Liebert® RDC™
GUIDE SPECIFICATIONS

1.0 GENERAL

1.1 SUMMARY

These specifications describe requirements for a small-footprint, free-standing power distribution cabinet, supplying power to sensitive loads. It shall include all equipment to properly interface the AC power source to the intended load.

1.2 STANDARDS

The specified system shall be designed, manufactured, tested and installed in compliance with:

- American National Standards Institute (ANSI)
- Canadian Standards Association (CSA)
- Institute of Electrical and Electronics Engineers (IEEE)
- ISO 9001
- National Electrical Code (NEC - NFPA 70)
- National Electrical Manufacturers Association (NEMA)
- National Fire Protection Association (NFPA 75)
- Underwriters Laboratories (UL)

Units shall be UL listed as a complete system under UL 891 Standard for Switchboards and shall comply with EN and the European Low Voltage Directive and be CE marked.

The specified system shall comply with latest FCC Part 15 EMI emission limits for Class A computing devices and the emission and immunity limits of EN50081-2/EN550022 Class A and EN50082-2.

The system shall safely withstand without misoperation or damage:

- Transient voltage surges on the AC power input as defined by ANSI/IEEE C62.41 for Category B3 locations (industrial and commercial facilities with high surge exposure),
- Electrostatic discharges (ESD) up to 10 kV at any point on the exterior of the unit and
- Electromagnetic fields from portable transmitters within 3 ft. (1m) of the unit.

1.3 SYSTEM DESCRIPTION

1.3.1 Electrical Requirements

Input/Output voltage shall be (415/240) (400/230) (380/220) (208/120) (_____) volts AC, (60) (50) Hz, three-phase, four-wire-plus-ground.

1.3.2 Environmental Requirements

A. Storage temperature range: -67° to +185°F (-55° to +85°C).

B. Operating temperature range: +32° to 104°F (0° to 40°C).

C. Relative humidity: Operation shall be reliable in an environment with 0% to 95% noncondensing relative humidity.

D. Operating altitude: Up to 6,600 ft. (2,000m) above Mean Sea Level. Derated for higher altitude applications.

E. Storage/transport: Up to 40,000 ft. (12,200m) above Mean Sea Level.

F. Audible noise: The audible noise level of the specified system shall be less than 45dBA.

1.4 DOCUMENTATION

1.4.1 Drawings

Wiring diagrams and drawings of major components shall be furnished.

1.4.2 Spare Parts

A list of recommended spare parts shall be supplied at the customer's request.

1.4.3 User's List

An in-service user's list shall be furnished upon request.

1.5 WARRANTY

The manufacturer shall provide a one-year warranty against defects in material and workmanship for 12 months after initial startup or 18 months after ship date, whichever occurs first. (Refer to the Warranty Statement for details.)

1.6 QUALITY ASSURANCE

The specified system shall be factory-tested before shipment. Testing shall include, but shall not be limited to: Quality Control Checks, "Hi-Pot" Test, two times rated voltage plus 1000 volts, per UL requirements (and Metering Calibration Tests). The system shall be designed and manufactured according to world-class quality standards. The manufacturer shall be ISO 9001 certified.

2.0 PRODUCT

2.1 COMPONENTS

2.1.1 Frame Construction and Enclosure

The frame shall be constructed of galvanized steel and pop riveted to provide a strong substructure. The cabinet shall be a freestanding NEMA type 1 enclosure and meet IP20 requirements. The unit shall have lockable, removable, hinged doors. The unit shall have easily removable and interchangeable output cable trays to allow matching of the size and number of cable/conduit openings to the site requirements. A minimum of 168 cable/conduit openings shall be provided. All service shall be capable of being performed with access to the front and rear, plus one side for installation flexibility. (Units with side-mounted tie-breakers shall require front, rear and side access.) Retrofitting additional power distribution cables shall require access to the front or rear of the unit only. A tool shall be required to remove the exterior panels that access the hazardous voltage area of the unit. Hinged doors shall provide access to the main panelboard circuit breakers and to all output circuit breakers. The color of the exterior doors and panels shall be manufacturer's standard color.

