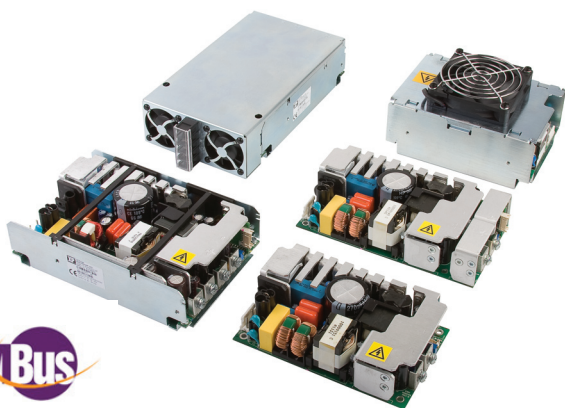


EMH Series



- Single & Dual Output Models
- IT & Medical (BF) Approvals
- 80 V – 275 VAC Operation
- Optional ORing Diode (EMH350D Models)
- Analog & PMBus Signals Options (EMH350)
- 5 V Standby (EMH350)
- 3 Year Warranty

Specification

Input

| | |
|-------------------------|--|
| Input Voltage | • 80-275 VAC, derate output power <90 VAC (see derating curve) |
| Input Frequency | • 47-63 Hz |
| Input Current | • 2.6 / 3.6 A at 115 VAC typical (250 / 350 W) • 1.3 / 1.8 A at 230 VAC typical (250 / 350 W) |
| Inrush Current | • 40 A max at 230 VAC, cold start 25 °C |
| Power Factor | • >0.9 |
| Earth Leakage Current | • 250 µA max, 264 VAC, 60 Hz |
| Patient Leakage Current | • 100 µA max |
| Input Protection | • 10 AF / 250 V internal fuse in line and neutral |

Output

| | |
|----------------------------|--|
| Output Voltage | • 12-48 VDC (see tables) |
| Output Voltage Trim | • ±10% V1 |
| Initial Set Accuracy | • ±1% V1, ±5% V2 |
| Minimum Load | • 100mA minimum load on V1 |
| Start Up Delay | • 1 s typical |
| Start Up Rise Time | • 50 ms |
| Hold Up Time | • 16 ms typical |
| Line Regulation | • ±0.5% maximum |
| Load Regulation | • ±1% V1, ±5% standby |
| Cross Regulation | • Dual output only (see regulation curves) |
| Transient Response | • 4% max. deviation, recovery to within 1% in 500 µs for a 50-75-50% load change |
| Ripple & Noise | • 1% pk-pk, 20 MHz bandwidth |
| Overvoltage Protection | • 115-140% V1 nom, recycle input to reset |
| Overtemperature Protection | • Auto reset |
| Overload Protection | • 110-150%, power limit |
| Short Circuit Protection | • Continuous, approximately constant current |
| Temperature Coefficient | • 0.05% /°C |
| Remote Sense | • Compensates for up to 0.5 V drop |

General

| | |
|-------------------------|--|
| Efficiency | • 87% typical |
| Isolation | • 4000 VAC input to output 2 x MOPP, 1500 VAC input to ground 1 x MOPP, 1500 VAC output to ground 1 x MOPP |
| Switching Frequency | • 62-560 / 71 / 50-130 KHz, PFC / Main / Standby Converter |
| Power Density | • 11.6 / 16.3 / 9.5 W/in ³ (250 / 350 / 350 W Dual) |
| Signals (Option EMH350) | • Power fail, Inhibit, 5V Standby, Current Share, fan speed control and I2C PMBus Options |
| MTBF | • 400 kHrs to MIL-HDBK-217F at 25 °C, GB |

Environmental

| | |
|-----------------------|---|
| Operating Temperature | • 0 °C to +70 °C, derate linearly from +50 °C at 2.5% / °C to 50% load at +70 °C |
| Cooling | • Forced cooled 12 CFM (350 W Dual: 16 CFM) or integral fan. See thermal considerations longform datasheet |
| Operating Humidity | • 95% RH, non-condensing |
| Storage Temperature | • -40 °C to +85 °C |
| Operating Altitude | • 3048 m |
| Shock | • ±3 x 30g shocks in each plane, total 18 shocks. 30g = 11 ms (±0.5 ms), half sine, conforms to EN60068-2-27 & EN60068-2-47 |
| Vibration | • Single axis 10 - 500 Hz at 2g sweep and endurance at resonance in all 3 planes. Conforms to EN60068-2-6 |

EMC & Safety

| | |
|----------------------|--|
| Emissions | • EN55011/32 level B conducted EN55011/32 level A radiated (See longform datasheet and/or EMC report) |
| Harmonic Currents | • EN61000-3-2, class A |
| Voltage Flicker | • EN61000-3-3 |
| Radiated Immunity | • EN61000-4-3, level 3 Perf Criteria A |
| EFT/Burst | • EN61000-4-4, level 3 Perf Criteria A |
| Surge | • EN61000-4-5, installation class 3, Perf Criteria A |
| Conducted Immunity | • EN61000-4-6, level 3, Perf Criteria A |
| Dips & Interruptions | • EN61000-4-11, 30% 10 ms, 60% 100 ms, 100% 5000 ms, Perf Criteria A, B, B, EN60601-1-2, 30% 500 ms, 60% 100 ms, 100% 10 ms, 100% 5000 ms, Perf Criteria A, A, A, B - 230 VAC. Consult longform datasheet for 115 V operation. |
| Safety Approvals | • EN60601-1, ANSI/AAMI ES60601-1, CSA22.2 No.60601-1 per cUL BF Rated, Including Risk Management, EN60950, UL60950, IEC62368-1:2014, UL62368-1:2014, CSA C22.2 No62368-1-14, EN62368-1:2014+A11:2017, CE & UKCA meets all applicable directives & legislation. |

