

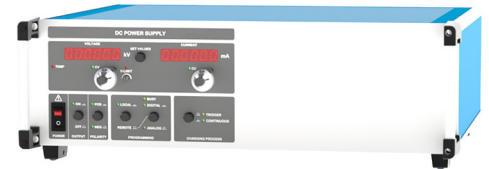
Charge power 400J/s Bench mount/ rack mount

AC-HVDC
capacitor chargers 

The HCK400 series are 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.



Features

- ▶ Output voltages 0-2kVDC to 0-65kVDC
- ▶ Single phase AC input
- ▶ Suitable for continuous or trickle charging
- ▶ Continuous or external triggered charging mode selectable
- ▶ Charging takes place with adjustable constant current without overshooting
- ▶ End of charge signal, when the final voltage is reached via LED and potential-free contact
- ▶ Repetition frequency typical <10Hz
- ▶ Multi-function control panel with user friendly interface
- ▶ Digital and/or analog interface option
- ▶ Manual voltage and current control with digital display
- ▶ Set-point display via a 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 simple terminal software gives greater flexibility
- ▶ Special solutions are available, visit our [more resources](#) section to see our full range of options

Applications



- ▶ Capacitor charging
- ▶ Capacitor conditioning
- ▶ Particle accelerator
- ▶ Pulsed applications
- ▶ Material crushing
- ▶ Cable testing
- ▶ Electromagnetic fields
- ▶ Renewable energy

Dimensions

Click the link to the dimensions table

→ [mechanical details](#)

More resources

Click the link or scan the code

→ xppower.com



Models & ratings

| Model number | Polarity | Output voltage | Output current | Input voltage | Frequency | Connectors | HV-cable |
|--------------|------------|----------------|----------------|--------------------|------------|------------|-----------|
| HCK2.0P400S | Positive | 0 to +2kV | 0 to 400mA | 230VAC, $\pm 10\%$ | 47 to 63Hz | SHV-10 | RG58 |
| HCK2.0N400S | Negative | 0 to -2kV | | | | | |
| HCK2.0R400S | Reversible | 0 to 2kV | | | | | |
| HCK3.5P200S | Positive | 0 to +3.5kV | 0 to 200mA | 230VAC, $\pm 10\%$ | 47 to 63Hz | F3415 | 130 660 |
| HCK3.5N400S | Negative | 0 to -3.5kV | | | | | |
| HCK3.5R200S | Reversible | 0 to 3.5kV | | | | | |
| HCK6.5P120S | Positive | 0 to +6.5kV | 0 to 120mA | 230VAC, $\pm 10\%$ | 47 to 63Hz | F3415 | 130 660 |
| HCK6.5N120S | Negative | 0 to -6.5kV | | | | | |
| HCK6.5R120S | Reversible | 0 to 6.5kV | | | | | |
| HCK012P060S | Positive | 0 to +12.5kV | 0 to 60mA | 230VAC, $\pm 10\%$ | 47 to 63Hz | F3430 | RG11 |
| HCK012N060S | Negative | 0 to -12.5kV | | | | | |
| HCK012R060S | Reversible | 0 to 12.5kV | | | | | |
| HCK020P040S | Positive | 0 to +20kV | 0 to 40mA | 230VAC, $\pm 10\%$ | 47 to 63Hz | KS150 | C2032 SVJ |
| HCK020N040S | Negative | 0 to -20kV | | | | | |
| HCK020R040S | Reversible | 0 to 20kV | | | | | |
| HCK035P020S | Positive | 0 to +35kV | 0 to 20mA | 230VAC, $\pm 10\%$ | 47 to 63Hz | KS160 | C2124 |
| HCK035N020S | Negative | 0 to -35kV | | | | | |
| HCK035R020S | Reversible | 0 to 35kV | | | | | |
| HCK065P012S | Positive | 0 to +65kV | 0 to 12mA | 230VAC, $\pm 10\%$ | 47 to 63Hz | KS160 | C2124 |
| HCK065N012S | Negative | 0 to -65kV | | | | | |
| HCK065R012S | Reversible | 0 to 65kV | | | | | |

Notes:

1. For further information, please refer to the [cables & connectors](#) guide.

Options

- Analog programming/interface
- Analog programming/interface, floating
- Computer interfaces IEEE 488, RS 232, RS 422, RS 485, Profibus, USB, LAN (more on request)
- Repetition Frequency up to 100Hz

For further information about options and special solutions, please click on any of the links below:

Special solutions & modifications

→ [view options](#)

Analog programming & interfaces

→ [view options](#)

Digital programming & interfaces

→ [view options](#)

Or consult XP Power Sales directly.

