

KHEA/KHNA30F

KH A 30 F - -

① ② ③ ④ ⑤ ⑥



Example recommended EMI/EMC filter
NAC-04-472-D



High voltage pulse noise type : NAP series
Low leakage current type : NAM series
* A higher current rating EMI/EMC filter may be recommended in view of the other devices that could be connected in parallel with the power supply.

- ① Series name
KHE : Euro style I/O terminals
KHN : Barrier blocks style I/O terminals
- ② Single output
- ③ Output wattage
- ④ Universal input
- ⑤ Output voltage
- ⑥ Option
C : with Coating

*Make sure necessary tests will be carried out on your end equipment with the power supply installed in accordance with any required EMC/EMI regulations.

| MODEL | KHEA/KHNA30F-5 | KHEA/KHNA30F-12 | KHEA/KHNA30F-24 |
|-----------------------|----------------|-----------------|-----------------|
| MAX OUTPUT WATTAGE[W] | 25 | 27.6 | 31.2 |
| DC OUTPUT | 5V 5A | 12V 2.3A | 24V 1.3A |

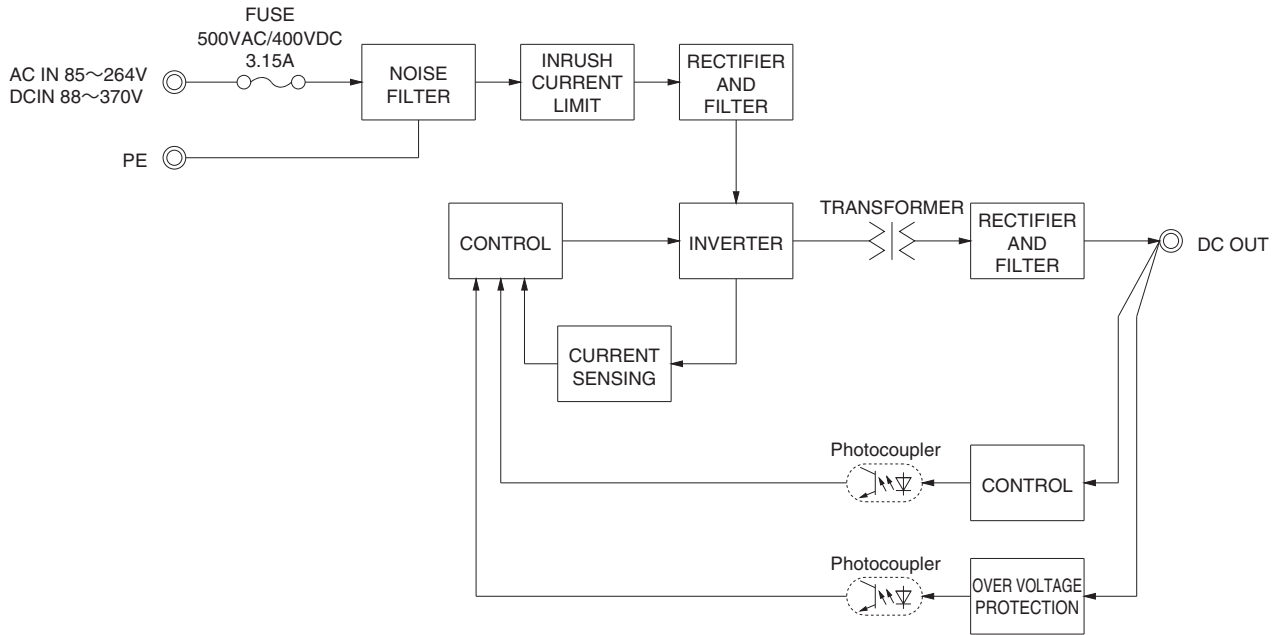
SPECIFICATIONS

| | MODEL | KHEA/KHNA30F-5 | KHEA/KHNA30F-12 | KHEA/KHNA30F-24 | |
|------------------------------------|---|---|--|-----------------|-----------|
| INPUT | VOLTAGE[V] | AC85 - 264 1 φ (Output derating is required) or DC88 - 370 *11 | | | |
| | CURRENT[A] | ACIN 115V | 0.45typ | 0.50typ | 0.55typ |
| | | ACIN 230V | 0.30typ | 0.30typ | 0.35typ |
| | FREQUENCY[Hz] | 50 / 60 (45 - 440) or DC | | | |
| | EFFICIENCY[%] | ACIN 115V | 84.0typ | 87.0typ | 88.5typ |
| | | ACIN 230V | 85.5typ | 88.5typ | 89.5typ |
| INRUSH CURRENT[A] | ACIN 115V | 18typ (Io=100%) (at cold start Ta=25°C) | | | |
| | *1 ACIN 230V | 35typ (Io=100%) (at cold start Ta=25°C) | | | |
| LEAKAGE CURRENT[ma] | 0.45 / 0.75max (ACIN 100V / 240V 60Hz, Io=100%, According to IEC60950-1 and DEN-AN) | | | | |
| OUTPUT | VOLTAGE[V] | 5 | 12 | 24 | |
| | CURRENT[A] | 5.0 | 2.3 | 1.3 | |
| | PEAK CURRENT[A] | - | - | - | |
| | LINE REGULATION[mV] *2 | 20max | 48max | 96max | |
| | LOAD REGULATION[mV] *2 | 80max | 100max | 150max | |
| | RIPPLE[mVp-p] *3 | 0 to +70°C | 150max | 150max | 150max |
| | | -20 - 0°C | 300max | 300max | 300max |
| | | Io=0 - 30% | 300max *4 | 300max *4 | 300max *4 |
| | RIPPLE NOISE[mVp-p] *3 | 0 to +70°C | 180max | 180max | 180max |
| | | -20 - 0°C | 360max | 360max | 360max |
| | | Io=0 - 30% | 360max *4 | 360max *4 | 360max *4 |
| | TEMPERATURE REGULATION[mV] | 0 to +70°C | 50max | 120max | 240max |
| | | -20 to +70°C | 60max | 150max | 290max |
| | DRIFT[mV] *5 | 20max | 48max | 96max | |
| START-UP TIME[ms] | 200typ (ACIN 115V, Io=100%) | | | | |
| HOLD-UP TIME[ms] | 20typ (ACIN 115V, Io=100%) | | | | |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 4.50 to 5.50 | 10.80 to 13.20 | 22.50 to 28.50 | | |
| OUTPUT VOLTAGE SETTING[V] | 5.00 to 5.15 | 12.00 to 12.48 | 24.00 to 24.96 | | |
| PROTECTION CIRCUIT AND OTHERS | OVERCURRENT PROTECTION | Works over 105% of rating and recovers automatically *10 | | | |
| | OVERVOLTAGE PROTECTION[V] | 6.30 to 7.60 | 13.80 to 16.80 | 30.00 to 36.00 | |
| | DC_OK LAMP | LED (Green) | | | |
| ISOLATION | INPUT-OUTPUT | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) | | | |
| | INPUT-PE | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) | | | |
| | OUTPUT-PE | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature) | | | |
| ENVIRONMENT | OPERATING TEMP., HUMID. AND ALTITUDE | -20 to +70°C, 20 - 90%RH (Non condensing), Type tested for -40°C start-up (Derating is required) | | | |
| | STORAGE TEMP., HUMID. AND ALTITUDE | -30 to +85°C, 20 - 90%RH (Non condensing) | | | |
| | VIBRATION *8 | 10 - 55Hz, 19.6m/s ² (2G), 3minutes period, 60 minutes along Z axis (Non operating, mounted on DIN Rail) | | | |
| | IMPACT | 196.1m/s ² (20G), 11ms, once each X, Y and Z axis (Packing state) | | | |
| SAFETY AND NOISE REGULATIONS | AGENCY APPROVALS | AC input | UL60950-1, C-UL (CSA60950-1), EN60950-1, UL508 (NEC Class2 per UL1310), ANSI/ISA12.12.01, ATEX, Complies with DEN-AN * | | |
| | | DC input | UL60950-1, C-UL (CSA60950-1), EN60950-1 | | |
| | CONDUCTED NOISE | Complies with FCC-B, VCCI-B, CISPR22-B, EN55011-B, EN55022-B | | | |
| | HARMONIC ATTENUATOR | Complies with IEC61000-3-2 (Class A) *6 (Not built-in to active filter) *9 | | | |
| OTHERS | CASE SIZE *7 | 22.5 × 75 × 90mm (W × H × D) [0.89 × 2.95 × 3.54 inches] | | | |
| | WEIGHT | 165g max | | | |
| | COOLING METHOD | Convection | | | |

*1 The value is primary surge. The current of input surge to a built-in EMI/EMC Filter(0.2ms or less)is excluded.
 *2 Please contact us about dynamic load and input response.
 *3 This is the value that measured on measuring board with capacitor of 22μF and 0.1μF at 150mm from output terminal.
 Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103). Please refer to the instruction manual 2.7.
 Ripple and ripple noise spec is change at Io=0 to 30% by burst operation.
 *4 In case of operating under 0°C ambient temperature, the value is two times of specification at 0 to 30% load factor.
 *5 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.