Models and Ratings - Single Outputs

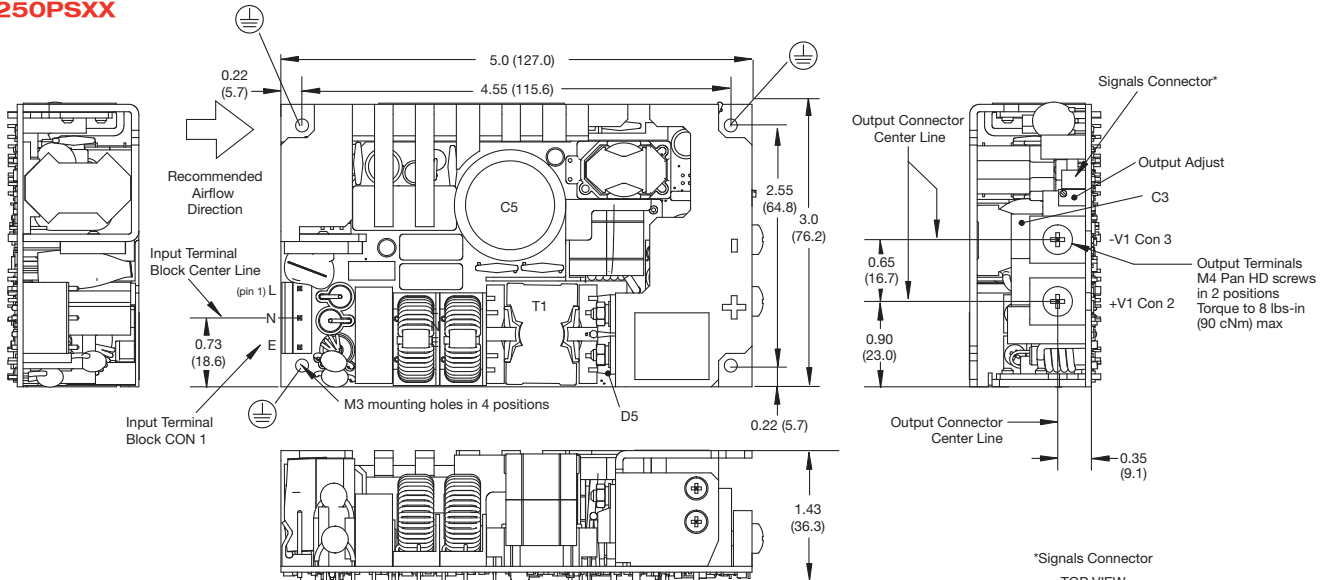
| Output Voltage V1 | Output Current V1 | Fan Supply V3 | Output Power | Model Number ⁽¹⁾ |
|-------------------|-------------------|---------------|--------------|-----------------------------|
| 12 V | 21.0 A | 12 V/0.6 A | 252 W | EMH250PS12 |
| 18 V | 14.0 A | 12 V/0.6 A | 252 W | EMH250PS18 |
| 24 V | 10.5 A | 12 V/0.6 A | 252 W | EMH250PS24 |
| 48 V | 5.2 A | 12 V/0.6 A | 250 W | EMH250PS48 |

Notes

1. The EMH250 is available with a top mounted fan cover option. Add suffix '-TF' to model number e.g. EMH250PS12-TF. See mechanical drawing later in this datasheet.

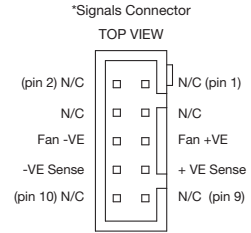
Mechanical Details

EMH250PSXX



| Input Connector CON 1 TYCO part # 640445-5 | |
|---|---------|
| Pin 1 | Line |
| Pin 3 | Neutral |
| Pin 5 | Earth |

| Output Connector | |
|------------------|-----|
| Con 2 | +V1 |
| Con 3 | -V1 |



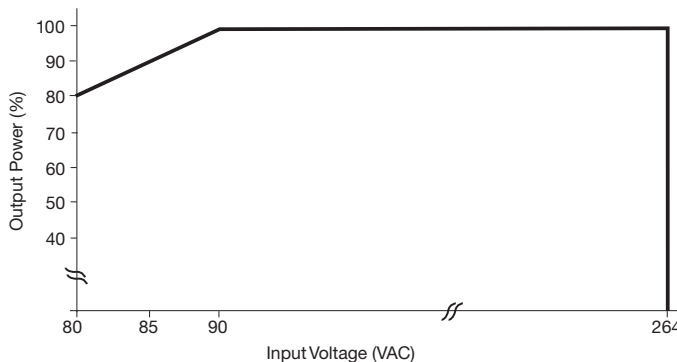
Signals Connector 10 way 2 mm pitch p/n JST B10B-PHDDR Mating Half - p/n JST PHDR-10VS, Contact- 26-22 AWG p/n JST SPHD-001T-P0.5

Pins 2 & 4 removed
Mates with Tyco SL-156 Series Connector

Notes

- Dimensions shown in inches (mm). Tolerance: ± 0.02 (± 0.5)
- Weight: 0.90 lb (410 g).
- Mounting holes marked with \oplus must be connected to safety earth for optimum EMC performance.

