

200J/s **BENCH MOUNT/
RACK MOUNT**

AC-HVDC CAPACITOR CHARGERS

The HCK200 series are highly-stable DC power supplies, designed specially to meet the requirements of capacitor charging and capacitor conditioning. They feature a robust output resistor to be able to withstand the demands of a pulsed load. The control circuit is designed for fast transitions from constant current to constant voltage operation.

The equipment is suitable for both continuous and pulsed charging, this is achieved using an adjustable constant current without overshoot. Capacitors with a resistive component are also suitable as loads. Usually, an external protective resistor is not required. It is, however, recommended for applications with very high levels of stored energy.

The specified maximum charging power is achieved when charging from zero volt (0) to the rated voltage. The HCK series can operate in circuits where the load capacitor is fully discharged with each pulse, or in circuits where the load capacitor is only partially discharged with each pulse. The charging process can either be continuous or triggered using the external trigger input.



Dimensions

See mechanical details table

Features

- Output voltages 0-2kVDC to 0-65kVDC
- Single phase AC input
- Continuous operation at full rated power
- Multi-function control panel with user friendly interface
- Digital, LAN and USB interface option
- Analog programming/interface option
- Manual voltage and current control with digital display
- Set-point display via push-button
- Set-point adjustment possible with disabled output
- Push-button switch for output voltage
- Adjustable overvoltage limit
- CE marked, EN61010-1 safety compliant
- Short circuit & arc protection
- 2 year warranty

Benefits

- Provides maximum device control & flexibility.
- Safe operation ensures maximum protection to the power supply
- High voltage release included for safe operation at high voltage output
- User friendly controls combined with bespoke terminal software gives greater flexibility
- Lighter than the leading brand products & easier to maintain
- Low cost of ownership

Applications

- Capacitor charging
- Capacitor conditioning

Models & Ratings

| Model Number | Polarity | Output Voltage | Charge Power | Output Current | Input Voltage | Frequency |
|---------------|------------|----------------|--------------|----------------|---------------|------------|
| HCK200-2000P | Positive | 0 to +2kV | 200J/s | 0 to 200mA | 230VAC, ±10% | 47 to 63Hz |
| HCK200-2000N | Negative | 0 to -2kV | | | | |
| HCK200-2000R | Reversible | 0 to 2kV | | | | |
| HCK200-3500P | Positive | 0 to +3.5kV | 200J/s | 0 to 100mA | 230VAC, ±10% | 47 to 63Hz |
| HCK200-3500N | Negative | 0 to -3.5kV | | | | |
| HCK200-3500R | Reversible | 0 to 3.5kV | | | | |
| HCK200-6500P | Positive | 0 to +6.5kV | 200J/s | 0 to 60mA | 230VAC, ±10% | 47 to 63Hz |
| HCK200-6500N | Negative | 0 to -6.5kV | | | | |
| HCK200-6500R | Reversible | 0 to 6.5kV | | | | |
| HCK200-12500P | Positive | 0 to +12.5kV | 200J/s | 0 to 30mA | 230VAC, ±10% | 47 to 63Hz |
| HCK200-12500N | Negative | 0 to -12.5kV | | | | |
| HCK200-12500R | Reversible | 0 to 12.5kV | | | | |
| HCK200-20000P | Positive | 0 to +20kV | 200J/s | 0 to 20mA | 230VAC, ±10% | 47 to 63Hz |
| HCK200-20000N | Negative | 0 to -20kV | | | | |
| HCK200-20000R | Reversible | 0 to 20kV | | | | |
| HCK200-35000P | Positive | 0 to +35kV | 200J/s | 0 to 10mA | 230VAC, ±10% | 47 to 63Hz |
| HCK200-35000N | Negative | 0 to -35kV | | | | |
| HCK200-35000R | Reversible | 0 to 35kV | | | | |
| HCK200-65000P | Positive | 0 to +65kV | 200J/s | 0 to 6mA | 230VAC, ±10% | 47 to 63Hz |
| HCK200-65000N | Negative | 0 to -65kV | | | | |
| HCK200-65000R | Reversible | 0 to 65kV | | | | |