*6 Please contact us about another class.
 *7 Case size contains neither the umbo.
 *8 Only as standard mounting orientation (A). Refer to the instruction manual 5.1.
 If install other than standard mounting orientation (A), please fix the power supply for withstand the vibration and impact.
 *9 When two or more units are operating it may not comply with the IEC61000-3-2.
 *10 If the overcurrent protection circuit operates continuously, the output voltage shut down. Refer to the instruction manual 2.3.
 *11 Under low DC input voltage below DC110V, the temperature derating -1°C/V or the output power derating -1%/V are required.
 * To meet the specifications. Do not operate over-loaded condition.
 * A sound may occur from power supply at light or peak loading.

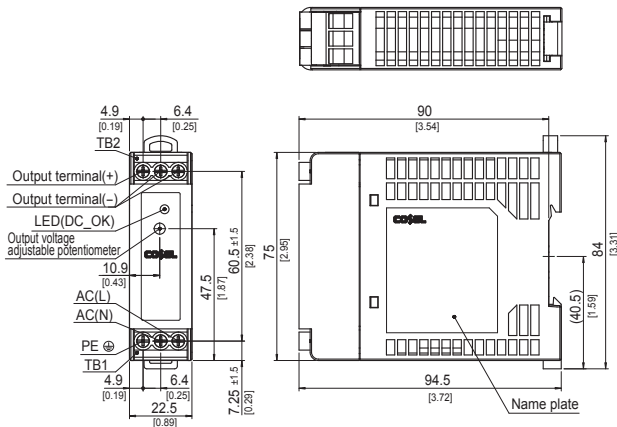
Block diagram



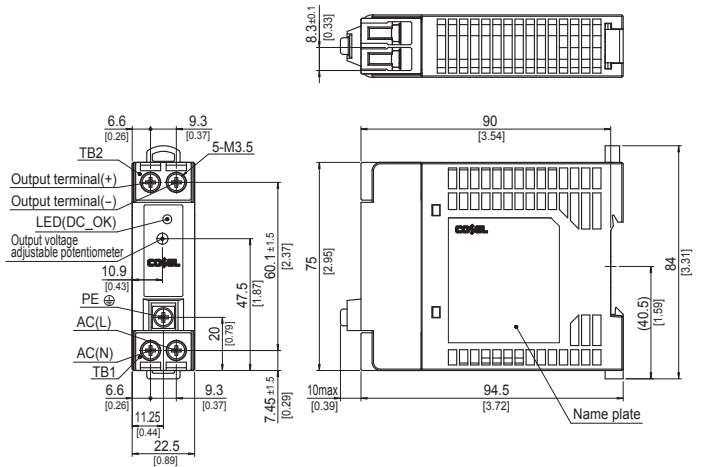
External view

<KHEA30F(Euro Style I/O Terminals)>

<KHNA30F(Barrier Blocks Style I/O Terminals)>



- ※ Tolerance : ± 1 [± 0.04]
- ※ Weight : 165g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis · Case material : PBT
- ※ Din rail attachment material : PC/ABS
- ※ Dimensions in mm, [] = inches
- ※ Screw tightening torque : 1N · m max

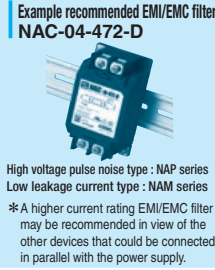


- ※ Tolerance : ± 1 [± 0.04]
- ※ Weight : 165g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis · Case material : PBT
- ※ Din rail attachment material : PC/ABS
- ※ Dimensions in mm, [] = inches
- ※ Screw tightening torque : 1.1N · m max

KHEA/KHNA60F

KH A 60 F - -

① ② ③ ④ ⑤ ⑥



- ① Series name
KHE : Euro style I/O terminals
KHN : Barrier blocks style I/O terminals
- ② Single output
- ③ Output wattage
- ④ Universal input
- ⑤ Output voltage
- ⑥ Option
C : with Coating

*Make sure necessary tests will be carried out on your end equipment with the power supply installed in accordance with any required EMC/EMI regulations.

| MODEL | KHEA/KHNA60F-12 | KHEA/KHNA60F-24 |
|-----------------------|-----------------|-----------------|
| MAX OUTPUT WATTAGE[W] | 54 | 60 |
| DC OUTPUT | 12V 4.5A | 24V 2.5A |

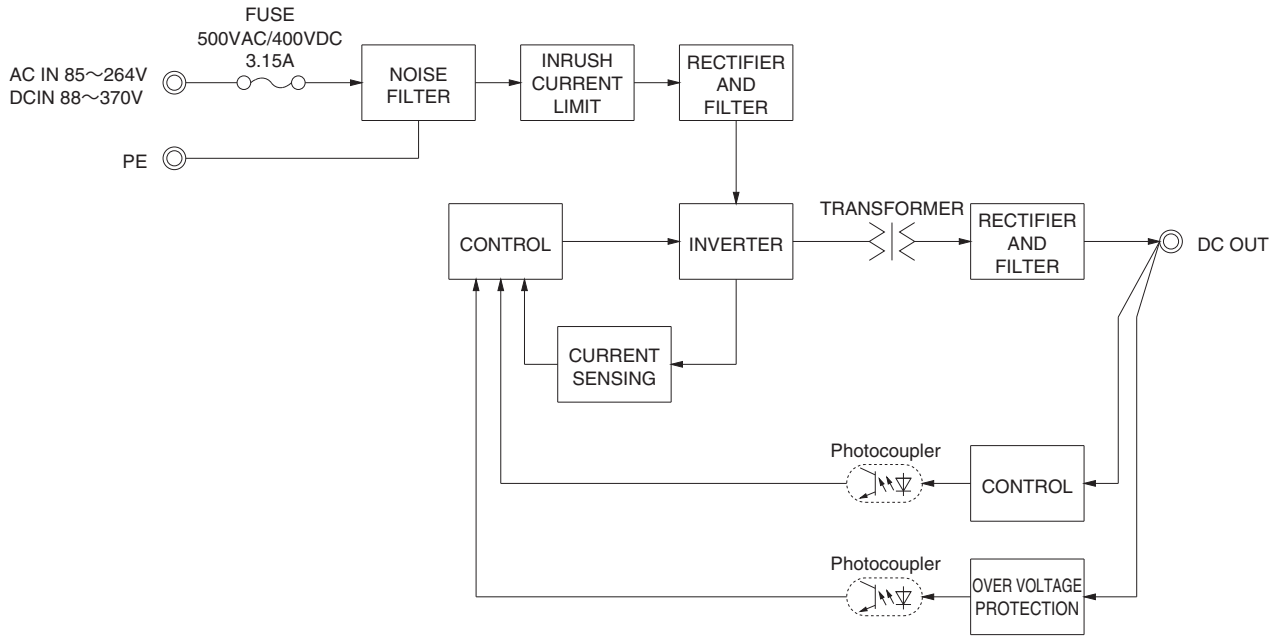
SPECIFICATIONS

| | MODEL | KHEA/KHNA60F-12 | KHEA/KHNA60F-24 | |
|------------------------------------|---|---|--|-----------|
| INPUT | VOLTAGE[V] | AC85 - 264 1 φ (Output derating is required) or DC88 - 370 *11 | | |
| | CURRENT[A] | ACIN 115V | 1.00typ | 1.10typ |
| | | ACIN 230V | 0.60typ | 0.70typ |
| | FREQUENCY[Hz] | 50 / 60 (45 - 440) or DC | | |
| | EFFICIENCY[%] | ACIN 115V | 87.0typ | 89.0typ |
| | | ACIN 230V | 88.0typ | 91.0typ |
| INRUSH CURRENT[A] | ACIN 115V | 18typ (Io=100%) (at cold start Ta=25°C) | | |
| | *1 ACIN 230V | 35typ (Io=100%) (at cold start Ta=25°C) | | |
| LEAKAGE CURRENT[ma] | 0.45 / 0.75max (ACIN 100V / 240V 60Hz, Io=100%, According to IEC60950-1 and DEN-AN) | | | |
| OUTPUT | VOLTAGE[V] | 12 | 24 | |
| | CURRENT[A] | 4.5 | 2.5 | |
| | PEAK CURRENT[A] | - | - | |
| | LINE REGULATION[mV] *2 | 48max | 96max | |
| | LOAD REGULATION[mV] *2 | 100max | 150max | |
| | RIPPLE[mVp-p] *3 | 0 to +70°C | 200max | 200max |
| | | -20 - 0°C | 300max | 300max |
| | | Io=0 - 30% | 300max *4 | 300max *4 |
| | RIPPLE NOISE[mVp-p] *3 | 0 to +70°C | 260max | 260max |
| | | -20 - 0°C | 360max | 360max |
| | | Io=0 - 30% | 360max *4 | 360max *4 |
| | TEMPERATURE REGULATION[mV] | 0 to +70°C | 120max | 240max |
| | | -20 to +70°C | 150max | 290max |
| | DRIFT[mV] *5 | 48max | 96max | |
| START-UP TIME[ms] | 200typ (ACIN 115V, Io=100%) | | | |
| HOLD-UP TIME[ms] | 20typ (ACIN 115V, Io=100%) | | | |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 10.80 to 13.20 | 22.50 to 28.50 | | |
| OUTPUT VOLTAGE SETTING[V] | 12.00 to 12.48 | 24.00 to 24.96 | | |
| PROTECTION CIRCUIT AND OTHERS | OVERCURRENT PROTECTION | Works over 105% of rating and recovers automatically *10 | | |
| | OVERVOLTAGE PROTECTION[V] | 13.80 to 16.80 | 30.00 to 36.00 | |
| | DC_OK LAMP | LED (Green) | | |
| ISOLATION | INPUT-OUTPUT | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) | | |
| | INPUT-PE | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) | | |
| | OUTPUT-PE | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature) | | |
| ENVIRONMENT | OPERATING TEMP., HUMID. AND ALTITUDE | -20 to +70°C, 20 - 90%RH (Non condensing), Type tested for -40°C start-up (Derating is required) | | |
| | STORAGE TEMP., HUMID. AND ALTITUDE | -30 to +85°C, 20 - 90%RH (Non condensing) | | |
| | VIBRATION *8 | 10 - 55Hz, 19.6m/s ² (2G), 3minutes period, 60 minutes along Z axis (Non operating, mounted on DIN Rail) | | |
| | IMPACT | 196.1m/s ² (20G), 11ms, once each X, Y and Z axis (Packing state) | | |
| SAFETY AND NOISE REGULATIONS | AGENCY APPROVALS | AC input | UL60950-1, C-UL (CSA60950-1), EN60950-1, UL508 (NEC Class2 per UL1310), ANSI/ISA12.12.01, ATEX, Complies with DEN-AN * | |
| | | DC input | UL60950-1, C-UL (CSA60950-1), EN60950-1 | |
| | CONDUCTED NOISE | Complies with FCC-B, VCCI-B, CISPR22-B, EN55011-B, EN55022-B | | |
| | HARMONIC ATTENUATOR | Complies with IEC61000-3-2 (Class A) *6 (Not built-in to active filter) *9 | | |
| OTHERS | CASE SIZE *7 | 32×90×90mm (W×H×D) [1.26×3.54×3.54 inches] | | |
| | WEIGHT | 270g max | | |
| | COOLING METHOD | Convection | | |

