

WRA960 SERIES

3PH AC - DC DIN RAIL MOUNTABLE POWER SUPPLY
INDUSTRIAL CONTROL EQUIPMENT



FEATURES

- 3 PHASE AC INPUT VOLTAGE
- SELV COMPONENTS DESIGN
- SHORT CIRCUIT PROTECTION
- INTERNAL INPUT FILTER
- OVER TEMPERATURE PROTECTION
- 3 YEARS WARRANTY



SELECTION CHART

WRA 960 - 24

Wattage

24 : 24V OUT

48 : 48V OUT

MODEL LIST

MODEL NO.	INPUT VOLTAGE	OUTPUT WATTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFF. (min.)	EFF. (typ.)
Single Output Models						
WRA960-24	3 ϕ 340~575 VAC	960 WATTS	+ 24 VDC	40 A	90%	92%
WRA960-24L	3 ϕ 340~575 VAC	960 WATTS	+ 24 VDC	40 A	90%	92%
WRA960-48	3 ϕ 340~575 VAC	960 WATTS	+ 48 VDC	20 A	91%	93%

SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

GENERAL

Characteristics	Conditions	min.	typ.	max.	unit
Switching frequency	Vi nom, Io nom		52		KHz
Isolation voltage	Input-Output	4,243 / 6,000			VAC / VDC
	Input-PE	2,828 / 4,000			VAC / VDC
	Output-PE	500 / 710			VAC / VDC
Isolation resistance	Input-Output, @ 500VDC	100			M Ω
Ambient temperature	Operating at Vi nom	-40		+ 71	°C
Derating (see derating curve)	Vi nom, from +61 to +71°C			3.5	% / °C
Storage temperature	Non operational	-40		+ 85	°C
Relative humidity	Vi nom, Io nom	20		95	% RH
Temperature coefficient	Vi nom, Io min			$\pm$ 0.03	% / °C
MTBF	Bellcore Issue 6 @40°C, GB	24V	355,000		Hours
		24L	380,000		Hours
		48V	396,000		Hours
Altitude during operation	EN 62368-1			5,000	m
Dimension	Screw terminal type	L125.9 x W275.8 x D120.9			mm
Cooling	Free air convection				
Installation position	Vertical (other direction may derating using)				
Pollution degree			2		

INPUT SPECIFICATIONS

Characteristics	Conditions	min.	typ.	max.	unit
Nominal voltage *1			I ϕ or 3 ϕ 380 / 480 VAC		
Rated input voltage	Io nom	400		500	VAC
Absolute input max. range	Ta min ... Ta max, AC in	340		575	VAC
	Io nom, DC in	480		820	VDC
Input current	Vi : 400 / 500 VAC, Io nom		1.72 / 1.5		A

*1. Single phase input is permissible, but output load is derated to 75%



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INPUT SPECIFICATIONS

Characteristics	Conditions	min.	typ.	max.	unit
Rated input current	V_i : 340 VAC, I_o nom			2.4	A
Line frequency	V_i nom, I_o nom	47		63	Hz
Inrush current	V_i nom, I_o nom	24V, 48V	30	35	A
Power dissipation	V_i : 400 VAC, I_o nom	24V	98		W
		48V	90		W
Leakage current	Input-Output			0.25	mA
	Input-PE			3.5	mA
Power factor (Passive)	V_i nom, I_o nom		0.8		

OUTPUT SPECIFICATIONS

Characteristics	Conditions	min.	typ.	max.	unit
Output voltage accuracy (Adjusted before shipment)	V_i nom, I_o max	0		+ 1	%
Minimum load	V_i nom	0			%
Line regulation	I_o nom, V_i min ... V_i max			± 1	%
Load regulation	V_i nom, I_o min ... I_o nom			± 1	%
Voltage trim range	V_i nom, 0.8 I_o nom	24V	22.5	28.5	VDC
		48V	47	56	VDC
Rated continuous loading	V_i nom	24V	40 A @ 24Vdc / 33.5 A @ 28.5Vdc		
		48V	20 A @ 48Vdc / 17 A @ 56Vdc		
Hold up time	V_i nom, I_o nom	15			ms
Turn on time	V_i nom, I_o nom			1,000	ms
	V_i nom, I_o nom → with 7000 μ F CAP			1,500	ms
Rise time	V_i nom, I_o nom			150	ms
	V_i nom, I_o nom → with 7000 μ F CAP			500	ms
Fall time				150	ms
Transient recovery time	V_i nom, $I \sim 0.5 I_o$ nom			2	ms
Ripple & noise	V_i nom, I_o nom, BW = 20MHz			80	mV
Power back immunity	V_i nom, I_o nom	24V	35		VDC
		48V	63		VDC
Capacitor load	V_i nom, I_o nom			7,000	μ F
DC ON indicator threshold at start up (Green LED)	V_i nom, I_o nom	24V	17.6	19.4	VDC
		48V	37	43	VDC
DC LOW indicator threshold after start up (Red LED)	V_i nom, I_o nom	24V	17.6	19.4	VDC
		48V	37	43	VDC
Parallel operation *2	0.1 I_o min ~ 0.9 I_o max			3	unit
Efficiency	V_i nom, I_o nom, P_o / P_i	Up to 93%, See model list and typ efficiency curve			