Options

- Analog programming
- Analog programming, floating
- Computer Interfaces - IEEE 488, RS 232, RS 422, RS485, Profibus DP, LAN, USB (more on request)
- Interlock
- Message output voltage <50V
- Higher stability: Stability, over 8 hours under constant conditions $<\pm 1 \times 10^{-5}$
Temperature coefficient $<\pm 1 \times 10^{-5}/K$ within the specified temperature range
- Higher repetition frequency
- Heavy duty castors for rack unit
- Supply voltages other than that shown in the models & ratings table may be specified

Please consult XP Power Sales

Input

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|-----------------------|-------------------------|---------|---------|-------|------------------------------|
| Input Voltage | | | | | See models and ratings table |
| Efficiency | | 90 | | % | |
| Oversvoltage Category | | II | | | |
| Protection Class | | I | | | |
| Input Connector | IEC60320 C20 receptacle | | | | |

Output

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|-------------------------------------|--|---------|---------|-------|--|
| Output Voltage Range | 0 | | 65 | kV | See models and ratings table |
| Output Current Range | 0 | | 200 | mA | See models and ratings table |
| Output Control | Continuous adjustment from 0 to rated voltage/current by front panel mounted potentiometers | | | | |
| Output Polarity | See models and ratings table | | | | |
| Output Isolation | "0V" terminal is connected to the PE (EARTH), Current return preferably takes place via the screen of the output cable | | | | |
| Stability | | ±0.1 | | % | Over 8 hours under constant conditions after 30 min. warm up |
| Voltage Setting Range | With the VOLTAGE ten-turn potentiometer, approx. 0.1% to 100% of the rated value (stable operation from 1%) | | | | |
| Current Setting Range | With the CURRENT ten-turn potentiometer, approx. 0.1% to 100% of the rated value (stable operation from 1%) | | | | |
| Set Point Resolution | $<\pm 1 \times 10^{-3}$ of rated value with potentiometer on front panel $<\pm 1 \times 10^{-5}$ of rated value with fine potentiometer 1×10^{-4} of rated value with option interface | | | | |
| Residual Ripple of Charging Current | | | 10 | % | pk-pk, of the rated value |
| Accuracy | Voltage: $<\pm 0.2\%$ of the nominal value Current: within the range of $>5\text{mA}$ up to $<200\text{A}$: $\pm 0.2\%$ of the nominal value Outside the above mentioned range: $<\pm 0.5\%$ of the nominal value Additional digital display error $<\pm 2$ digits | | | | |
| Charge Voltage Reproducibility | $\pm 10\%$ mains voltage variation: $<\pm 1 \times 10^{-4}$ of rated value Over 8h: $<\pm 1 \times 10^{-3}$ of rated value in temperature range of $<\pm 2 \times 10^{-4}/\text{K}$ At repetition frequency of $<10\text{Hz}$: $<\pm 1 \times 10^{-3}$ of rated value At repetition frequency of $>10\text{Hz}$: $<\pm 1 \times 10^{-2}$ of rated value | | | | |
| Short Circuit Protection | The power supply is short-circuit and flash-over proof. The maximum current can be drawn at any output voltage even at short-circuit. | | | | |
| Repetition Frequency | | | 10 | Hz | Optional up to 100Hz |

Safety Approvals

| Safety Agency | Safety Standard | Notes & Conditions |
|---------------|----------------------------------|--------------------|
| EN | EN61010-1 | |
| CE | Meets all applicable directives | |
| UKCA | Meets all applicable legislation | |