The unit shall be naturally convection-cooled. No fans for forced-air cooling system shall be used. The convection cooling method shall allow continuous full-load operation. Heat rejection shall be through a screened protective top that prohibits entry of foreign material.

The cabinet dimensions shall be a maximum of 24 in. wide by 78 in. high by 26 in. deep (610 x 1981 x 660mm). The distributed floor weight shall be less than 250 lb./sq.ft. (1225 kg/sq. m).

2.1.2 Cable Entry/Exit

The Liebert RDC shall be designed for bottom cable entry/exit. The unit shall have a screen top with provisions for entrance and exit of all input and output cabling through the bottom of the unit.

2.1.3 Input Power Connections

The Liebert RDC shall have (one) (two) (four) input power feed(s). (All panelboards shall be connected to the input power feed [one input].) (The front panelboard(s) shall be connected to one input power feed with the rear panelboard(s) connected to the second input power feed.) (Each panelboard shall be connected to an input power feed [four inputs].) Input power conductors shall connect to the main panelboard circuit breakers or terminal blocks. Power terminal connections shall be provided for connection of a 173% rated neutral and a parity-sized insulated ground.

2.1.4 Main Panelboard Circuit Breaker

Each distribution panelboard shall be protected by a main panelboard circuit breaker. The breaker shall be UL listed and IEC rated for use at the system voltage. The breaker shall have a rating of 225 amperes, with an interrupting rating of (22kA) (Standard [no rating available for @ 380-415V]) RMS symmetrical amperes.

2.1.5 Distribution Panelboards

The specified system shall contain (four) (three) (two) (one) vertically mounted (Square D) (GE [not available @ 380-415V]) (bolt-in) (plug-in) panelboard(s) for distribution to the intended loads. (Two panelboards) (One panelboard) shall be accessed from the front of the unit and (two panelboards) (one panelboard) shall be accessed from the rear of the unit. Each panelboard shall be totally enclosed with a hinged accent panel that provides access to that panelboard. The panelboard shall have a rating of 225 amperes, with an interrupting rating of (22kA) (Standard [no rating available for @ 380-415V]) RMS symmetrical amperes. The panelboard(s) shall provide a total of (168) (126) (84) (42) single-pole branch circuit breaker positions. Each panelboard shall include separate isolated neutral and safety-ground busbars for the neutral and safety-ground connections for at least 42 output circuits. The neutral busbar and wiring shall be sized for at least 1.73 times the panelboard full load rating to accommodate high harmonic neutral currents associated with single-phase nonlinear loads.

2.1.6 Branch Circuit Breakers

Each load shall be protected by an individual branch circuit breaker. Single-pole, two-pole and three-pole (plug-in) (bolt-on) type branch breakers up through 100 amperes shall be utilized. Each branch circuit breaker shall provide overcurrent protection and shall clearly indicate the ON, OFF and TRIPPED positions. All branch circuit breakers shall have a minimum interrupting rating of [(10kA) (22kA) at 208V](6kA at 380-425V) RMS symmetrical amperes at (208/120) (380/220) (400/230) (415/240) VAC. Each branch circuit breaker shall be sized in accordance with the NEC and shall be UL/CSA listed. Branch circuit breakers shall have an associated directory label identifying the branch circuit number and the equipment being served.

2.1.7 Output Distribution Cables

The cable supplying each load shall consist of UL/ULc listed liquid-tight, flexible metal conduit containing the required THHN copper insulated power, neutral and parity-sized ground conductors. The flexible conduit shall be liquid-tight, insulated and shielded to minimize electrical or mechanical disturbances to the conductors. The length of each cable and the type of receptacle/termination shall be as specified on the detailed cable schedule. Each output distribution cable shall be permanently labeled at each end of the cable with the assigned circuit number and receptacle type, equipment identification and cable length. Each cable shall be thoroughly factory-checked and factory-tested. Tests shall include continuity, phase rotation and a Hi Pot test at twice-rated circuit voltage plus 1000 volts. Each cable shall be a UL listed assembly.

