

DIN Rail Power Supply

48V 120W 1 Phase / DRL-48V120W1AA



*This picture is for reference to DRL-48V120W series only.

Highlights & Features

- Universal AC input voltage
- Built-in constant current circuit for reactive loads
- Up to 90.0% efficiency
- Full power from -10°C to +50°C operation at 230 Vac @ 5,000 meters or 16,400 feet altitude
- Built-in DC OK relay contact option available
- Compliance to SEMI F47 @ 200 Vac
- Conformal coating on PCBAs to protect against common dust and chemical pollutants

Safety Standards



CB Certified for worldwide use

Model Number: DRL-48V120W1AA
Unit Weight: 0.54 kg (1.19 lb)
Dimensions (H x W x D): 123.6 x 40 x 117.6 mm (4.87 x 1.57 x 4.63 inch)

General Description

Delta's LYTE DIN rail power supply series is designed for cost sensitive users who need to fulfill essential features needed for many general industrial applications, without compromising on quality and reliability. The convection-cooled LYTE series will operate between -20°C to +70°C, with full rated power available from -10°C to +50°C at 230 Vac. The overcurrent protection is designed to operate in constant current mode, which makes the LYTE series suitable for inductive and capacitive load applications. The product is certified according to safety standards IEC/EN/UL 60950-1 & IEC/EN/UL 62368-1 for Information Technology Equipment (ITE) and UL 508 for Industrial Control Equipment (ICE). Electromagnetic radiated and conducted emissions are compliant to EN 55032, Class B; and, the product is RoHS compliant for environmental protection.

Model Information

LYTE DIN Rail Power Supply

Model Number	Input Voltage Range	Rated Output Voltage	Rated Output Current
DRL-48V120W1AA	85-264 Vac (120-375 Vdc)	48 Vdc	2.50 A

Model Numbering

DR	L –	48V	120W	1	A	□
DIN Rail	Product Type L – LYTE Series	Output Voltage	Output Power	Single Phase	Delta Standard	A – Without DC OK Contact S – With DC OK Relay Contact

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Specifications

Input Ratings / Characteristics

Nominal Input Voltage	100-240 Vac	
Input Voltage Range	85-264 Vac	
Nominal Input Frequency	50-60 Hz	
Input Frequency Range	47-63 Hz	
DC Input Voltage Range*	120-375 Vdc	
Input Current	2.2 A typ. @ 115 Vac, 1.2 A typ. @ 230 Vac	
Efficiency at 100% Load	89% typ. @ 115 Vac, 90% typ. @ 230 Vac	
Max Power Dissipation	0% load	1.21 W @ 115 Vac & 230 Vac
	100% load	13.3 W @ 115 Vac & 230 Vac
Max Inrush Current (Cold Start)	20 A typ. @ 115 Vac, 40 A typ. @ 230 Vac	
Leakage Current	< 0.25 mA @ 264 Vac	

*Fulfills test conditions for DC input. Safety approval for DC input can be obtained upon request.

Output Ratings / Characteristics**

Nominal Output Voltage	48 Vdc	
Factory Set Point Tolerance	48 Vdc \pm 2%	
Output Voltage Adjustment Range	44-56 Vdc	
Output Current	2.50 A (120 W max.)	
Output Power	120 W	
Line Regulation	< 0.5% (@ 85-264 Vac, 100% load)	
Load Regulation	< 1% (0-100% load)	
PARD*** (20 MHz)	< 150 mVpp @ > -10°C to +70°C < 300 mVpp @ \leq -10°C to -20°C	
Rise Time	30 ms typ. @ nominal input (100% load)	
Start-up Time	200 ms typ. @ 115 Vac & 230 Vac (100% load)	
Hold-up Time	20 ms typ. @ 115 Vac (100% load)	
	90 ms typ. @ 230 Vac (100% load)	
Dynamic Response (Overshoot & Undershoot O/P Voltage)	\pm 10% @ 85-264 Vac input, 0-100% load (Slew Rate: 0.1 A/ μ s)	
Start-up with Capacitive Loads	4,000 μ F Max	
Functional	DC OK Relay Contact	Rated: 30 V at 1 A The relay contact are normally "ON" (closed) when the output (Vout) is greater than 90% of its rated value.

**For power de-rating from -10°C to -20°C, and 40°C to 70°C @ 115 Vac & 50°C to 70°C @ 230 Vac, and Vin < 100 Vac, see power de-rating on page 3.

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

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Mechanical

Case Cover / Chassis	SGCC / Aluminium	
Dimensions (H x W x D)	123.6 x 40 x 117.6 mm (4.87 x 1.57 x 4.63 inch)	
Unit Weight	0.54 kg (1.19 lb)	
Indicator	Green LED (DC OK)	
Cooling System	Convection	
Terminal	Input	3 Pins (Rated 600 V / 35 A)
	Output	DRL-48V120W1AA : 4 Pins (Rated 300 V / 28 A)
	Output / Signal	DRL-48V120W1AS : 6 Pins (Rated 300 V / 28 A)
Wire	Input	AWG 18-8
	Output	AWG 22-12
	Signal	AWG 24-12
Mounting Rail	Standard TS35 DIN Rail in accordance with EN 60715	
Noise (1 Meter from power supply)	Sound Pressure Level (SPL) < 25 dBA	

