OR-35 Series HV Pulsed Power Supply

Model WE-OR-35 · 3 kV / 3 kA Capacitor-Bank Discharge PSU for Pulsed Magnet & High-Energy Physics Applications

PRODUCTION FAT and SAT passed · 6-unit deployment · 3 PSUs per 42U rack · 0–3 kV in 10 V steps · SOUP UDP control · Fiber optic trigger · ≥10,000 pulse lifetime

Doc Ref: WE-OR-000035 · Rev Production · 2024-04-17

High-Voltage Capacitor Discharge Performance with Precision Triggering

The Woodruff Engineering High-Voltage Pulsed Power Supply Model WE-OR-35 delivers 0–3 kV output at up to 3 kA peak current through a rack-mounted capacitor-bank discharge architecture, utilizing an internal 600–700 µF high-voltage capacitor array optimized for rapid energy delivery into pulsed electromagnet, plasma discharge, or transient test loads. The system features fiber optic trigger input for electrical isolation and immunity to electromagnetic interference, responding to external trigger commands in under 1 millisecond to initiate capacitor discharge through controlled thyristor or IGBT switching networks. This fast-trigger capability combined with the substantial stored energy (up to 3.15 kilojoules at 3 kV) makes the WE-OR-35 ideally suited for applications requiring repeatable high-current pulses with precise timing control, including fusion diagnostics, electromagnetic forming, capacitor discharge welding, and pulsed magnetic field research where microsecond-level synchronization between multiple power channels is critical.

Multi-Unit Synchronization and Ethernet-Based Control Architecture

Designed explicitly for multi-unit synchronized deployment, the WE-OR-35 enables coordinated operation of up to six independent power supplies discharging within ±0.050 milliseconds of each other—critical for applications such as multi-coil pulsed magnet arrays, phased plasma heating systems, or distributed electromagnetic launchers where field uniformity or precise energy sequencing depends on sub-millisecond timing accuracy across parallel channels. Each unit charges from standard 120 VAC mains input to full programmable voltage in under 5 minutes, with output voltage settable in 10-volt increments over Ethernet UDP communication using the Simple Over UDP Protocol (SOUP), allowing centralized control and monitoring of entire multi-unit installations through standard network infrastructure. This networked control architecture simplifies integration with facility automation systems, experimental sequencing controllers, or supervisory data acquisition platforms, while the capacitor bank's rapid recharge capability supports duty cycles suitable for laboratory research environments requiring tens to hundreds of pulses per day without extended idle periods between shots.

Comprehensive Safety Systems and Rack-Integrated Mechanical Design

Safety systems are integrated at multiple layers: automatic capacitor dump circuitry discharges stored energy to below 50 volts within 60 seconds upon mains power loss, preventing hazardous residual voltages during service or emergency conditions, while a slow internal bleed resistor network ensures complete discharge to 0 volts within 24 hours for long-term safe storage or extended maintenance periods. A continuously illuminated HV LIVE warning lamp provides immediate visual indication of energized capacitor status, and the fail-safe isolated floating high-voltage rail architecture prevents ground fault currents and enables differential voltage measurements across load terminals. All units are housed in 19-inch standard rack enclosures with IP30 ingress protection (≤22″ H × 19″ W × 34″ D, <150 lb per unit), featuring UL/CE-certified components throughout and