Environmental

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|--------------------|---|---------------|---------|--------|-----------------------|
| Temperature Range | 0 | | +40 | °C | Operating and storage |
| Humidity | Max. relative humidity 80% up to +31°C, decreasing linearly down to 50% relative humidity at +40°C | | | | Operating |
| | No precipitation and max. relative humidity of 80% | | | | Storage |
| Cooling | Heat generated in the power supply unit is dissipated by convection or, in the case of high-power units >400J/s by forced cooling by ventilation. | | | | |
| Operating Altitude | | 6,500 (2,000) | | ft (m) | |
| Protection | Open/short circuits, arcs, overtemperature | | | | |

Signals & Controls

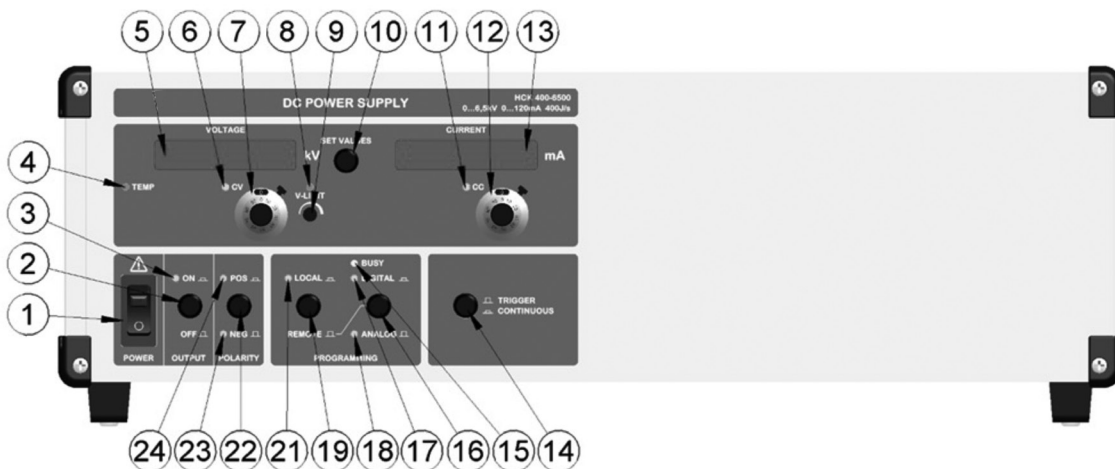
| | Function |
|-----------------------------------|---|
| Front panel | <p>Voltage and current potentiometer, power switch, HV ON/OFF switch, display for current and voltage, voltage limit potentiometer</p> <p>Display of the output voltage and current set points is possible with the VIEW SET push-button.</p> <p>Feedback after reaching the end of charge voltage is provided using an LED on the front panel and via a voltage-isolated interface – "Trigger" BU2 (optocoupler output).</p> |
| Capacitor charger operating modes | <p>The capacitor charger can be operated without limits over the entire working range. Thus, the rated current can be continuously drawn at maximum voltage. If suitable interface options are present, you can choose between LOCAL, ANALOGUE and DIGITAL operating modes. The HV output's polarity is positive, negative; or reversible (see models & ratings table).</p> |

EMC: Emissions

| Phenomenon | Standard | Notes & Conditions |
|-------------------|-------------|--------------------|
| Harmonic Currents | EN61000-6-2 | |
| Voltage Flicker | EN61000-6-3 | |

