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CliQ II DIN Rail Power Supply

24V 60W 1 Phase, NEC Class 2 / DRP024V060W1N□



Highlights & Features

- Universal AC input voltage
- Power will not de-rate for the entire input voltage range
- UL 1310 safety approval
- NEC Class 2 and Limited Power Source (LPS) approvals
- Conformal coating on PCBA to protect against chemical and dust pollutants
- Hazardous Locations approval for ATEX and Class I, Div 2 (DRP024V060W1NY)

Safety Standards



CB Certified for worldwide use

Model Number: DRP024V060W1N□
Unit Weight: 0.33 kg (0.73 lb)
Dimensions (L x W x D): 120.6 x 32 x 119.3 mm (4.75 x 1.26 x 4.70 inch)

General Description

Delta's CliQ II DIN rail power supply series with UL 1310 and NEC Class 2 approvals offers start-of-the-art designs made to withstand harsh industrial environments. The rugged plastic case is both shock and vibration resistant according to IEC 60068-2 and adheres to IP20 protection level. The products can be used in general industrial applications, especially for dry indoor condition with the advantage of lower wiring costs for a system due to its compliance with NEC Class 2 requirements. The NEC (National Electrical Code) is a North American standard, which is regarded as a law in most North American states. The NEC describes the installation of electric conductors and equipment within or on buildings. The Class 2 power units can operate over a wide temperature range of -25°C to +80°C (Cold Start at -40°C). The products also feature universal AC input voltage range from 85Vac to 264Vac and the power will not de-rate throughout the entire range. Another great feature is the conformal coating on the PCBA which allows selected models to be certified to ATEX and Class I, Div 2 for use in hazardous locations.

Model Information

CliQ II DIN Rail Power Supply

Model Number	Input Voltage Range	Rated Output Voltage	Rated Output Current
DRP024V060W1N□	85-264Vac (120-375Vdc)	24Vdc	2.50A

Model Numbering

DR	P	024V	060W	1	N	□
DIN Rail	Power Supply	Output Voltage	Output Power	Single Phase	NEC Class 2	Y - Plastic Case, <u>with</u> Class I, Div 2 and ATEX Z - Plastic Case, <u>without</u> Class I, Div 2 and ATEX



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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
DC Input Voltage Range*	120-375Vdc
Input Current	< 1.50A @ 115Vac, < 0.80A @ 230Vac
Efficiency at 100% Load	> 88.0% @ 115Vac, > 89.0% @ 230Vac
Max Inrush Current (Cold Start)	< 40A @ 115Vac, < 80A @ 230Vac
Leakage Current	< 0.5mA @ 240Vac

* Fulfills test conditions for this range. DC input safety approval can be obtained upon request.

Output Ratings / Characteristics**

Nominal Output Voltage	24Vdc
Factory Set Point Tolerance	± 2%
Output Voltage Adjustment Range	22-28Vdc
Output Current	2.50A (60W Max.)
Output Power	60W
Line Regulation	< 0.5% (@ 85-264Vac input, 100% load)
Load Regulation	< 1% (@ 85-264Vac input, 0-100% load)
PARD*** (20MHz)	< 240mVpp
Rise Time	< 100ms @ nominal input (100% load)
Start-up Time	< 3,000ms @ nominal input (100% load)
Hold-up Time	> 20ms @ 115Vac (100% load) > 125ms @ 230Vac (100% load)
Dynamic Response (Overshoot & Undershoot O/P Voltage)	± 5% @ 85-264Vac input, 0-100% load (Slew Rate: 0.1A/μS, 50% duty cycle @ 5Hz to 1KHz)
Start-up with Capacitive Loads	8,000μF Max

**For power de-rating from 50°C to 80°C, see power de-rating on page 3.

***PARD is measured with an AC coupling mode, 5cm wires, and in parallel with 0.1μF ceramic capacitor & 47μF electrolytic capacitor.

