. The power supply will then go into "Latch mode" until the PSU cools down and the AC power is recycled.

Short Circuit Protection (Auto-Recovery)

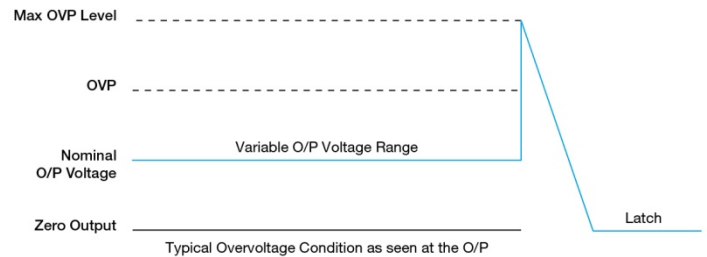
The power supply's output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate in "Hiccup mode", as shown in the illustration in the OLP/OCP section on this page. The power supply will return to normal operation after the short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

External Input Protection Device

The unit is protected at the L pin, with an internal fuse that cannot be replaced. The power supply has been tested and approved on 20A (UL) and 16A (IEC) branch circuits without additional protection device. An external protection device is only required if the supplying branch has an ampacity greater than above. Thus, if an external protective device is necessary, or, utilized, please refer a minimum value of 10A B- or 6A C- characteristic breaker.

Overvoltage Protection (Auto-Recovery)

The power supply's overvoltage circuit will be activated when its internal feedback circuit fails. The output voltage shall not exceed its specifications defined on Page 3 under "Protections".



Over Temperature Protection (Auto-Recovery)

As mentioned, 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 condition at 100% load, the power supply will run into OTP when the surrounding air temperature is >75°C. When activated, the output voltage will go into latch-off mode until the component temperature cools down and the AC power is recycled.

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Operating Mode

■ Redundant Operation

In order to ensure proper redundant operation for the power supply unit (PSU), the output voltage difference between the two units must be kept at 0.45~0.50V for 24V supplies. Follow simple steps given below to set them up for the redundant operation:

Step 1.

Measure output voltage of PSU 1 and PSU 2. If PSU 1 is the master unit, then V_O of PSU 1 must be higher than PSU 2. In order to set the output voltage, individually connect the power supply to 50% of rated load at any line voltage from 85-264Vac, and set the PSU 1 and PSU 2 output voltage.

Step 2.

Connect the power supply units PSU 1 and PSU 2 to Vin 1 & Vin 2, respectively, of the DRR-20N (or 20A) module shown on the diagram on the right.

Step 3.

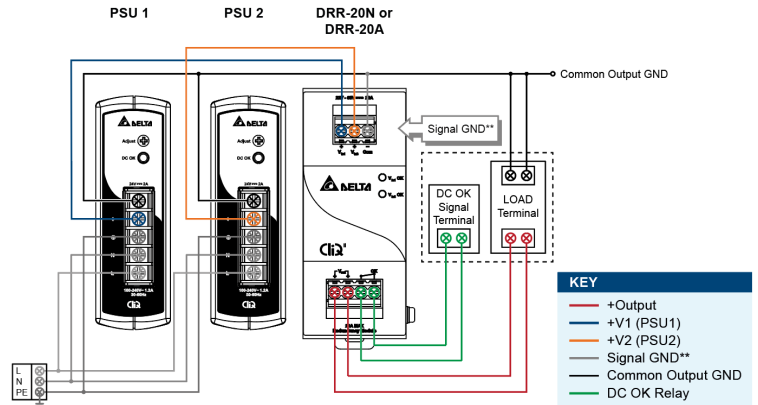
Connect the system load from V_{out} . Please note that output voltage V_{out} from DRR module will be $= V_O$ (output voltage of power supply) $- V_{drop}^*$ (in DRR module).

* V_{drop} will vary from 0.60V to 0.90V (Typical 0.65V) depending on the load current and surrounding air temperature.

■ Parallel Operation

The power supply units (PSUs) can also be used for parallel operation in order to increase the output power. The difference in output voltage between the two units must be kept to within 25mV of each other. This difference must be verified with the same output load connected independently to each unit.