*1 The value is primary surge. The current of input surge to a built-in EMI/EMC Filter(0.2ms or less)is excluded.
 *2 Please contact us about dynamic load and input response.
 *3 This is the value that measured on measuring board with capacitor of 22μF and 0.1μF at 150mm from output terminal.
 Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103). Please refer to the instruction manual 2.7.
 Ripple and ripple noise spec is change at Io=0 to 30% by burst operation.
 *4 In case of operating under 0°C ambient temperature, the value is two times of specification at 0 to 30% load factor.
 *5 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.

*6 Please contact us about another class.
 *7 Case size contains neither the umbo.
 *8 Only as standard mounting orientation (A). Refer to the instruction manual 5.1.
 If install other than standard mounting orientation (A), please fix the power supply for withstand the vibration and impact.
 *9 When two or more units are operating it may not comply with the IEC61000-3-2.
 *10 If the overcurrent protection circuit operates continuously, the output voltage shut down. Refer to the instruction manual 2.3.
 *11 Under low DC input voltage below DC110V, the temperature derating -1°C/V or the output power derating -1%/V are required.
 * To meet the specifications. Do not operate over-loaded condition.
 * A sound may occur from power supply at light or peak loading.

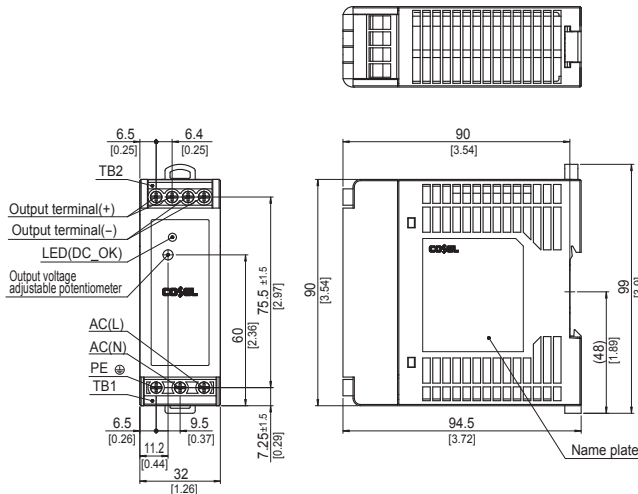
Block diagram



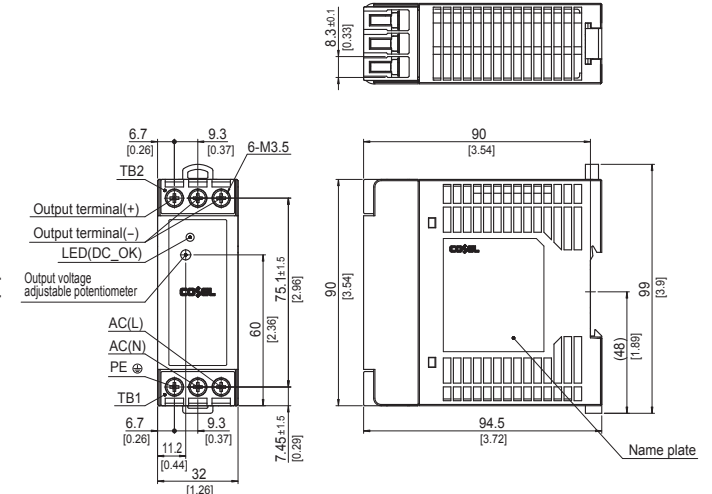
External view

<KHEA60F(Euro Style I/O Terminals)>

<KHNA60F(Barrier Blocks Style I/O Terminals)>



- ※ Tolerance : ± 1 [± 0.04]
- ※ Weight : 270g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis · Case material : PBT
- ※ Din rail attachment material : PC/ABS
- ※ Dimensions in mm, [] = inches
- ※ Screw tightening torque : 1N · m max



- ※ Tolerance : ± 1 [± 0.04]
- ※ Weight : 270g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis · Case material : PBT
- ※ Din rail attachment material : PC/ABS
- ※ Dimensions in mm, [] = inches
- ※ Screw tightening torque : 1.1N · m max

KHEA/KHNA90F

KH A 90 F - -

① ② ③ ④ ⑤ ⑥



Example recommended EMI/EMC filter
NAC-04-472-D



High voltage pulse noise type : NAP series
Low leakage current type : NAM series
* A higher current rating EMI/EMC filter may be recommended in view of the other devices that could be connected in parallel with the power supply.

- ① Series name
KHE : Euro style I/O terminals
KHN : Barrier blocks style I/O terminals
- ② Single output
- ③ Output wattage
- ④ Universal input
- ⑤ Output voltage
- ⑥ Option
C : with Coating
E : NEC Class2 (24V)

* Make sure necessary tests will be carried out on your end equipment with the power supply installed in accordance with any required EMC/EMI regulations.

| | | |
|-----------------------|-----------------|-----------------|
| MODEL | KHEA/KHNA90F-12 | KHEA/KHNA90F-24 |
| MAX OUTPUT WATTAGE[W] | 81.6 | 91.2 |
| DC OUTPUT | 12V 6.8A | 24V 3.8A |