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Mechanical

Case Cover / Chassis	Plastic	
Dimensions (L x W x D)	120.6 x 32 x 119.3 mm (4.75 x 1.26 x 4.70 inch)	
Unit Weight	0.33 kg (0.73 lb)	
Indicator	Green LED (DC OK)	
Cooling System	Convection	
Terminal	Input	3 Pins (Rated 300V/30A)
	Output	2 Pins (Rated 300V/30A)
Wire	Input / Output	AWG 22-10
Mounting Rail	Standard TS35 DIN Rail in accordance with EN 60715	
Noise (1 Meter from power supply)	Sound Pressure Level (SPL) < 40dBA	

Environment

Surrounding Air Temperature	Operating	-25°C to +80°C (Cold Start at -40°C)
	Storage	-40°C to +85°C
Power De-rating	Vertical Mounting	> 50°C de-rate power by 2.5% / °C, > 70°C de-rate power by 4% / °C
	Horizontal Mounting	> 50°C de-rate power by 2.5% / °C, > 70°C de-rate power by 4% / °C
Operating Humidity	5 to 95% RH (Non-Condensing)	
Operating Altitude	0 to 2,500 Meters (8,200 ft.)	
Shock Test	Non-Operating	IEC 60068-2-27, 30G (300m/S ²) for a duration of 18ms, 1 time per direction, 2 times in total
Vibration (Non-Operating)	Non-Operating	IEC 60068-2-6, 10Hz to 500Hz @ 30m/S ² (3G peak); 60 min per axis for all X, Y, Z direction
Over Voltage Category	III	According to EN 50178 / EN 60204-1 (clearance and creepage distances) and IEC 62103 (safety part)
Pollution Degree	2	

Protections

Overvoltage	< 32V, ±10%, SELV Output, Hiccup Mode, Non-Latching (Auto-Recovery)
Overload / Overcurrent	> 110-150% of rated load current, Hiccup Mode, Non-Latching (Auto-Recovery)
Over Temperature	< 80°C Surrounding Air Temperature @ 100% load, Non- Latching (Auto-Recovery)
Short Circuit	Hiccup Mode, Non-Latching (Auto-Recovery when the fault is removed)
Internal Fuse	T3.15AH
Degree of Protection	IP20
Protection Against Shock	Class I with PE* connection

*PE: Primary Earth

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Reliability Data

MTBF	> 800,000 hrs. as per Telcordia SR-332 I/P: 115Vac & 230Vac, O/P: 100% load, Ta: 25°C
Expected Cap Life Time	10 years (115Vac & 230Vac, 50% load @ 40°C)

Safety Standards / Directives

Electrical Equipment of Machines		EN 60204-1 (over voltage category III)
Electrical Equipment for use in Electrical Power Installations		EN 62477-1 / IEC 62103
Safety Entry Low Voltage		PELV (EN60204), SELV (EN 60950-1)
Electrical Safety	SIQ Bauart UL/cUL recognized CB scheme	EN 60950-1 UL 60950-1 and CSA C22.2 No. 60950-1 IEC 60950-1, Limited Power Source (LPS)
Industrial Control Equipment	UL/cUL listed CSA	UL 508 and CSA C22.2 No. 107.1-01 (File No. E315355) CSA C22.2 No. 107.1-01 (File No. 181564)
Hazardous Location / ATEX (For DRP024V060W1NY)	Hazardous Location	cCSAus to CSA C22.2 No. 213-M1987, ANSI / ISA 12.12.01:2007 [Class I, Division 2, Group A, B, C, D T4, Ta= -25°C to +80°C (> +50°C derating)] EN 60079-0:2009, EN 60079-15:2010 [Ⓔ II 3G Ex nA nC IIC T4 Gc, Ta= -25°C to +80°C (> +50°C derating)]
Ⓔ II 3G ATEX 2014/34/EU (For DRP024V060W1NY)		Certificate No. EPS 12 ATEX 1 491 X
Class 2 Power Supply		UL/cUL recognized to UL 1310 and CSA C22.2 No. 223
CE		In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU For DRP024V060W1NY: In conformance with Equipment for explosive atmospheres (ATEX) directive 2014/34/EU
Material and Parts		RoHS Directive 2011/65/EU Compliant
Galvanic Isolation	Input to Output	4.0KVac
	Input to Ground	1.5KVac
	Output to Ground	1.5KVac

