

2400V Ferroresonant Type Switchgear Constant Current Regulator

Liberty Airport Systems' 2400V Ferroresonant CCR brings the latest in digitally controlled ferroresonant technology to airports using 4160V systems. The *Freedom Series™* 2400V ferro CCR allows airports with RSS Type regulators to expand or upgrade their existing switchgear lineup using ferroresonant technology. They can also be installed in a standalone fashion for airports needing a 2400V dry-type ferro CCR. *Freedom Series™* sets new standards in performance, ease of maintenance, and personnel safety.

System Application

Ferroresonant CCRs are recommended for series circuits that have oscillating loads, where low output harmonic content is desired, or when used with power line carrier control technology. While the trend is to power regulators at 600V or less, there are many installations in North America still operating at a line voltage of 2400V. Liberty offers a complete line of 2400V CCRs to complement these existing installations.

Freedom Series™ 2400V CCRs are designed to be integrated into a switchgear line-up assembly and powered from a single supply. Applications include:

- General aviation, commercial, and military airports operating in visibility conditions ranging from VFR to CAT IIIb.
- Runway and taxiway edge lighting, centerline lighting, signs, approach systems, PAPI, VASIS.
- Flashing loads including series-powered ALSF or SSALR strobes, ODALs, REILs, LAHSO, Runway Guard Lights.
- Surface Movement and Guidance Control Systems (SMGCS) using power line carrier technology to control and monitor individual lamps or segments.

Standards Compliance

- FAA Advisory Circular 150/5345-10F, June 24/05, Type L-828 and L-829.
- Transport Canada CCR Specification K290-2.
- Canadian Department of National Defence Standards.
- ICAO Aerodrome Design Manual Doc 9157, Part 5.



Fig. 1 Liberty 2400V CCRs installed next to RSS20 CCR.

Technology Benefits

- Digital control for precise waveform accuracy, high-speed response, and local data storage using Digital Signal Processor technology.
- Digital output accuracy and drift-free circuitry for increased lamp life.
- Digital operator interface provides full monitoring, diagnostics, and alarm indication. Dedicated status LEDs provide clear indication of warning and fault conditions.
- Membrane keys with tactile response provide maintenance personnel with access to all display values and configuration parameters.
- Auto-calibration reduces maintenance costs by eliminating the need for scheduled preventative maintenance service.
- Ferroresonant design provides a stable output current that is not affected by flashing loads.
- True sine wave output provides high input power factor, low electromagnetic interference (EMI), low total harmonic distortion (THD) and excellent immunity to electrical transients and surges.

Switchgear Features

- CCRs may be mounted side by side to form a continuous switchgear line-up.
- CCRs are provided with integral 4 conductor 600A, 5KV power bus. Internal ground bus is also provided.
- Integral tilt-out fuse disconnect eliminates the need to install remote wall-mounted high voltage fused cut-outs.
- Integral horizontal power and control raceways allow all field and control cables to be routed within the switchgear assembly with no external conduit or cable trays required.
- Integral vertical power and control raceways allow top or bottom cable exit from each cell or from selected cells.
- *Freedom Series™* CCRs are cable raceway and bus work-compatible with existing Westinghouse, Hughey & Phillips or Honeywell RSS20 switchgear installations.

Maintenance & Safety Features

- All ratings are dry-type and convection air-cooled. No cooling fans are required.
- No output calibration tuning is required.
- Control electronic components are modular with plug-in connectors for quick removal and insertion.
- A removeable top cover provides ease of service and inspection of bus connections.
- All high voltage connections are fully guarded for personnel safety.
- Built-in Field Circuit Isolator / Cut-out ensures personnel are isolated from the high voltage field circuit during field testing or maintenance.
- A safety interlock ensures power is disconnected when the door is opened.
- The CCR is equipped with over current, over voltage and open-circuit protection and is available with input and output lightning protection.

