# CCR200 series

**200W** Fan cooled | **170W** Conduction cooled | **110W** Convection cooled

AC-DC power supplies

The CCR200 series of compact medical AC-DC power supplies are designed to operate in convection cooled, conduction cooled, and fan cooled applications with power ratings from 110W to 200W. CCR200 offers high efficiency and high power density in a low profile, baseplate cooled design that ensures effective thermal management and quiet operation for noise sensitive applications.

Featuring Class B conducted and radiated emissions, worldwide industrial and medical safety approvals, 2 x MOPP isolation and low leakage currents, the CCR200 is designed for easy integration into a wide range of BF rated medical applications including respiratory care, imaging, patient monitoring, patient treatment, and industrial applications such as process control, test & measurement, and industrial printing.

## Features

- 200W fan cooled, 170W conduction cooled
- Universal, single phase input: 85 to 264VAC
- 78.6 x 57.9mm footprint, 25.4mm profile
- High efficiency, up to 94%
- Low earth leakage <300µA
- Low patient leakage <75µA
- Medical versions Class I & Class II
- Medical (BF) & ITE safety approvals
- Class B conducted and radiated emissions
- 3 year warranty

## Applications

Healthcare

Instrumentation

Process control

Robotics

Technology

## Dimensions

78.6 x 57.9 x 25.4mm (3.09" x 2.28" x 1.00")

## Documentation

For further information click the link or scan the code

→ xppower.com

## Models & ratings

| Model number | Output voltage | Output current | | | Efficiency[3] |
|---|---|---|---|---|---|
| | | Convection cooled | Conduction cooled[2] | Fan cooled[1] | |
| CCR200PS12 | 12.0V | 9.17A | 14.17A | 16.67A | 92% |
| CCR200PS15 | 15.0V | 7.33A | 11.33A | 13.33A | 93% |
| CCR200PS24 | 24.0V | 4.58A | 7.08A | 8.33A | 94% |
| CCR200PS28 | 28.0V | 3.92A | 6.07A | 7.14A | 93% |
| CCR200PS30 | 30.0V | 3.67A | 5.67A | 6.66A | 93% |
| CCR200PS36 | 36.0V | 3.06A | 4.72A | 5.67A | 94% |
| CCR200PS48 | 48.0V | 2.29A | 3.54A | 4.16A | 94% |
| CCR200PS54 | 54.0V | 2.04A | 3.15A | 3.70A | 94% |

**Notes:**

1. Requires 24 $m^3$/h (14CFM)
2. Thermal resistance for conduction cooling ≤1.5°C/W.
3. Typical value at 230VAC input and 200W load.

## Input

| Characteristic | Minimum | Typical | Maximum | Units | Notes & conditions |
|---|---|---|---|---|---|
| Input voltage - operating | 85[1] | 115/230 | 264 | VAC | Derate output linearly from 200W at 115VAC to 150W at 85VAC – fan cooled |
| | | | | | Derate output linearly from 170W at 115VAC to 130W at 85VAC – conduction cooled |
| | | | | | Derate output linearly from 110W at 115VAC to 90W at 85VAC – convection cooled |
| Input frequency | 47 | 50/60 | 63 | Hz | Agency approval, 47-63Hz |
| Power factor | 0.96 | >0.98 | | | 230VAC, 100% load |
| Input current - full load | | | 2.5/1.2 | A | 115/230VAC |
| Inrush current | | | 85 | A | 240 VAC cold start, 25°C |
| Earth leakage current | | | 300 | µA | 264 VAC/60Hz |
| No load input power | | | 0.3/0.32 | W | 115VAC/230VAC |
| Input protection | T3.15A/250V Internal fuse fitted in line and neutral. | | | | |