Derating Curve - All EMH250 & EMH350 Models



Models and Ratings - Single Outputs

EMH350 ^{XP}

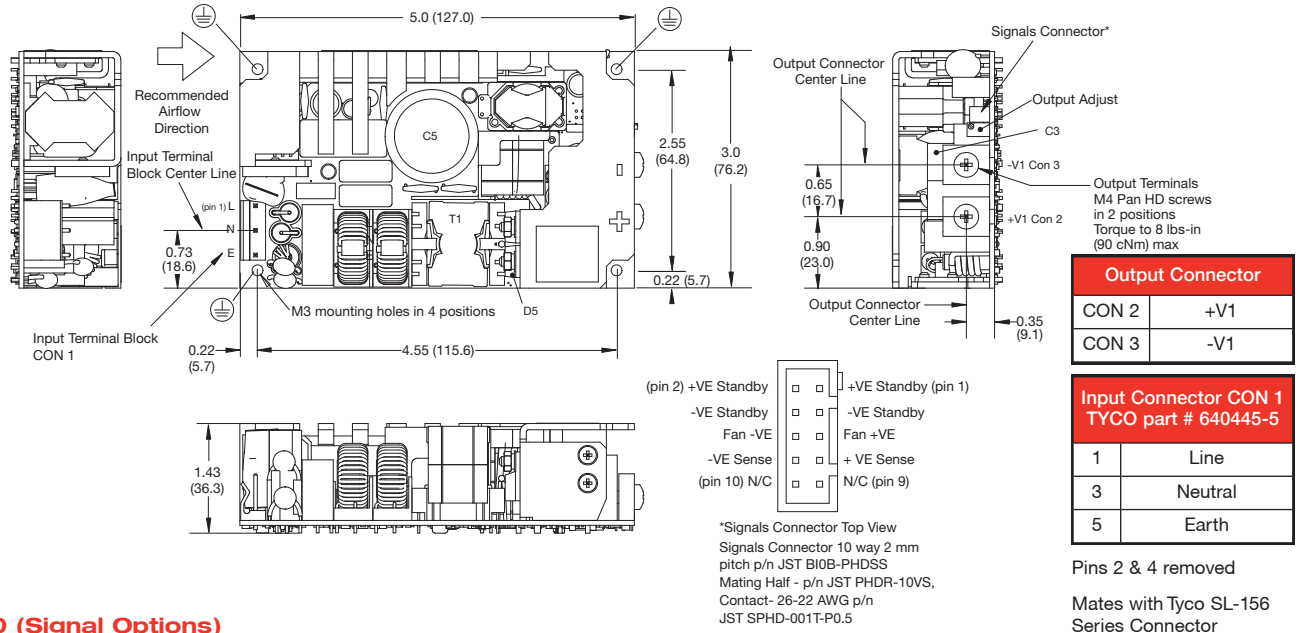
| Output Voltage V1 | Output Current V1 | Standby Supply | Fan Supply V3 | Output Power | Model Number ⁽¹⁾ |
|-------------------|-------------------|----------------|---------------|--------------|-----------------------------|
| 12 V | 29.2 A | 5.0 V / 2.0 A | 12 V/0.6 A | 354 W | EMH350PS12 |
| 18 V | 19.5 A | 5.0 V / 2.0 A | 12 V/0.6 A | 354 W | EMH350PS18 |
| 24 V | 14.6 A | 5.0 V / 2.0 A | 12 V/0.6 A | 355 W | EMH350PS24 |
| 48 V | 7.3 A | 5.0 V / 2.0 A | 12 V/0.6 A | 354 W | EMH350PS48 |

Notes

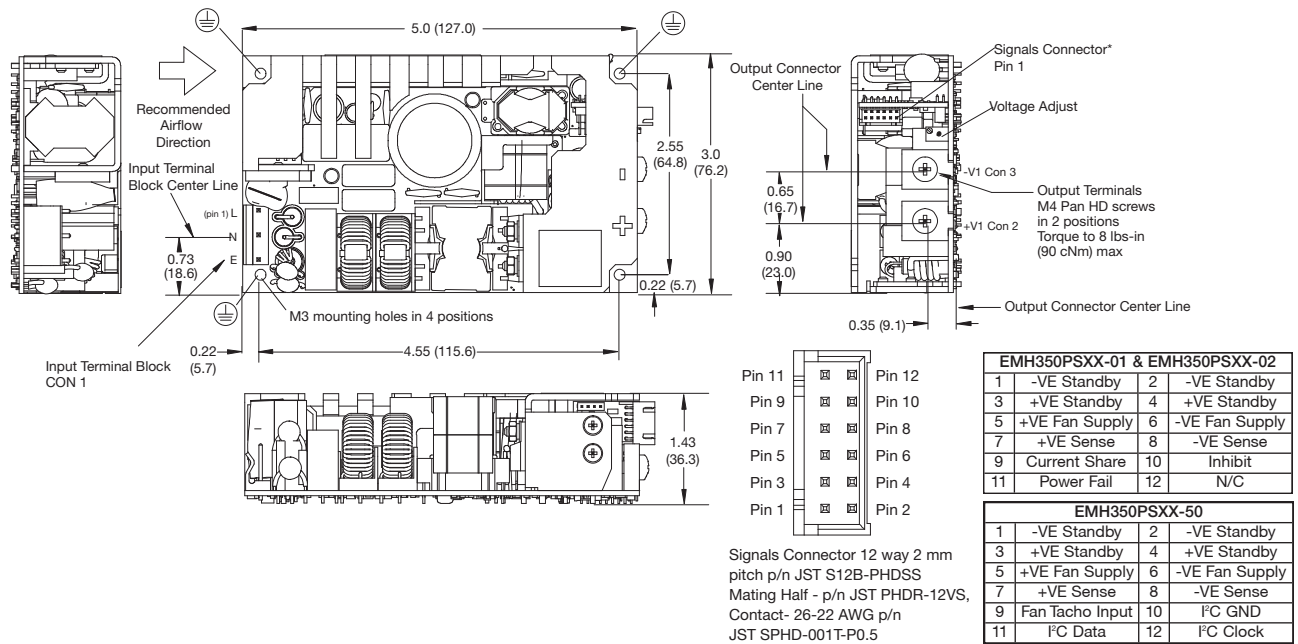
1. The EMH350 is available with various analog, digital signal and cover options. See compatibility table and mechanical drawing later in this datasheet.

Mechanical Details

EMH350



EMH350 (Signal Options)



Notes

- Dimensions shown in inches (mm). Tolerance: ±0.02 (±0.5)
- Weight: 0.90 lb (410 g).

- Mounting holes marked with ⊕ must be connected to safety earth for optimum EMC performance.