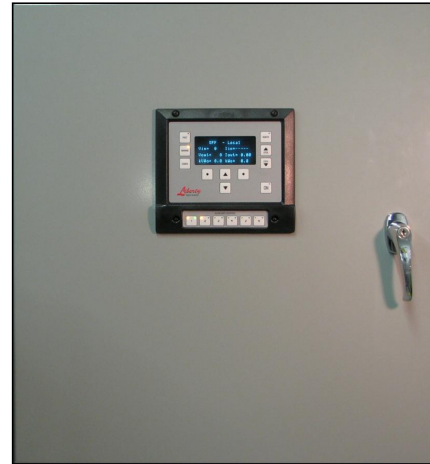


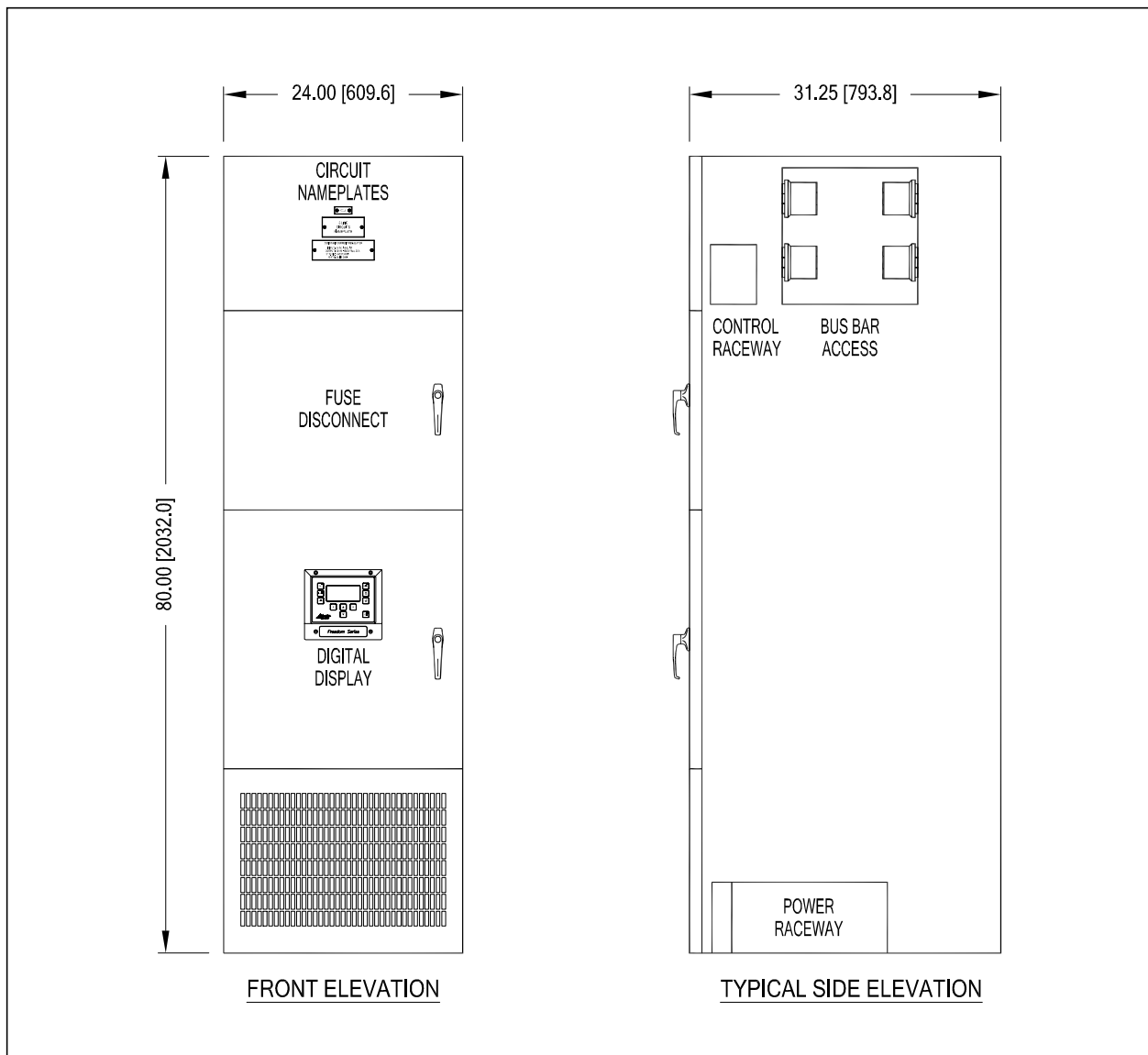
Fig. 2 Freedom Series Digital Door

Control and Monitoring

- Available in output ratings from 4 kW to 20 kW at 6.6 A.
- All CCRs are user configurable, including selection of 1 to 5 brightness steps, output current adjustment, selection of monitoring features, operational parameters and alarm setpoints.
- User-configurable failsafe capabilities allow last state (latching) or preset brightness selection upon failure of control system.
- Monitoring of CCR status including commanded and actual brightness, warning and fault conditions including door interlock, local switch position, over current, over voltage or open circuit trips, communications or hardware failure.
- Analog monitoring of input and output current, voltage, VA, power, power factor, elapsed time at each brightness step and number of operations.
- Supports redundant 24 VDC external power from the control system allowing monitoring and indication even on power failure to the CCR.
- Available L-829 monitoring functions including primary power, circuit trips, loss of VA, brightness within specifications, number of failed lamps per circuit with warning and alarm indication.
- Available insulation resistance monitoring to ground (Auto-Megger) and ground fault alarm indications.
- Available control and monitoring of up to six L-847 circuit selectors from the CCR front panel display.

Built-in Networking

- Available fully redundant RS-485 network support using Allen-Bradley DF1 or Modbus protocols.
- Available redundant 100 Mb Ethernet network support using Ethernet/IP, or Modbus TCP protocols.
- Direct communication interface to Liberty *Freedom Series™* or *Spirit SE Series™* Airfield Lighting Control and Monitoring Systems using Ethernet or RS-485 networks.