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EMC

Emissions (CE & RE)		CISPR 22, EN 55022, CISPR 11, EN 55011, FCC Title 47: Class B
Component Power Supply for General Use		EN 61204-3
Immunity		EN 55024, EN 61000-6-2
Electrostatic Discharge	IEC 61000-4-2	Level 4 Criteria A ¹⁾ Air Discharge: 15kV Contact Discharge: 8kV
Radiated Field	IEC 61000-4-3	Level 3 Criteria A ¹⁾ 80MHz-1GHz, 10V/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⁾ : 2kV
Conducted	IEC 61000-4-6	Level 3 Criteria A ¹⁾ 150kHz-80MHz, 10Vrms
Power Frequency Magnetic Fields	IEC 61000-4-8	Criteria A ¹⁾ 10A/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
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)

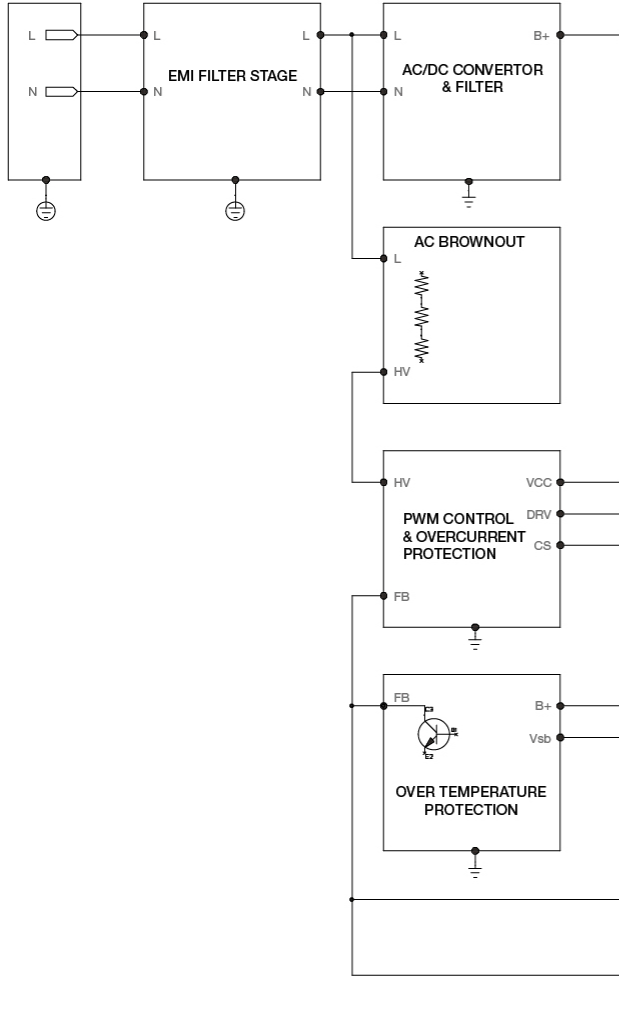
3) Symmetrical: Differential mode (Line to line)

CliQ II DIN Rail Power Supply

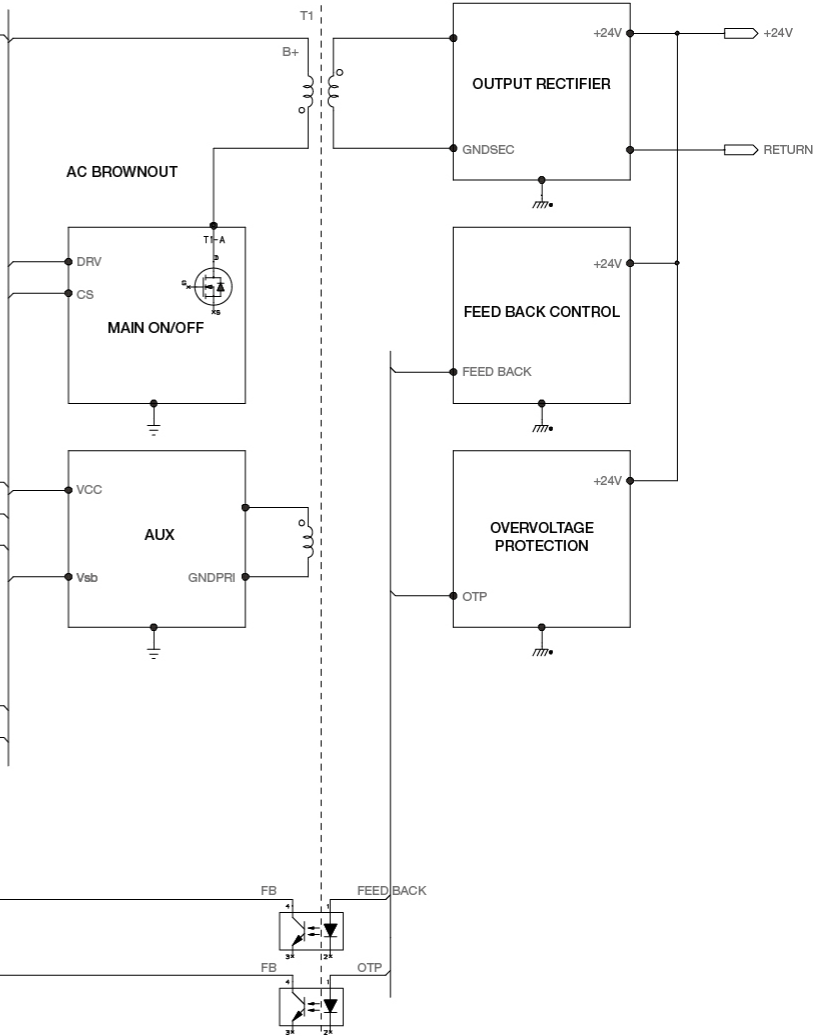
24V 60W 1 Phase, NEC Class 2 / DRP024V060W1N□