Models and Ratings - Single Outputs

EMH350D ^{XP}

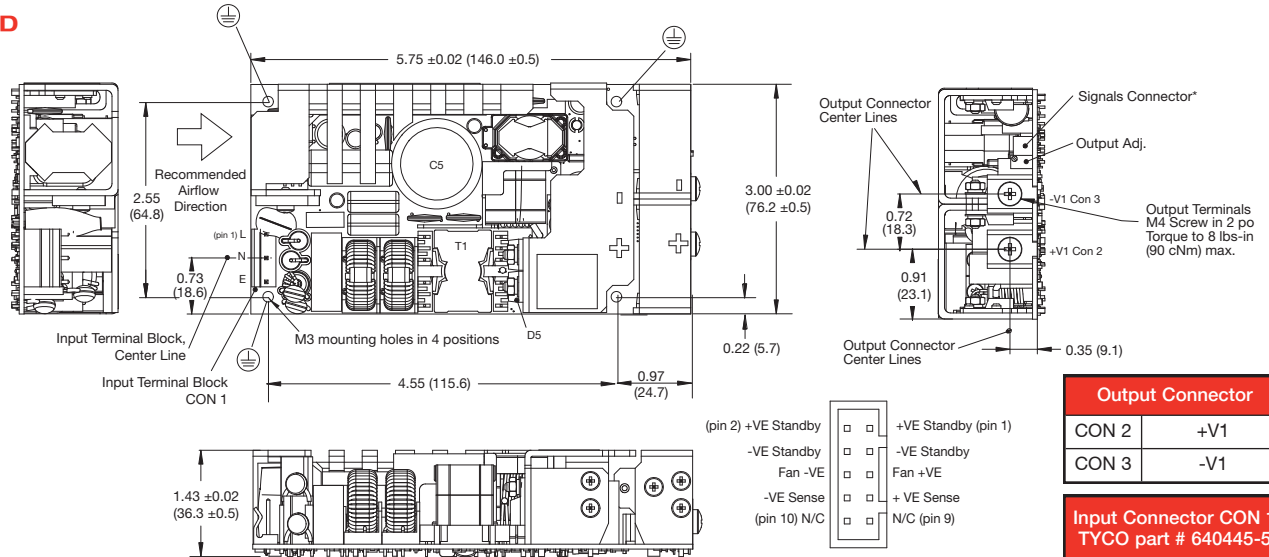
| Output Voltage V1 | Output Current V1 | Standby Supply | Fan Supply V3 | Output Power | Model Number ⁽¹⁾ |
|-------------------|-------------------|----------------|---------------|--------------|-----------------------------|
| 12 V | 29.2 A | 5.0V / 2.0 A | 12V/0.6 A | 354 W | EMH350PS12D |
| 18 V | 19.5 A | 5.0V / 2.0 A | 12V/0.6 A | 354 W | EMH350PS18D |
| 24 V | 14.6 A | 5.0V / 2.0 A | 12V/0.6 A | 355 W | EMH350PS24D |
| 48 V | 7.3 A | 5.0V / 2.0 A | 12V/0.6 A | 354 W | EMH350PS48D |

Notes

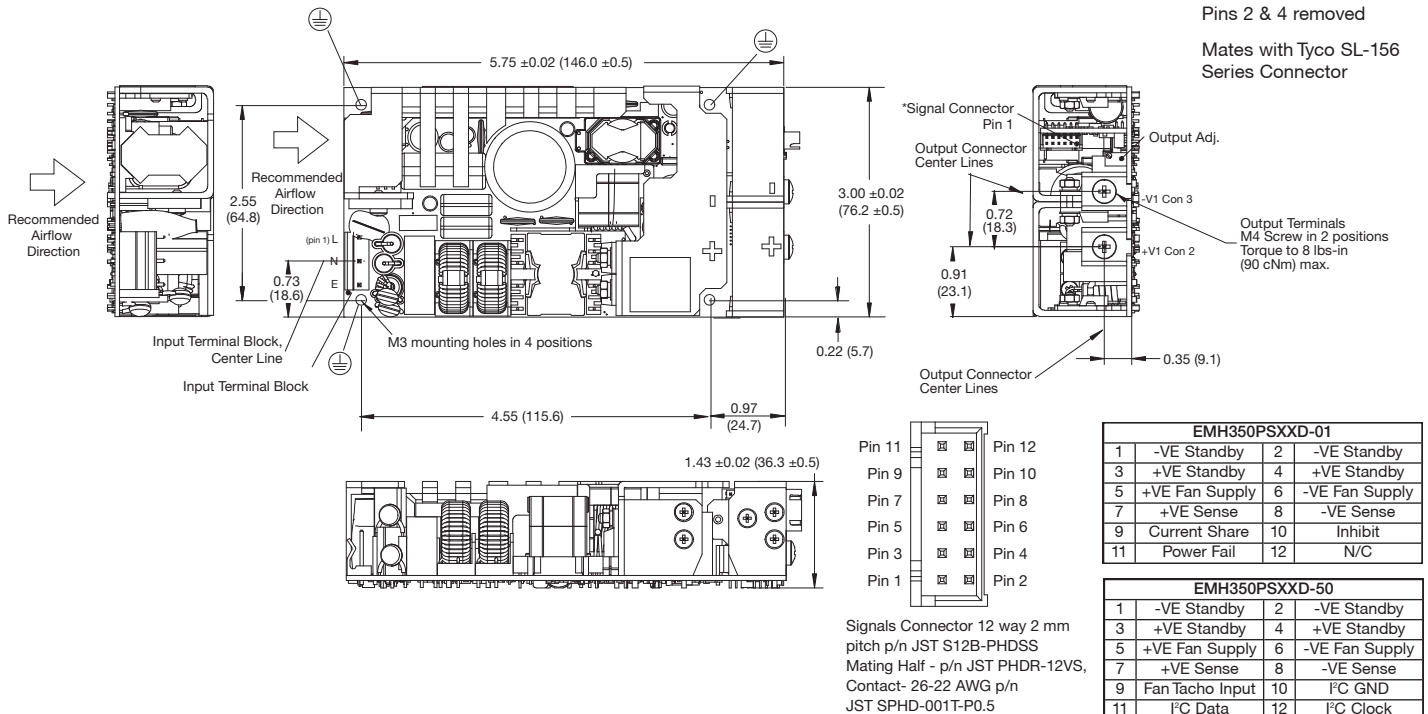
1. The EMH350D models are fitted with an integral ORing diode and are also available with various analog and digital signal options. See compatibility table and mechanical drawing later in this datasheet.