Mechanical Details

Front view with controls

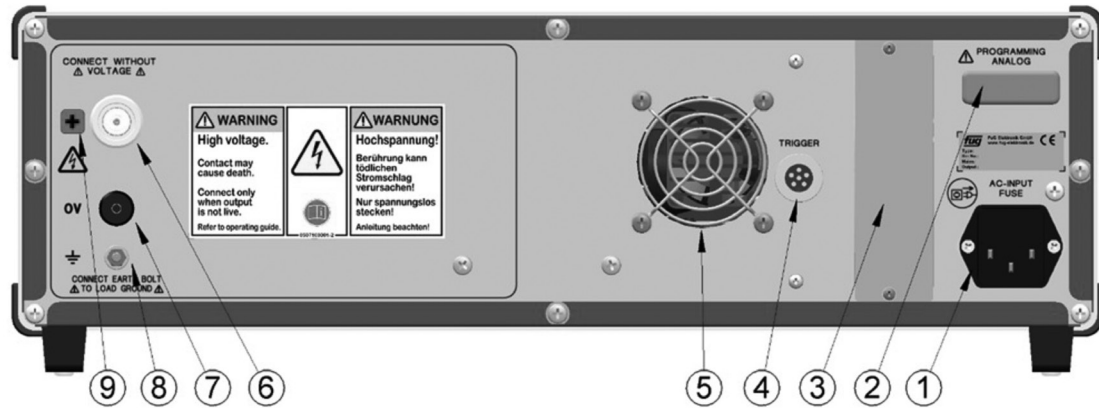


Front panel shown for illustrative purposes only, dimensions and layout differ by power rating - see mechanical details table.

| Number | Function | Number | Function |
|--------|--|--------|--|
| 1 | AC power switch with indicator light Disconnects the power supply from the mains, double-pole switching | 13 | Current display flashing: Set point; not flashing: Actual value |
| 2 | HV Output ON/OFF button (There is no mains disconnection) | 14 | Charging Mode – continuous charging or via external trigger |
| 3 | HV ON LED Lights up green when the regulation and therefore the power stage is operating (OUTPUT ON) | 15 | BUSY LED displays data traffic on the digital interface (Optional) |
| 4 | Over-temperature LED, internal device temperature too high, fan failure or blocked (Use is type-dependent) | 16 | Switching the operation mode between REMOTE/ANALOG and REMOTE/DIGITAL (Optional) |
| 5 | Voltage display flashing: Set point; not flashing: Actual value | 17 | LED indicating digital programming active (Optional) |
| 6 | LED for constant voltage control mode (constant voltage) | 18 | LED indicating analog programming active (Optional) |
| 7 | Lockable ten-turn potentiometer for output voltage adjustment | 19 | Switching the operation mode between LOCAL and REMOTE, control mode (Optional) |
| 8 | Air inlet (depending on device type) | 20 | Unused |
| 9 | Set-point limit adjustment for voltage V-LIMIT (can be operated with a screwdriver) | 21 | LED indicating local control mode active (Optional) |
| 10 | Push button for SET VALUES switch displays between set point and actual output mode, displays flash when in set point mode | 22 | Polarity reversal: Local output polarity selection Without polarity reversal, labelling of polarity using coloured label: RED: POSITIVE; BLUE: NEGATIVE (Optional) |
| 11 | LED for constant current mode (constant current) | 23 | LED for negative output voltage set (Optional polarity reversal) |
| 12 | Lockable Ten-turn-potentiometer for output current adjustment | 24 | LED for positive output voltage set (Optional polarity reversal) |

Mechanical Details

Rear view with single phase AC input



Rear panel shown for illustrative purposes only, dimensions and layout differ by power rating - see mechanical details table.

| Number | Function | Number | Function |
|--------|---|--------|---|
| 1 | AC input with mains fuses up to 400J/s: IEC connector (as shown) with integrated fuse, from 800J/s, C20 mains cable in accordance with IEC60320-C20, equipped with automatic circuit breaker. | 6 | HV output |
| 2 | 15-pin Sub-D connector for analog programming (Optional) | 7 | 0V load connection, internally connected to the 0V of the electronics. This 0V connection is permanently connected to the housing, the shielding of the output cable and to the PE conductor. |
| 3 | Slot for digital interface (e.g.: IEEE-488, RS232, USB, LAN, etc.) (Optional) | 8 | Earth bolt: This connection must be connected to the ground of the load |
| 4 | Trigger Socket (Trigger input and "charge complete" optocoupler output) | 9 | Polarity indication: RED: POSITIVE, BLUE: NEGATIVE RED/BLUE: OPTIONAL POLARITY REVERSAL SWITCH |
| 5 | Air outlet for forced cooling (depending on model) | | |

