2000 to 4080W 3-Phase Input Industrial Power Supplies

https://product.tdk.com/en/power/tps
www.emea.lambda.tdk.com/tps



COTS Industrial Test COMM Broadcast

PMBus

The TPS series industrial AC-DC power supplies offer output power up to 4,080W in a 2U high package with 3 phase supply input. Features include voltage and current programming, remote on/off, remote sense, a standby supply, PMBus™ communication, built in ORing FET and wide operating temperature range of -40°C to +70°C. The TPS4000 is also designed to meet MIL-STD-461F/G RE102 EMI and MIL-STD-810F vibration and shock. Designed to meet MIL-STD 1399 section 300B (Electric Power Characteristics)

Features	Benefits
• 400/440/480Vac (Nominal) 3 Phase Delta or Wye	• Global Use
• Fully Regulated, Wide Range Voltage Adjustment	• Versatile Application
• Voltage and Current Programming	• Flexible Control and Adjustment
• -40°C (start up) to +70°C operation	• Suitable for Rugged Environments
• 92% Typical Efficiency	• Less Energy Used
• PMBus™ Communication	• Remote Output Programming and Monitoring
• Built in ORing FET for parallel operation	• Suitable for N + 1 Redundancy

Model Selector

Model	Nominal Output Voltage (V)	Adjustment Range (V)	Max Current (A)	Max Power (W)	Max Current at Nominal Voltage (A)	Max Power at Nominal Voltage (V)
TPS4000-12	12	9.6 - 14.1	166	2000	170	2040
TPS4000-24	24	19.2 - 28.5	166	4000	170	4080
TPS4000-48	48	38.4 - 58	83.3	4000	85	4080

*Wider range adjustment as stated on the UL safety files are possible, although some parameters might not meet some of the listed specifications.

Related Products

Type	Part Number	Description
EMC filter	RTMN-5020	High attenuation 20A 500Vac 3-phase input two stage filter

Specification

Model		TPS4000-12	TPS4000-24	TPS4000-48
Input				
Input Voltage Range (Operating)	Vac	350 - 528, Delta or Wye 3 phase		
Nominal Input Voltage Range	Vac	400 - 480, Delta or Wye 3 phase (Note: Safety certified for 360-528Vac only)		
Input Frequency	Hz	47 - 63		
Input Current (At nominal Vin)	A	5	8	8
Inrush Current at 400-480Vac (Cold Start)	A	<25 per phase (excluding initial filter capacitor charging <2ms)		
Dropped Phase Power	W	12V: 1200, 24-48V: 1600 Not recommended for long term operation		
Leakage Current (RMS)	mA	<3		
Power Factor (400-480Vac, typ at full load)	-	0.88	0.92	
Harmonic Compliance	-	Not applicable		
Hold Up Time (typ)	ms	>10 at 80% of rated current, nominal input/output voltage		
Efficiency (Typical)	-	85	92	92
Conducted & Radiated EMI	-	EN55032-A Conducted and radiated (In end system)		
Immunity	-	EN61000, see immunity table. MIL-STD-461F/G CS101, CS114 (Army Ground), CS115, CS116		
Line Dip	-	SEMI F47-0706 at 480Vac nominal (Criteria B)		
Safety Certifications and Markings	-	IEC/UL/CSA/EN62368-1, 60950-1, CE and UKCA Marks		

Immunity

Test	Standard	Test Level	Criteria	Notes
ESD	EN61000-4-2	±8 kV air discharge, ±4 kV contact discharge	B	See test report
Radiated Susceptibility	EN61000-4-3	3 V/m from 80-1000 MHz (80% AM at 1kHz)	A	See test report
Electrical Fast Transient Burst	EN61000-4-4	Power line pulses of ± 1 kV; I/O line pulses of ± 0.5 kV	B	See test report
Surge	EN61000-4-5	3±2kV common mode, ±1kV differential mode	B	See test report
Conducted Susceptibility	EN61000-4-6	3 Vrms, 150 kHz - 80 MHz 1 kHz 80% AM	A	See test report
Magnetic fields	EN61000-4-8	Inductive loop at 50 Hz, to 30.0 amps (rms) per meter & 300.0 amps (rms) per meter	A	See test report
Voltage Dips and Input Interruptions	EN61000-4-11	Voltage Dips of 30% and >95%; Interruptions of >95%.	B / C	See test report