Mechanical Details

EMH350D



EMH350D (Signal Options)



Notes

- Dimensions shown in inches (mm). Tolerance: ±0.02 (±0.5)
- Weight: 1.0 lbs (450 g).
- Mounting holes marked with \oplus must be connected to safety earth for optimum EMC performance.

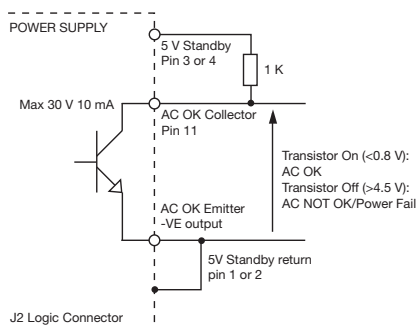
Signals Description & Compatibility

| Signal & Cover Options | | | | | | | | | | |
|------------------------|--------------|------------|-------------|------------------|--------------------|---------------|----------------------------|-------|------------------------|------------------------------|
| Model | Functions | | | | | | | | Cover Compatibility | |
| | Remote Sense | Fan Supply | 5 V Standby | AC OK/Power Fail | Inhibit V1 & V Fan | Current Share | Variable Speed Fan Control | PMBus | Standard Top Fan (-TF) | Variable Speed Top Fan (-VF) |
| EMH250PSXX | ✓ | ✓ | | | | | | | ✓ | |
| EMH350PSXX | ✓ | ✓ | ✓ | | | | | | ✓ | |
| EMH350PSXX-01 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | |
| EMH350PSXX-02 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ |
| EMH350PSXX-50 | ✓ | ✓ | ✓ | | | | | ✓ | ✓ | |
| EMH350PSXXD | ✓ | ✓ | ✓ | | | | | | | |
| EMH350PSXXD-01 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| EMH350PSXXD-50 | ✓ | ✓ | ✓ | | | | | ✓ | | |

| Characteristic | Notes & Conditions |
|------------------------------|--|
| Signals & Control | |
| Remote Sense | Compensates for 0.5 V total voltage drop |
| 12 V Fan Supply (V3) | 12 V/0.6 A supply, present when AC supplied, inhibit turns fan supply off. |
| 5V Standby | 5 V/2 A supply, always present when AC supplied |
| AC OK/Power Fail | AC OK is an open collector transistor, referenced to negative output, providing a minimum of 3 ms warning of loss of output regulation. The transistor is normally on when AC is healthy. See fig. 1. |
| Inhibit | The inhibit high pin should be pulled below 0.4 V to switch V1 & V Fan (V3) off. Open circuit or 2-8 V maximum to switch the output on. See fig. 2. |
| Current Share | Connecting pin 9 (-01 & -02 models) of like voltage units (3 maximum) will force the current to share between the outputs. Units share current within 10% of each other at full load. See fig. 3. |
| Variable Speed Fan Control | When used in conjunction with -VF fan cover, varies the speed of the fan depending on temperature of the unit. See longform datasheet for details. |
| I2C/PMBus | The I2C PMBus compatible interface can be used for monitoring the unit output voltage, current, internal temperature, external 3 wire TACHO fan and run time. Adjustment of the output voltage and current limit set point and identification of the unit model number and serial number are also possible. See longform datasheet for full details. |

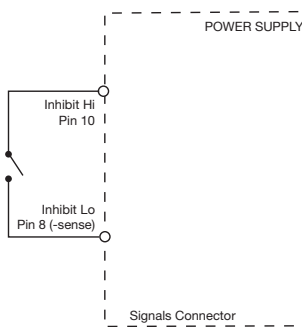
AC OK/Power Fail

Figure 1.



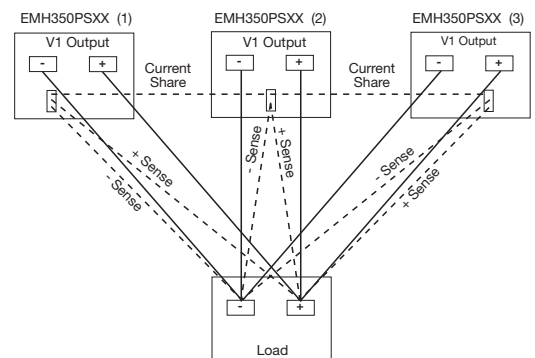
Inhibit

Figure 2.