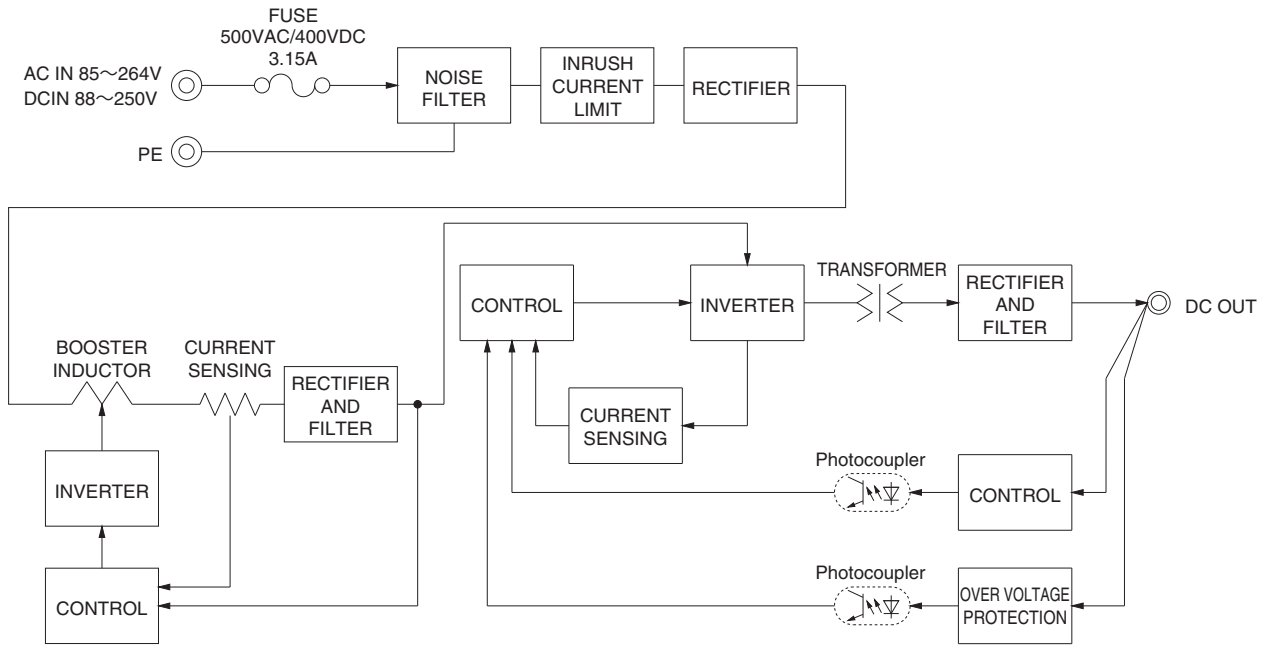
SPECIFICATIONS

| | MODEL | KHEA/KHNA90F-12 | KHEA/KHNA90F-24 | |
|------------------------------------|---|---|--|---------------------------------|
| INPUT | VOLTAGE[V] | AC85 - 264 1 φ (Output derating is required) or DC88-250 *10 | | |
| | CURRENT[A] | ACIN 115V | 0.85typ | 0.95typ |
| | | ACIN 230V | 0.45typ | 0.55typ |
| | FREQUENCY[Hz] | 50 / 60 (45 - 66) or DC | | |
| | EFFICIENCY[%] | ACIN 115V | 87.0typ | 89.0typ (88.0typ for option -E) |
| | | ACIN 230V | 88.0typ | 91.0typ (89.5typ for option -E) |
| | POWER FACTOR (Io=100%) | ACIN 115V | 0.98typ | |
| | | ACIN 230V | 0.86typ | |
| INRUSH CURRENT[A] | ACIN 115V | 18typ (Io=100%) (at cold start Ta=25°C) | | |
| | *1 ACIN 230V | 35typ (Io=100%) (at cold start Ta=25°C) | | |
| LEAKAGE CURRENT[ma] | 0.45 / 0.75max (ACIN 100V / 240V 60Hz, Io=100%, According to IEC60950-1 and DEN-AN) | | | |
| OUTPUT | VOLTAGE[V] | 12 | 24 | |
| | CURRENT[A] | 6.8 | 3.8 | |
| | PEAK CURRENT[A] | - | | |
| | LINE REGULATION[mV] *2 | 48max | | |
| | LOAD REGULATION[mV] *2 | 100max | | |
| | RIPPLE[mVp-p] *3 | 0 to +70°C | 200max | 200max |
| | | -20 - 0°C | 300max | 300max |
| | | Io=0 - 30% | 300max *4 | 300max *4 |
| | RIPPLE NOISE[mVp-p] *3 | 0 to +70°C | 260max | 260max |
| | | -20 - 0°C | 360max | 360max |
| | | Io=0 - 30% | 360max *4 | 360max *4 |
| | TEMPERATURE REGULATION[mV] | 0 to +70°C | 120max | 240max |
| | | -20 to +70°C | 150max | 290max |
| | DRIFT[mV] *5 | 48max | | |
| | START-UP TIME[ms] | 500typ (ACIN 115V, Io=100%) | | |
| HOLD-UP TIME[ms] | 20typ (ACIN 115V, Io=100%) | | | |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 10.80 to 13.20 | | | |
| OUTPUT VOLTAGE SETTING[V] | 12.00 to 12.48 | 22.50 to 28.50 (Fixed for option -E) 24.00 to 24.96 (24.00 to 24.50 for option -E) | | |
| PROTECTION CIRCUIT AND OTHERS | OVERCURRENT PROTECTION | Works over 105% of rating (101% for option -E), recovers automatically *9 | | |
| | OVERVOLTAGE PROTECTION[V] | 13.80 to 16.80 | 30.00 to 36.00 (26.40 to 33.60 for option -E) | |
| | DC_OK LAMP | LED (Green) | | |
| ISOLATION | INPUT-OUTPUT | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) | | |
| | INPUT-PE | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) | | |
| | OUTPUT-PE | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature) | | |
| ENVIRONMENT | OPERATING TEMP., HUMID. AND ALTITUDE | -20 to +70°C, 20 - 90%RH (Non condensing), Type tested for -40°C start-up (Derating is required) | | |
| | STORAGE TEMP., HUMID. AND ALTITUDE | -30 to +85°C, 20 - 90%RH (Non condensing) | | |
| | VIBRATION *8 | 10 - 55Hz, 19.6m/s ² (2G), 3minutes period, 60 minutes along Z axis (Non operating, mounted on DIN Rail) | | |
| | IMPACT | 196.1m/s ² (20G), 11ms, X, Y and Z axis (Packing state) | | |
| SAFETY AND NOISE REGULATIONS | AGENCY APPROVALS | AC input | UL60950-1, C-UL (CSA60950-1), EN60950-1, UL508, NEC Class2 (24V output only option -E), ANSI/ISA12.12.01, ATEX, Complies with DEN-AN | |
| | | DC input | UL60950-1, C-UL (CSA60950-1), EN60950-1 | |
| | CONDUCTED NOISE | Complies with FCC-B, VCCI-B, CISPR22-B, EN55011-B, EN55022-B | | |
| | HARMONIC ATTENUATOR | Complies with IEC61000-3-2 (Class A) *6 | | |
| OTHERS | CASE SIZE *7 | 50×90×90mm (W×H×D) [1.97×3.54×3.54 inches] | | |
| | WEIGHT | 405g max | | |
| | COOLING METHOD | Convection | | |

*1 The value is primary surge. The current of input surge to a built-in EMI/EMC Filter(0.2ms or less) is excluded.
 *2 Please contact us about dynamic load and input response.
 *3 This is the value that measured on measuring board with capacitor of 22 μF and 0.1 μF at 150mm from output terminal.
 Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103). Please refer to the instruction manual 2.7.
 Ripple and ripple noise spec is change at Io=0 to 30% by burst operation.
 *4 In case of operating under 0°C ambient temperature, the value is two times of specification at 0 to 30% load factor.
 *5 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the

input voltage held constant at the rated input/output.
 *6 Please contact us about another class.
 *7 Case size contains neither the umbo.
 *8 Only as standard mounting orientation (A). Refer to the instruction manual 5.1.
 If install other than standard mounting orientation (A), please fix the power supply for withstand the vibration and impact.
 *9 If the overcurrent protection circuit operates continuously, the output voltage shut down. Refer to the instruction manual 2.3.
 *10 Under low DC input voltage below DC110V, the temperature derating -1°C/V or the output power derating -1%/V are required.
 * To meet the specifications. Do not operate over-loaded condition.
 * A sound may occur from power supply at light or peak loading.

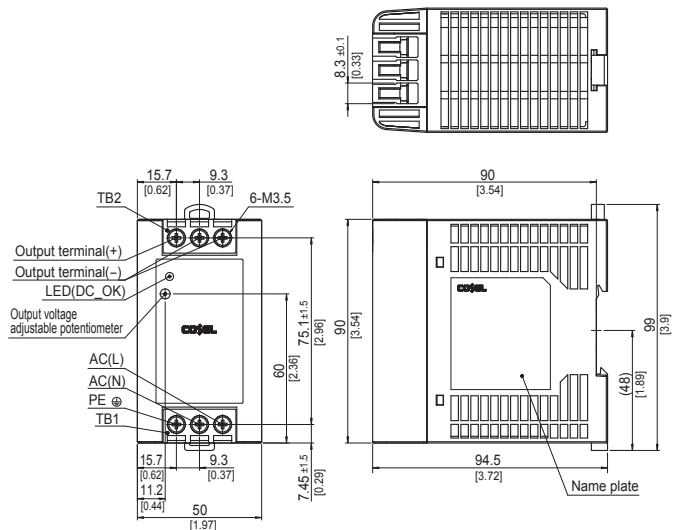
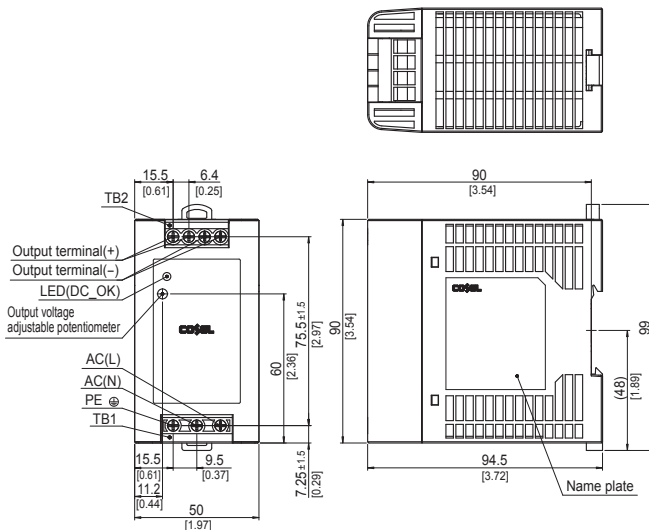
Block diagram



External view

<KHEA90F(Euro Style I/O Terminals)>

<KHNA90F(Barrier Blocks Style I/O Terminals)>



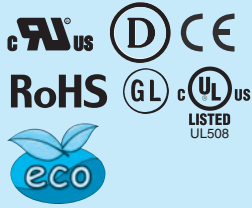
- ※ Tolerance : ± 1 [± 0.04]
- ※ Weight : 405g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis · Case material : PBT
- ※ Din rail attachment material : PC/ABS
- ※ Dimensions in mm, [] = inches
- ※ Screw tightening torque : 1N · m max

- ※ Tolerance : ± 1 [± 0.04]
- ※ Weight : 405g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis · Case material : PBT
- ※ Din rail attachment material : PC/ABS
- ※ Dimensions in mm, [] = inches
- ※ Screw tightening torque : 1.1N · m max

KHEA/KHNA120F

KH A -120 F -24 -

① ② ③ ④ ⑤ ⑥



Example recommended EMI/EMC filter
NAC-04-472-D



High voltage pulse noise type : NAP series
Low leakage current type : NAM series
* A higher current rating EMI/EMC filter may be recommended in view of the other devices that could be connected in parallel with the power supply.