- Locally re-configurable using serial port. Remotely re-configurable via dial-up modem or internet using VPN access.
- Custom communications protocols or interface gateways can be provided.



Ordering Information

Type:

FSR8 - Freedom Series 2400V Ferroresonant L828
 FSR9 - Freedom Series 2400V Ferroresonant L829

Construction:

S - Switchgear

Output kW Rating:

04 - 4 kW	10 - 10 kW	20 - 20 kW
07 - 7.5 kW	15 - 15 kW	

Class:

A - 6.6 A Output

Input Voltage:

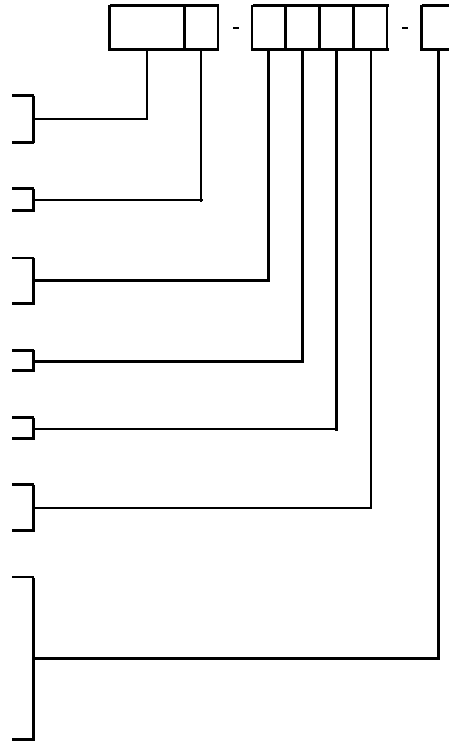
1 - 2400 VAC, 60 Hz

Control Voltage:

A - 24VDC Internal	C - 48VDC Internal	E - 120VAC Internal
B - 24VDC External	D - 48VDC External	F - 120VAC External

Options (Select as Many as Required):

- 21 - Output Lightning Arrestors
- 23 - Insulation Resistance Monitor (Megger)
- 41 - Redundant Ethernet Network Interface
- 42 - Redundant RS485 Network Interface
- 43 - Single Ethernet Network Interface
- 44 - Single RS485 Network Interface
- 51 - Circuit Selector Control & Monitoring Interface



Other Regulator Products

Existing Westinghouse, H&P and Honeywell RSS Type CCRs can be upgraded to the latest digital technology described in this brochure allowing the airport to maintain their existing 4160V infrastructure (switchgear, generator and automatic transfer systems).

We also manufacture complete lines of Ferroresonant and thyristor style regulators operating at 208 to 600V input. These regulators are available standalone as well as in complete switchgear lineup configurations.

Application Engineering

If you have any unique power or control system requirements or applications, please do not hesitate to contact us.

Our engineering staff would be pleased to work with you on finding a cost-effective solution using current technology.



Liberty Airport Systems Inc.
 C5 - 3375 North Service Road
 Burlington ON, Canada L7N 3G2

Tel: 905.631.1597
 Fax: 905.631.5387
 info@libertyairportsystems.com