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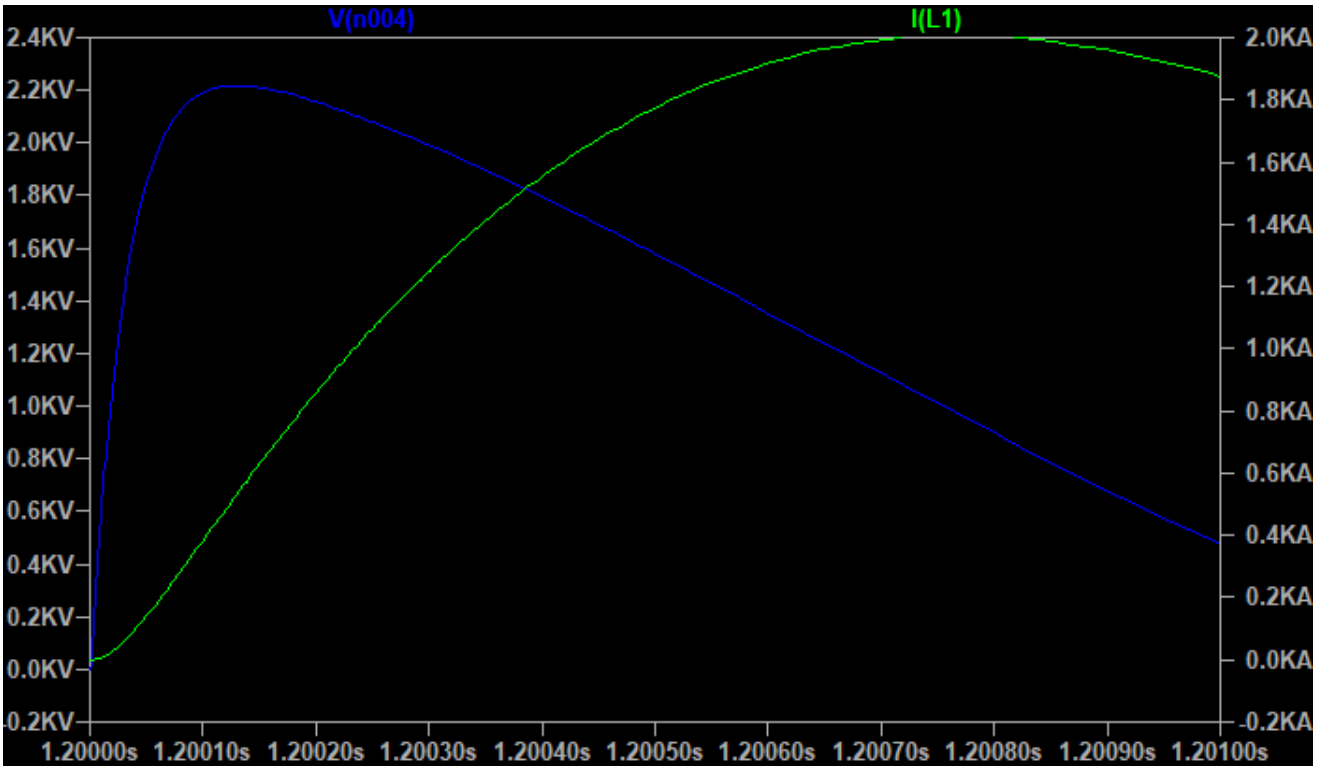
Production datasheet reviewed & accepted requirements.

security Torx fasteners to prevent unauthorized access to internal high-voltage components. The compact form factor allows installation of three complete WE-OR-35 units per standard 42U equipment rack mounted on heavy-duty castered frames, enabling mobile or semi-permanent laboratory installations with integrated cooling, power distribution, and cable management for turnkey deployment in research facilities requiring multi-channel pulsed power capabilities.

Example expected waveform



Waveform will vary depending on the load.

MODEL WE-OR-35

High-Voltage Capacitor Discharge Power Supply

0–3 kV @ 3 kA Peak • 600–700 µF Capacitor Bank • Fiber Optic Trigger • Multi-Unit Synchronization

ELECTRICAL OUTPUT SPECIFICATIONS

Output Voltage Range	0 – 3000 V DC *Programmable in 10V increments*
Maximum Peak Current	3000 A (3 kA) *Into low-impedance loads during discharge*
Voltage Resolution	10 V steps *Networked setpoint control via Ethernet UDP*
Maximum Stored Energy	3.15 kJ @ 3 kV *$E = ½CV^2 = 0.5 \times 650\ \mu F \times (3000\ V)^2$*
Output Configuration	Isolated floating HV rail *Fail-safe design, no earth ground reference*
Load Impedance Range	0.1 – 10 Ω typical *Optimized for electromagnet coils and resistive loads*
Discharge Waveform	Damped sinusoidal or RLC decay *Determined by load inductance and resistance*
Typical Pulse Width	1 – 100 ms *Depends on load L/R time constant*
Peak Power Delivery	~4.5 MW instantaneous *3 kV × 3 kA at current peak (load dependent)*
Polarity	Unipolar (single polarity) *Positive or negative configurable at installation*

