



SERIES: VMS-200 | **DESCRIPTION:** AC-DC POWER SUPPLY

FEATURES

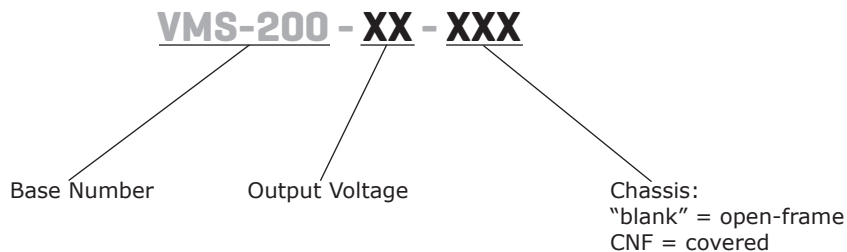
- compact 2 x 4" high power-density design (CNF version is 2.4 x 4.6")
- universal input range
- efficiencies up to 93.5%
- 4th edition medical safeties
- fan output (+12 Vdc)
- over voltage, over current, over temperature and short circuit protections
- covered and open-frame configurations



| MODEL | output voltage | output current | output power ¹ | ripple and noise ² | efficiency ³ |
|------------|----------------|----------------|---------------------------|-------------------------------|-------------------------|
| | (Vdc) | max (A) | max (W) | max (mVp-p) | typ (%) |
| VMS-200-12 | 12 | 16.67 | 200 | 150 | 92 |
| VMS-200-24 | 24 | 8.33 | 200 | 240 | 93.5 |
| VMS-200-48 | 48 | 4.17 | 200 | 480 | 93 |

- Notes:
1. Maximum output power of 200 W with 10 CFM forced air or baseplate cooling, 180 W at 220 Vac with convection cooling.
 2. At full load, nominal input, 20 MHz bandwidth oscilloscope, output terminated with 47 μ F aluminum electrolytic and 0.1 μ F ceramic capacitors.
 3. At full load, 25°C, 230 Vac input.
 4. All specifications are measured at Ta=25°C, nominal input voltage, and 75% rated output load unless otherwise specified.

PART NUMBER KEY



INPUT

| parameter | conditions/description | min | typ | max | units |
|---|------------------------------|-----|-----|-----|-------|
| voltage | | 90 | | 264 | Vac |
| frequency | | 47 | | 60 | Hz |
| under voltage shutdown | | 69 | | 83 | Vac |
| current | at 100 Vac, full load | | | 2.5 | A |
| inrush current | at 240 Vac, 25°C, cold start | | | 100 | A |
| leakage current | at 264 Vac | | | 0.3 | mA |
| leakage current (enclosure/ patient) | | | | 0.1 | mA |
| power factor correction | meets EN 61000-3-2 | | | | |
| no load power consumption | | | | 0.3 | W |

OUTPUT

| parameter | conditions/description | min | typ | max | units |
|----------------------------|---|-----|------------|--------------------------|-------------------------------|
| output capacitance | at 115/230 Vac, full load 12 Vdc output models 24 Vdc output models 48 Vdc output models | | | 16,400 8,570 1,270 | μ F μ F μ F |
| initial set point accuracy | at 60% load, 25°C | | ± 2 | | % |
| line regulation | high line to low line at full load | | ± 0.5 | | % |
| load regulation | at 60% \pm 40% load | | ± 1 | | % |
| hold-up time | at 115 Vac | | 10 | | ms |
| switching frequency | | | 85 | | kHz |
| temperature coefficient | | | ± 0.05 | | %/°C |
| fan output | open-frame: 12 Vdc / 300 mA covered: 12 Vdc / 500 mA | | | | |
| LED | indicates when power is on | | | | |

PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|--------------------------|---|-----|----------------|-----|-------------------|
| over voltage protection | recycle ac input to restart 12 Vdc output models 24 Vdc output models 48 Vdc output models | | 16 31 56 | | Vdc Vdc Vdc |
| over current protection | hiccup, auto recovery | 130 | 150 | 180 | % |
| short circuit protection | hiccup, auto recovery | | | | |