Block Diagram

PRIMARY



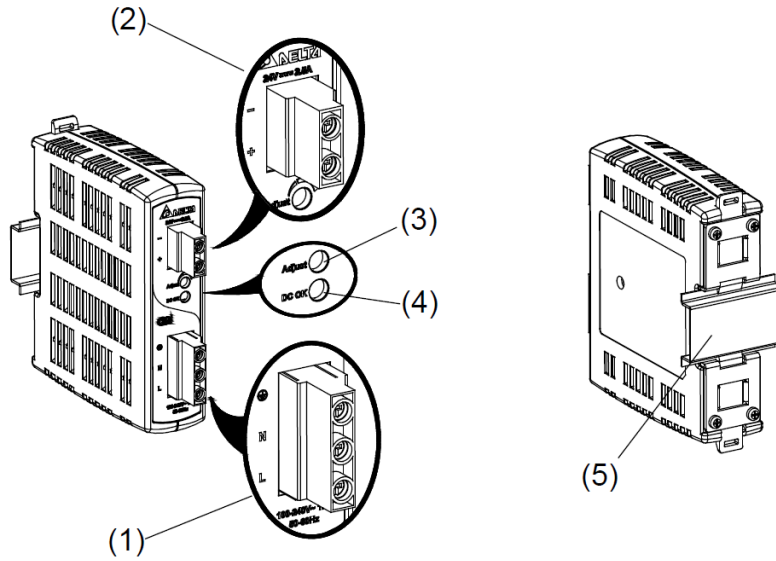
SECONDARY



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24V 60W 1 Phase, NEC Class 2 / DRP024V060W1N□

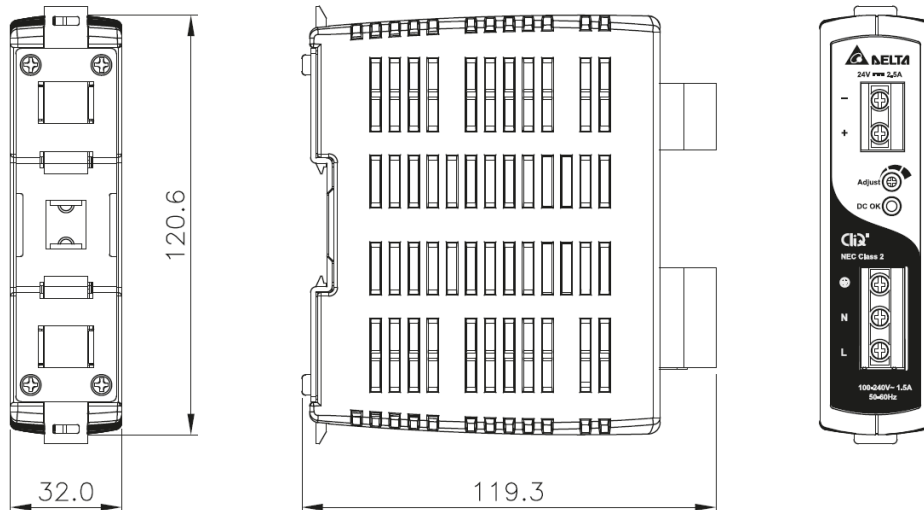
Device Description



- 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

Dimensions

L x W x D: 120.6 x 32 x 119.3 mm (4.75 x 1.26 x 4.70 inch)