CAPACITOR BANK SPECIFICATIONS

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Total Capacitance	600 – 700 µF *High-voltage film capacitors, series/parallel configuration*
Capacitor Voltage Rating	3500 V DC working voltage *Individual capacitor rated >3.5 kV for safety margin*
Capacitor Technology	Metallized polypropylene film *Self-healing, high dV/dt capability for pulsed discharge*
Number of Capacitor Elements	8 – 12 individual units *Series-parallel configuration for voltage and capacitance*
ESR (Equivalent Series Resistance)	<10 mΩ total *Low ESR for high peak current delivery*
ESL (Equivalent Series Inductance)	<500 nH total *Minimized for fast rise time*
Peak Discharge Current Rating	>5 kA per capacitor *Individual capacitor peak current capability*
Ripple Current Rating	100 A RMS continuous *Repetitive pulsed operation thermal limit*
Lifetime	>100,000 charge/discharge cycles *At rated voltage and current*
Operating Temperature	-25°C to +85°C *Capacitor internal temperature range*

TRIGGER AND SYNCHRONIZATION SYSTEM

Trigger Input Type	Fiber optic (ST or SC connector) *Electrical isolation for EMI immunity*
Trigger Response Time	<1 millisecond *From optical trigger to capacitor discharge initiation*
Trigger Threshold	TTL-compatible optical signal *Standard fiber optic transmitter interface*

Multi-Unit Synchronization	±0.050 ms (±50 µs) jitter *6 units discharging from common trigger source*
Trigger Delay Adjustment	0 – 10 ms programmable *Per-unit delay for phased discharge sequences*
Minimum Inter-Pulse Interval	5 minutes (charge time dependent) *Limited by capacitor recharge rate*
Trigger Fiber Length	Up to 100 meters *Standard multimode fiber optic cable*
External Trigger Compatibility	TTL, CMOS, isolated relay *Via fiber optic transmitter module (customer-provided)*
Trigger Arming Interlock	Software-enabled *Prevents accidental discharge until armed via network command*

DISCHARGE CONTROL SYSTEM (SWITCHING)

Switching Device Type	High-voltage thyristor (SCR) or IGBT *Solid-state switching for reliability and fast response*
Voltage Blocking Rating	>4 kV *Sufficient margin above 3 kV capacitor voltage*
Current Rating	>5 kA surge current *Single-cycle discharge capability*
Turn-On Time	<5 microseconds *From trigger gate signal to full conduction*
Snubber Circuit	RC snubber across switch *Protects semiconductor from voltage spikes during commutation*
Crowbar Protection	Optional short-circuit crowbar *Emergency fast discharge on fault detection*

Gate Drive System	Isolated fiber optic gate driver *Electrically isolated from control electronics*
Discharge Path	Direct capacitor → switch → load *Minimized series inductance for fast rise time*

CHARGING SYSTEM

Input Power	120 VAC, 60 Hz, single-phase *Standard North American mains power*
Input Current	15 A maximum *At full charging rate*
Charging Time	<5 minutes to full voltage *0 to 3 kV charge time at maximum charge rate*
Charger Topology	High-voltage DC supply with current limiting *Transformer-rectifier or resonant converter architecture*
Charging Current	2 – 5 mA constant current *Controlled charge rate to prevent capacitor stress*
Charge Regulation	Constant current → constant voltage *Transitions to CV mode at setpoint voltage*
Voltage Setpoint Accuracy	±1% of setting *At final charge voltage*
Voltage Monitoring	High-voltage divider with isolation *Real-time capacitor voltage measurement*
Automatic Charge Inhibit	Disables charging on interlock fault *Safety system prevents charging with open access*
Charge Complete Indicator	LED + network status *Visual and remote indication*

CONTROL AND COMMUNICATION SYSTEM

Network Interface	Ethernet 10/100 Mbps *RJ45 connector, standard TCP/IP networking*
Control Protocol	Simple Over UDP Protocol (SOUP) *Lightweight UDP-based command/response protocol*
Voltage Setting Resolution	10 V increments *0, 10, 20, ... 2990, 3000 V selectable*
Network Commands	Set voltage, arm, disarm, status query *ASCII command strings over UDP*
Status Reporting	Voltage, charge state, fault status *Real-time telemetry via UDP broadcast or query*
IP Configuration	Static IP or DHCP *User-configurable network settings*
Response Time	<100 ms *Network command to PSU response*
Multi-Unit Addressing	Individual IP per unit *Independent control of up to 6 synchronized units*
Firmware Updates	Ethernet bootloader *Field-upgradable firmware via network*
Local Indicators	LED status display *Power, network, charge, fault, HV live*