Environment

Surrounding Air Temperature	Operating	-20°C to +70°C
	Storage	-40°C to +85°C
Power De-rating	Temperature	-10°C to -20°C de-rate power by 2%/°C > 40°C de-rate power by 1.67% / °C @ 115 Vac > 50°C de-rate power by 2.5% / °C @ 230 Vac
	Input Voltage	< 100 Vac de-rate power by 1% / Vac
Operating Humidity	5 to 95% RH (Non-Condensing)	
Operating Altitude	0 to 5,000 Meters (16,400 ft.)	
Shock Test	Non-Operating	IEC 60068-2-27, 27, Half Sine Wave: 50 G for duration of 11 ms; 3 times per direction, 9 times in total
	Operating	IEC 60068-2-27, 27, Half Sine Wave: 10 G for duration of 11 ms; 1 time in X axis
Vibration	Non-Operating	IEC 60068-2-6, Random: 5 Hz to 500 Hz; 2.09 G _{rms} ; 20 min per axis for all X, Y, Z directions
	Operating	IEC 60068-2-6, Sine Wave: 10 Hz to 500 Hz @ 19.6 m/s ² (2 G peak); displacement of 0.35 mm; 10 min per cycle, 60 min for X direction
Pollution Degree	2	

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Protections

Overvoltage	57.0 V - 67.2 V, SELV Output, Latch Mode
Overload / Overcurrent	105-150% of rated load current, Continuous current
Over Temperature	Latch Mode
Short Circuit	Hiccup Mode, Non-Latching (Auto-Recovery when the fault is removed)
Internal Fuse at L pin	T4 A / 250 V
Degree of Protection	IP20
Protection Against Shock	Class I with PE* connection

*PE: Primary Earth

Reliability Data

MTBF	Telcordia SR-332	> 700,000 hrs	I/P: 100 Vac, O/P: 100% load, Ta: 25°C
Expected Cap Life Time	10 years (115 Vac & 230 Vac, 50% load @ 40°C)		

Safety Standards / Directives

Safety Entry Low Voltage		SELV
Electrical Safety	TUV Bauart	EN 60950-1, EN 62368-1
	UL/cUL recognized	UL 60950-1 and CSA C22.2 No. 60950-1 (File No. E131881) UL 62368-1 and CSA C22.2 No. 62368-1 (File No. E131881)
	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. E338991)
CE		In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU
UKCA		In conformance with Electrical Equipment (Safety) Regulations 2016 and Electromagnetic Compatibility Regulations 2016
Galvanic Isolation	Input to Output	3.0 KVac
	Input to Ground	2.0 KVac
	Output to Ground	0.5 KVac

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EMC

Emissions (CE & RE)	Generic Standards: EN/BS EN 61000-6-3, EN/BS EN 61000-6-4 CISPR 32, EN/BS EN 55032, EN/BS EN 55011, FCC Title 47: Class B; GB9254.1		
Component Power Supply for General Use	EN/BS EN 61204-3		
Immunity	Generic Standards: EN/BS EN 61000-6-1, EN/BS EN 61000-6-2, EN/BS EN 55024		
Electrostatic Discharge	IEC 61000-4-2	Level 4 Criteria A ¹⁾ Air Discharge: 15 kV Contact Discharge: 8 kV	
Radiated Field	IEC 61000-4-3	Level 3 Criteria A ¹⁾ 80 MHz – 1 GHz, 10 V/M with 1 kHz tone / 80% modulation 1.4 GHz – 2 GHz, 3 V/M with 1 kHz tone / 80% modulation 2 GHz – 2.7 GHz, 1 V/M with 1 kHz tone / 80% modulation	
Electrical Fast Transient / Burst	IEC 61000-4-4	Level 3 Criteria A ¹⁾ 2 kV	
Surge	IEC 61000-4-5	Level 4 Criteria A ¹⁾ Common Mode ³⁾ : 4 kV Differential Mode ⁴⁾ : 2 kV	
Conducted	IEC 61000-4-6	Level 3 Criteria A ¹⁾ 150 kHz – 80 MHz, 10 Vrms	
Power Frequency Magnetic Fields	IEC 61000-4-8	Level 4 Criteria A ¹⁾ 30 A/m	
Voltage Dips and Interruptions	IEC 61000-4-11	0% of 100 Vac, 20 ms 40% of 100 Vac, 200 ms 70% of 100 Vac, 500 ms 0% of 100 Vac, 5,000 ms 0% of 240 Vac, 20 ms 40% of 240 Vac, 200 ms 70% of 240 Vac, 500 ms 0% of 240 Vac, 5,000 ms	Criteria A ¹⁾ Criteria B ²⁾ Criteria A ¹⁾ Criteria B ²⁾ Criteria A ¹⁾ Criteria A ¹⁾ Criteria A ¹⁾ Criteria B ²⁾
Low Energy Pulse Test (Ring Wave)	IEC 61000-4-12	Level 3 Criteria A ¹⁾ Common Mode ³⁾ : 2 kV Differential Mode ⁴⁾ : 1 kV	
Harmonic Current Emission	IEC/EN/BS EN 61000-3-2, Class A; GB17625.1		
Voltage Fluctuation and Flicker	IEC/EN/BS EN 61000-3-3		
Voltage Sag Immunity SEMI F47 - 0706	80% of 200 Vac 70% of 200 Vac 50% of 200 Vac	160 Vac, 1,000 ms 140 Vac, 500 ms 100 Vac, 200 ms	Criteria A ¹⁾ Criteria A ¹⁾ Criteria A ¹⁾