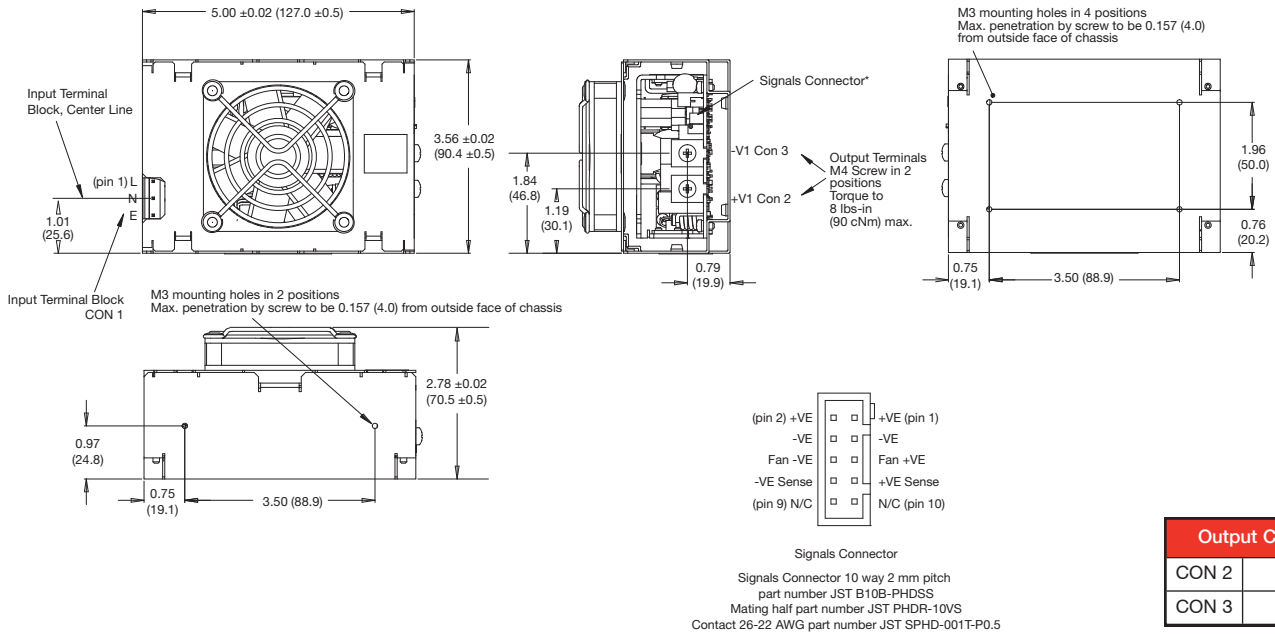


Parallel Load & Current Share

Figure 3.



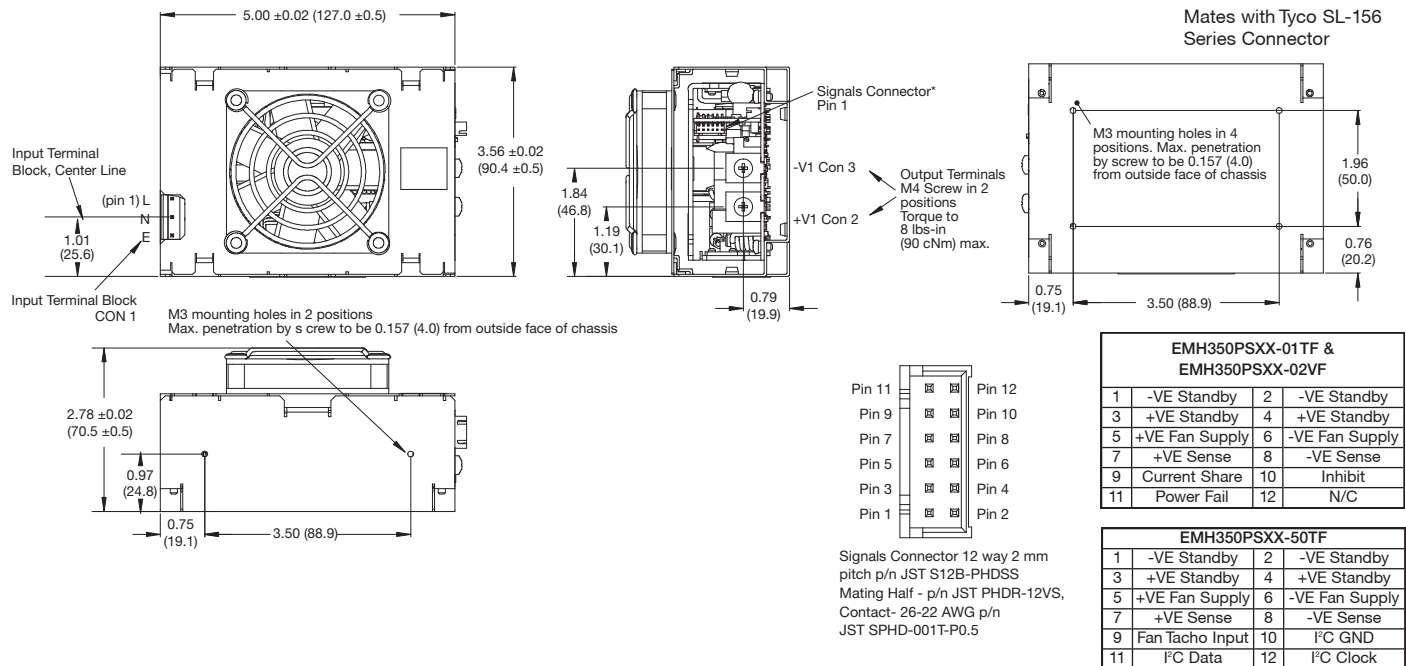
Top Fan - EMH250-TF & EMH350-TF



| Output Connector | |
|------------------|-----|
| CON 2 | +V1 |
| CON 3 | -V1 |

| Input Connector CON 1 TYCO part # 640445-5 | |
|---|---------|
| 1 | Line |
| 3 | Neutral |
| 5 | Earth |

Top Fan with Signals Options - EMH350-01TF, EMH350-50TF & EMH350-02VF



Pins 2 & 4 removed
Mates with Tyco SL-156 Series Connector

| EMH350PSXX-01TF & EMH350PSXX-02VF | | | |
|-----------------------------------|----------------|----|----------------|
| 1 | -VE Standby | 2 | -VE Standby |
| 3 | +VE Standby | 4 | +VE Standby |
| 5 | +VE Fan Supply | 6 | -VE Fan Supply |
| 7 | +VE Sense | 8 | -VE Sense |
| 9 | Current Share | 10 | Inhibit |
| 11 | Power Fail | 12 | N/C |

| EMH350PSXX-50TF | | | |
|-----------------|-----------------------|----|------------------------|
| 1 | -VE Standby | 2 | -VE Standby |
| 3 | +VE Standby | 4 | +VE Standby |
| 5 | +VE Fan Supply | 6 | -VE Fan Supply |
| 7 | +VE Sense | 8 | -VE Sense |
| 9 | Fan Tacho Input | 10 | I ² C GND |
| 11 | I ² C Data | 12 | I ² C Clock |