PROTECTION AND SAFETY SYSTEMS

Automatic Dump on Mains Loss	Discharges to <50 V within 60 seconds *Active dump circuit triggers on AC power failure*
Slow Bleed Resistor	Fully discharges to 0 V within 24 hours *Passive resistor network for long-term safety*
Bleed Resistor Value	~1 – 10 MΩ *High resistance for minimal standby power loss*

HV LIVE Warning Lamp	Flashing red LED indicator *Visible warning when capacitor voltage >50 V*
Isolated Floating HV Rail	No earth ground reference *Prevents ground fault currents, enables differential measurements*
Access Interlocks	Disables charging when enclosure open *Prevents operator exposure to high voltage*
Overcurrent Detection	Load current monitoring *Fault logging on excessive discharge current*
Overvoltage Protection	Hardware limit at 3.2 kV *Prevents capacitor overcharge*
Ground Fault Detection	Optional isolation monitor *Detects leakage current to chassis ground*
Emergency Stop	Physical E-stop button *Immediately dumps capacitors and disables charging*

MECHANICAL SPECIFICATIONS

Enclosure Type	19-inch rack-mount chassis *Standard EIA-310-D compliant rack enclosure*
Dimensions (Single Unit)	≤22″ H × 19″ W × 34″ D *≤559 mm × 483 mm × 864 mm (≤12U rack height)*
Weight (Single Unit)	<150 lb (<68 kg) *Including capacitors, charging system, and chassis*
Rack Configuration	3 units per 42U rack *Mounted on heavy-duty castered frame*
Ingress Protection	IP30 *Protected against solid objects >2.5 mm*
Chassis Material	Steel or aluminum

	Powder-coated finish
Fasteners	Security Torx throughout *Prevents unauthorized access to high-voltage internals*
Front Panel	Status LEDs, E-stop, network port *Operator interface and safety controls*
Rear Panel	HV output terminals, AC input, fiber optic trigger *High-voltage connectors with insulating boots*
Mounting Hardware	Rack ears and slides included *Tool-less rack installation compatible*
Cable Management	Integrated strain relief *HV output cable retention and bending radius protection*

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	0°C to +40°C *Ambient air temperature range*
Storage Temperature	-20°C to +60°C *Non-operating storage range*
Humidity	10% to 90% RH non-condensing *Typical indoor laboratory environment*
Altitude	≤2000 meters *Voltage breakdown derating required above 2000 m*
Cooling Method	Forced air (internal fans) *Self-contained convection cooling*
Cooling Airflow	Front-to-rear *Requires minimum 6 inches clearance front and rear*
Acoustic Noise	<60 dB(A) @ 1 meter *During standby and charging (fans running)*

Installation Location	Indoor laboratory environment *Controlled temperature and humidity*

COMPLIANCE AND CERTIFICATION

Component Certification	UL and CE certified components *All major electrical components carry safety certifications*
High-Voltage Safety Standards	IEC 61010-1 compliant design *Electrical equipment for measurement, control, and laboratory use*
EMC Compliance	Designed to FCC Part 15 Class A *Industrial EMI/EMC emissions and immunity*
Safety Labeling	ANSI Z535 warning labels *High-voltage hazard markings per US safety standards*
Documentation	Operation manual, schematics, test reports *Complete technical documentation package*

PERFORMANCE SPECIFICATIONS

Voltage Ripple (Charged State)	<1% of setpoint *Capacitor voltage stability while armed*
Voltage Droop (Standby)	<5% per hour *Self-discharge rate when fully charged and armed*
Discharge Energy Efficiency	>95% *Percentage of stored energy delivered to load (minimal resistive losses)*
Charge Efficiency	>90% *AC mains to capacitor storage efficiency*
Rise Time (Into Resistive Load)	<10 µs to 90% peak current *1 Ω load, limited by circuit inductance*

Jitter (Trigger to Discharge)	<10 µs unit-to-unit *Timing variation on common trigger signal*
Repetition Rate	Up to 12 shots per hour *Limited by 5-minute charge time*
MTBF (Mean Time Between Failures)	>10,000 hours *Estimated from component ratings at rated duty cycle*

KEY FEATURES

Fiber Optic Trigger for EMI Immunity: Electrical isolation via fiber optic trigger input eliminates ground loops and provides complete immunity to electromagnetic interference during pulsed discharge events. Sub-millisecond response time (<1 ms) ensures precise synchronization with external experimental sequencing or data acquisition systems, while the optical interface allows safe trigger signal transmission across high-voltage isolation barriers without risk of arcing or voltage breakdown.