1) Criteria A: Normal performance within the specification limits

2) Criteria B: Temporary degradation or loss of function which is self-recoverable

3) Asymmetrical: Common mode (Line to earth)

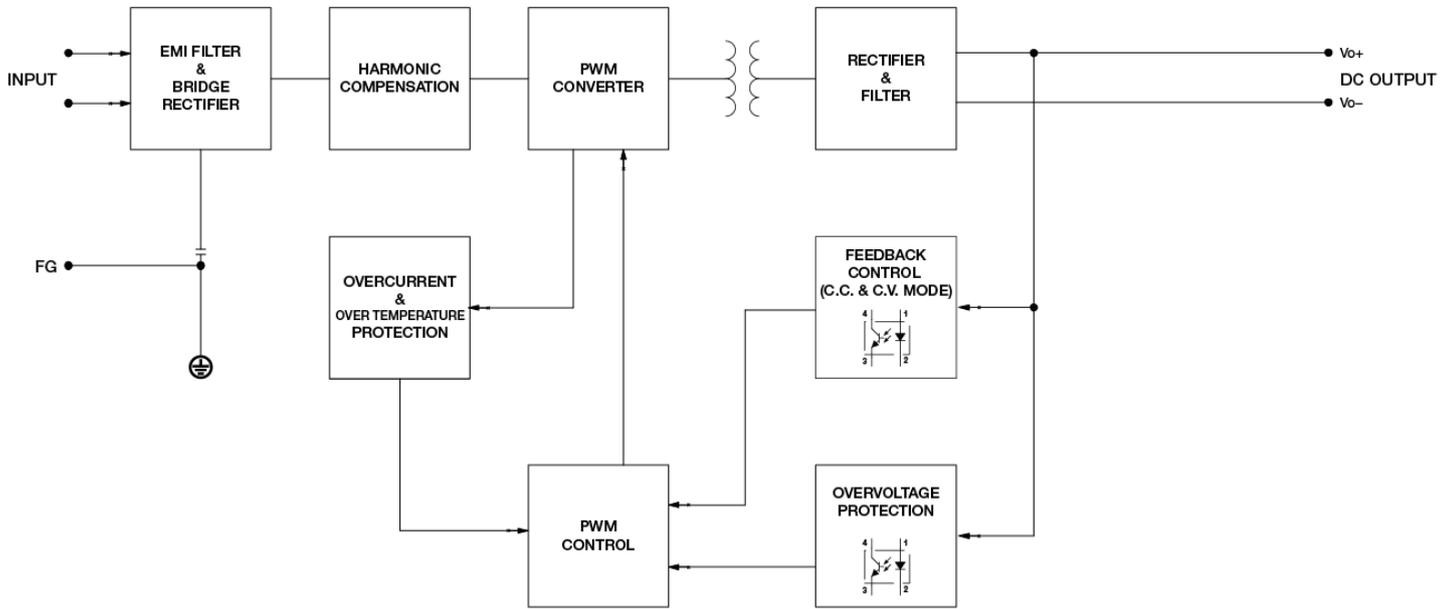
4) Symmetrical: Differential mode (Line to line)

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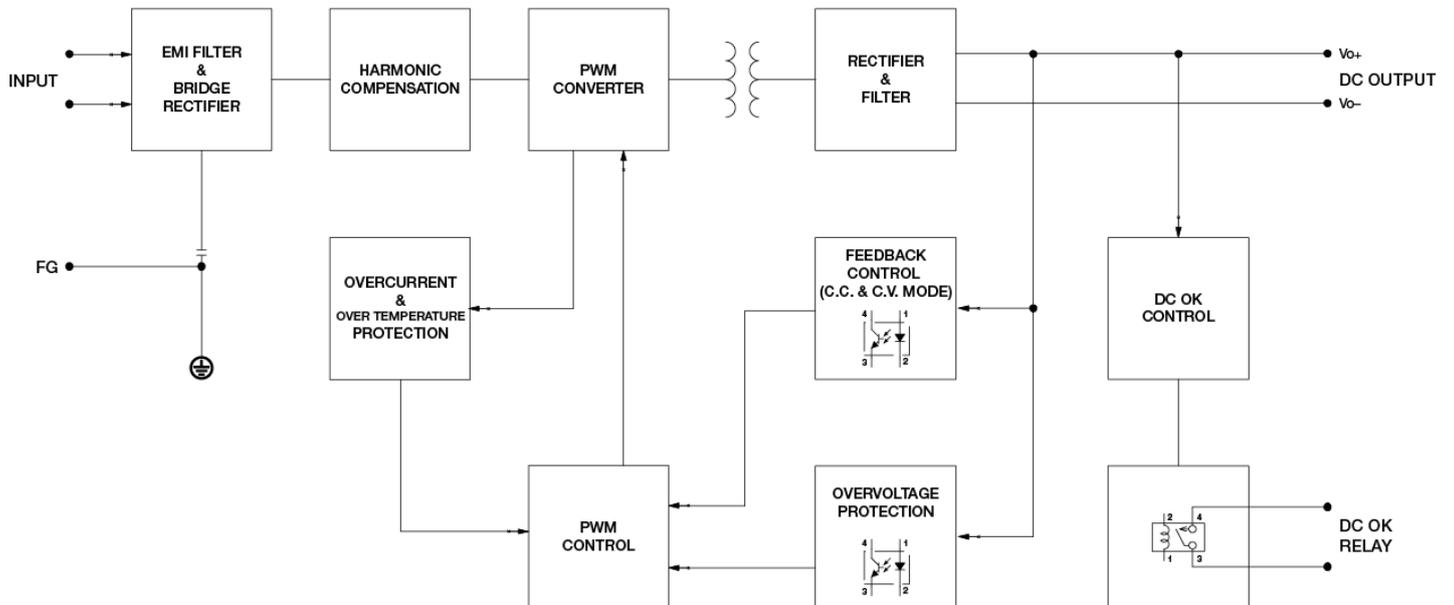
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Block Diagram