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24V 60W 1 Phase, NEC Class 2 / DRP024V060W1N□

Engineering Data

Output Load De-rating VS Surrounding Air Temperature

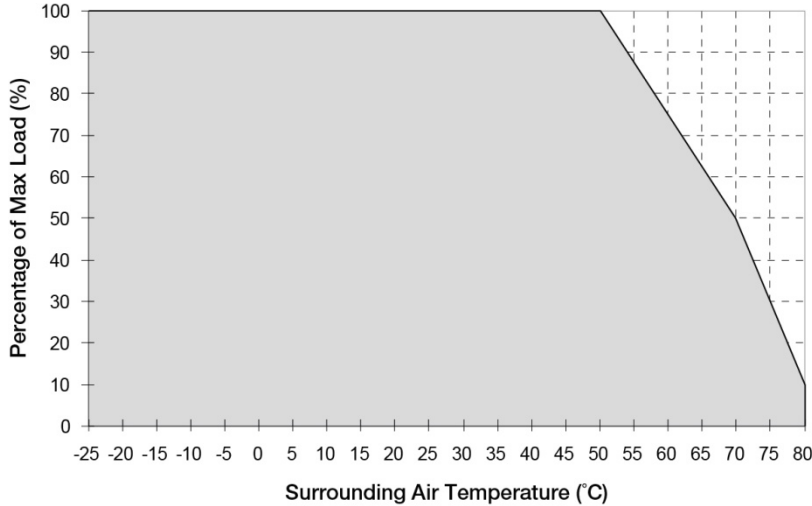
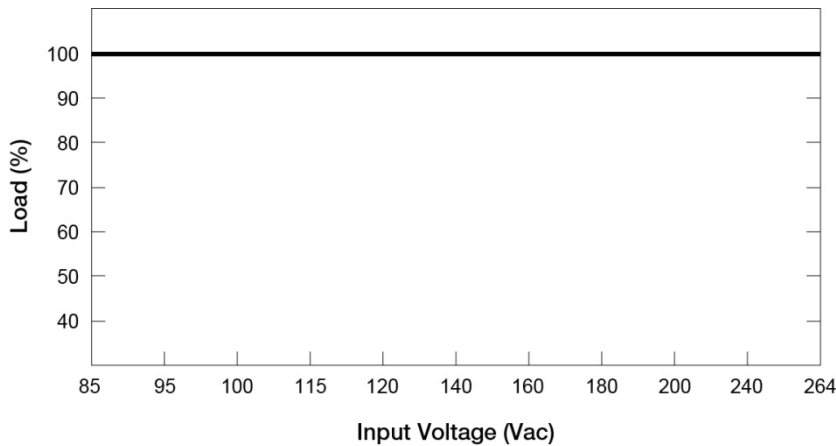


Fig. 1 De-rating for Vertical and Horizontal Mounting Orientation
 > 50°C de-rate power by 2.5% / °C,
 > 70°C de-rate power by 4% / °C

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 surrounding air temperature > 50°C, the device will run into Over Temperature Protection. When activated, the output voltage will go into bouncing mode and will recover when the surrounding air temperature is lowered or the load is reduced as far as necessary to keep the device in working condition.
3. In order for the device to function in the manner intended, it is also necessary to keep a safety distance of 20mm (0.79 inch) with adjacent units 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.

Output Load De-rating VS Input Voltage



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

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Assembly & Installation

The power supply unit (PSU) can be mounted on 35mm DIN rails in accordance with EN 60715. The device should be installed with input terminal block at the bottom.

Each device is delivered ready to install.