2.2 ACCESSORIES (OPTIONAL COMPONENTS)

2.2.1 Current Monitoring Panel

The current monitoring panel shall consist of a four-digit high-visibility Liquid Crystal Display (LCD) to monitor current parameters. Front and rear LCDs shall be provided with push-button switches for operator interface. The three-phase and neutral currents for each panelboard shall be displayed. The display and switches shall be accessible without opening the door. All currents shall be monitored using true RMS measurements for accurate representation of non-sinusoidal waveforms typical of computers and other sensitive loads.

2.2.2 Current Plus Monitoring

The Current Plus Monitoring (CPM) shall monitor the current and voltage of the panelboard main circuit breaker and include a monochrome Liquid Crystal Display (LCD) with oval bezel that includes power and alarm LEDs, audible alarm and silence push button. The CPM shall display the power parameters and alarms listed below for each panelboard main. A display shall be mounted on the front and rear doors, the display and switches are accessible without opening the door.

The following metering parameters shall be displayed:

- Voltage
  - Line-to-line
  - Line-to-neutral
- Neutral Current
- Ground Current
- kVA
- Power Factor
- Voltage Total Harmonic Distortion (THD)
- Current Total Harmonic Distortion (THD)
- Crest Factor

Circuit identification and status of each breaker shall be displayed.

The CPM shall detect and annunciate by alarm message the following conditions:

- Overvoltage
- Undervoltage
- Neutral Overcurrent
- Ground Overcurrent
- Phase Overcurrent
- Phase Overcurrent Warning
- Summary Alarm

All alarm thresholds for monitored parameters shall be adjustable by way of the service port to match site requirements. The factory setpoints for the alarms shall be as follows:

- Overvoltage - at least one of the line-to-line voltages exceeds +6% of nominal
- Undervoltage - at least one of the line-to-line or line-to-neutral voltages falls below -13% of nominal
- Phase Overcurrent Warning - current exceeds 75% of breaker amps
- Phase Overcurrent - current exceeds 80% of breaker amps
- Neutral Current - current exceeds 95% of breaker amps
- Ground Current - current exceeds 5 amps

Summary Alarm

- Summary Alarm - shall detect and annunciate upon occurrence of any alarm

Summary Alarm Contacts

- The CPM shall have form C (1 NO and 1 NC) summary alarm contact for remote alarm status. The contacts are rated at 24VAC @ 1A. The contacts shall change state upon occurrence of any alarm including warnings and shall reset when the alarm is cleared.

To facilitate troubleshooting, all alarms shall be stored in non-volatile memory to protect against erasure by a power outage. Alarms shall be manually reset after the alarm condition has been corrected. Alarms can be reset through Modbus.

Alarms shall be saved in an event log. The event log shall store 128 events using a first-in, first-out format (FIFO).

Communication - (The CPM shall have 3 Liebert IntelliSlot® ports; up to 3 Liebert IntelliSlot cards can be added for customer connection to a Building Management System (BMS).) (The CPM shall communicate with a Liebert SiteScan® System using RS485.)

2.2.3 Liebert Distribution Monitoring (Liebert LDMF)

The system shall be capable of receiving input from branch current sensor modules. The Liebert LDMF system shall monitor (one) (two) (three) (four) 42 pole panelboard(s). Each Sensor Module shall contain twenty-one 100A current transformers (CT) capsulated in an epoxy filled plastic enclosure designed to mount next to the panelboard. No individual current transformers mounted on a printed circuit board shall be used. Sensor Module shall be designed to work with (Square D) (GE) panelboards.

In addition to monitoring the branch circuit breakers, the Liebert LDMF shall monitor the current and voltage of the panelboard main circuit breaker. These measurements are used for reporting the average RMS current, power and other parameters.

The Liebert LDMF shall report alarm and status conditions for each branch circuit breaker and the panelboard main circuit breaker.