DRL-48V120W1AA



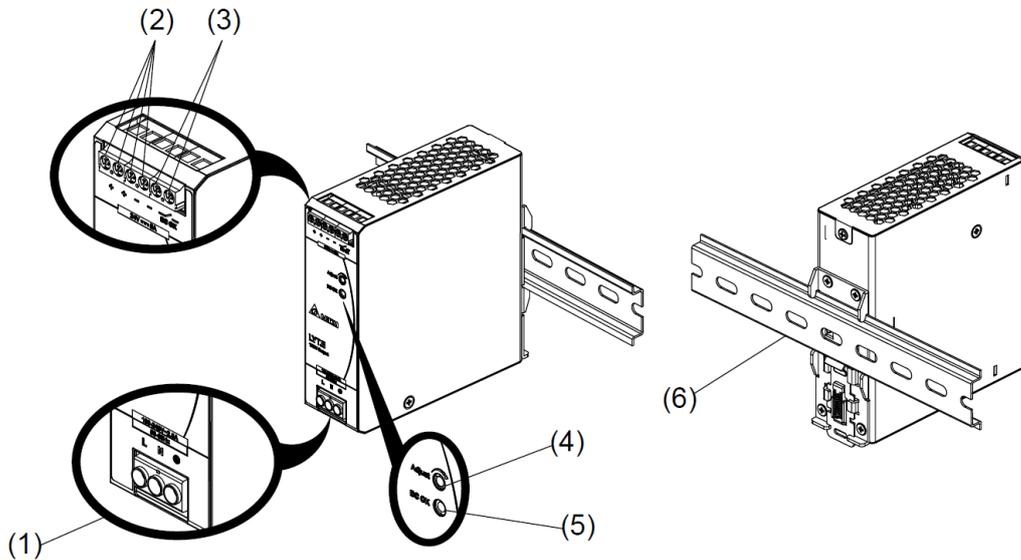
DRL-48V120W1AS



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Device Description

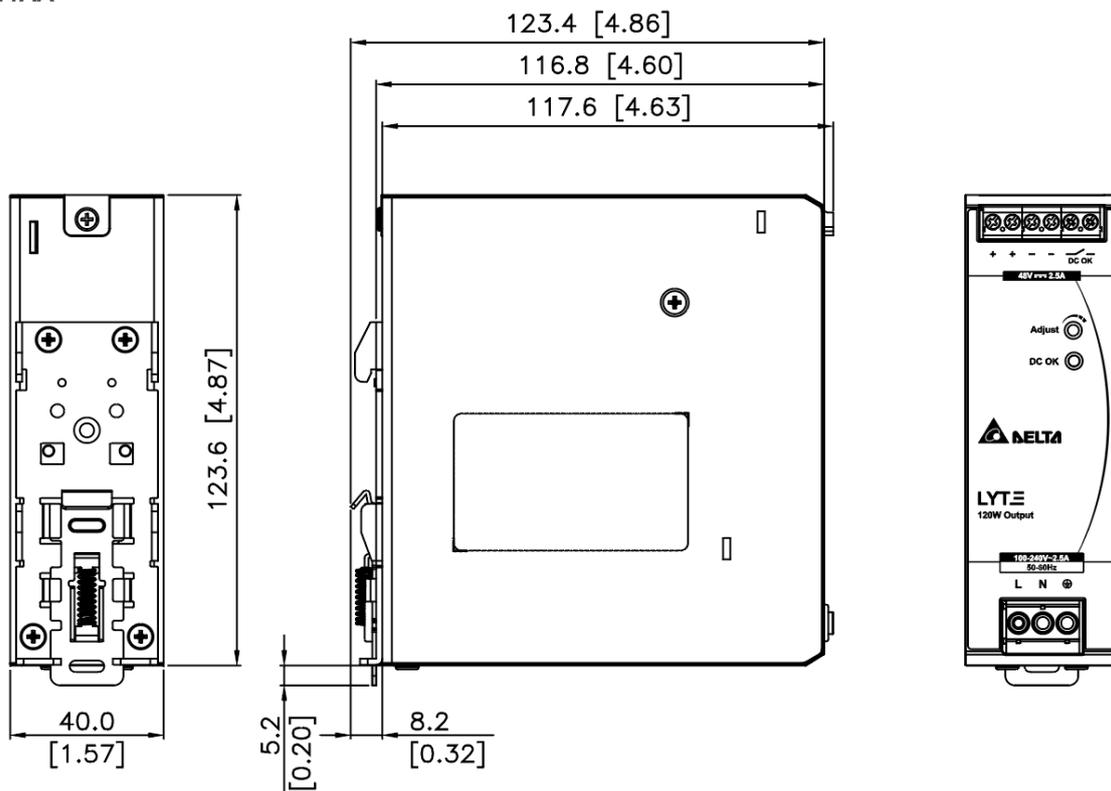


- 1) Input terminal block connector
- 2) Output terminal block connector
- 3) DC OK relay contact (for DRL-48V120W1AS only)