SAFETY & COMPLIANCE

| parameter | conditions/description | min | typ | max | units |
|-----------------------------------|---|-----|-----|-------------------------|-------------------|
| isolation voltage | input to output for 1 minute input to earth ground for 1 minute output to earth ground for 1 minute | | | 4,000 1,500 1,500 | Vac Vac Vac |
| isolation resistance | | 100 | | | M Ω |
| safety approvals | UL/cUL 60601-1 (3.1 edition), IEC 60601-1 (3.1 edition), EN 60601-1 (3.1 edition) | | | | |
| safety class | Class I & II | | | | |
| EMI/EMC | EN 60601-1-2 (4th edition) | | | | |
| conducted disturbance | EN 55011, FCC CFR 47 Part 18, Class B | | | | |
| radiated disturbance ¹ | EN 55011, FCC CFR 47 Part 18, Class B | | | | |
| harmonic current emissions | IEC 61000-3-2:2014, Class A, Class D | | | | |

Notes: 1. Need an external 1 mH choke at input for Class II type to pass EN 55011 Class B.

SAFETY & COMPLIANCE (CONTINUED)

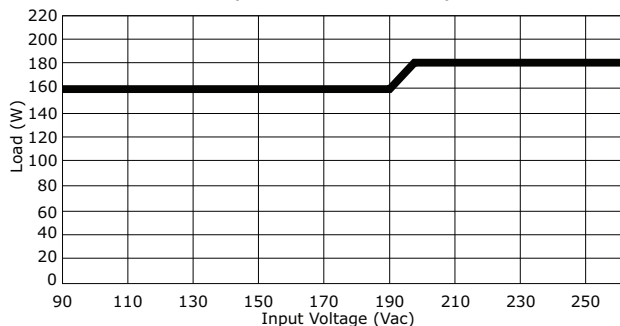
| parameter | conditions/description | min | typ | max | units |
|--|--|-----|---------|-----|-------|
| voltage fluctuations & flicker | IEC 61000-3-3:2013, Criteria A | | | | |
| radio-frequency, continuous radiated disturbance | IEC 61000-4-3:2010, Criteria A | | | | |
| electrical fast transient (EFT) | IEC 61000-4-4:2012, ±0.5 kV, ±1 kV, ±2 kV, Criteria A | | | | |
| surge | IEC 61000-4-5:2014, L-N: ±0.5 kV, ±1 kV, L-PE, N-PE: ±0.5 kV, ±1 kV, ±2 kV, Criteria A | | | | |
| conducted disturbances, induced by RF fields | IEC 61000-4-6:2013, Criteria A | | | | |
| power frequency magnetic field | IEC 61000-4-8:2009, Criteria A | | | | |
| voltage dips | IEC 61000-4-11:2004, dip: 30% 500 ms, dip: 60% 100 ms, dip >95% 10 ms, Criteria A | | | | |
| voltage interruptions | IEC 61000-4-11:2004, >95% 5,000 ms, Criteria B | | | | |
| MTBF | as per MIL-HDBK-217F, at full load, 25°C | | 279,000 | | hours |
| RoHS | 2011/65/EU | | | | |

ENVIRONMENTAL

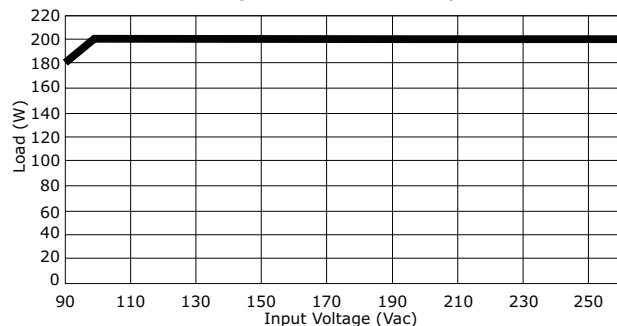
| parameter | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature | see derating curves | -20 | | 80 | °C |
| storage temperature | | -40 | | 85 | °C |
| operating humidity | non-condensing | | | 93 | % |
| storage humidity | non-condensing | | | 93 | % |