Mounting

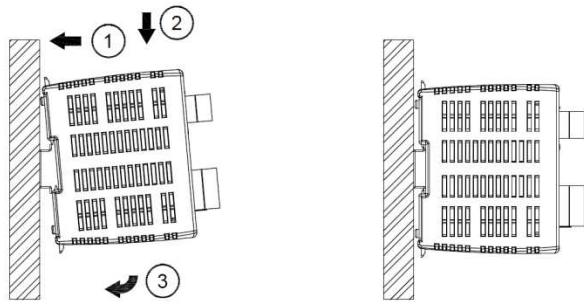


Fig. 2.1 Mounting

Snap on the DIN rail as shown in Fig. 2.1:

1. Tilt the unit upwards and insert it onto the DIN rail.
2. Push downwards until stopped.
3. Press against the bottom front side for locking.
4. Shake the unit slightly to ensure that it is secured.

Dismounting

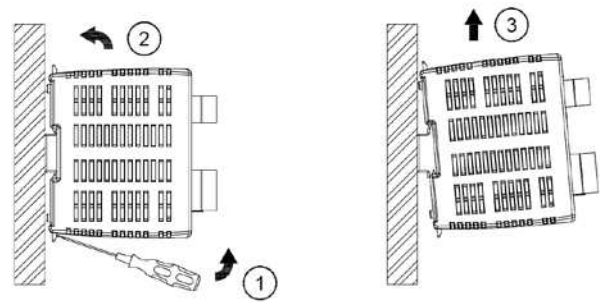


Fig. 2.2 Dismounting

To uninstall, pull or slide down the latch with screw driver as shown in Fig. 2.2. Then slide the power supply unit (PSU) in the opposite direction, release the latch and pull out the power supply unit (PSU) from the rail.

In accordance to EN 60950 / UL 50950, flexible cables require ferrules.

Use appropriate copper cables designed to sustain operating temperature of:

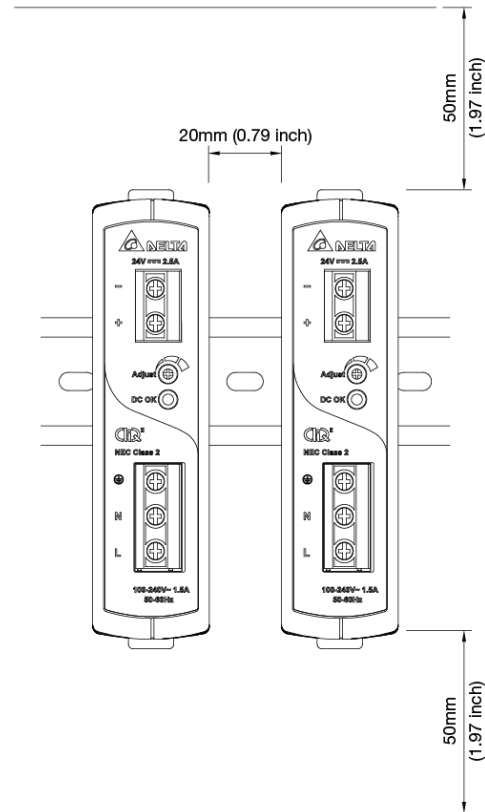
1. 60°C, 60°C / 75°C for USA
2. At least 75°C for ambient not exceeding 60°C, and 90°C for ambient exceeding 60°C for Canada.

CliQ II DIN Rail Power Supply

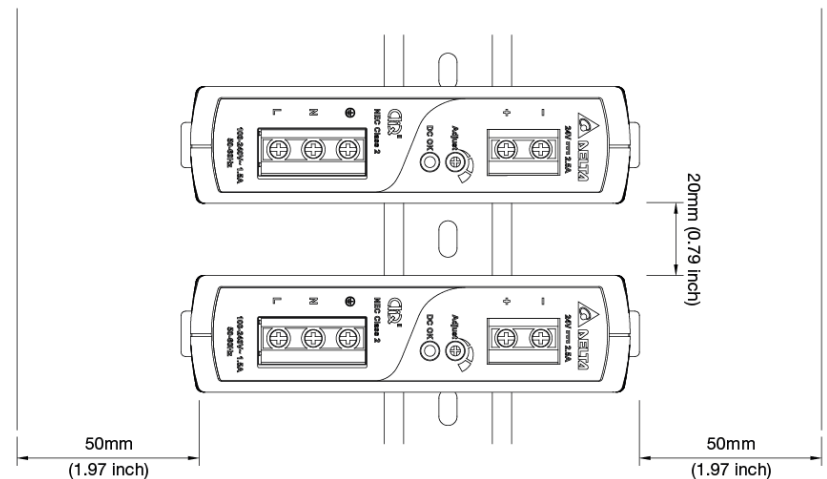
24V 60W 1 Phase, NEC Class 2 / DRP024V060W1N□

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, keep a distance of 50mm (1.97 inch) above and below the device as well as a lateral distance of 20mm (0.79 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!
- Only plug in and unplug connectors when power is turned off!
- 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 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.
- CAUTION: "For use in a controlled environment".