Multi-Unit Synchronization (±50 µs): Designed for coordinated operation of up to six independent WE-OR-35 units discharging within ±0.050 milliseconds (±50 microseconds) of each other from a common trigger source, enabling applications such as multi-coil pulsed magnet arrays, phased plasma discharge systems, or distributed electromagnetic forming where precise energy delivery timing across multiple channels is critical for field uniformity, plasma symmetry, or synchronized force application.

Ethernet UDP Control (SOUP Protocol): Simple Over UDP Protocol (SOUP) provides lightweight, low-latency network control for voltage setpoint (10V increments), arming/disarming, and real-time status monitoring over standard Ethernet infrastructure. Individual IP addressing per unit enables centralized control of multi-unit installations through facility automation systems, LabVIEW, Python, or custom experimental control software without proprietary drivers or complex communication protocols.

Three-Tier Safety Architecture: Active automatic dump circuit discharges capacitors to below 50 volts within 60 seconds on AC mains loss, providing immediate safety during power failures or emergency shutdowns. Passive slow bleed resistor network ensures complete discharge to 0 volts within 24 hours for long-term safe storage, maintenance, or equipment decommissioning. Fail-safe isolated floating high-voltage rail architecture prevents ground fault currents and enables differential voltage measurements across load terminals while maintaining operator safety through multiple independent discharge paths.

Compact Rack-Mounted Deployment: Standard 19-inch rack enclosure (≤22″ H × 19″ W × 34″ D, <150 lb) with IP30 ingress protection enables installation of three complete WE-OR-35 units per standard 42U equipment rack mounted on heavy-duty castered frames. Modular design simplifies laboratory deployment, allows mobile or semi-permanent installations, and integrates with existing rack infrastructure for power distribution, cooling, and cable management. Security Torx fasteners

throughout prevent unauthorized access to internal high-voltage components while allowing rapid authorized service and maintenance.

High-Energy-Density Capacitor Bank: 600–700 µF metallized polypropylene film capacitor bank stores up to 3.15 kilojoules at 3 kV, providing substantial energy delivery into pulsed electromagnet, plasma discharge, or transient test loads with peak currents up to 3 kA. Low equivalent series resistance (<10 mΩ) and inductance (<500 nH) enable fast rise times (<10 µs into resistive loads) and high peak power delivery (~4.5 MW instantaneous), while self-healing film technology and >100,000 cycle lifetime ensure reliable long-term operation in repetitive pulsed applications.

HIGH-VOLTAGE CAPACITOR DISCHARGE POWER SUPPLIES — Product Variants

Rack-Mounted Capacitor Banks • Fiber Optic Trigger • Multi-Unit Synchronization • Ethernet UDP Control