DERATING CURVES

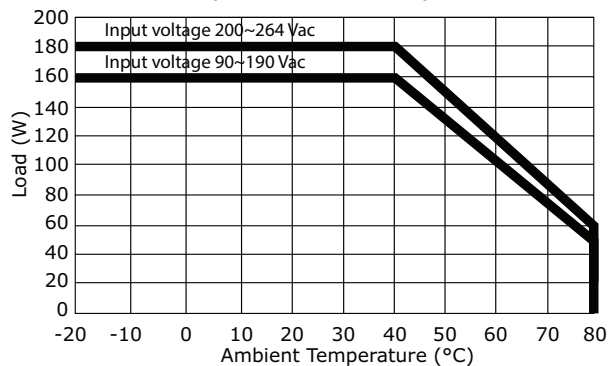
VMS-200 Output Power vs. Input Voltage (Natural Convection)



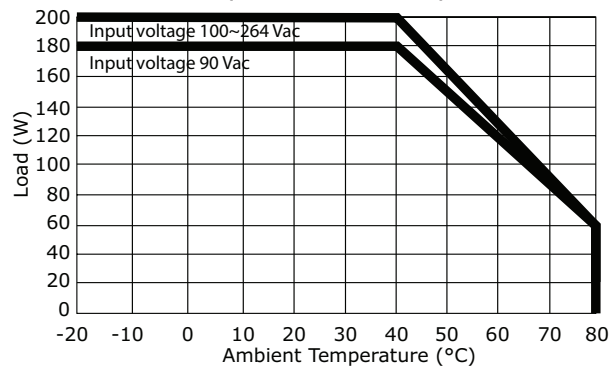
VMS-200-CNF Output Power vs. Input Voltage (Natural Convection)



VMS-200 Output Power vs. Ambient Temperature (Natural Convection)

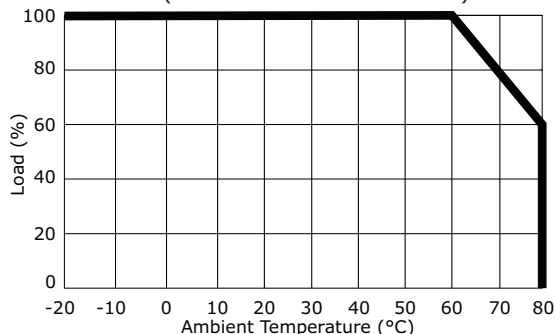


VMS-200-CNF Output Power vs. Ambient Temperature (Natural Convection)

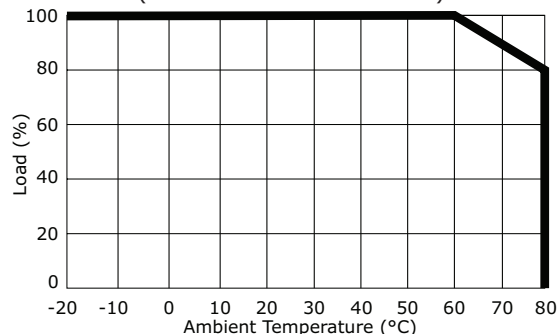


DERATING CURVES (CONTINUED)

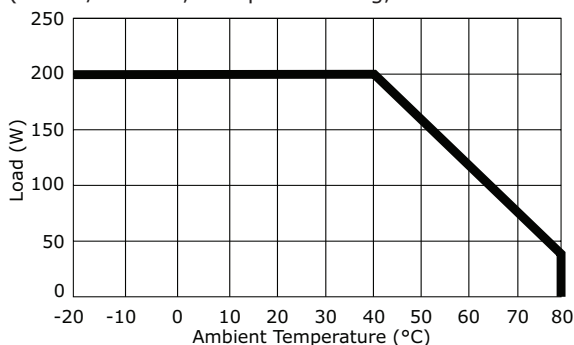
VMS-200 Output Power vs. Ambient Temperature
(200W with 10 CFM air flow)