[1] Agency approval, 90-264VAC

## Output

| Characteristic | Minimum | Typical | Maximum | Units | Notes & conditions |
|---|---|---|---|---|---|
| Output voltage - V1 | 12 | | 54 | VDC | See models and ratings table |
| Initial set accuracy | | | ±1 | % | 50% load, 115/230VAC |
| Minimum load | No minimum load required | | | | |
| Start up delay | | | 1 | s | 115/230VAC full load |
| Hold up time | 10 | | | ms | 115VAC full load at 25°C |
| Drift | | | ±0.02 | % | After 20 min warm up |
| Line regulation | | | ±0.3 | % | |
| Load regulation | | | ±0.5 | % | 0-100% load |
| Transient response | | | 4 | % | Recovery within 1% in less than 500µs for a 50-75% and 75-50% load step |
| Output voltage adjustment | | ±5 | | % | |
| Ripple & noise | | | 1/100 | %/mV | Measured at 20MHz bandwidth and 10µF electrolytic capacitor in parallel with 0.1µF ceramic capacitor at 25°C (12V & 15V/other models) |
| Overvoltage protection | 110 | | 140 | % | Vnom, recycle input to reset, 54V model OVP <63V |
| Overload protection | 125 | | 165 | % | Inom |
| Short circuit protection | Trip & restart | | | | |
| Temperature coefficient | | | 0.02 | %/°C | |
| Overtemperature protection | Measured internally, auto resetting | | | | |

## General

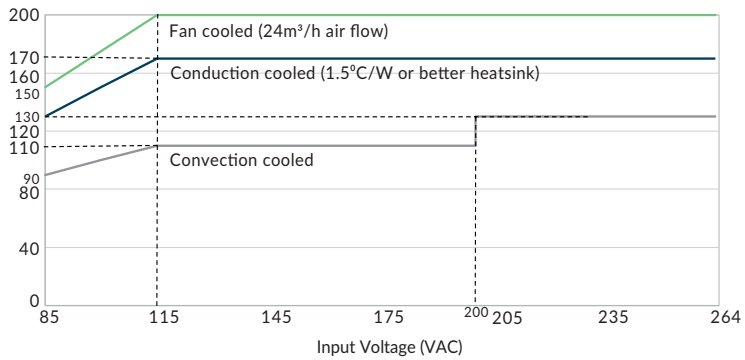
| Characteristic | Minimum | Typical | Maximum | Units | Notes & conditions |
|---|---|---|---|---|---|
| Efficiency | | 94 | | % | See models and ratings table |
| Isolation: input to output | 4000 | | | VAC | 2 x MOPP |
| input to ground | 1800 | | | VAC | 1 x MOPP |
| output to ground | 1500 | | | VAC | 1 x MOPP |
| Switching frequency | | 130/110 | | kHz | Main converter (varies with load, 15V model/others) |
| | 70 | | 140 | kHz | PFC (varies with load) |
| Power density | | | 1.7 | W/cm³ | Fan cooled |
| Patient leakage current | | | 75 | µA | |
| Mean time between failure | 450 | | | khrs | MIL-HDBK-217F, 25°C GB. |
| Weight | | 220 (0.485) | | g (lb) | |

## Environmental

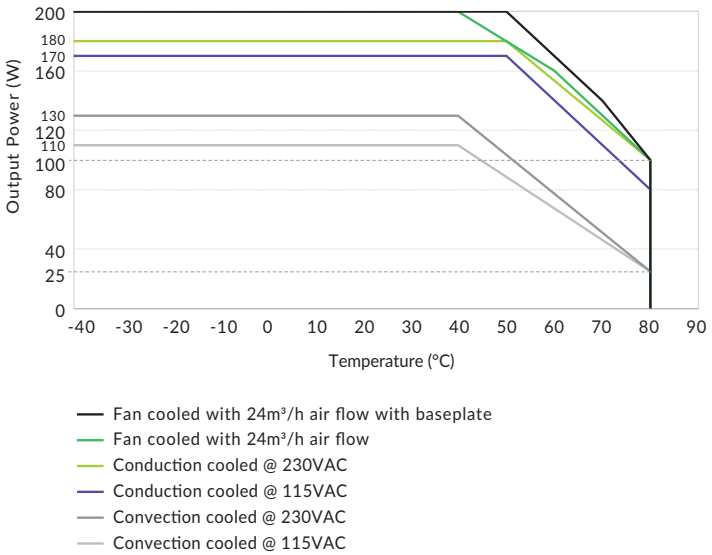
| Characteristic | Minimum | Typical | Maximum | Units | Notes & conditions |
|---|---|---|---|---|---|
| Operating temperature | -40 | | +80 | °C | See derating curve, safety approved to 50°C. |
| Storage temperature | -40 | | +85 | °C | |
| Cooling | 24 (14.0) | | | m³/h (CFM) | For fan cooled operation |
| Humidity | 5 | | 95 | %RH | Non-condensing |
| Operating altitude | | | 4000 / 5000 (2000) | m | Medical/ITE OVC II (OVC III) |
| Vibration | Single axis 10-500Hz at 2g sweep and endurance at resonance in all 3 planes. Conforms to EN60068-2-6 | | | | |
| Shock | ±3 x 30g shocks in each plane, total 18 shocks. 30g = 11ms (±0.5msecs), half sine. Conforms to EN60068-2-27 | | | | |
| Baseplate temperature | | | 95 | °C | When using conduction cooling, max baseplate temperature (measured at the center) is 95°C but some components are not thermally connected to the baseplate. The temperatures of these components may not exceed temperatures shown in the thermal considerations section on page 5. |