MODEL	VOLTAGE RANGE	PEAK CURRENT	C	STORED ENERGY	TRIGGER RESPONSE	RACKSIZE	FUSION APPLICATIONS	LEADTIME
WE-OR-35-050V-10KA	0–50 V	10 kA	8 F (8,000,000 µF)	10 kJ	<500 µs	24U(~300 lb)	IFE z-pinch drivers Capacitor bank modules Ultra-low impedance loads	18 wks
WE-OR-35-050V-05KA	0–50 V	5 kA	4 F (4,000,000 µF)	5 kJ	<500 µs	18U(~200 lb)	Plasma initiation Pulsed coil drivers High-current diagnostics	16 wks
WE-OR-35-100V-20KA	0–100 V	20 kA	4 F (4,000,000 µF)	20 kJ	<500 µs	36U(~450 lb)	IFE capacitor modules Pulsed magnet drivers Plasma compression	20 wks
WE-OR-35-100V-10KA	0–100 V	10 kA	2 F (2,000,000 µF)	10 kJ	<800 µs	24U(~300 lb)	Tokamak auxiliary coils Pulsed field systems Capacitor discharge forming	18 wks
WE-OR-35-200V-10KA	0–200 V	10 kA	1 F (1,000,000 µF)	20 kJ	<800 µs	24U(~280 lb)	MFE plasma heating NBI modulator banks Pulsed magnet research	18 wks
WE-OR-35-500V-08KA	0–500 V	8 kA	0.4 F (400,000 µF)	50 kJ	<1 ms	18U(~220 lb)	Stellarator trim coils Diagnostic pulsers Plasma control systems	16 wks
WE-OR-35-500V-05KA	0–500 V	5 kA	0.2 F (200,000 µF)	25 kJ	<1 ms	12U(~180 lb)	Tokamak diagnostics Feedback control coils Transient field generation	14 wks
WE-OR-35-1000V-05KA	0–1 kV	5 kA	0.1 F(100,000 µF)	50 kJ	<1 ms	12U(~170 lb)	General purpose MFE Pulsed electromagnets Material processing	14 wks
WE-OR-35-1500V-04KA	0–1.5 kV	4 kA	50,000 µF	56 kJ	<1 ms	12U(~160 lb)	Plasma diagnostics RF modulator supplies Electromagnetic forming	14 wks
WE-OR-35-2000V-03KA	0–2 kV	3 kA	30,000 µF	60 kJ	<1 ms	12U(~150 lb)	MFE edge diagnostics Pulsed X-ray sources Capacitor discharge welding	14 wks
WE-OR-35-3000V-03KA ⭐	0–3 kV	3 kA	650 µF	3.2 kJ	<1 ms	12U(~150 lb)	Fusion diagnostics Plasma imaging systems Magnetic probe drivers	12 wks
WE-OR-35-4000V-02KA	0–4 kV	2 kA	400 µF	3.2 kJ	<1 ms	12U(~145 lb)	High-voltage diagnostics X-ray flash systems Electrostatic applications	14 wks
WE-OR-35-5000V-02KA	0–5 kV	2 kA	250 µF	3.1 kJ	<1 ms	12U(~140 lb)	Pulsed X-ray generators Electron beam systems Plasma breakdown initiation	14 wks
WE-OR-35-8000V-01KA	0–8 kV	1 kA	100 µF	3.2 kJ	<1 ms	12U(~135 lb)	Diagnostic X-ray pulsers High-field research Electrostatic testing	16 wks
WE-OR-35-10KV-01KA	0–10 kV	1 kA	60 µF	3.0 kJ	<1 ms	12U(~130 lb)	Extreme diagnostic systems Pulsed electron sources Specialized HV applications	18 wks

⭐ *WE-OR-35-3000V-03KA: Original reference design — Validated architecture, established supply chain*

Scaling Architecture Principles:

• Voltage-Current Trade-off: Lower voltage variants require higher capacitance for similar energy storage ($E = \frac{1}{2}CV^2$), resulting in larger/heavier capacitor banks. Ultra-low voltage systems (50-200V) require massive Farad-scale capacitance (1-8 F) versus microfarad-scale for high voltage (60-650 µF).• Peak Current Scaling: Determined by capacitor ESR, discharge path inductance, and switch ratings. Higher current variants (>5 kA) require parallel capacitor strings and larger bus bars, increasing system weight and volume.• Energy Storage Range: Variants span 3-60 kJ to cover diverse fusion applications from compact diagnostics (kJ-scale) to IFE capacitor modules (tens of kJ). Custom energy levels available on request.• Trigger Response Time: <500 µs for ultra-low voltage/high-current IFE applications requiring minimal inductance; <1 ms standard for general MFE applications where slightly longer rise times are acceptable.• Rack Size Scaling: 12U

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(compact, high-voltage) to 36U (large, low-voltage high-current) based on capacitor volume. Weight ranges from ~130 lb (10 kV, 60 µF) to ~450 lb (100V, 4 F ultra-capacitor banks).

Common Features Across All Variants:

• Fiber Optic Trigger Input: Electrical isolation, <1 ms response (faster for low-voltage variants), ST/SC connectors• Multi-Unit Synchronization: ±50 µs jitter across up to 6 units from common trigger source• Ethernet UDP Control (SOUP): Voltage setpoint (10V steps), arm/disarm, status monitoring, individual IP addressing• Three-Tier Safety: Auto dump on mains loss (<50V in 60s), slow bleed resistor (0V in 24h), isolated floating HV rail• 19-inch Rack Mount: Standard EIA-310-D enclosure, IP30 protection, security Torx fasteners throughout• Fast Charging: <5 minutes to full voltage from 120 VAC mains (charge time may extend for ultra-large capacitor banks)• UL/CE Components: Safety-certified components throughout, IEC 61010-1 compliant design• HV LIVE Warning Lamp: Flashing red LED indicator when capacitor voltage >50V• Emergency Stop: Physical E-stop button dumps capacitors and disables charging• Networked Multi-Unit Control: Coordinate up to 6 units for phased or synchronized discharge sequences