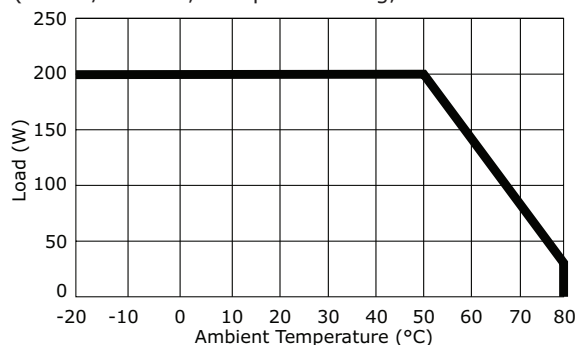
VMS-200-CNF Output Power vs. Ambient Temperature
(200W with 10 CFM air flow)



VMS-200 Output Power vs. Ambient Temperature
(at 115/230 Vac, baseplate cooling, natural convection)

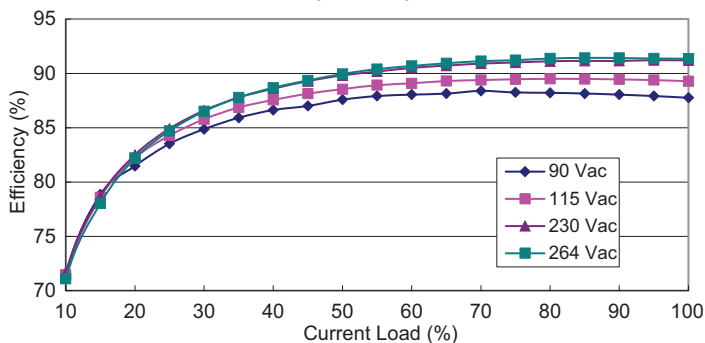


VMS-200-CNF Output Power vs. Ambient Temperature
(at 115/230 Vac, baseplate cooling, natural convection)

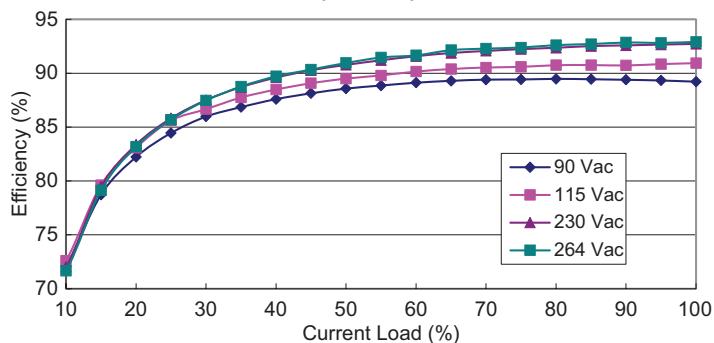


EFFICIENCY CURVES

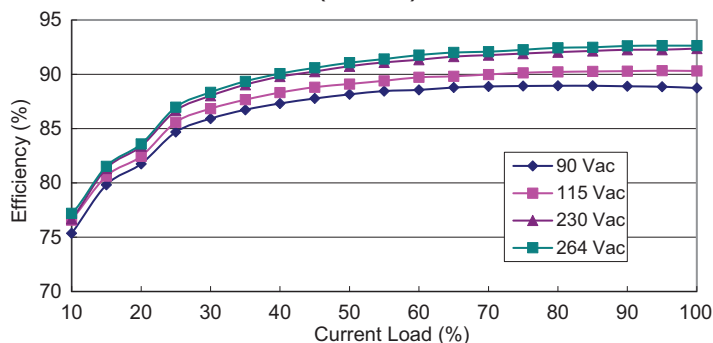
12 Vdc Output Efficiency Curve
(at 25°C)