- ① Series name
KHE : Euro style I/O terminals
KHN : Barrier blocks style I/O terminals
- ② Single output
- ③ Output wattage
- ④ Universal input
- ⑤ Output voltage
- ⑥ Option
C : with Coating
N2: Screw mounting

*Make sure necessary tests will be carried out on your end equipment with the power supply installed in accordance with any required EMC/EMI regulations.

| | |
|-----------------------|--------------------|
| MODEL | KHEA / KHNA120F-24 |
| MAX OUTPUT WATTAGE[W] | 120 |
| DC OUTPUT | 24V 5A (Peak 7.5A) |

SPECIFICATIONS

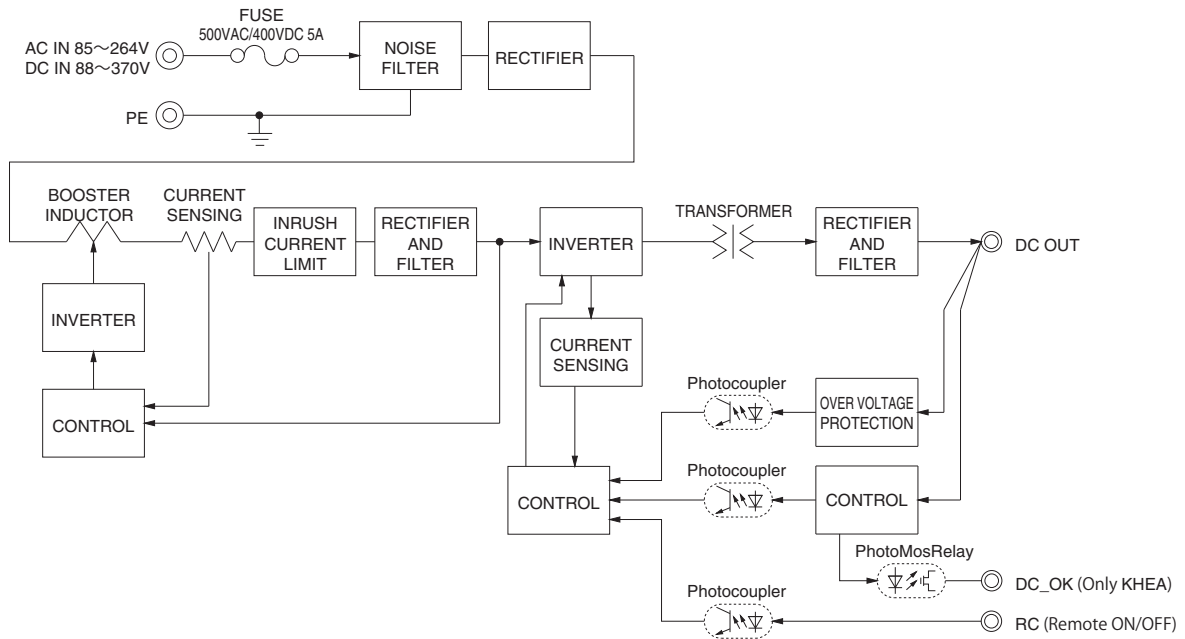
| | MODEL | KHEA / KHNA120F-24 | |
|------------------------------------|---|---|-------------------------------|
| INPUT | VOLTAGE[V] | AC85 - 264 1 φ or DC88 - 370 *10 | |
| | CURRENT[A] | ACIN 115V | 1.2typ |
| | | ACIN 230V | 0.6typ |
| | FREQUENCY[Hz] | 50 / 60 (45 - 66) or DC | |
| | EFFICIENCY[%] | ACIN 115V | 90typ |
| | | ACIN 230V | 92typ |
| | POWER FACTOR | ACIN 115V | 0.98typ |
| | | ACIN 230V | 0.93typ |
| | INRUSH CURRENT[A] | ACIN 115V | 15typ (at cold start Ta=25°C) |
| | | *1 ACIN 230V | 30typ (at cold start Ta=25°C) |
| LEAKAGE CURRENT[ma] | 0.45 / 0.75max (ACIN 100V / 240V 60Hz, Io=100%, According to IEC60950-1 and DEN-AN) | | |
| OUTPUT | VOLTAGE[V] | 24 | |
| | CURRENT[A] | 5 | |
| | PEAK CURRENT[A] | *2 7.5 | |
| | LINE REGULATION[mV] | *3 96max | |
| | LOAD REGULATION[mV] | *3 150max *4 | |
| | RIPPLE[mVp-p] | *5 0 to +70°C | 120max |
| | | -25 - 0°C | 240max |
| | | Io=0 - 30% | 240max *4 |
| | RIPPLE NOISE[mVp-p] | *5 0 to +70°C | 150max |
| | | -25 - 0°C | 300max |
| | | Io=0 - 30% | 300max *4 |
| | TEMPERATURE REGULATION[mV] | 0 to +70°C | 240max *4 |
| | | -25 to +70°C | 360max *4 |
| | DRIFT[mV] | *6 96max | |
| | START-UP TIME[ms] | 750max (ACIN 115V, Io=100%) | |
| HOLD-UP TIME[ms] | 20typ (ACIN 115V, Io=100%) | | |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 22.5 to 28.5 | | |
| OUTPUT VOLTAGE SETTING[V] | 24.0±1.0% | | |
| PROTECTION CIRCUIT AND OTHERS | OVERCURRENT PROTECTION | Works over 101% of peak current and recovers automatically | |
| | OVERVOLTAGE PROTECTION[V] | 30.0 to 36.0 | |
| | REMOTE ON/OFF (RC) | Provided | |
| | DC_OK LAMP | LED (Green) | |
| | ALARM LAMP | LED (Red) | |
| DC_OK CONTACT | Relay contact 30VDC 1A max, 30VAC 0.5A max (resistive load) (Only KHEA) | | |
| ISOLATION | INPUT-OUTPUT | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) | |
| | INPUT-PE | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) | |
| | OUTPUT-PE | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature) | |
| | OUTPUT-RC, DC_OK | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature) | |
| ENVIRONMENT | OPERATING TEMP.,HUMID.AND ALTITUDE | -25 to +70°C, 20 - 90%RH (Non condensing), Type tested for -40°C start-up (Derating is required) | |
| | STORAGE TEMP.,HUMID.AND ALTITUDE | -40 to +85°C, 20 - 90%RH (Non condensing) | |
| | VIBRATION | *9 10 - 55Hz, 19.6m/s ² (2G), 3minutes period, 60 minutes along Z axis (Non operating, mounted on DIN Rail) | |
| | IMPACT | 196.1m/s ² (20G), 11ms, once each X, Y and Z axis (Packing state) | |
| SAFETY AND NOISE REGULATIONS | AGENCY APPROVALS | AC input UL60950-1, C-UL (CSA60950-1), EN60950-1, UL508, ANSI/ISA12.12.01, ATEX, GL, Complies with DEN-AN DC input UL60950-1, C-UL (CSA60950-1), EN60950-1 | |
| | CONDUCTED NOISE | Complies with FCC-B, VCCI-B, CISPR22-B, EN55011-B, EN55022-B | |
| | HARMONIC ATTENUATOR | Complies with IEC61000-3-2 (Class A) *7 | |
| OTHERS | CASE SIZE | *8 37×124×117mm (W×H×D) [1.46×4.88×4.61 inches] | |
| | WEIGHT | 580g max | |
| | COOLING METHOD | Convection | |

- *1 The value is primary surge. The current of input surge to a built-in EMI/EMC Filter(0.2ms or less)is excluded.
- *2 Refer to 3, instruction manual.
- *3 Please contact us about dynamic load and input response.
- *4 The output voltage is below 23.5V, the value is equal to three times of the specification.
- *5 This is the value that measured on measuring board with capacitor of 22 μF and 0.1 μF at 150mm from output terminal.

- Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103). Please refer to the instruction manual 2.7.
- *6 Drift is the change in DC output for a eight hour period after a half-hour warm-up at 25 C, with the input voltage held constant at the rated input/output.
- *7 Please contact us about another class.
- *8 Case size contains neither the umbro.

- *9 Only as standard mounting orientation (A). Refer to the instruction manual 5.1. If install other than standard mounting orientation (A), please fix the power supply for withstand the vibration and impact.
- *10 Under low DC input voltage below DC110V, the temperature derating -1C/V or the output power derating -1%/V are required.
- * To meet the specifications. Do not operate over-loaded condition.
- * A sound may occur from power supply at light or peak loading.