Input

| Characteristic | Minimum | Typical | Maximum | Units | Notes & conditions |
|----------------------|----------------------------------|---------|---------|-------|--------------------|
| Input voltage | See models and ratings table | | | | |
| Efficiency | | 90 | | % | |
| Overvoltage category | | II | | | |
| Protection class | | I | | | |
| Input connector | IEC 60320-1 C14 receptacle | | | | |
| Input cable | Single phase mains: with CEE-7/7 | | | | |

Output

| Characteristic | |
|-------------------------------------|--|
| Output voltage range | See models and ratings table |
| Output current range | 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) but may be disconnected as needed. Current return preferably takes place via the screen of the output cable |
| HV output connection | Mating HV connector and 3m cable supplied |
| 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 option fine potentiometer with option interface 16-bit resolution incl. sign bit (max. 22bit) |
| Residual ripple of charging current | Max. 10% pp of the rated value (measuring bandwidth 30 Hz to 10 MHz) |
| 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 change 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 | typically $< 10\text{ Hz}$, up to 100 Hz on request |

Environmental

| Characteristic | Minimum | Typical | Maximum | Units | Notes & conditions |
|-----------------------|----------------------------------|---------|---------|-------|---|
| Temperature operation | 0 | | +40 | °C | |
| Storage temperature | -20 | | +50 | °C | |
| Humidity - operation | | | +80 | % | Up to +31°C, decreasing linearly down to 50% RH at 40°C |
| Humidity - storage | | | +80 | % | No precipitation, dust-free and dry |
| Operating altitude | | | 2000 | m | Above sea level |
| Pollution degree | | 1 | | | |
| Ingress protection | IP20 | | | | |
| Operation location | Only for use in dry indoor areas | | | | |

Signals & controls

| | Function |
|-----------------|---|
| Front panel | Voltage and current potentiometer, power switch, HV ON/OFF switch, digital display for current and voltage, voltage limit potentiometer. Display of the output voltage and current set points is possible with the VIEW SET push-button. Charging mode selectable via front switch, feedback via LED. |
| Operating modes | A continuous or external triggered charging mode can be selected. External charging control with potential free trigger input and "Charge Complete" output via optokoppler (details on page 7). The power supplies can be operated in the LOCAL, ANALOG (optional) and DIGITAL (optional) operating modes. |

EMC: immunity & emissions

| Phenomenon | Standard | Notes & conditions |
|------------|-------------|--|
| Immunity | EN61000-6-1 | Standard for residential, commercial and light-industrial environments |
| Emissions | EN61000-6-3 | Standard for equipment in residential environments |