Capacitor Technology Selection by Voltage Range:

• 50-200V Range: Electrolytic or ultra-capacitor (EDLC) technology for very high capacitance (Farad-range) in compact volume• 200-1000V Range: Metallized polypropylene film capacitors, series-parallel configurations for capacitance/voltage balance• 1-3 kV Range: Film capacitors with self-healing capability, optimized dV/dt and ESR for pulsed discharge• 3-10 kV Range: High-voltage film capacitors in series strings, enhanced corona shielding and potting compoundsAll variants use capacitors rated for >100,000 discharge cycles and designed for repetitive pulsed operation.

Multi-Unit Synchronization Applications:

• IFE Z-Pinch Drivers: 6× WE-OR-35-100V-20KA units (120 kJ total) discharging within ±50 µs for symmetric compression• Tokamak Multi-Coil Arrays: 3-6× medium-voltage units driving independent poloidal field coils with phased timing• Pulsed Magnet Research: Coordinated discharge of multiple units into series or parallel coil configurations• Diagnostic Arrays: Synchronized triggering of Thomson scattering lasers, magnetic probes, or imaging systems• Plasma Heating: Phased discharge sequences for RF modulator banks or NBI power supplies• Electromagnetic Forming: Multi-point synchronized discharge for distributed force applicationFiber optic trigger distribution ensures sub-millisecond synchronization across all units regardless of physical spacing.

Lead Time Determinants:

• Standard Voltage (500-3000V): 12-14 weeks — established capacitor supply chain, proven designs• Low Voltage (<500V): 16-18 weeks — large ultra-capacitor banks require extended procurement and assembly• High Voltage (>3000V): 14-18 weeks — high-voltage capacitors and enhanced insulation add complexity• Ultra-High Current (>10 kA): 18-20 weeks — parallel switching, heavy bus bars, custom mechanical design• First Article: Add 4-6 weeks for initial design validation, testing, and customer review• Multi-Unit Orders: Volume pricing available, staggered delivery schedules for phased installation

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CAPACITOR DISCHARGE POWER SUPPLIES

Technical Specification Form — Model WE-OR-35 Series

Please complete all sections below. This information will be used to prepare a detailed quotation and ensure the system meets your requirements. If you have questions about any specification, contact us at **sales@woodruffeng.com**

CUSTOMER INFORMATION

Organization / Institution _____

Contact Name _____

Email Address _____

Phone Number _____

Shipping Address _____

ELECTRICAL REQUIREMENTS

Preferred Model (if known):

☐ WE-OR-35-_____ (specify model number)

☐ Custom specification (complete requirements below)

Output Voltage Required _____ *V or kV (Range: 50V to 10 kV)*

Peak Current Required _____ *kA (Range: 1 kA to 20 kA)*

Energy Storage Required _____ *kJ (Range: 3 kJ to 60 kJ)*

Voltage Range Selection:

☐ Ultra-low voltage (50-200V) — High current IFE applications

☐ Low-medium voltage (500-1000V) — General purpose MFE

☐ Medium-high voltage (1.5-3 kV) — Fusion diagnostics

☐ High voltage (4-10 kV) — X-ray / specialized diagnostics

DISCHARGE SPECIFICATIONS

Typical Pulse Width _____ *ms or µs (Duration of capacitor discharge)*

Repetition Rate _____ *pulses per hour or per day*

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Production datasheet reviewed & accepted requirements.

Duty Cycle _____ % *(% time actively discharging)*

Discharge Waveform:

☐ Damped sinusoidal (natural RLC response)

☐ Fast rise time critical (<10 µs required)

☐ Controlled discharge profile (specify requirements below)

Load Type:

_____

Load Impedance: _____ Ω Load Inductance: _____ µH or mH

TRIGGER AND SYNCHRONIZATION

Trigger Input Type:

☐ Fiber optic (standard ST connector)

☐ Fiber optic (SC connector preferred)

☐ Other fiber type (specify): _____

Trigger Fiber Cable Length Required _____ *meters (Up to 100m standard)*

Multi-Unit Synchronization:

☐ Single unit (no synchronization required)