- 4) DC voltage adjustment potentiometer
- 5) DC OK LED (Green)
- 6) Universal mounting rail system

Dimensions

H x W x D: 123.6 x 40 x 117.6 mm (4.87 x 1.57 x 4.63 inch)

DRL-48V120W1AA

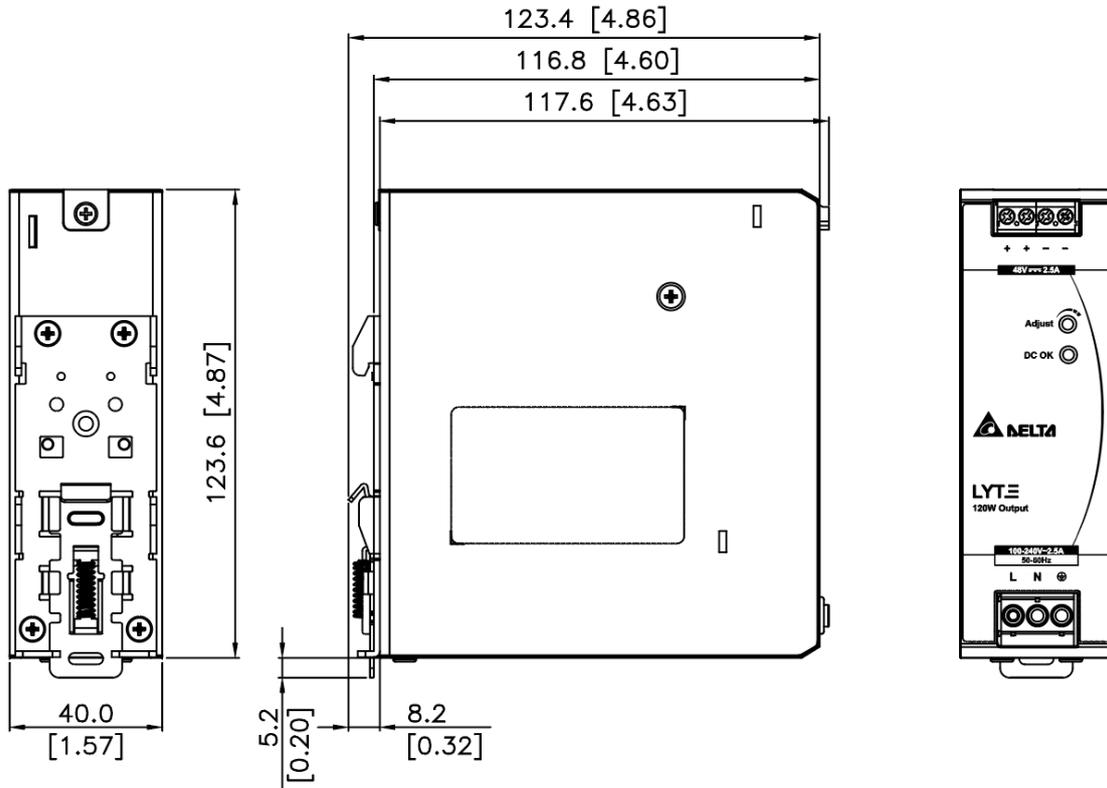


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H x W x D: 123.6 x 40 x 117.6 mm (4.87 x 1.57 x 4.63 inch)