Specification

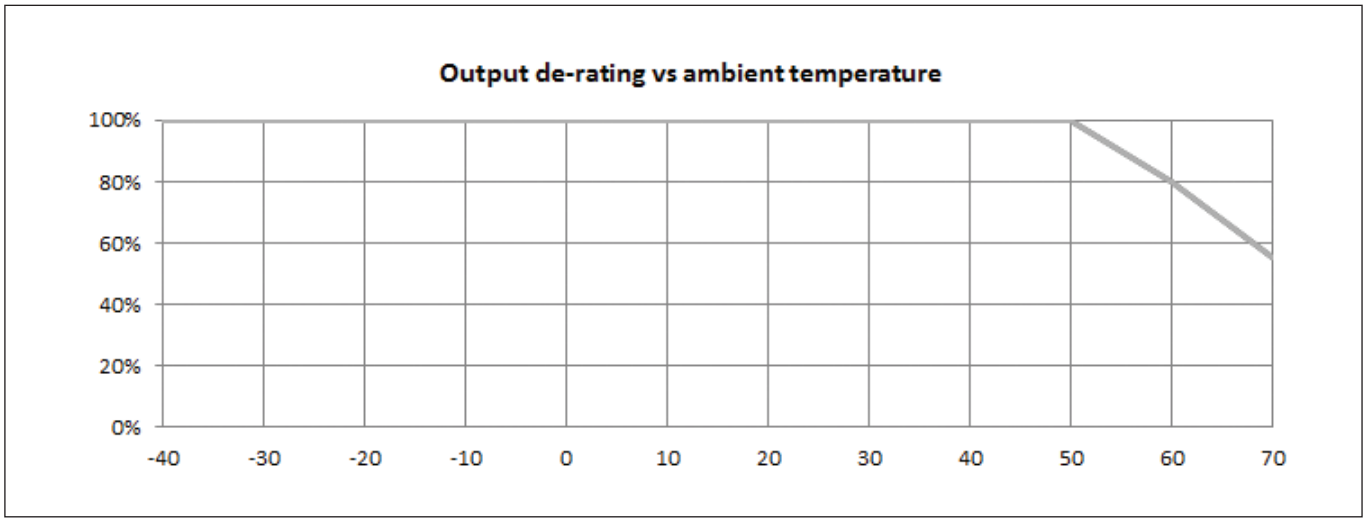
Model		TPS4000
Output		
Line Regulation	%	<0.25
Load Regulation	%	<0.5
Total Regulation	%	<1.75
Warm Up Drift	%	<0.2
Temperature Stability	-	0.05% of rated Vout for 8hrs after 30min warmup
Temperature Coefficient	ppm/°C	200
Ripple & Noise (pk-pk) Maximum	%	1
Minimum Load	A	None
Overcurrent Protection	%	Adjustable (70-105% of maximum rated current). Constant current style.
Overvoltage Protection	%	110 - 135 of output voltage set point (tracking). Cycle AC or use the remote on/off to reset
Overtemperature Protection	-	Internal thermostat. Automatic reset
Fan Fail	-	Blocked or fan failure detection. Cycle AC input or use PMBus to reset
Remote Sense	-	Compensates for a total of 1V cable drop
Remote On/Off	-	Enable or inhibit (selectable)
Voltage Programming	-	0 - 5V external voltage adjusts the output from Vout max to Vout min
Overcurrent Programming	-	0 - 5V external voltage adjusts the current limit from Iout max to Iout min
DC Good	-	Open Collector, ON when output is above 90% of output set point (tracking)
AC Fail	-	Open Collector, ON when AC input is above 340Vac, the load is >30% and unit is enabled
Dropped Phase Warning	-	Open collector, OFF during normal operation, active low during dropped phase state. Load >30%
Standby Voltage	-	11.2 - 12.5V, 0.3A
Indicators	-	Green LEDs indicates DC is OK and AC is ON. Blinking red/green during dropped phase (Load >30%)
Parallel Operation	-	Single wire current share, up to 8 units. (Internal ORing MOSFETs are fitted). Derate to 90% output power
Series Operation	-	Possible, see installation manual