24 Vdc Output Efficiency Curve
(at 25°C)



48 Vdc Output Efficiency Curve
(at 25°C)



MECHANICAL DRAWING (CONTINUED)

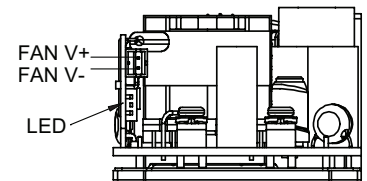
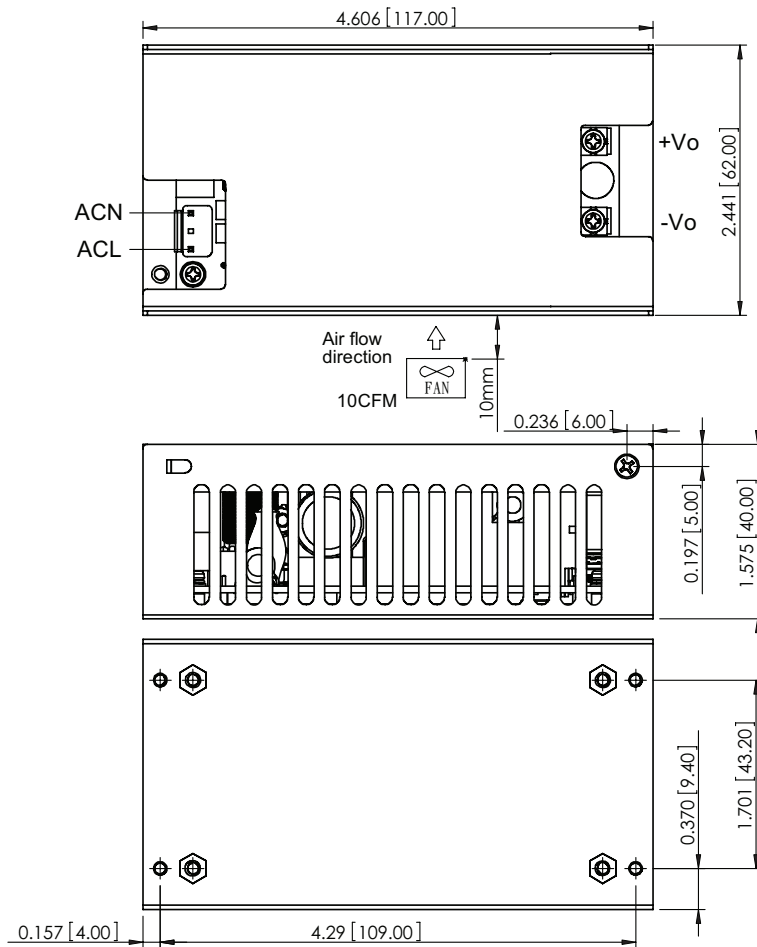
Covered

units: inch [mm]

tolerance: ±0.020 [±0.50]

| CN1 | |
|-----|----------|
| PIN | Function |
| 1 | ACL |
| 2 | - |
| 3 | ACN |