☐ 2 units synchronized

☐ 3 units synchronized

☐ 4-6 units synchronized

☐ More than 6 units (describe requirements below)

Synchronization Jitter Requirement: _____ *µs (Standard: ±50 µs)*

CONTROL AND NETWORKING

Network Control Requirements:

☐ Ethernet UDP (SOUP protocol) — standard

☐ Static IP addressing required

☐ DHCP acceptable

☐ Integration with facility control system (specify below)

Control System Integration _____ *(e.g., LabVIEW, EPICS, custom SCADA)*

Voltage Setpoint Control:

☐ 10V step resolution (standard)

☐ Finer resolution required (specify): _____ V steps

☐ Fixed voltage operation (no network control needed)

Monitoring and Data Logging:

☐ Real-time voltage/current monitoring via network

☐ Discharge event logging required

☐ Fault status reporting via network

☐ Local status display only

SAFETY AND PROTECTION REQUIREMENTS

Standard Safety Features (included on all units):

☐ ✓ Auto dump on mains loss (<50V in 60 seconds)

☐ ✓ Slow bleed resistor (0V in 24 hours)

☐ ✓ HV LIVE warning lamp (flashing when >50V)

☐ ✓ Emergency stop button

☐ ✓ Isolated floating HV rail

Additional Safety Interlocks:

☐ External interlock inputs required (facility-provided)

☐ Access door interlocks (disables charging when open)

☐ Key switch arming control

☐ Remote emergency stop capability

MECHANICAL AND INSTALLATION

Rack Mounting:

☐ 19-inch rack mount (standard)

☐ Installation in existing rack (specify rack height available)

☐ Standalone castered frame (multi-unit systems)

☐ Custom mounting requirements (describe below)**Installation Location:**

Available Rack Space _____ *U (Rack units available, 1U = 1.75 inches)*

Floor Loading Capacity _____ *kg/m² or lb/ft²*

☐ Indoor laboratory (climate controlled)

☐ Industrial facility

☐ Cleanroom environment

Ambient Temperature Range _____ °C *(Typical: 0-40°C operating)*

CHARGING AND POWER INPUT

AC Input Power Available:

☐ 120 VAC, 60 Hz (standard North American)

☐ 230 VAC, 50 Hz (international)

☐ Other (specify): _____ VAC, _____ Hz

Available Circuit Current _____ A *(Typical: 15A @ 120VAC)*

Charging Time Requirements:

☐ <5 minutes acceptable (standard)

☐ Faster charging required (may need higher input power)

☐ Slower charging acceptable (reduced input power)

APPLICATION DETAILS

Primary Application:

☐ IFE (Inertial Fusion Energy) — Z-pinch, compression, pulsed power

☐ MFE (Magnetic Fusion Energy) — Diagnostics, auxiliary coils

☐ Pulsed electromagnets — Materials research, magnetic forming

☐ Plasma diagnostics — Thomson scattering, imaging, probes

☐ X-ray generation — Flash X-ray, pulsed sources

☐ Electromagnetic forming — Industrial metalworking

☐ Other (describe below)

Application Description:

(Brief description of the application, experimental setup, or system integration)

SCHEDULE AND BUDGET

Target Delivery Date _____ *(Typical lead times: 12-20 weeks)*

Installation Date (if known) _____

Budget Range (optional) _____ $ _____ to $ _____

Quantity Required:

☐ Single unit

☐ 2-3 units

☐ 4-6 units (synchronized array)

☐ More than 6 units (specify): _____

Project Funding Status:

☐ Funded — ready to proceed

☐ Budget estimate needed for funding approval

☐ Feasibility study / concept development

SPECIAL REQUIREMENTS AND NOTES

Testing and Documentation:

☐ Factory Acceptance Testing (FAT) required

☐ Discharge waveform characterization required

☐ Detailed test reports and certification

☐ As-built drawings and schematics

☐ Operation and maintenance manuals

Installation and Commissioning:

☐ Woodruff Engineering installation support required

☐ Woodruff Engineering commissioning assistance

☐ Operator training required

☐ Customer self-installation (documentation only)

Additional Requirements or Notes:

SUBMISSION

Please email this completed form to: **sales@woodruffeng.com**

We will review your specifications and provide a detailed quotation within 3–5 business days. For multi-unit synchronized systems or custom requirements, we may schedule a brief technical consultation call to ensure optimal system configuration.