Specification

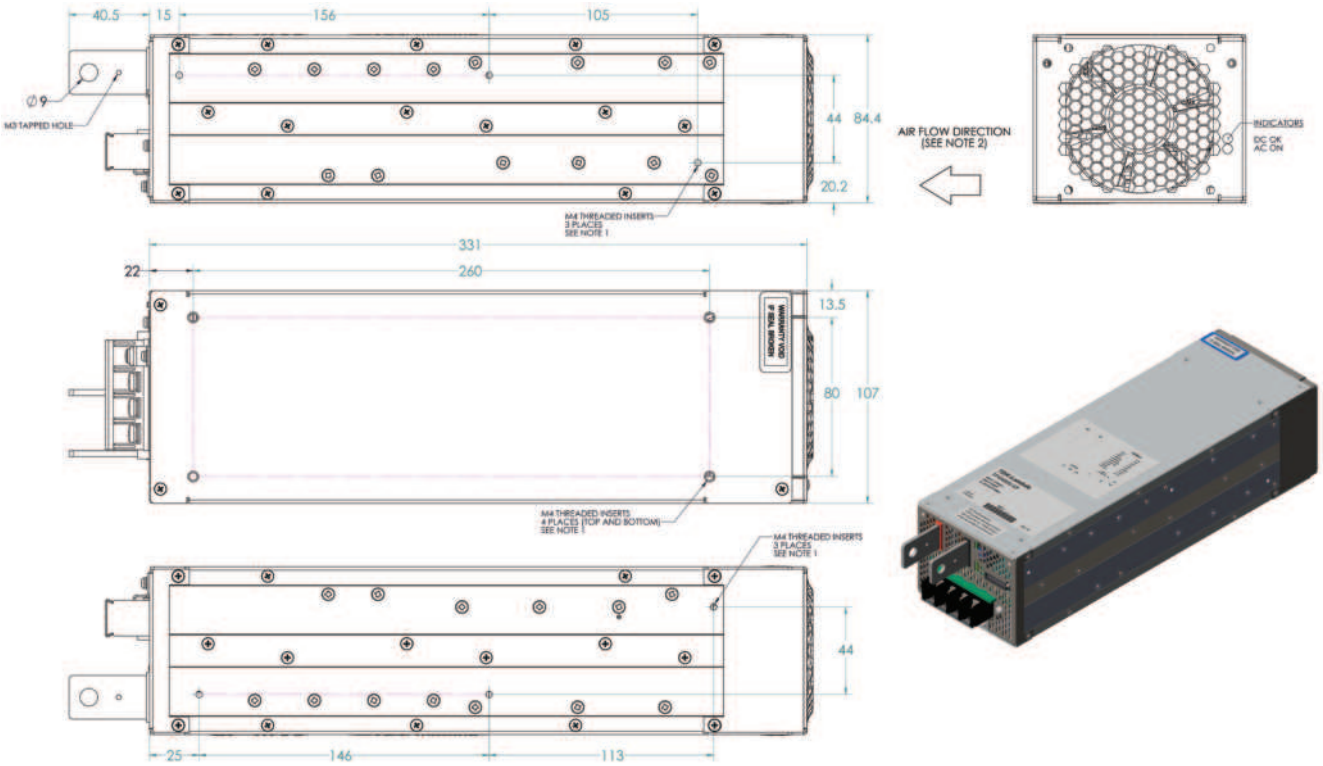
Model		TPS4000
Environmental		
Operating Temperature (-40°C start-up)	°C	-10 to +70, derate linearly from 100% to 80% load from 50 to 60, and from 80% to 55% at 70 (At -40°C a 10 min warm up at 80% load is required to meet specification)
Storage Temperature	°C	-40 to +85
Humidity (non condensing)	%RH	Operating 10 - 95, storage 10 - 90
Pollution Degree	-	PD 2
Cooling	-	Internal variable speed fan
Altitude	m	4,000
Withstand Voltage (For 1 minute)	Vac	Input to Ground 2,000Vac, Input to Output 3,000Vac, Output to Ground 500Vdc
Isolation Resistance	MΩ	>100 at 25°C, 70%RH & 500Vdc
Vibration (Operating)	-	Designed to meet MIL-STD-810F, Method 514.5, Proc I, Category 1, 10
Shock	-	Designed to meet MIL-STD-810F, Method 516.5, Procedure I, IV & VI
Other		
Weight (Typ)	g	4,000
Size (WxHxD)	mm	107 x 85 x 335 (excluding output busbars)
Size (WxHxD)	Inches	4.21 x 3.35 x 13.2 (excluding output busbars)
Mating Connectors	-	Signal: Housing, JST PHDR-20VS, Crimp terminals, SPHD-001T-P0.5 PMBus shunt jumper: Samtec 2SN-BK-G
MTBF - Telcordia SR-332 issue 3	hrs	250,000 hours Method 1, Ground Benign, 25C, nominal input
Warranty	yrs	3 years
PMBus Functions		
Output Voltage Monitoring		
Output Current Monitoring		
Internal Temperature Monitoring		
Remote On/Off Programming		
Remote Voltage Programming		
Remote Overcurrent Programming		
Fault Clearing		
Reading Manufacturing Related Data		