CONTROL AND PROTECTION

Characteristics	Conditions	min.	typ.	max.	unit
Input fuse		T5 A / 500 VAC internal / phase			
Internal surge voltage protection	IEC 61000-4-5	Varistor			
Rated over load protection	V_i nom (see typ current limited curve)	110		135	%
Power Rdy *2 (for WRA960-24 model only)	Threshold voltage of contact closed (at start up)	17.6		19.4	VDC
	Electrical isolation	500			VDC
	Contact rating at 60VDC			0.3	A
Over voltage protection	V_i nom, 0.8 I_o nom (Shut-down)	24V	30	33	VDC
		48V	60	66	VDC
Output short circuit		Hiccup mode			
Over temperature	Detect on heat sink, shut down O/P voltage, recovers automatically after temperature goes down.	100		110	°C
Degree of protection		IP20			

*2. This function is not on 24L model.

SPECIFICATION

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APPROVALS AND STANDARDS

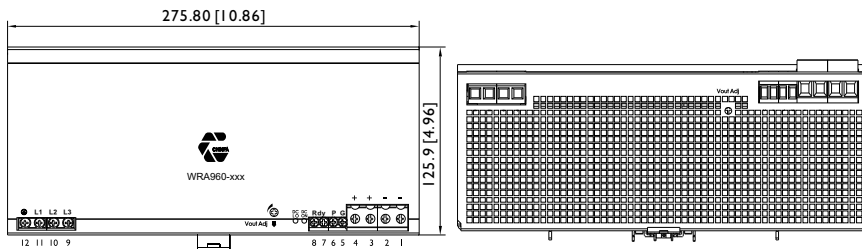
UL / cUL	UL 508 Listed UL 60950-1 Recognized ISA 12.12.01(Class I, Division 2, Groups A, B, C and D)
TUV	EN 62368-1, EN 61558-1, EN 61558-2-16 (meet EN 60204-1)
cTUVus	UL 62368-1
CE	BS EN / EN 61000-6-3, BS EN / EN 55032 Class B, BS EN / EN 61000-3-2, BS EN / EN 61000-3-3 BS EN / EN 61000-6-2, BS EN / EN 55035, BS EN / EN 61000-4-2 Level 4, BS EN / EN 61000-4-3 Level 3 BS EN / EN 61000-4-4 Level 4, BS EN / EN 61000-4-5 Level 4 BS EN / EN 61000-4-6 Level 3, BS EN / EN 61000-4-8 Level 4, BS EN / EN 61000-4-11 BS EN / EN 61204-3, CISPR 32
CQC	GB4943.1, GB/T 9254.1, GB17625.1
Vibration resistance	meet IEC 60068-2-6 (Mounting on rail : 10-500 Hz, 2G, along X, Y, Z each Axis, 60 min for each Axis)
Shock resistance	meet IEC 60068-2-27 (15G, 11ms, 3 Axis, 6 Faces, 3 times for each Face)

PHYSICAL CHARACTERISTICS

Case size	Screw terminal type 125.9 x 275.8 x 120.9 mm (4.96 x 10.86 x 4.76 inches)
Case material	Metal
Weight	3400g
Packing	3.68kg ; 6 pcs / 23kg / 2.41CUFT

MECHANISM & PIN CONFIGURATION

mm [inch]



CONSTRUCTION

Easy snap-on mounting onto the DIN-Rail (TS35/7.5 or TS35/15), unit sits safely and firmly on the rail.

INSTALLATION

Ventilation / Cooling
Normal convection
All sides 25mm free space
For cooling recommended
Connector size range
Input and Rdy, P, G Control : AWG24 - 10 (0.2~4mm²), flexible / solid cable
Output : AWG20 - 6 (0.5~10mm²), flexible / solid cable
- Input connector can withstand torque at maximum 9 pound-inches
Rdy, P, G control connector can withstand torque at maximum 5.5 pound-inches
8m/m stripping at cable end recommends
- Output connector can withstand torque at maximum 15.6 pound-inches
10m/m stripping at cable end recommends
Use copper conductors only, 60 / 75°C