Charging Process

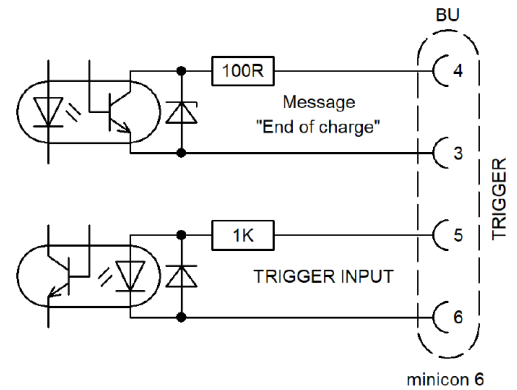
The power supplies are equipped with a “CONTINUOUS/TRIGGER” switch (14) and a 6-pin socket. In the “CONTINUOUS” position, charging happens continuously, in the “TRIGGER” position, charging takes place after release by an external signal on the 6-pin interface.

Trigger-Signal

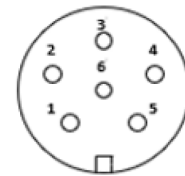
The triggering is floating via an optocoupler. This input is standardised and designed for a control voltage between +12V and +24V. The control power source polarity is positive to pin 5 and negative to pin 6.

End of charge

When the final charging voltage is reached, this is indicated by the “CV” LED (6) illuminating (voltage reached). It is also reported to the external controller via an optocoupler on the trigger connector. This signal is isolated and it is passed through a downstream transistor from the optocoupler. An open collector signal with 100Ω series resistor is available on pins 3 and 4. (The transistor conducts with approx. 50mA, pin 4 LOW = End of charge).



| Number | Function | Number | Function |
|--------|---------------------------|--------|-------------------|
| 1/2 | N/C | 5/6 | “Trigger” command |
| 3/4 | “CHARGE COMPLETE” message | 5 | ANODE |
| 3 | EMITTER | 6 | CATHODE GND |
| 4 | COLLECTOR | | |



MINICON 6 pin
(solder side of plug)

Mechanical Details

| Model Number | Mounting | Width | | Height | | Depth | Weight |
|---------------|----------------------------|-------|-------|--------|----------------------|----------------------|--------|
| HCK200-2000P | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 6kg |
| HCK200-2000N | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 6kg |
| HCK200-2000R | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 6kg |
| HCK200-3500P | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 7kg |
| HCK200-3500N | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 7kg |
| HCK200-3500R | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 7kg |
| HCK200-6500P | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 7kg |
| HCK200-6500N | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 7kg |
| HCK200-6500R | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 7kg |
| HCK200-12500P | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 450mm | 8kg |
| HCK200-12500N | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 450mm | 8kg |
| HCK200-12500R | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 450mm | 8kg |
| HCK200-20000P | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm ⁽²⁾ | 12kg |
| HCK200-20000N | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm ⁽²⁾ | 12kg |
| HCK200-20000R | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 450mm | 12kg |
| HCK200-35000P | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm ⁽²⁾ | 12kg |
| HCK200-35000N | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm ⁽²⁾ | 12kg |
| HCK200-35000R | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 450mm | 12kg |
| HCK200-65000P | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm ⁽³⁾ | 450mm ⁽²⁾ | 20kg |
| HCK200-65000N | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm ⁽³⁾ | 450mm ⁽²⁾ | 20kg |
| HCK200-65000R | Bench mount ⁽¹⁾ | 19" | 443mm | 5U | 221mm | 550mm | 35kg |

Notes:

1. Rack mount option
2. With polarity reversal switch these units will be 100mm deeper.
3. With polarity reversal switch these units will be 2-3U higher

Cables

Mains input cable

Single phase mains: with CEE-7/7

Mating connectors

For control inputs and outputs not included (digital interface cables are commercially available).

Screened HV output cable

3m long with mating connector fitted one end only. Delivered short circuited for safety reasons.