For DRP024V060W1NY:

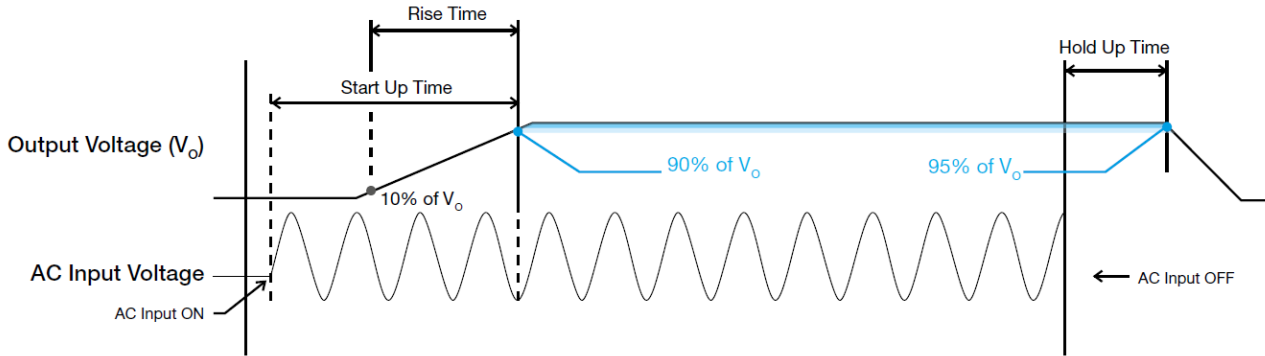
- The power supplies unit must be installed in an IP54 enclosure or cabinet in the final installation. The enclosure or cabinet must comply with EN 60079-0 or EN 60079-15.
- Warning: Explosion Hazard - Substitution of components may impair suitability for Class I, Division 2.
- Warning: Explosion Hazard - Do not disconnect equipment or adjust potentiometer unless the power has been switched off or the area is known to be non-hazardous.

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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

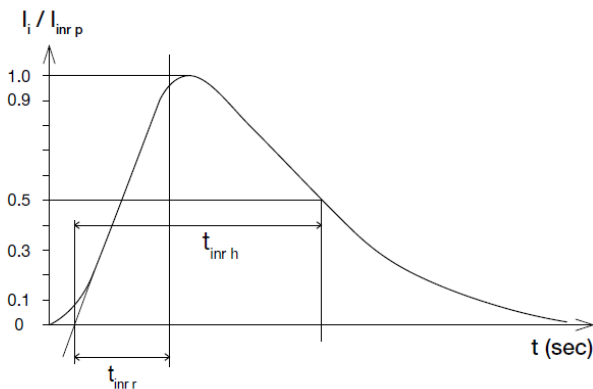
The time required for the output voltage to change from 10% to 90% of its final steady state set value.

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

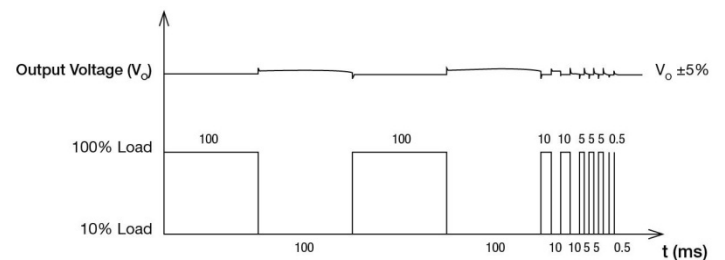
Inrush current is the peak, instantaneous, input current measured and, occurs when the input voltage is first applied. For AC input voltages, the maximum peak value of inrush current will occur during the first half cycle of the applied AC voltage. This peak value decreases exponentially during subsequent 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 0 to 100% of its rated current.