Notes

1. Dimensions shown in inches (mm). Tolerance: ±0.02 (±0.5)

2. Weight: 1.67 lbs (760 g).

Models and Ratings - Dual Outputs

EMH350 ^{XP}

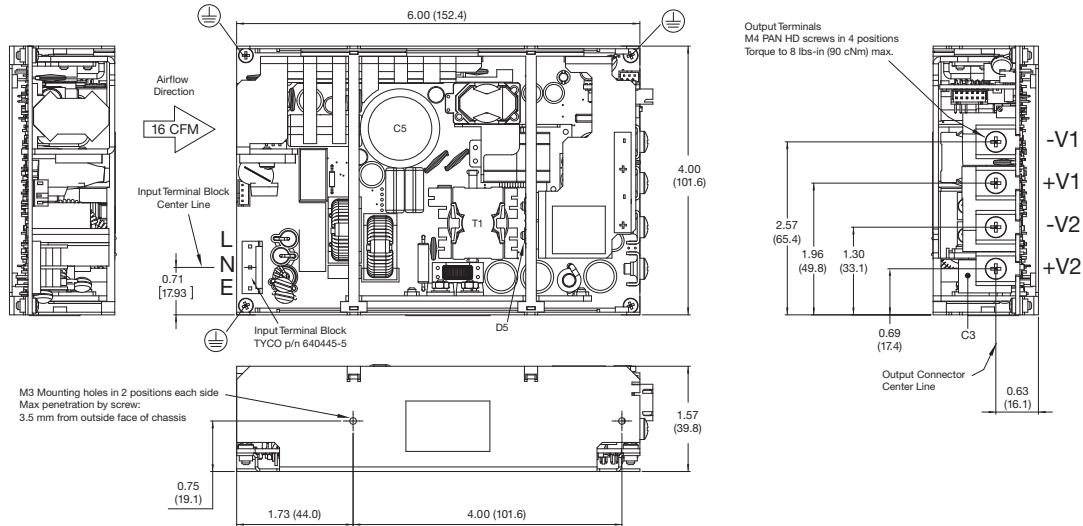
| Output Voltage V1 | Output Current V1 | Output Voltage V2 | Output Current V2 | Standby Supply | Fan Supply V3 | Output Power | Model Number ⁽¹⁾ |
|-------------------|-------------------|-------------------|-------------------|----------------|---------------|--------------|-----------------------------|
| 12 V | 16.5 A | 24 V | 8.3 A | 5.0 V/2.0 A | 12 V/0.6 A | 354 W | EMH350PD21-U |
| 24 V | 8.3 A | 48 V | 4.2 A | 5.0 V/2.0 A | 12 V/0.6 A | 354 W | EMH350PD24-U |

Notes

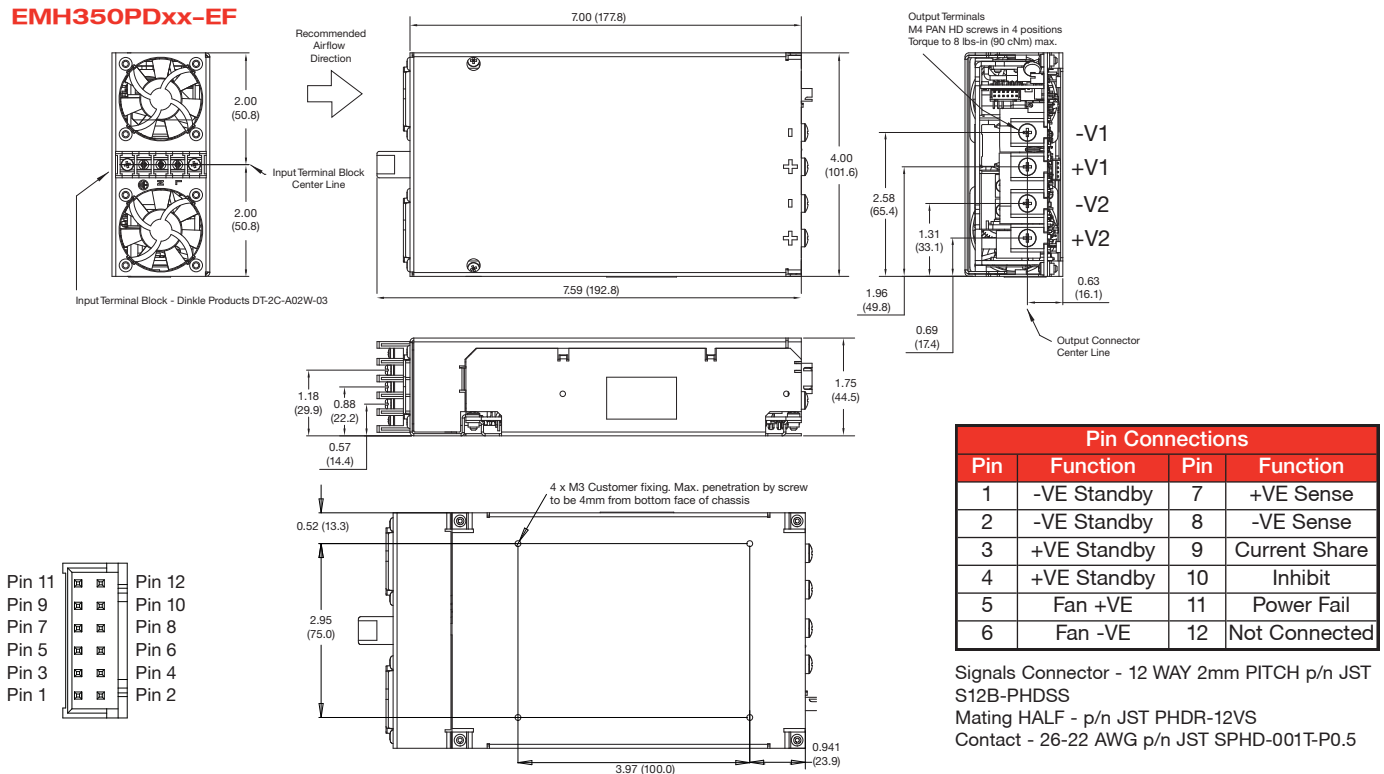
- For integral end fan version, replace '-U' in model number with '-EF'
- Output voltages to 120 VDC possible with series output connection contact sales.