DRL-48V120W1AS



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Engineering Data

Output Load De-rating VS Surrounding Air Temperature

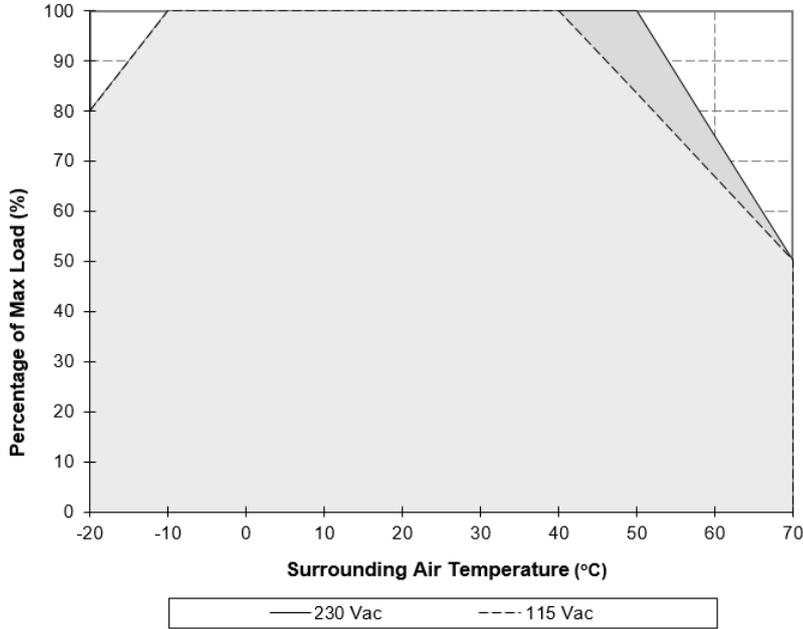
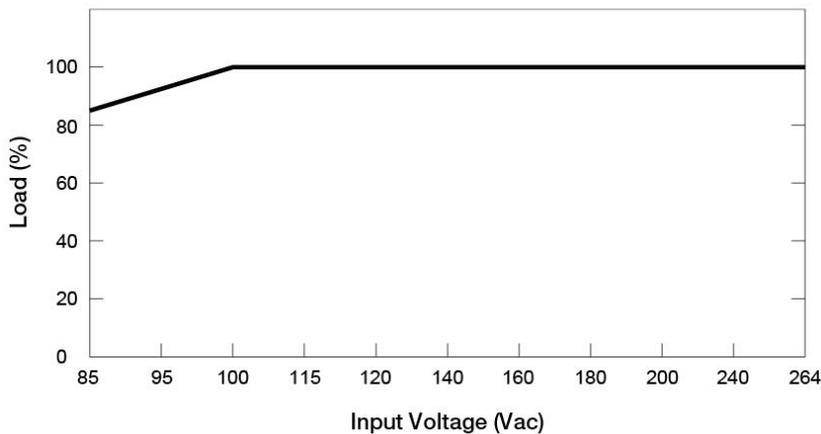


Fig. 1 De-rating for Vertical Mounting Orientation
 -10°C to -20°C de-rate power by 2% / °C
 > 40°C de-rate power by 1.67% / °C @ 115 Vac
 > 50°C de-rate power by 2.5% / °C @ 230 Vac

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 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 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.

Output Load De-rating VS Input Voltage



- No output power de-rating for the input voltage from 100 Vac to 264 Vac

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Assembly & Installation

The power supply unit (PSU) can be mounted on 35 mm 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

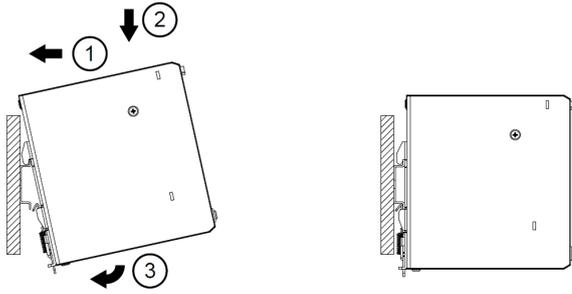


Fig. 2.1 Mounting

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

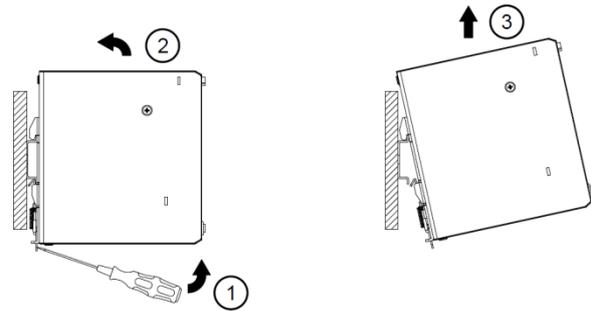


Fig. 2.2 Dismounting

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 60950 and EN 62368 / UL 62368, flexible cables require ferrules.

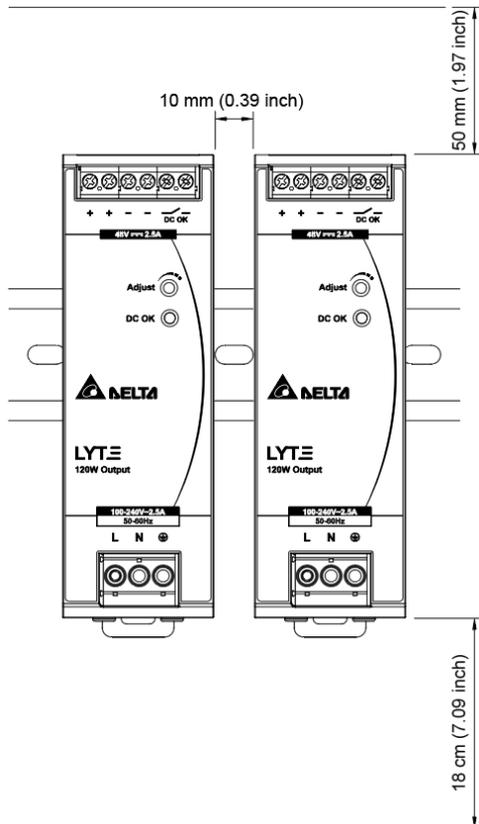
Use appropriate copper cables designed to sustain operating temperature of at least 60°C / 75°C or more to fulfill UL requirements.

