Delta CliQ M SIL 3 Power Supply 1AC/24VDC/20A

The device must be installed by qualified persons only and in accordance with the specific national regulations (e.g. VDE, DIN, etc.). Before installing this unit, read these operating and installation instructions carefully and completely.

1. Description

Technical Data

Input (AC)	
Nominal input voltage and frequency	100-240Vac / 50-60Hz; or 110-300Vdc (for ITE only)
Voltage range	85-276Vac (DC input range 88-375Vdc)
Frequency	47-63Hz
Nominal current	< 5.30A @ 100Vac, < 2.50A @ 230Vac < 5.00A @ 110Vdc, < 3.00A @ 300Vdc
Inrush current limitation (+25°C, cold start)	9A typ. @ 120Vac, 7A typ. @ 230Vac
Hold-up time	43ms typ. @ 120Vac & 230Vac
Start-up time	1000ms typ. @ 120Vac & 230Vac
Internal fuse	T 8A - LITTELFUSE (Type 477) UL E10480 & Europe: Rated 500Vac & 400Vdc - CONQUER (Type UDE/UDE-A) UL E82636 & Europe: Rated 500Vac & 500Vdc
Leakage current	TN/TT-system: < 0.80mA @ 264Vac IT-system: < 2.00mA @ 264Vac
Output (DC)	
Nominal output voltage U_N	24Vdc
Factory setting	± 1.0%
Adjustment range of the voltage	24-28Vdc
Output current	20A (V_{out} = 24Vdc) 17A (V_{out} = 28Vdc) 30A (for 5s, V_{out} = 24Vdc) 25.5A (for 5s, V_{out} = 28Vdc)
Derating	> 60°C (2.5% / °C) in Vertical > 40°C (2.5% / °C) in Horizontal
Max. power dissipation: 0% load 100% load	 < 9.40W @ 120Vac, < 10.20W @ 230Vac < 40.60W @ 120Vac, < 34.00W @ 230Vac
Efficiency at 100% load	93.83% typ. @ 120Vac, 94.17% typ. @ 230Vac
PARD (20MHz) at 100% load	< 120mVpp
Max. relay contact rating	30V (SELV) / 1A resistive load
General Data	
Type of housing	Aluminium
LED signals	Green LED DC OK Red LED Overload
MTBF	> 778,800 hrs. as per Telcordia SR-332 (I/P: 100Vac; O/P: 24V, 20A; Ta: 25°C)
Dimensions (L x W x D)	124mm x 82mm x 127mm
Weight	1.4 kg
Connection method	Screw connection
Wire stripping length	7mm
Operating temperature (Surrounding air temperature)	-25°C to +70°C
Storage temperature	-40°C to +85°C
Humidity at +25°C, no condensation	5 to 95% RH
Vibration (non-operating)	10 to 500Hz @ 30m/S² (3G peak); displacement of 0.35mm; 60 min. per axis for all X, Y, Z directions in acc. with IEC60068-2-6
Shock (in all directions)	30G (300m/S²) in all directions according to IEC60068-2-27
Pollution degree	2
Operating altitude and over voltage category: IEC/EN62477-1, EN60204-1 and IEC62103-1 IEC/EN60950-1, IEC/EN62368-1, IEC/EN61010-1 and IEC/EN61010-2-201	 III (operating altitude 2,500 Meters) II (operating altitude 5,000 Meters) II (operating altitude 5,000 Meters)
Climatic class	3K3 according to EN60721
Safety and Protection	
Transient surge voltage protection	VARISTOR
Current limitation at short-circuits approx.	I_{surge} = 150% of Po_{max} typically (hiccup mode)
Surge voltage protection against internal surge voltages	Yes
Isolation voltage: Input / Output Input / PE Input / DC OK* Output / PE Output / DC OK DC OK / PE	 3.00KVac 1.50KVac 3.00KVac 0.50KVac 0.50KVac 0.50KVac
Protection degree	IP20
Safety class	Class I with PE connection

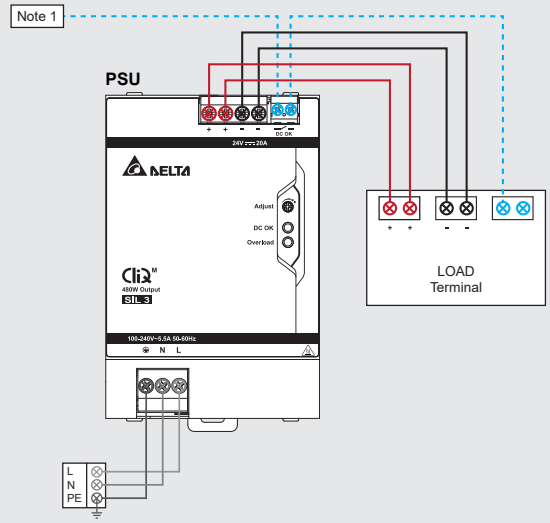
*Recommend connecting DC OK pins to output pins.