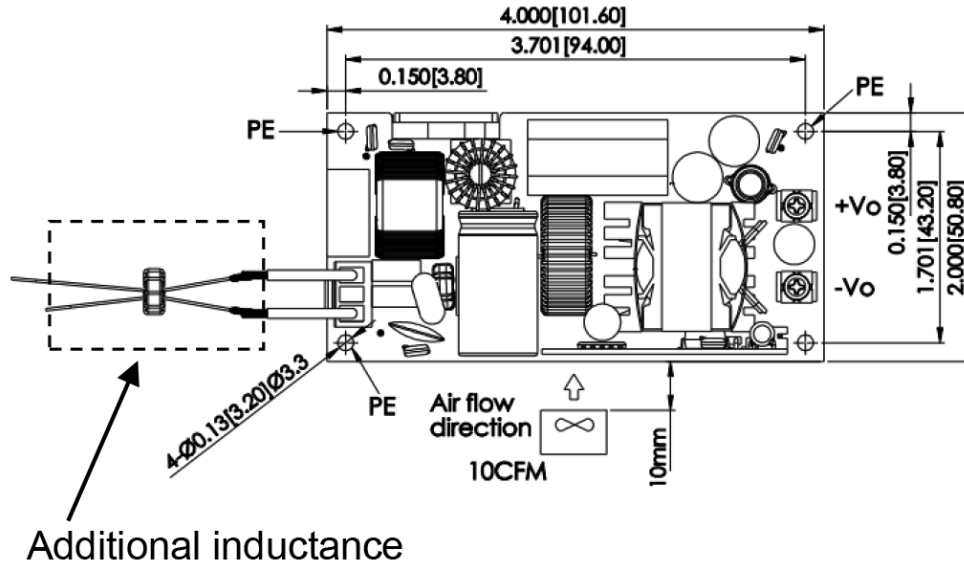
| FAN | |
|-----|----------|
| PIN | Function |
| 1 | FAN V+ |
| 2 | FAN V- |



EMI RECOMMENDATION

To Meet EN 55011 Class B, Class II

VMS-200



VMS-200-CNF

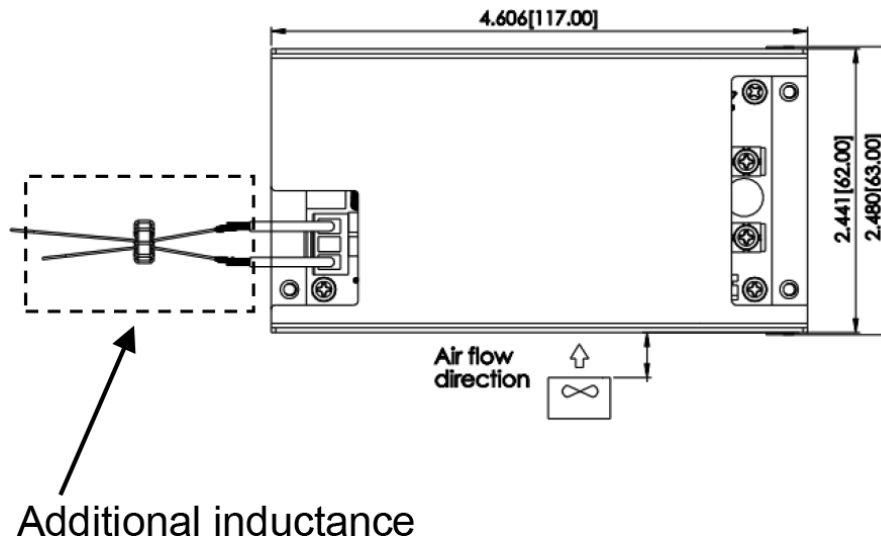


Table 1

| Specification | Inductance | Duplex Winding/ Turns | Manufacturers |
|------------------|------------|--------------------------|---------------|
| T16*10*5C R12 | 1 mH | TEX-E Ø0.65/11T | VAKOS |

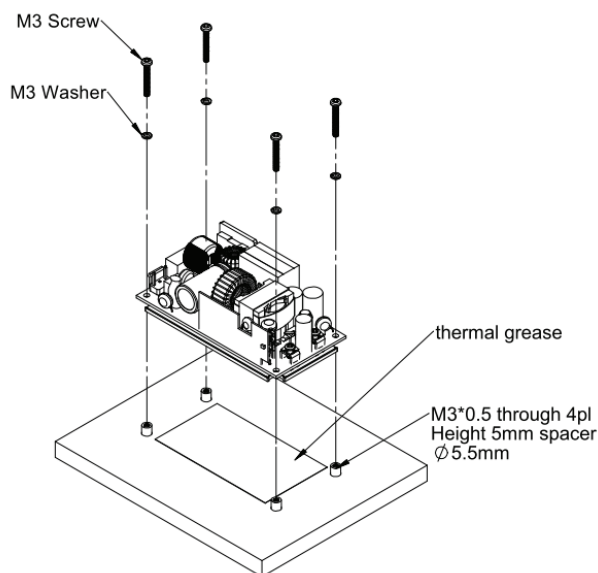
INSTALLATION INSTRUCTIONS

The VMS-200 series has (4) 3.2 mm diameter mounting holes that can be used in (4) types of installations.