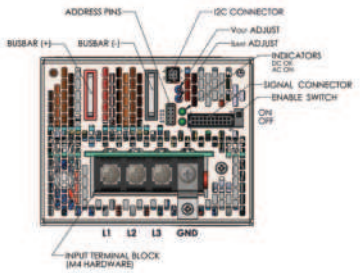
Notes
See website for detailed specifications, test methods and installation manual

Derating Curve



Outline Drawing





I2C CONNECTOR	
PIN No.	FUNCTION
1	SDA
2	SCL
3	SMB GND
4	SMB ALERT

SIGNAL CONNECTOR	
PIN No.	FUNCTION
1	
2	
3	
4	
5	OT
6	-SNS
7	GND (SIGNAL)
8	-SNS
9	PHASE OK
10	
11	RTN (PHASE OK)
12	PSON
13	RTN (AC OK)
14	PSON
15	ACOK
16	+SNS
17	DC OK
18	-SNS
19	RTN (DC OK)
20	+12V

TDK-Lambda
OUTLINE DRAWING
TPS4000-XX

NOTES:
1. MOUNTING SCREWS MUST NOT PROTRUDE INTO THE POWER SUPPLY MORE THAN 6mm
2. ALLOW A MINIMUM OF 50mm UNRESTRICTED AIR SPACE AT THE REAR OF THE UNIT. DO NOT OBSTRUCT AIR FLOW TO THE UNIT FRONT PANEL.
3. SIGNAL CONNECTOR RECEPTACLE: JST P/N: PHDR-20VS
   RECEPTACLE CONTACTS: JST P/N: SPHD-001T-P0.5
4. I2C CONNECTOR RECEPTACLE: MOLEX P/N: 51110-0460
   RECEPTACLE CONTACTS: MOLEX P/N: 50394-8051
5. ADDRESS PIN SELECTOR SHUNT JUMPER: SAMTEC P/N: 2SN-BK-G

11/20/19: Added second side view with mounting hole dimensions

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