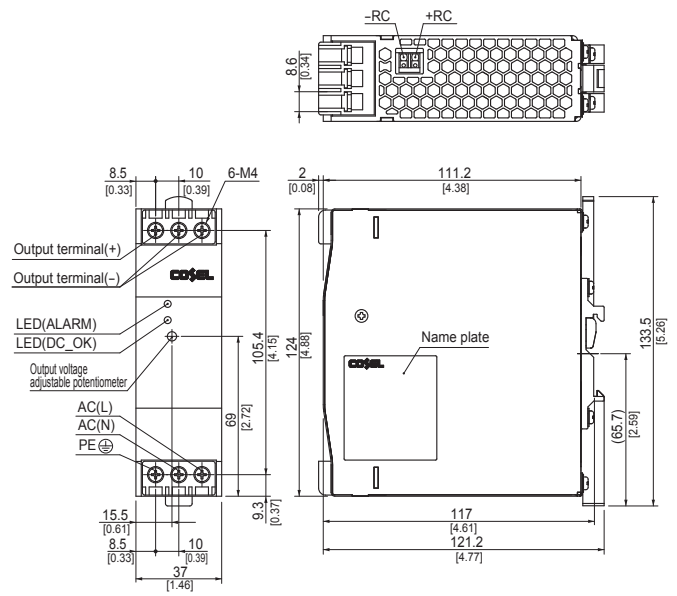
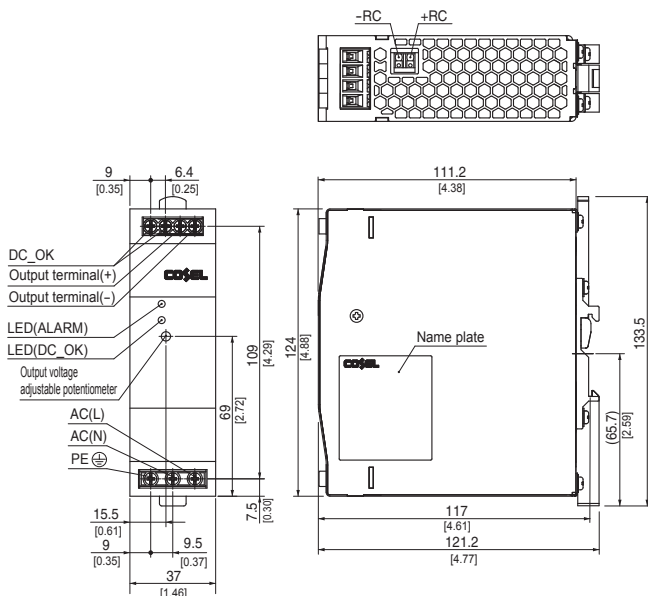
Block diagram



External view

<KHEA120F(Euro Style I/O Terminals)>

<KHNA120F(Barrier Blocks Style I/O Terminals)>



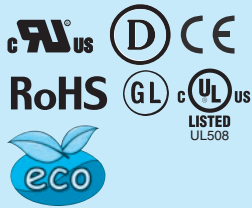
- ※ Tolerance : ±1 [±0.04]
- ※ Weight : 580g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis material : Aluminum
- ※ Case material : Stainless steel
- ※ DIN rail attachment material : Aluminum, Stainless steel, Nylon
- ※ Dimensions in mm, [] = inches
- ※ Screw tightening torque : 1N · m max

- ※ Tolerance : ±1 [±0.04]
- ※ Weight : 580g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis material : Aluminum
- ※ Case material : Stainless steel
- ※ DIN rail attachment material : Aluminum, Stainless steel, Nylon
- ※ Dimensions in mm, [] = inches
- ※ Screw tightening torque : 1.6N · m max

KHEA/KHNA240F

KH A -240 F -24 -

① ② ③ ④ ⑤ ⑥



Example recommended EMI/EMC filter
NAC-06-472-D



High voltage pulse noise type : NAP series
Low leakage current type : NAM series
* A higher current rating EMI/EMC filter may be recommended in view of the other devices that could be connected in parallel with the power supply.

- ① Series name
KHE : Euro style I/O terminals
KHN : Barrier blocks style I/O terminals
- ② Single output
- ③ Output wattage
- ④ Universal input
- ⑤ Output voltage
- ⑥ Option
C : with Coating
N2: Screw mounting

*Make sure necessary tests will be carried out on your end equipment with the power supply installed in accordance with any required EMC/EMI regulations.

| | |
|-----------------------|--------------------|
| MODEL | KHEA / KHNA240F-24 |
| MAX OUTPUT WATTAGE[W] | 240 |
| DC OUTPUT | 24V 10A (Peak 15A) |

SPECIFICATIONS

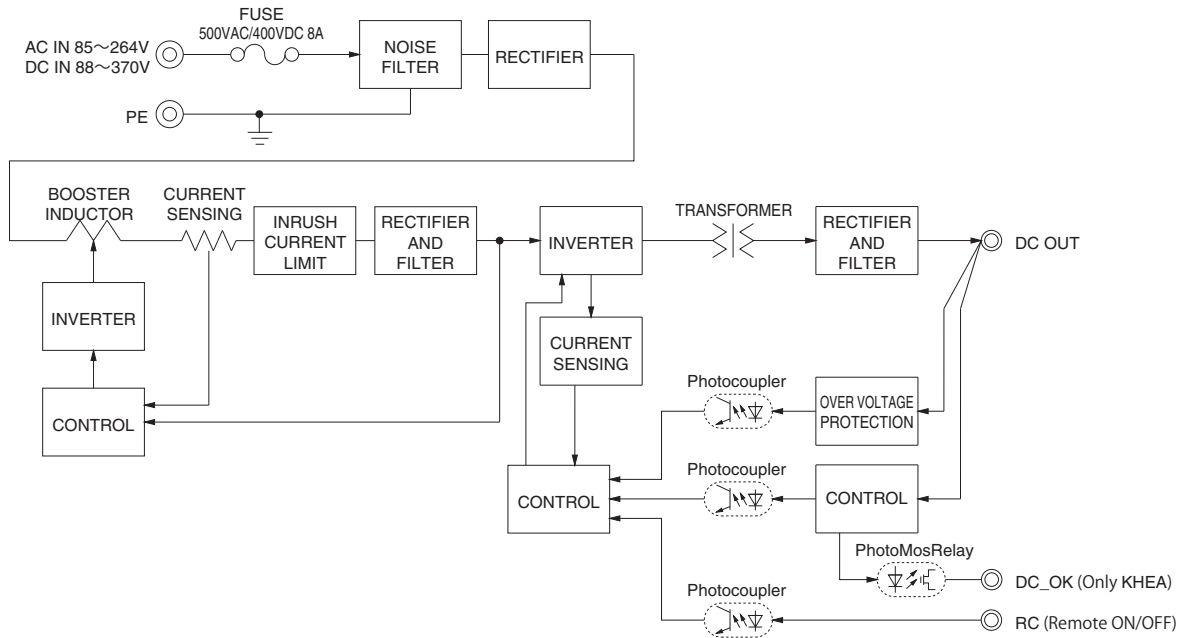
| MODEL | | KHEA / KHNA240F-24 | |
|------------------------------------|---|--|--|
| INPUT | VOLTAGE[V] | AC85 - 264 1 φ or DC88 - 370 *10 | |
| | CURRENT[A] | ACIN 115V | 2.3typ |
| | | ACIN 230V | 1.2typ |
| | FREQUENCY[Hz] | 50 / 60 (45 - 66) or DC | |
| | EFFICIENCY[%] | ACIN 115V | 92typ |
| | | ACIN 230V | 94typ |
| | POWER FACTOR | ACIN 115V | 0.98typ |
| | | ACIN 230V | 0.93typ |
| INRUSH CURRENT[A] | ACIN 115V | 20typ (more than 3 sec. to re-start) | |
| | *1 ACIN 230V | 40typ (more than 3 sec. to re-start) | |
| LEAKAGE CURRENT[ma] | 0.45 / 0.75max (ACIN 100V / 240V 60Hz, Io=100%, According to IEC60950-1 and DEN-AN) | | |
| OUTPUT | VOLTAGE[V] | 24 | |
| | CURRENT[A] | 10 | |
| | PEAK CURRENT[A] | *2 15 | |
| | LINE REGULATION[mV] | *3 96max | |
| | LOAD REGULATION[mV] | *3 150max *4 | |
| | RIPPLE[mVp-p] | 0 to +70°C | 120max |
| | | *5 -25 - 0°C | 240max |
| | | Io=0 - 30% | 240max *4 |
| | RIPPLE NOISE[mVp-p] | 0 to +70°C | 150max |
| | | *5 -25 - 0°C | 300max |
| | | Io=0 - 30% | 300max *4 |
| | TEMPERATURE REGULATION[mV] | 0 to +70°C | 240max *4 |
| | | *5 -25 to +70°C | 360max *4 |
| | DRIFT[mV] | *6 96max | |
| START-UP TIME[ms] | 750max (ACIN 115V, Io=100%) | | |
| HOLD-UP TIME[ms] | 20typ (ACIN 115V, Io=100%) | | |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 22.5 to 28.5 | | |
| OUTPUT VOLTAGE SETTING[V] | 24.0 ± 1.0% | | |
| PROTECTION CIRCUIT AND OTHERS | OVERCURRENT PROTECTION | Works over 101% of peak current and recovers automatically | |
| | OVERVOLTAGE PROTECTION[V] | 30.0 to 36.0 | |
| | REMOTE ON/OFF (RC) | Provided | |
| | DC_OK LAMP | LED (Green) | |
| | ALARM LAMP | LED (Red) | |
| DC_OK CONTACT | Relay contact 30VDC 1A max, 30VAC 0.5A max (resistive load) (Only KHEA) | | |
| ISOLATION | INPUT-OUTPUT | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) | |
| | INPUT-PE | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) | |
| | OUTPUT-PE | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature) | |
| | OUTPUT-RC, DC_OK | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature) | |
| ENVIRONMENT | OPERATING TEMP., HUMID. AND ALTITUDE | -25 to +70°C, 20 - 90%RH (Non condensing), Type tested for -40°C start-up (Derating is required) | |
| | STORAGE TEMP., HUMID. AND ALTITUDE | -40 to +85°C, 20 - 90%RH (Non condensing) | |
| | VIBRATION | *9 10 - 55Hz, 19.6m/s ² (2G), 3minutes period, 60 minutes along Z axis (Non operating, mounted on DIN Rail) | |
| IMPACT | 196.1m/s ² (20G), 11ms, once each X, Y and Z axis (Packing state) | | |
| SAFETY AND NOISE REGULATIONS | AGENCY APPROVALS | AC input | UL60950-1, C-UL (CSA60950-1), EN60950-1, UL508, ANSI/ISA12.12.01, ATEX, GL, Complies with DEN-AN |
| | | DC input | UL60950-1, C-UL (CSA60950-1), EN60950-1 |
| | CONDUCTED NOISE | Complies with FCC-B, VCCI-B, CISPR22-B, EN55011-B, EN55022-B | |
| HARMONIC ATTENUATOR | Complies with IEC61000-3-2 (Class A) *7 | | |
| OTHERS | CASE SIZE | *8 | 50 × 124 × 117mm (W × H × D) [1.97 × 4.88 × 4.61 inches] |
| | WEIGHT | 900g max | |
| | COOLING METHOD | Convection | |