Type 1

Mounting from top with spacers (VMS-200 models)

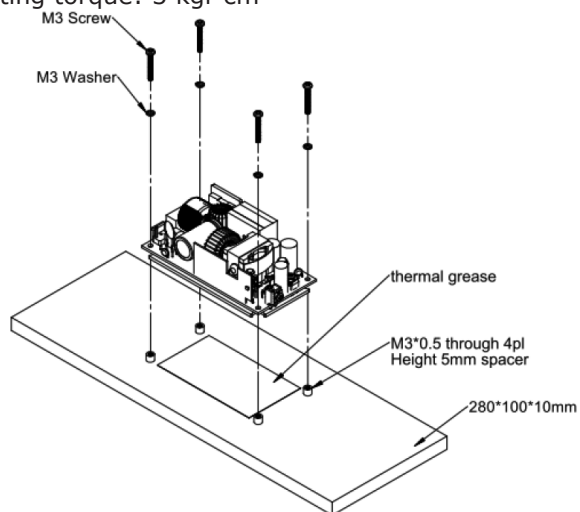
Spacer: 5.5 mm diameter max, 5 mm high minimum
Screw Size: (4) M3X0.5 (head & washer OD not to exceed 6 mm)
Mounting torque: 3 kgf-cm



Type 3 (External Baseplate Cooling)

Mounting from top with spacers (VMS-200 models)

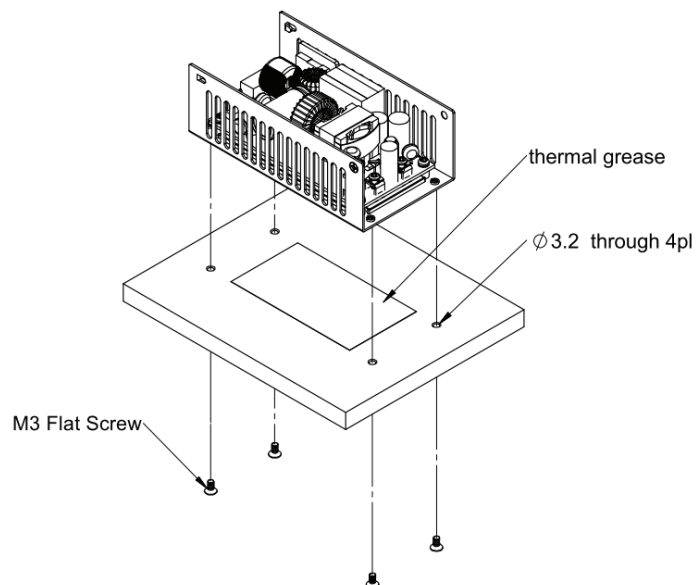
Heat Sink: 280 x 100 x 10 mm
Spacer: 5.5 mm diameter max, 5 mm high minimum
Screw Size: (4) M3X0.5 (head & washer OD not to exceed 6 mm)
Mounting torque: 3 kgf-cm



Type 2

Mounting from bottom (VMS-200-CNF models)

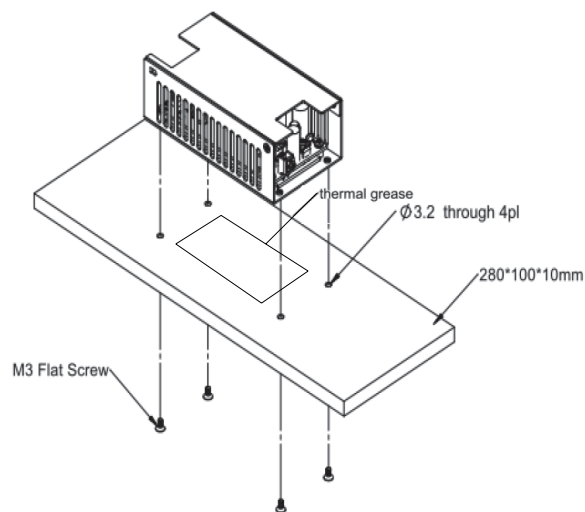
Screw Size: (4) M3X0.5
Mounting torque: 3 kgf-cm