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Safety Instructions

■ Vertical Mounting



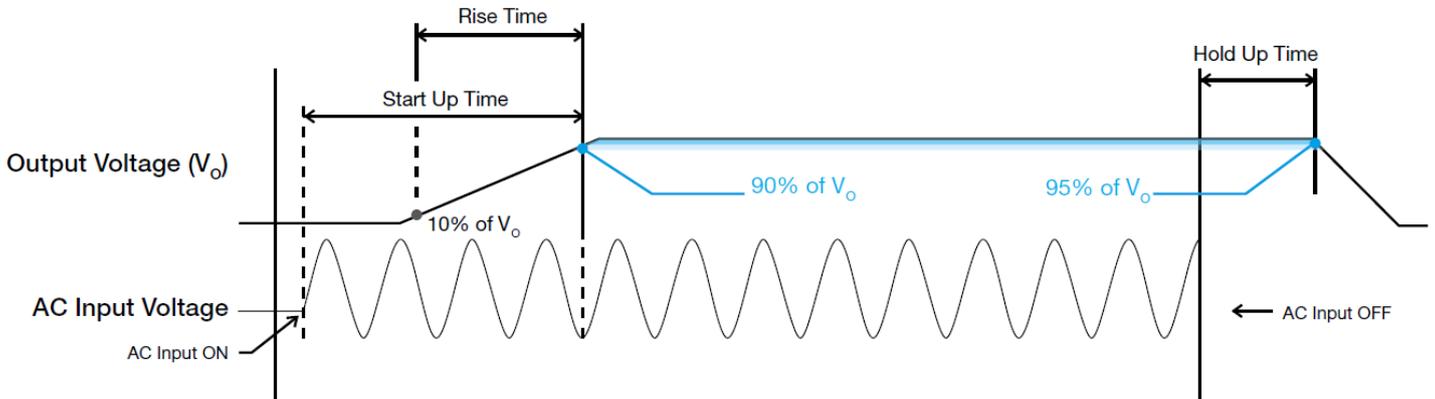
- ALWAYS switch mains of input power OFF before connecting and disconnecting the input voltage to the unit. If mains are not turned OFF, there is risk of explosion / severe damage.
- **To guarantee sufficient convection cooling, keep a distance of 50 mm (1.97 inch) above and 18 cm (7.09 inch) below the device as well as a lateral distance of 10 mm (0.39 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 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

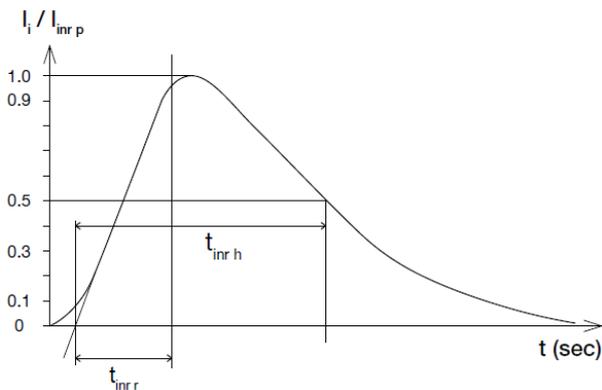
The time required for the output voltage to change from 10% to 90% of its final steady state set value.

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

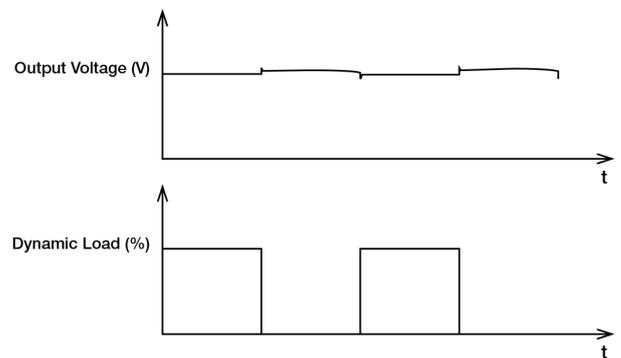
Inrush current is the peak, instantaneous, input current measured and, occurs when the input voltage is first applied. For AC input voltages, the maximum peak value of inrush current will occur during the first half cycle of the applied AC voltage. This peak value decreases exponentially during subsequent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



Dynamic Response

The power supply output voltage will remain within $\pm 10\%$ of its steady state value, when subjected to a dynamic load from 0% to 100% of its rated current.

- 50% duty cycle / 5 Hz to 100 Hz

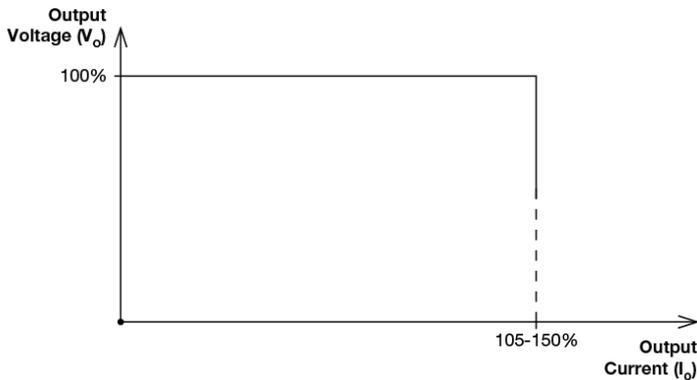


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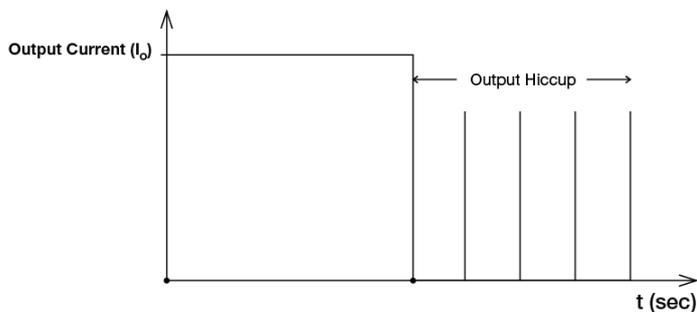
Overload & Overcurrent Protections (Continuous Current)