■ 50% duty cycle / 5Hz to 1KHz

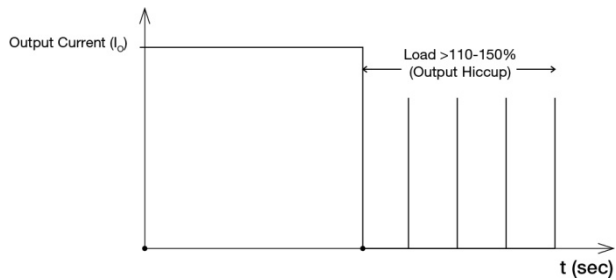


CliQ II DIN Rail Power Supply

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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 110-150% 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.



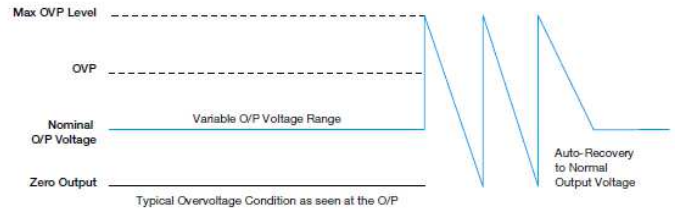
It is not recommended to prolong the duration of I_O when it is <110% but >100%, since it may cause damage to the PSU.

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.

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 described in load de-rating section, the power supply also has Over Temperature Protection (OTP). In the event of a higher operating temperature at 100% load, the power supply will run into OTP when the operating temperature is beyond what is recommended in the de-rating graph. When activated, the output voltage will go into bouncing mode until the temperature drops to its normal operating temperature as recommended in the de-rating graph.

CliQ II DIN Rail Power Supply

24V 60W 1 Phase, NEC Class 2 / DRP024V060W1N□

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 V_{in1} & V_{in2} , 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.

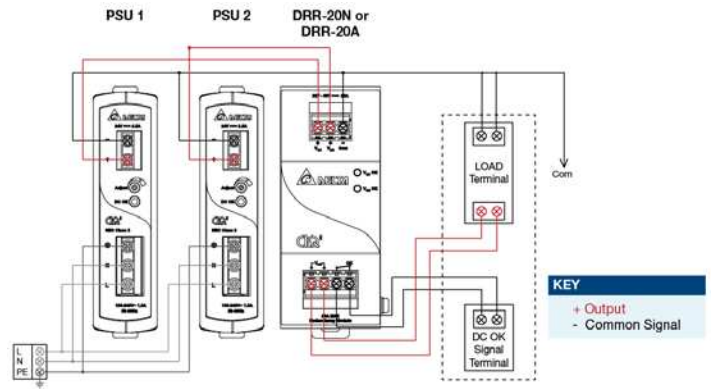


Fig. 3 Redundant Operation Connection Diagram

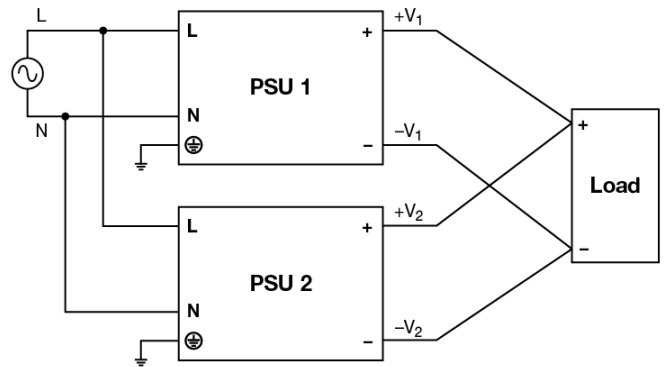


Fig. 4 Parallel Operation Connection Diagram

CliQ II DIN Rail Power Supply

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Others

Delta RoHS Compliant

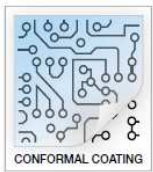


Restriction of the usage of hazardous substances

The European directive 2011/65/EU limits the maximum impurity level of homogeneous materials such as lead, mercury, cadmium, chrome, 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".

This product conforms to this standard.

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 PCBAs or circuit board. The coating preserves the performance of precision electronic primarily by preventing ionizable contaminants such as salt from reaching circuit nodes, where the material slumps around sharp edges. This can be a problem especially in highly conversing atmosphere.