Mechanical Details

EMH350PDxx-U



EMH350PDxx-EF



Notes

- Dimensions shown in inches (mm). Tolerance: ±0.02 (±0.5)
- Weight: 0.90 lb (410 g).
- Mounting holes marked with \oplus must be connected to safety earth for optimum EMC performance.

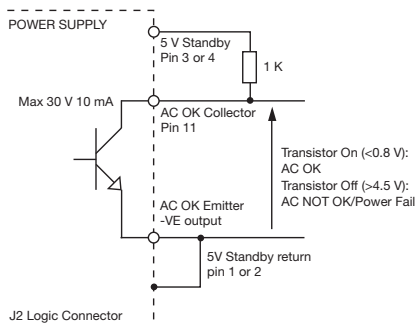
Signals Description & Compatibility

| Model | Functions | | | | | | | PMBus |
|---------------|--------------|------------|-------------|-------------------|--------------------|---------------|---|---------------|
| | Remote Sense | Fan Supply | 5 V Standby | AC OK/ Power Fail | Inhibit V1 & V Fan | Current Share | | |
| EMH350PDxx-U | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Contact Sales |
| EMH350PDxx-EF | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |

| Characteristic | Notes & Conditions |
|------------------------------|---|
| Signals & Control | |
| Remote Sense | Compensates for 0.5 V total voltage drop |
| 12 V Fan Supply (V3) | 12 V/0.6 A supply, present when AC supplied, inhibit turns fan supply off. |
| 5V Standby | 5V/2 A supply, always present when AC supplied |
| AC OK/Power Fail | AC OK is an open collector transistor, referenced to negative sense, providing a minimum of 3 ms warning of loss of output regulation. The transistor is normally off when AC is healthy. See fig. 4. |
| Inhibit | The inhibit high pin should be pulled below 0.4 V to switch V1, V2 & V Fan (V3) off. Open circuit or 2-8 V maximum to switch the output on. See fig. 5. |
| Current Share | Connecting pin 9 (-01 & -02 models) of like voltage units (3 maximum) will force the current to share between the outputs. Units share current within 10% of each other at full load. See fig. 6. |

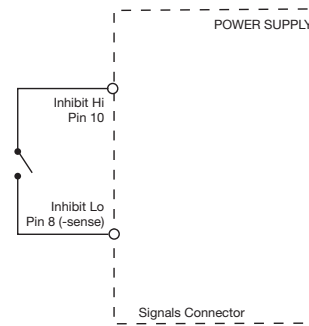
AC OK/Power Fail

Figure 4.



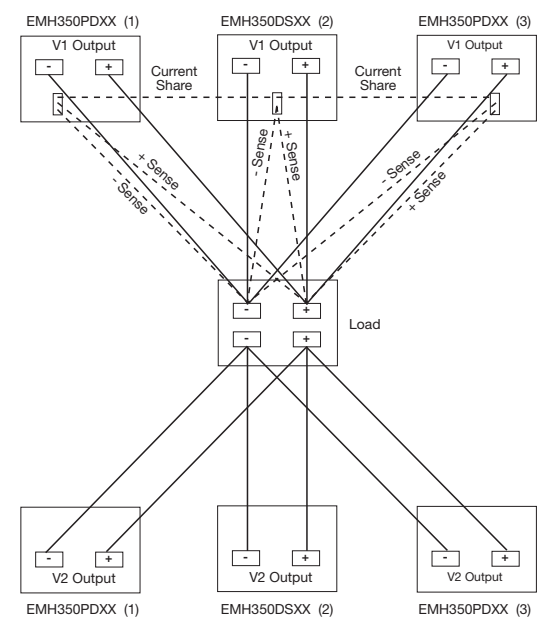
Inhibit

Figure 5.



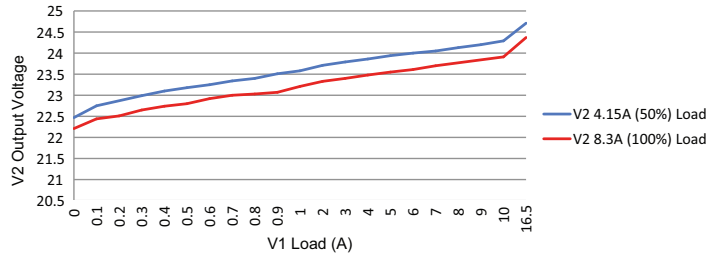
Parallel Load & Current Share

Figure 6.

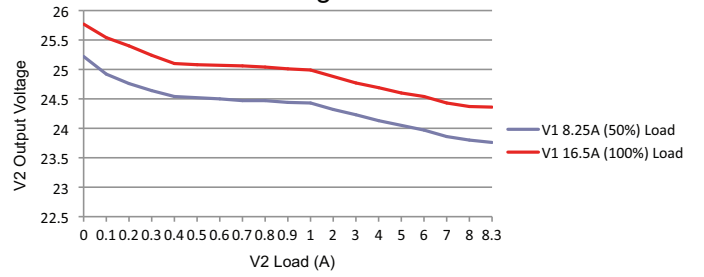


EMH350PD21

V2 Cross Regulation

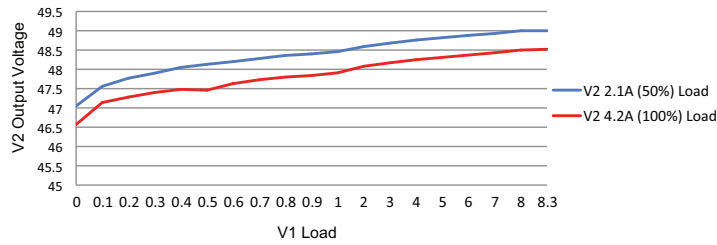


V2 Load Regulation



EMH350PD24

V2 Cross Regulation



V2 Load Regulation