## Derating curve

### Input derating curve




### Thermal derating curve



## Emissions - EMC

| Phenomenon | Standard | Test level | Notes & conditions |
|---|---|---|---|
| Conducted | EN55032/EN55011 | Class B | |
| Radiated | EN55032/EN55011 | Class B | |
| Harmonic currents | EN61000-3-2 | Class A, C & D | Class C ≥80W |
| Voltage flicker | EN61000-3-3 | | |

## Emissions - immunity

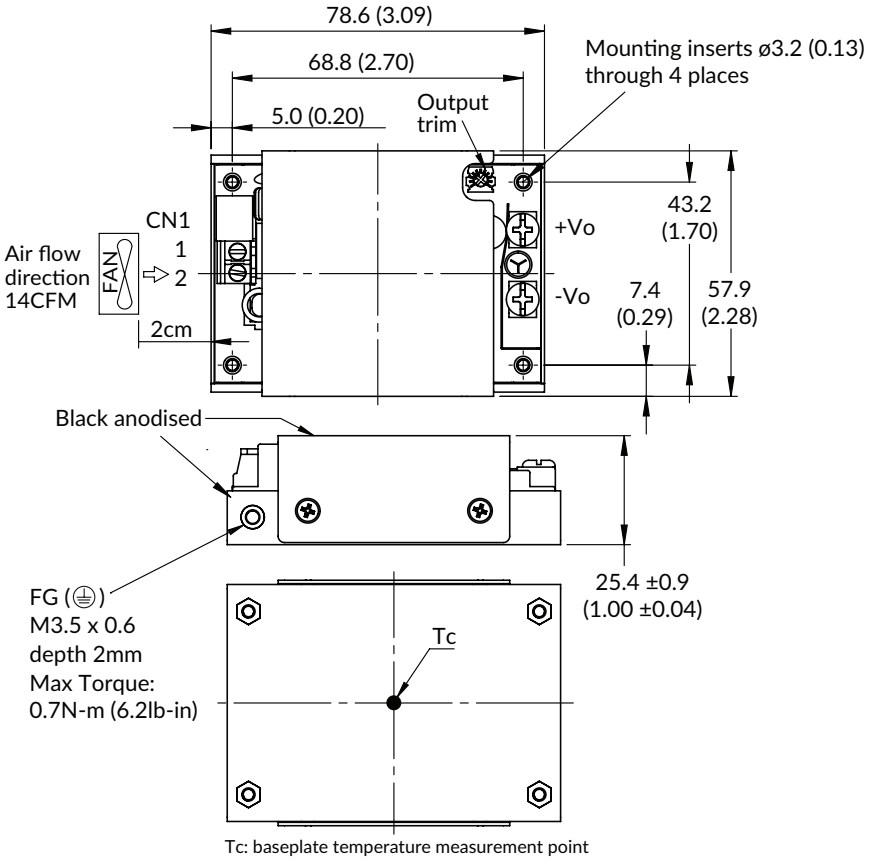
| Phenomenon | Standard | Test level | Criteria | Notes & conditions |
|---|---|---|---|---|
| Medical device EMC | IEC60601-1-2 | Ed.4.0 : 2014 | as below | |
| Low voltage PSU EMC | EN55035 | | as below | |
| ESD immunity | EN61000-4-2 | 4 | A | ±15kV air, ±8kV contact |
| Radiated immunity | EN61000-4-3 | 10V/m | A | |
| EFT/burst | EN61000-4-4 | ±2kV | A | |
| Surge | EN61000-4-5 | Installation class 4 | A | ±2kV line to line, ±4kV line to earth |
| Conducted | EN61000-4-6 | 6V | A | |
| Magnetic field | EN61000-4-8 | 30A/m | A | |
| Dips and interruptions | EN55035 (115VAC) | Dip 100% (0VAC), 10ms | A | |
| | | Dip 100% (0VAC), 20ms | A | |
| | | Dip 30% (80.5VAC), 500ms | B | |
| | | Dip 60% (46VAC), 100ms | B | |
| | | Dip 100% (0VAC), 5000ms | B | |
| | EN55035 (230VAC) | Dip 100% (0VAC), 10ms | A | |
| | | Dip 100% (0VAC), 20ms | A | |
| | | Dip 30% (181VAC), 500ms | A | |
| | | Dip 60% (92VAC), 100ms | A | |
| | | Dip 100% (0VAC), 5000ms | B | |
| | EN60601-1-2 (100VAC) | Dip 100% (0VAC), 10ms | A | |
| | | Dip 100% (0VAC), 20ms | A | |
| | | Dip 30% (70VAC), 500ms | B | |
| | | Dip 100% (0VAC), 5000ms | B | |
| | EN60601-1-2 (240VAC) | Dip 100% (0VAC), 10ms | A | |
| | | Dip 100% (0VAC), 20ms | A | |
| | | Dip 30% (168VAC), 500ms | A | |
| | | Dip 100% (0VAC), 5000ms | B | |