GENERAL TOLERANCE

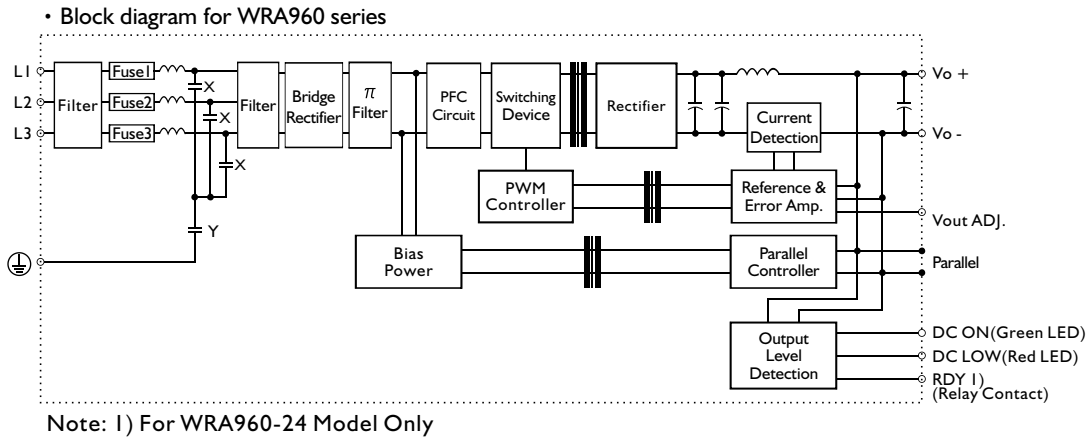
0.00[0.00] - 30.00[1.18]	±0.30[0.01]
30.00[1.18] - 120.00[4.72]	±0.50[0.02]
120.00[4.72] - 400.00[15.75]	±0.80[0.03]

PIN ASSIGNMENT

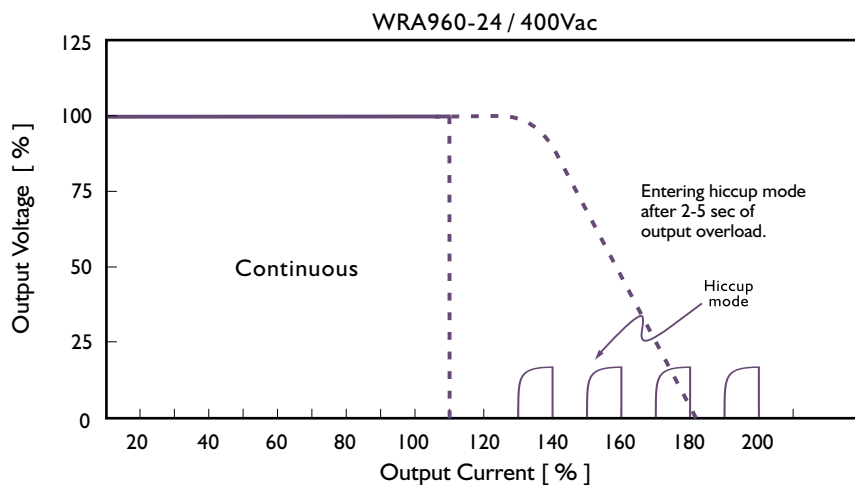
PIN NO.	Designation		Description
1, 2	OUT	V -	Negative output terminal
3, 4		V +	Positive output terminal
5		G	Parallel GND PIN for current share
6		P	Parallel PIN for current share
7		RDY	A normal open circuit of PhotoMOS Relay (24V model only)
8	IN	L3	Input terminals
9		L2	Input terminals
10		L1	Input terminals
11		⊕	Ground this terminal to minimize high-frequency emissions
12	OTHER	DC ON	Operation indicator LED
		DC LO	DC LOW voltage indicator LED
		Vout ADJ.	Trimmer-potentiometer for Vout adjustment

* WRA960-24L without PIN5~PIN8

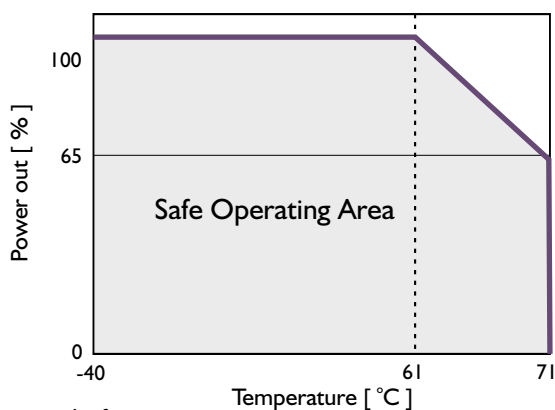
CIRCUIT SCHEMATIC



TYP. CURRENT LIMITED CURVE



DERATING CURVE



TYP. EFFICIENCY CURVE