2. Safety Manual

The following application shows how to use the Delta CliQ M SIL 3 Power Supply 1AC/24VDC/20A (DRM-24V480W1SN) to set up:

- Single power application for 20A
- Redundant power application for 20A

2.1 Single power application for 20A



Safety Function and Failure behavior:

Power Supply DRM-24V480W1SN is considered to be operating as a Type A component, having Hardware Fault Tolerance (HFT) = 1.
The safety function is to limit the output voltage (overvoltage protection) to 30V and if higher than 30V the PSU will switch off (Latch Mode) within 20ms. The safe state is no output voltage. The output undervoltage protection limit is to 18V, then the PSU will shut down and operate in “Hiccup Mode”. The safe state is Hiccup Mode i.e. the power supply will repeatedly turn on and off. During this operation mode the output voltage will be between 0 and 28Vdc (depending on the initial DC voltage adjustment potentiometer set). After the fault condition is removed, the PSU will automatically restart within 17s.

Failure rates of the electronic components are calculated according to IEC 61508 standard.

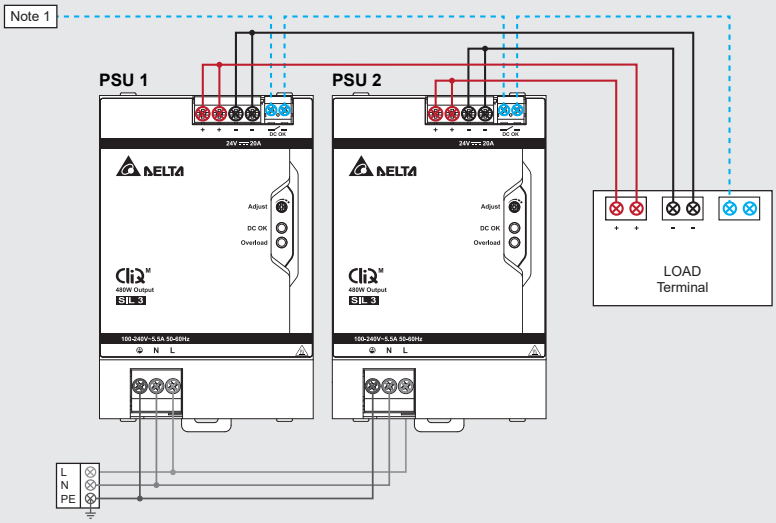
Note 1: The signaling is not part of the safety function, but it can also be set by the user for failure detection. An active signaling mode of the power supply (DC OK relay contact) can be connected with 24V of the interconnected system, a TTL logic/clock signal from the output of load or a separate voltage source can be used.

Safety parameter: Overvoltage and undervoltage protection circuitry implemented in the power supply in a **stand-alone application**.

Safety Functions Specifications	Value	Remark
Safety Integrity Level	SIL 3	IEC 61508, IEC 61511
Component Type	A	
PFH [1/h]	1.18E-09	Corresponds 1.18% of SIL 3
PFD_{AVG}	7.60E-05	Corresponds to 7.60% of SIL 3; this value is valid for the stated Proof Test Interval T1
SFF	> 60%	
T1 (Proof Test Interval)	15 years	
HFT	1	

The overvoltage and undervoltage protection circuitry implemented in the power supply fulfills the requirement up to SIL 3 and can be used in applications up to SIL 3 according to IEC 61508 and IEC 61511 standard.

2.2 Redundant power application for 20A



Safety Function and Failure behavior:

The 1+1 redundant power system build up with path 1 (PSU1) and path 2 (PSU2) provides a symmetrical load sharing operation and increases the system availability. Use the same cable cross sections (wire size) and the same cable lengths for wiring the DC convergence point to avoid unbalanced load sharing. In the absence of path 1, path 2 will take over the output power and securely supply the load. If both paths are missing, the output will be switched off and the power system will have a safe state.

Power Supply DRM-24V480W1SN is considered to be operating as a Type A component, having Hardware Fault Tolerance (HFT) = 1.
The safety function is to limit the output voltage (overvoltage protection) to 30V and if higher than 30V the PSU will switch off (Latch Mode) within 20ms. The safe state is no output voltage. The output undervoltage protection limit is to 18V, then the PSU will shut down and operate in “Hiccup Mode”. The safe state is Hiccup Mode i.e. the power supply will repeatedly turn on and off. During this operation mode the output voltage will be between 0 and 28Vdc (depending on the initial DC voltage adjustment potentiometer set). After the fault condition is removed, the PSU will automatically restart within 17s.

Failure rates of the electronic components are calculated according to IEC 61508 standard.

Note 1: The signaling is not part of the safety function, but it can also be set by the user for failure detection. An active signaling mode of the power supply (DC OK relay contact) can be connected with 24V of the interconnected system, a TTL logic/clock signal from the output of load or a separate voltage source can be used.

Safety parameter: Overvoltage and undervoltage protection circuitry implemented in the power supply in a **20A redundant power application**.

Safety Functions Specifications	Value	Remark
Safety Integrity Level	SIL 3	IEC 61508, IEC 61511
Component Type	A	
PFH [1/h]	2.36E-09	Corresponds < 2.36% of SIL 3
PFD_{AVG}	1.52E-04	Corresponds to 15.2% of SIL 3
SFF	> 60%	
T1 (Proof Test Interval)	15 years	
HFT	1	

The overvoltage and undervoltage protection circuitry implemented in the power supply fulfills the requirement up to SIL 3 and can be used in applications up to SIL 3 according to IEC 61508 and IEC 61511 standard.