Bipolar Magnet Power Supplies

Models 665 and 668

- Linear, bipolar, water-cooled power supply
- 100 ppm class current stability
- Low ripple noise (from 5 mV)
- 5 kW and 8.8 kW
- CE compliant
- Local and remote programming and monitoring
- LEDs indicating power supply status
- Power output disable upon fault detection
- Thermally protected
- Output connectors at cabinet rear, protected by removable cover
- Steel cabinet with wheels and leveling feet

Model 665 and Model 668 Bipolar Magnet Power Supply (665: 50 V, 100 A, 5 kW, 668: 65 V, 135 A, 8.8 kW)

The 660 series are true linear, bipolar DC power supplies using a fixed diode rectifier to convert AC to DC, and a pass transistor stage to regulate the output to the power supply. They act as a DC current source and can be operated manually from the front panel or remotely via a ±10 V input. The user can also set current and voltage limits. The bipolar operation of these power supplies provides a smooth transition through zero, eliminating the need for current reversal contactors or relays.

Linear magnet power supplies have several advantages over switch mode power supplies, including smooth field generation that is nearly free from offending electromagnetic signatures. The clean field background allows greater resolution and finer detail in results drawn from data taken during high sensitivity experiments.

Bipolar architecture furthers the idea of clean field generation. The 660 series power supplies maintain tight control over the entire output range, including zero output. This is achieved without reversal contactors or relays, which produce unintended field spikes and other discontinuities. As a result, field hysteresis and other biases are avoided in experimental data.

The front panel displays the current and voltage outputs with 0.1 A and 0.1 V resolution. The current can be controlled via 100% (full-scale) and 1% (fine adjust) ten-turn indexed potentiometers. The voltage limit is also set via potentiometer. The front panel has connectors for external monitoring of both of these signals. There are 4 green LEDs to indicate when the power supply is on, the status of interlocks, and when the unit is ready for operation. Displaying faults for internal and external failures, overheating, overload, and overpower are 9 red LEDs. High speed fault detection for transistors helps avoid cascade output failures. The front panel also includes switches for standby, output start, polarity, and local/remote mode.

The 660 Series can be controlled by the user via any ±10 V input or by a Lake Shore Model 475 gaussmeter. The combination of these power supplies with an electromagnet and Model 475 gaussmeter form a versatile electromagnet field control system. This system is ideally suited for integration into customer-designed magnetic test platforms for applications including magneto-optical studies, magnetic hysteresis studies, in-line annealing, Hall effect studies, susceptibility measurements, spin magnetic resonance demonstrations, and biological studies. Refer to page 60 for more information.

Specifications

Output current and voltage:
Model 665: ±100 A, ±50 V (5 kW)
Model 668: ±135 A, ±65 V (8.8 kW)

Ramp rate:
Up to 10 A/s

Load:
Resistive electromagnet or any equivalent resistive load. Supplies are compensated for typical electromagnets — highly inductive loads may require tuning in the field.

Nominal load:
Model 665: 0.5 Ω
Model 668: 0.5 Ω

Minimum load (consult Lake Shore for other magnet load requirements)**:**
Model 665: 0.25 Ω
Model 668: 0.35 Ω

Output current stability:
±(0.01% of reading + 0.01% of full scale range)
under conditions of constant line voltage, load, and temperature

Current noise:
±(0.001% of reading + 0.001% of full scale range) peak to peak,
between 0.01 Hz and 1 Hz

Voltage ripple:
5 mV RMS + 0.01% of full scale range

Output settings:
Current setpoint, current limit, and voltage limit

Output programming:
Local via two 10-turn potentiometers (100%, 1%);
remote via ±10 V programming input (BR2 connector)

Output displays:
Current and voltage outputs displayed with digital resolution of ≥0.1 A

Output voltage monitor:
±10 V full scale (BR2 connector)

Output current monitor:
±10 V full scale (BR2 connector)

Current output connections:
9.5 mm threaded studs with nuts

On/off control:
Front panel separate on, off, and reset push buttons; remote on/off capable

Power supply fault detection circuitry:
- Transistor fault detect
- Slew rate limit protection
- Internal condensation protection
- Overheat protection
- Overpower protection
- Overload protection
- External interlocks

Input power:
Model 665: (7.6 kVA max)
21 A/phase with 208/220 VAC between phases
11 A/phase with 380/400 VAC between phases
Model 668: (15.5 kVA max)
39 A/phase with 208 VAC between phases
19 A/phase with 400 VAC between phases
Custom voltage configurations are available

50–60 Hz; 3-phase plus ground (4-wire)

Line voltage must be specified at time of order.
Cable from power supply to facility power not included.

Cooling water requirements (minimum at 0.5 Ω nominal load):
Model 665: flow rate: 8 L/min (2.1 gal/min)
pressure drop: 0.12 MPa (17 psi)
Model 668: flow rate: 8 L/min (2.1 gal/min)
pressure drop: 0.14 MPa (20 psi)

Cooling water connections:
Model 665 and 668: ¼-inch NPT female thread; ¼-inch NPT male to 10 mm (~3/8 in) hose barb included

Operating environment:
Ambient temperature: +10 °C to +30 °C (50 °F to 86 °F)
Humidity: 55% ±10% (non-condensing)
Cooling water: +15 °C to +25 °C (59 °F to 77 °F)
CAUTION: Internal condensation can cause damage to the power supply.

Mechanical outline:
Freestanding rack cabinet with locking wheels and 4 lifting eye bolts

Size and weight:
Model 665: 1.35 m high × 0.7 m deep × 0.6 m wide
(53.1 in × 27.6 in × 23.6 in); 250 kg (550 lb)
Model 668: 1.35 m high × 0.7 m deep × 0.6 m wide
(53.1 in × 27.6 in × 23.6 in); 354 kg (780 lb)

Shipping size and weight:
Model 665: 1.52 m × 0.84 m × 0.76 m (60 in × 33 in × 30 in); 295 kg (650 lb)
Model 668: 1.78 m × 0.91 m × 0.76 m (70 in × 36 in × 30 in); 400 kg (880 lb)

Ordering Information

Part number	Description
Model 665-208	±100 A, ±50 V, 5.0 kW, 208 VAC
Model 665-220	±100 A, ±50 V, 5.0 kW, 220 VAC
Model 665-380	±100 A, ±50 V, 5.0 kW, 380 VAC
Model 665-400	±100 A, ±50 V, 5.0 kW, 400 VAC
Model 668-208	±135 A, ±65 V, 8.8 kW, 208 VAC
Model 668-220	±135 A, ±65 V, 8.8 kW, 220 VAC
Model 668-380	±135 A, ±65 V, 8.8 kW, 380 VAC
Model 668-400	±135 A, ±65 V, 8.8 kW, 400 VAC

Consult Lake Shore for other available voltages
All specifications are subject to change without notice