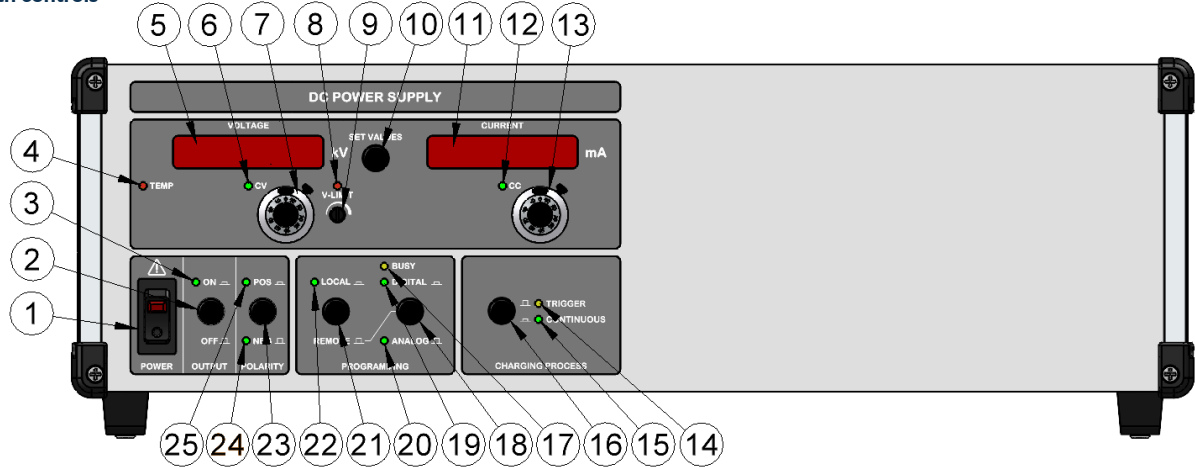
Safety approvals

| Safety agency | Safety standard | Notes & conditions |
|---------------|---------------------------------|--------------------|
| EN | EN61010-1 | |
| CE | Meets all applicable directives | |



Mechanical details

Front view with controls



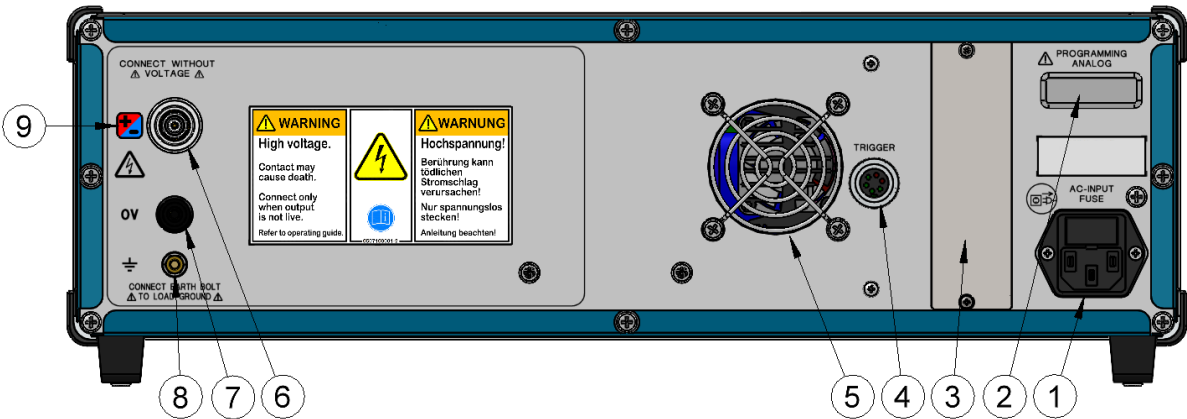
Example: HCK with dimensions: width 19"/443mm; height 3U/133mm

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

| Number | Function | Number | Function |
|--------|---|--------|--|
| 1 | POWER switch (AC) with indicator light: Disconnects the power supply from the mains, two-pole switching. | 14 | TRIGGER LED: Illuminated yellow indicating the external TRIGGER charging progress is active. |
| 2 | OUTPUT switch (DC). There is no mains disconnection! | 15 | LED CONTINUOUS: Illuminated green indicating the CONTINUOUS charging progress is active. |
| 3 | ON LED: DC output ON. Illuminated green when the controller and power stage are ON. | 16 | CHARGING PROCESS switch: adjustment for charging mode CONTINUOUS or via external TRIGGER. |
| 4 | TEMP LED: Illuminated red indicating overtemperature. Internal temperature too high, fan failed or airflow blocked. | 17 | BUSY LED: Illuminated yellow indicating data traffic on the digital interface. (Optional) |
| 5 | VOLTAGE display: Indicating actual value. Displays set point when flashing. | 18 | DIGITAL/ANALOG operation mode switch: Switches between REMOTE/ANALOG mode and REMOTE/DIGITAL mode. (Optional) |
| 6 | CV LED: Illuminated green indicating constant voltage mode. | 19 | DIGITAL LED: Illuminated green indicating digital programming active. (Optional) |
| 7 | Voltage adjustment: Ten-turn potentiometer with lockable precision dial. | 20 | ANALOG LED: Illuminated green indicating analog programming active. (Optional) |
| 8 | V-LIMIT LED for active voltage set-point limit. | 21 | LOCAL/REMOTE operation mode switch: Switches between LOCAL mode and REMOTE mode. (Optional) |
| 9 | V-LIMIT Set-point limitation adjustment for voltage (can only be operated with a screwdriver). | 22 | LOCAL LED: Illuminated green indicating LOCAL control mode active. (Optional) |
| 10 | SET VALUES switch: Switches displays between actual value and set value. | 23 | POLARITY switch: Local output polarity adjustment (Optional) Without polarity reversal, polarity labelled using coloured stickers: RED: POSITIVE; BLUE: NEGATIVE |
| 11 | CURRENT display: Indicating actual value. Displays set point when flashing. | 24 | NEG LED set for negative output voltage. (Optional reverse polarity switch) |
| 12 | CC LED: Illuminated green indicating constant current control mode. | 25 | POS LED set for positive output voltage. (Optional reverse polarity switch) |
| 13 | Current adjustment: Ten-turn potentiometer with lockable precision dial. | | |