## Safety approvals

| Certification | Standard | Notes & conditions |
|---|---|---|
| CB report | IEC62368-1 | Audio/video, information and communication technology equipment |
| | IEC60601-1 | Medical |
| UL | UL62368-1 | Audio/video, information and communication technology equipment |
| | ANSI/AAMI ES60601-1 & CSA C22.2 No.60601-1 | Medical |
| EN | EN62368-1 | Audio/video, information and communication technology equipment |
| | EN60601-1 | Medical |
| CE | Meets all applicable directives | |
| UKCA | Meets all applicable legislation | |

| Isolation | Standard | Notes & conditions |
|---|---|---|
| Primary to Secondary | 2 x MOPP (Means of Patient Protection) | Class I for ITE<br>Class I & II for Medical |
| Primary to Earth | 1 x MOPP (Means of Patient Protection) | |
| Secondary to Earth | 1 x MOPP (Means of Patient Protection) | |

## Mechanical details




Tc: baseplate temperature measurement point

**AC input connector (CN1): ECE ETB22**

| Pin connections | | |
|---|---|---|
| **Pin** | **Function** | **Mating wire range** |
| 1 | ACL | 14-18AWG |
| 2 | ACN | |

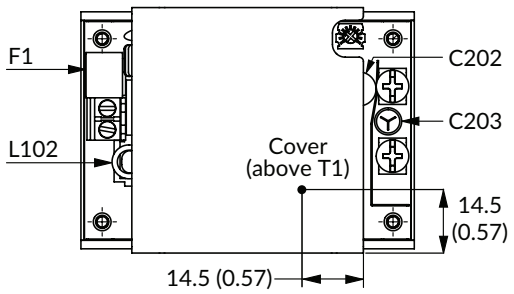
Max torque: 0.4N-m (3.5lb-in)

**Notes:**

1. All dimensions shown in mm (inches). Tolerance: ±0.5 (0.02).
2. Weight: Standard versions: 220g (0.485lb) approx.
3. DC output terminal screws are M4. Max Torque: 0.7N-m (6.2 lb-in)

## Thermal considerations

| Temperature measurements (at maximum ambient) | |
|---|---|
| **Component** | **Max temperature °C** |
| **L102** | 130°C |
| **Cover (above T1)** | 95°C |
| **F1** | 125°C |
| **C202** | 125°C |
| **C203** | 105°C |
| **Baseplate** | 95°C |




In order to ensure safe operation of the PSU in the end-use equipment, the temperature of the components listed in the table must not be exceeded.

Temperature should be monitored using K type thermocouples placed on the hottest part of the component (out of direct air flow).