The power supply's Overload (OLP) and Overcurrent (OCP) Protections will be activated when output current is 105~150% of I_o (Max load). Upon such an occurrence, the V_o (output voltage) will start to droop. Once the power supply has reached its maximum power limit, the protection will be activated; and, the power supply will operate in continuous current. The power supply will recover once the cause of OLP or OCP is removed, and I_o (output current) is back within the specified range.



Short Circuit Protection (Auto-Recovery)

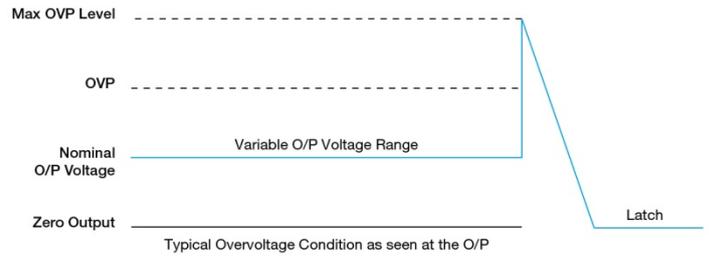
The power supply's output Short Circuit Protection function also provides protection against short circuits. When a short circuit is applied, the output current will operate in "Hiccup mode". The power supply will return to normal operation after the short circuit is removed.



Overvoltage Protection (Latch Mode)

The power supply's overvoltage circuit will be activated when its internal feedback circuit fails. The output voltage shall not exceed its specifications as described in "Protections" section. Power supply will latch off, and require removal/re-application of input AC voltage in order to restart.

The power supply should be latch.



Over Temperature Protection (Latch Mode)

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; or, when the operating temperature is beyond what is recommended in the de-rating graph, the OTP circuit will be activated. When activated, power supply will latch off, until the surrounding air temperature drops to its normal operating temperature or the load is reduced as recommended in the de-rating graph. Removal/re-application of input AC voltage will then be required in order to restart.

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Operating Mode

■ Redundant Operation

In order to ensure proper redundant operation for the power supply units (PSUs), the output voltage difference between the two units must be kept at 0.9~1.0 V for these 48 V 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.

Step 2.

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

Step 3.

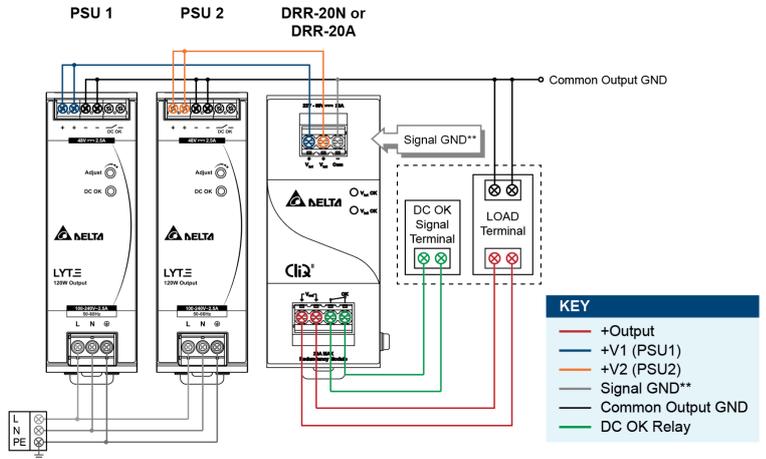
Connect the system load to V_{out} . Please note that output voltage V_{out} from DRR module will be $= V_O$ (output voltage of power supply) $- V_{drop}^*$ (in DRR module).

* V_{drop} will vary from 0.60 V to 0.90 V (Typical 0.65 V) 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 25 mV 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. 3 Redundant Operation Connection Diagram

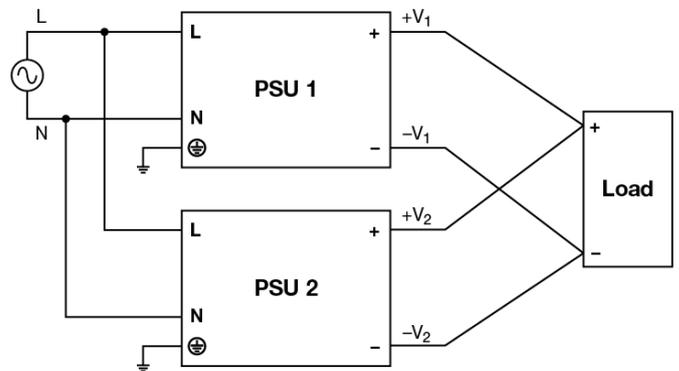


Fig. 4 Parallel Operation Connection Diagram