Type 4 (External Baseplate Cooling)

Mounting from bottom (VMS-200-CNF models)

Heat Sink: 280 x 100 x 10 mm
Screw Size: (4) M3X0.5
Mounting torque: 3 kgf-cm



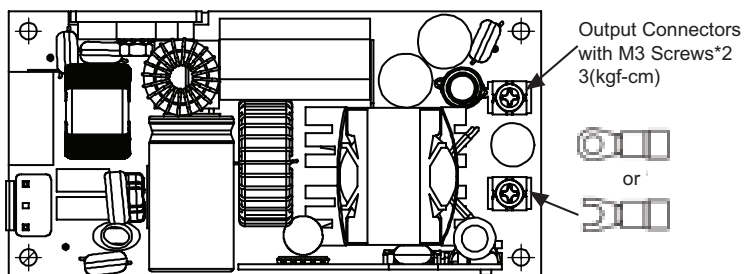
INSTALLATION INSRUCTIONS (CONTINUED)

Output Terminals

Mate with round or Y terminals

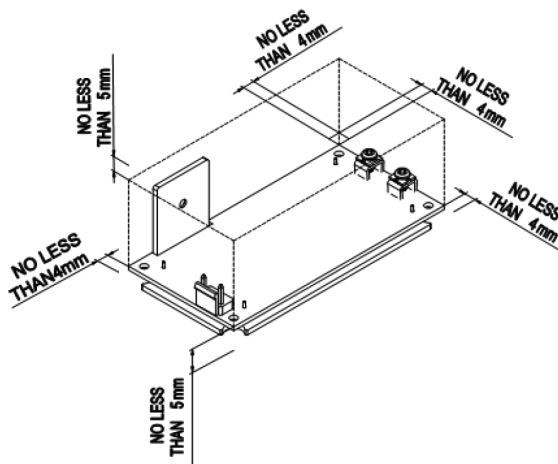
Terminal Size: (2) M3

Torque: 3 kgf-cm



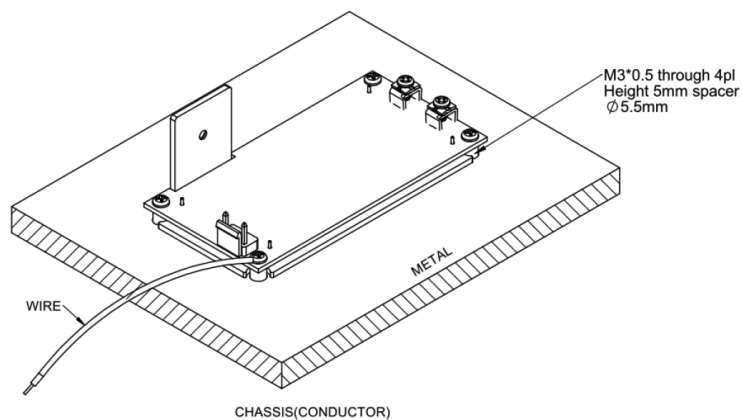
Mounting Clearance

Allow at least 4 mm side clearance and 5 mm height clearance. If clearances aren't met, the isolation and withstand specifications may not be met.



Protective Earth

PE should be connected to the earth (ground) terminal of the apparatus otherwise conducted noise and output noise will increase.



REVISION HISTORY

| rev. | description | date |
|------|-----------------|------------|
| 1.0 | initial release | 12/12/2017 |

The revision history provided is for informational purposes only and is believed to be accurate.



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