- *1 The value is primary surge. The current of input surge to a built-in EMI/EMC Filter(0.2ms or less)is excluded.
- *2 Refer to 3, instruction manual.
- *3 Please contact us about dynamic load and input response.
- *4 The output voltage is below 23.5V, the value is equal to three times of the specification.
- *5 This is the value that measured on measuring board with capacitor of 22μF and 0.1μF at 150mm from output terminal.

- Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103). Please refer to the instruction manual 2.7.
- *6 Drift is the change in DC output for a eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
- *7 Please contact us about another class.
- *8 Case size contains neither the umbro.

- *9 Only as standard mounting orientation (A). Refer to the instruction manual 5.1. If install other than standard mounting orientation (A), please fix the power supply for withstand the vibration and impact.
- *10 Under low DC input voltage below DC110V, the temperature derating -1°C/V or the output power derating -1%/V are required.
- * To meet the specifications. Do not operate over-loaded condition.
- * A sound may occur from power supply at light or peak loading.

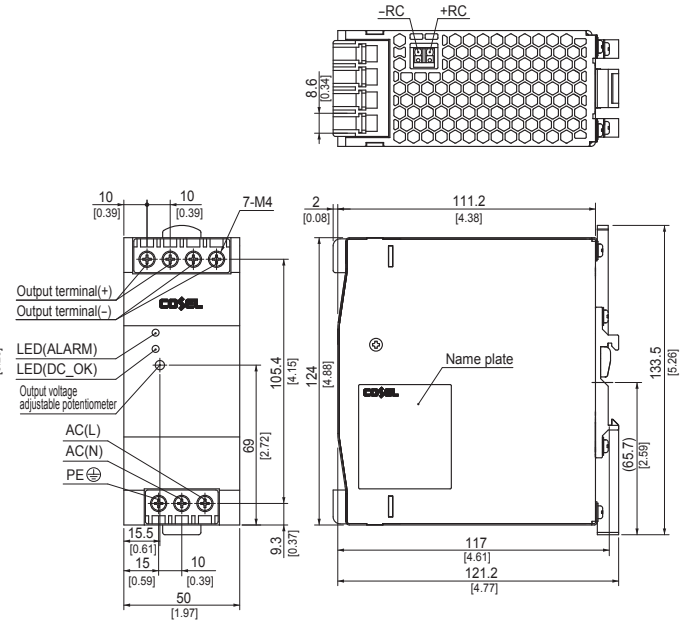
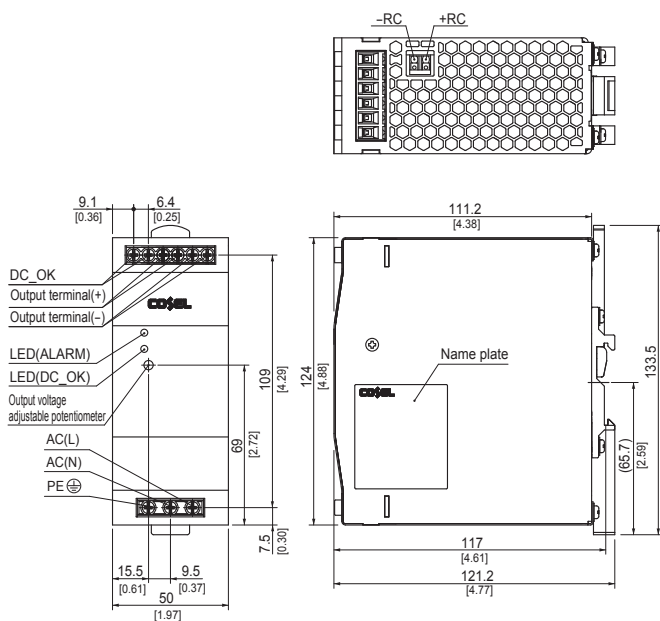
Block diagram



External view

<KHEA240F(Euro Style I/O Terminals)>

<KHNA240F(Barrier Blocks Style I/O Terminals)>



- ※ Tolerance : ±1 [±0.04]
- ※ Weight : 900g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis material : Aluminum
- ※ Case material : Stainless steel
- ※ DIN rail attachment material : Aluminum, Stainless steel, Nylon
- ※ Dimensions in mm, [] = inches
- ※ Screw tightening torque : 1N · m max

- ※ Tolerance : ±1 [±0.04]
- ※ Weight : 900g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis material : Aluminum
- ※ Case material : Stainless steel
- ※ DIN rail attachment material : Aluminum, Stainless steel, Nylon
- ※ Dimensions in mm, [] = inches
- ※ Screw tightening torque : 1.6N · m max

KHEA/KHNA480F

KH A 480 F - -

① ② ③ ④ ⑤ ⑥



Example recommended EMI/EMC filter
NAC-10-472-D



High voltage pulse noise type : NAP series
Low leakage current type : NAM series
* A higher current rating EMI/EMC filter may be recommended in view of the other devices that could be connected in parallel with the power supply.

- ① Series name
KHE : Euro style I/O terminals
KHN : Barrier blocks style I/O terminals
- ② Single output
- ③ Output wattage
- ④ Universal input
- ⑤ Output voltage
- ⑥ Option
C : with Coating
N2: Screw mounting

*Make sure necessary tests will be carried out on your end equipment with the power supply installed in accordance with any required EMC/EMI regulations.

| | | |
|-----------------------|--------------------|--------------------|
| MODEL | KHEA / KHNA480F-24 | KHEA / KHNA480F-48 |
| MAX OUTPUT WATTAGE[W] | 480 | 480 |
| DC OUTPUT | 24V 20A (Peak 30A) | 48V 10A (Peak 15A) |