Parameters such as EMI, inrush current, leakage current, PARD, start up time will be different from those on the datasheet, when two units are connected in parallel. The user will need to verify that any differences will still allow the two power supplies connected in parallel will work properly in their product/application.



**The Signal GND in the DRR module is for the built-in LED and DC OK signals. The Output GND terminals from the two PSU's do not need to be connected to the Signal GND terminal.

Fig. 2 Redundant Operation Connection Diagram

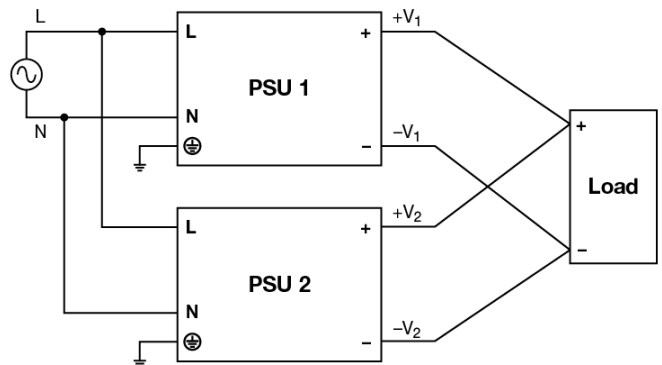


Fig. 3 Parallel Operation Connection Diagram

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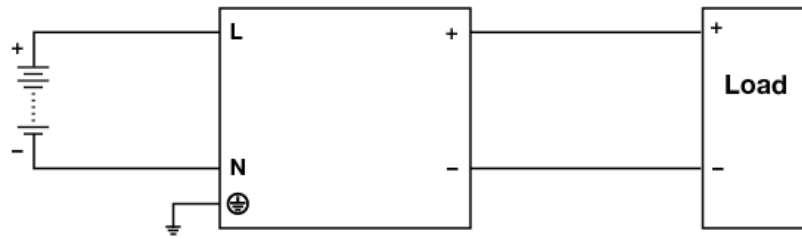


Fig. 4 DC Input Operation Connection Diagram

■ DC Input Operation

Step 1.
Use a battery or similar DC source.

Step 2.
Connect +pole to L and -pole to N.

Step 3.
Connect the PE terminal to an earth wire or to the machine ground.

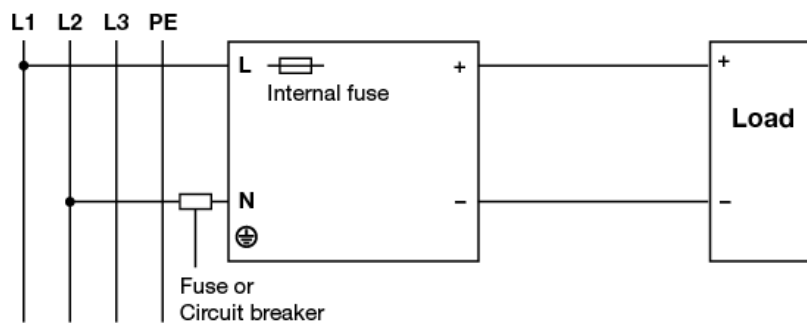


Fig. 5 2 of 3 Phase System Input Operation Connection Diagram

■ 2 of 3 Phase System Input Operation

Delta's CliQ can use on 2 of 3 phase system. Please refer to the following step.

Step 1.
The input voltage applied from Line to Neutral is below the maximum rated input. The input voltage shall be below 240Vac +10%.

Step 2.
The external protector is needed on N (Neutral) input line to secure a safety. N line does not have internal fuse protection. An appropriate fuse or circuit breaker should be connected in series with N input line connection like the following.

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Others

Attention

Delta provides all information in the datasheets on an "AS IS" basis and does not offer any kind of warranty through the information for using the product. In the event of any discrepancy between the information in the catalog and datasheets, the datasheets shall prevail (please refer to www.DeltaPSU.com for the latest datasheets information). Delta shall have no liability of indemnification for any claim or action arising from any error for the provided information in the datasheets. Customer shall take its responsibility for evaluation of using the product before placing an order with Delta.

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