Mechanical details

Rear view with single phase AC input



Example: HCK with polarity reversal and dimension: width 19"/443mm; height 3U/133mm

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: IEC connector (as shown) with integrated fuse. | 6 | HV output: dedicated for screened HV-cable with grounded shield, wich can be used for current return. |
| 2 | 15-pin Sub-D connector for analogue programming. (Optional) | 7 | 0V load connection: internally connected to the 0V of the electronics. Is permanently connected to the protective conductor (PE). |
| 3 | Slot for digital interface (e.g.: IEEE-488, RS232, USB, LAN, ...). (Optional) | 8 | Earth connection: is permanently connected to the protective earth (PE). Can be connected to the ground of the load. |
| 4 | TRIGGER Socket: Trigger input and "Charge Complete" optocoupler output. | 9 | Polarity indications: RED: POSITIVE BLUE: NEGATIVE RED/BLUE: REVERSE POLARITY SWITCHING |
| 5 | Air outlet (depending on model). | | |

Charging process

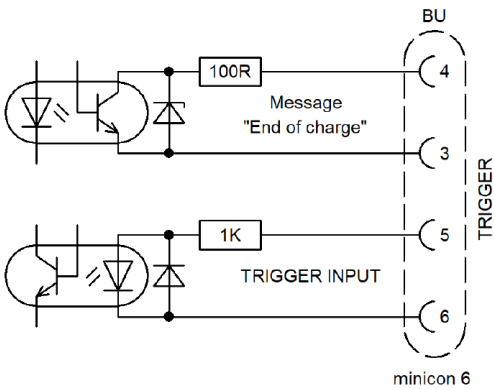
The power supplies are equipped with a “CONTINUOUS/TRIGGER” switch (14) and a 6-pin socket. In the “CONTINUOUS” position, charging happens continuously, in the “TRIGGER” position, charging takes place after release by an external signal on the 6-pin interface.

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 | | |



Mechanical details

| Model Number | Mounting | Width | | Height | | Depth | Weight ⁽²⁾ |
|--------------|----------------------------|-------|-------|--------|-------|-------|-----------------------|
| HCK2.0P400S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 11kg |
| HCK2.0N400S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 11kg |
| HCK2.0R400S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 11kg |
| HCK3.5P200S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 11kg |
| HCK3.5N400S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 11kg |
| HCK3.5R200S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 11kg |
| HCK6.5P120S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 11kg |
| HCK6.5N120S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 11kg |
| HCK6.5R120S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 350mm | 11kg |
| HCK012P060S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 550mm | 15kg |
| HCK012N060S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 550mm | 15kg |
| HCK012R060S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 550mm | 15kg |
| HCK020P040S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 550mm | 15kg |
| HCK020N040S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 550mm | 15kg |
| HCK020R040S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 550mm | 15kg |
| HCK035P020S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 550mm | 30kg |
| HCK035N020S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 550mm | 30kg |
| HCK035R020S | Bench mount ⁽¹⁾ | 19" | 443mm | 3U | 133mm | 550mm | 30kg |
| HCK065P012S | Bench mount ⁽¹⁾ | 19" | 443mm | 7U | 310mm | 550mm | 55kg |
| HCK065N012S | Bench mount ⁽¹⁾ | 19" | 443mm | 7U | 310mm | 550mm | 55kg |
| HCK065R012S | Bench mount ⁽¹⁾ | 19" | 443mm | 9U | 399mm | 550mm | 70kg |

- Notes:
- 1. Rack mount options available, click on the link below for full details.
 - 2. All weights are approximate.

Rack mount options

→ [view options](#)