SPECIFICATIONS

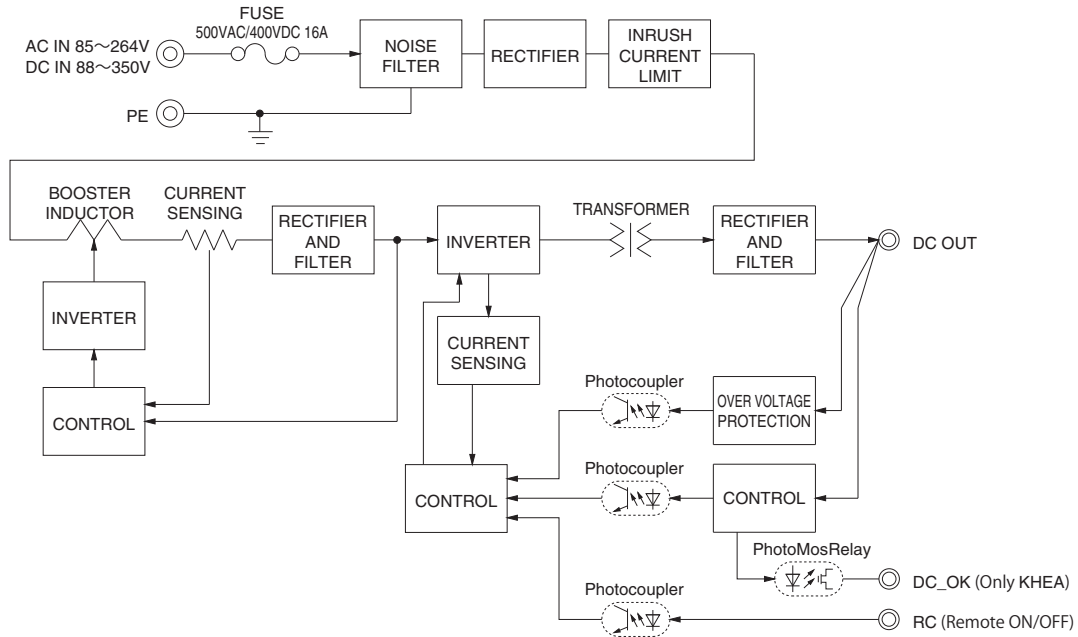
| | MODEL | KHEA / KHNA480F-24 | KHEA / KHNA480F-48 | |
|------------------------------------|--|--|---|--------|
| INPUT | VOLTAGE[V] | AC85 - 264 1 φ (Output derating is required) or DC88 - 350 *10 | | |
| | CURRENT[A] | ACIN 115V | 4.6typ | |
| | | ACIN 230V | 2.3typ | |
| | FREQUENCY[Hz] | 50 / 60 (45 - 66) or DC | | |
| | EFFICIENCY[%] | ACIN 115V | 92typ | |
| | | ACIN 230V | 94typ | |
| | POWER FACTOR | ACIN 115V | 0.98typ | |
| | | ACIN 230V | 0.93typ | |
| INRUSH CURRENT[A] | ACIN 115V | 20typ (more than 3 sec. to re-start) | | |
| | *1 ACIN 230V | 40typ (more than 3 sec. to re-start) | | |
| LEAKAGE CURRENT[ma] | 0.75 / 1.5max (ACIN 100V / 240V 60Hz, Io=100%, According to IEC60950-1 and DEN-AN) | | | |
| OUTPUT | VOLTAGE[V] | 24 | 48 | |
| | CURRENT[A] | 20 | 10 | |
| | PEAK CURRENT[A] | *2 30 | 15 | |
| | LINE REGULATION[mV] | *3 96max (Io=30-100%) *9 | 192max (Io=30-100%) *9 | |
| | LOAD REGULATION[mV] | *3 150max (Io=30-100%) *9 | 300max (Io=30-100%) *9 | |
| | RIPPLE[mVp-p] | 0 to +70°C | 120max | 120max |
| | | -25 - 0°C | 240max | 240max |
| | | Io=0 - 30% | 500max | 750max |
| | RIPPLE NOISE[mVp-p] | 0 to +70°C | 150max | 150max |
| | | -25 - 0°C | 300max | 300max |
| | | Io=0 - 30% | 600max | 750max |
| | TEMPERATURE REGULATION[mV] | 0 to +70°C | 240max | 480max |
| | | -25 to +70°C | 360max | 600max |
| | DRIFT[mV] | *5 96max | 192max | |
| START-UP TIME[ms] | 750max (ACIN 115V, Io=100%) | | | |
| HOLD-UP TIME[ms] | 20typ (ACIN 115V, Io=100%) | | | |
| OUTPUT VOLTAGE ADJUSTMENT RANGE[V] | 22.5 to 26.4 | 45.0 to 55.2 | | |
| OUTPUT VOLTAGE SETTING[V] | 24.0±1.0% | 48.0±1.0% | | |
| PROTECTION CIRCUIT AND OTHERS | OVERCURRENT PROTECTION | Works over 101% of peak current and recovers automatically | | |
| | OVERVOLTAGE PROTECTION[V] | 30.0 to 36.0 | 57.6 to 67.2 | |
| | REMOTE ON/OFF (RC) | Provided | | |
| | DC_OK LAMP | LED (Green) | | |
| | ALARM LAMP | LED (Red) | | |
| DC_OK CONTACT | Relay contact 30VDC 1A max, 30VAC 0.5A max (resistive load) (Only KHEA) | | | |
| ISOLATION | INPUT-OUTPUT | AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) | | |
| | INPUT-PE | AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (At Room Temperature) | | |
| | OUTPUT-PE | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature) | | |
| | OUTPUT-RC, DC_OK | AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (At Room Temperature) | | |
| ENVIRONMENT | OPERATING TEMP., HUMID. AND ALTITUDE | -25 to +70°C, 20 - 90%RH (Non condensing), Type tested for -40°C start-up (Derating is required) | | |
| | STORAGE TEMP., HUMID. AND ALTITUDE | -40 to +85°C, 20 - 90%RH (Non condensing) | | |
| | VIBRATION | *8 10 - 55Hz, 19.6m/s ² (2G), 3minutes period, 60 minutes along Z axis (Non operating, mounted on DIN Rail) | | |
| IMPACT | 196.1m/s ² (20G), 11ms, once each X, Y and Z axis (Packing state) | | | |
| SAFETY AND NOISE REGULATIONS | AGENCY APPROVALS | AC input | UL60950-1, C-UL (CSA60950-1), EN60950-1, UL508, ANSI/ISA12.12.01, ATEX, GL (Only 24V), Complies with DEN-AN | |
| | | DC input | UL60950-1, C-UL (CSA60950-1), EN60950-1 | |
| | CONDUCTED NOISE | Complies with FCC-B, VCCI-B, CISPR22-B, EN55011-B, EN55022-B | | |
| HARMONIC ATTENUATOR | Complies with IEC61000-3-2 (Class A) *6 | | | |
| OTHERS | CASE SIZE | *7 70×124×117mm (W×H×D) [2.76×4.88×4.61 inches] | | |
| | WEIGHT | 1,200g max | | |
| | COOLING METHOD | Convection | | |

- *1 The value is primary surge. The current of input surge to a built-in EMI/EMC Filter(0.2ms or less)is excluded.
- *2 Refer to 3, instruction manual.
- *3 Please contact us about dynamic load and input response.
- *4 This is the value that measured on measuring board with capacitor of 22 μ F and 0.1 μ F at 150mm from output terminal.
Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN: RM103).

- *5 Please refer to the instruction manual 2.7.
Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25 C, with the input voltage held constant at the rated input/output.
- *6 Please contact us about another class.
- *7 Case size contains neither the umbo.
- *8 Only as standard mounting orientation (A). Refer to the instruction manual 5.1.
If install other than standard mounting orientation (A), please fix the power

- supply for withstand the vibration and impact.
- *9 Burst operation at 30% load or less.
- *10 Under low DC input voltage below DC110V, the temperature derating -1C/V or the output power derating -1%/V are required.
- * To meet the specifications. Do not operate over-loaded condition.
- * A sound may occur from power supply at light or peak loading.

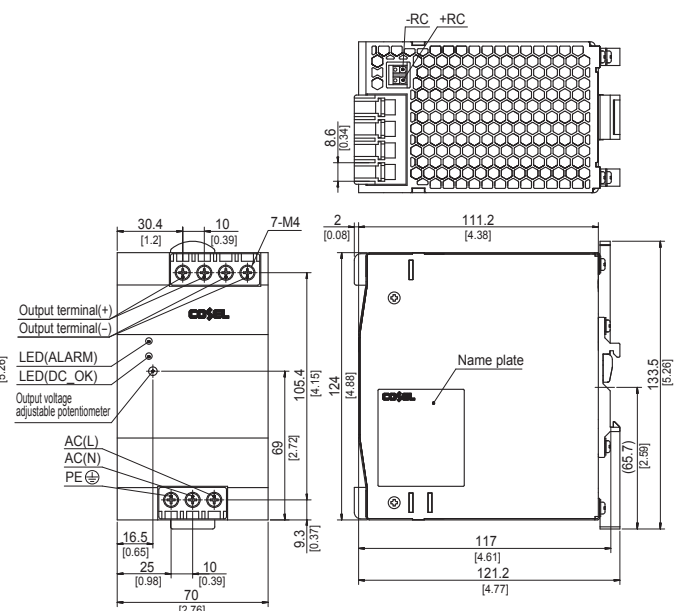
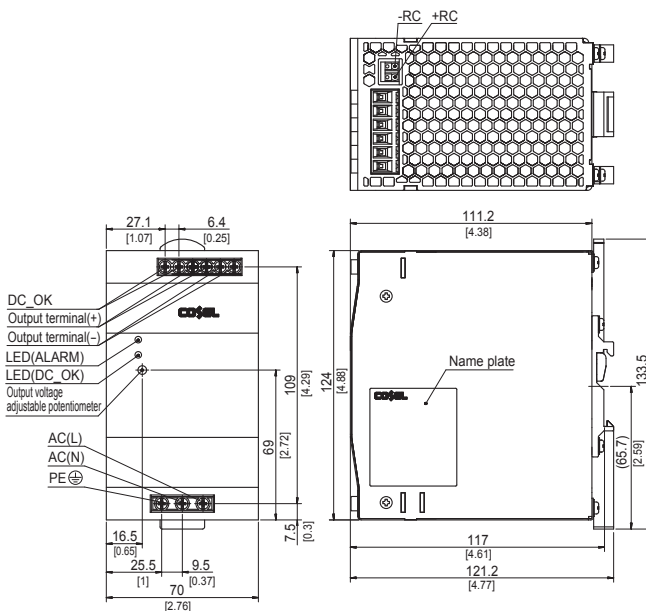
Block diagram



External view

<KHEA480F(Euro Style I/O Terminals)>

<KHNA480F(Barrier Blocks Style I/O Terminals)>



- ※ Tolerance : ± 1 [± 0.04]
- ※ Weight : 1,200g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis material : Aluminum
- ※ Case material : Stainless steel
- ※ DIN rail attachment material : Aluminum, Stainless steel, Nylon
- ※ Dimensions in mm, [] = inches
- ※ Screw tightening torque : 1N · m max

- ※ Tolerance : ± 1 [± 0.04]
- ※ Weight : 1,200g max
- ※ PCB Material/thickness : FR-4 / 1.6mm [0.06]
- ※ Chassis material : Aluminum
- ※ Case material : Stainless steel
- ※ DIN rail attachment material : Aluminum, Stainless steel, Nylon
- ※ Dimensions in mm, [] = inches
- ※ Screw tightening torque : 1.6N · m max