The Liebert LDMF shall monitor and display the following parameters for each branch circuit breaker:

- Phase Current
- Percent Load
- kW
- kW-Hours

In addition, the Liebert LDMF shall monitor and display the following parameters for the panelboard main circuit breaker:

- Voltage
  - Line-to-Line
  - Line-to-Neutral
- Neutral Current
- Ground Current
- kVA
- Power Factor
- Voltage Total Harmonic Distortion (THD)
- Current Total Harmonic Distortion (THD)
- Crest Factor

Circuit identification and status of each breaker shall be displayed. Parameters shall be updated every 500msec.

The Liebert LDMF shall detect and annunciate by alarm message the following conditions:

- Overvoltage - panelboard main breaker
- Undervoltage - panelboard main breaker
- Neutral Overcurrent - panelboard main breaker
- Ground Overcurrent - panelboard main breaker
- Phase Overcurrent - panelboard main breaker and branch breakers
- Phase Overcurrent Warning - panelboard main breaker and branch breakers
- Phase Low Current Warning - branch breakers
- Summary Alarm

All alarm thresholds for monitored parameters shall be adjustable by way of the service port to match site requirements. The factory setpoints for the alarms shall be as follows:

Panelboard Main Breaker:

- Overvoltage - at least one of the line-to-line voltages exceeds +6% of nominal
- Undervoltage - at least one of the line-to-line or line-to-neutral voltages falls below -13% of nominal
- Phase Overcurrent Warning - current exceeds 75% of breaker amps
- Phase Overcurrent - current exceeds 80% of breaker amps
- Neutral Current - current exceeds 95% of breaker amps
- Ground Current - current exceeds 5 amps

Branch Breakers

- Over Current Warning - current exceeds 75% of breaker amps
- Phase Overcurrent - current exceeds 80% of breaker amps
- Low Current Warning - minimum current level of a branch breaker

Summary Alarm

- Summary Alarm - shall detect and annunciate upon occurrence of any alarm

Summary Alarm Contacts

- The Liebert LDMF shall have form C (1 NO and 1 NC) summary alarm contact for remote alarm status. The contacts are rated at 24VAC @ 1A. The contacts shall change state upon occurrence of any alarm including warnings and shall reset when alarm is cleared.

To facilitate troubleshooting, all alarms shall be stored in non-volatile memory to protect against erasure by a power outage. Alarms shall be manually reset after the alarm condition has been corrected. Alarms can be reset through Modbus.

Alarms shall be saved in an event log. The event log shall store 128 events using a first-in, first-out format (FIFO).

Communication - (The Liebert LDMF shall have 3 Liebert IntelliSlot ports; up to 3 Liebert IntelliSlot cards can be added for customer connection to a Building Management System (BMS).) (The Liebert LDMF shall communicate with a Liebert SiteScan System using the SiteScan Monitoring Interface option.)

Note: The Liebert LDMF requires side access for installation and maintenance with GE Panelboards.

2.2.4 Liebert LDMF Display

A monochrome Liquid Crystal Display (LCD) with power and alarm LEDs, audible alarm and an alarm silence push button. It will display all Liebert LDMF power parameters and alarms listed in Section 2.2.3 for the panelboard main and branch breakers. The display shall be mounted on the front and rear doors.

2.2.5 Liebert SiteScan Monitoring Interface

Monitoring interface module allows the Liebert LDMF to communicate with Liebert SiteScan Web 3.0 or later. Includes software and graphics that support up to 168 branch breakers using an Ethernet connection.

2.2.6 Liebert IntelliSlot IS-WEBS Card

The Liebert RDC shall be supplied with an IS-WEBS Card for remote communication using SNMP/WEB output. An RJ-45 connector shall be supplied for connection to Ethernet LAN.

2.2.7 Liebert IntelliSlot IS-485S Card

The Liebert RDC shall be supplied with a IS-485S Card for remote communication using Modbus 485 output. A terminal strip shall be provided for 2-wire connection.

2.2.8 Liebert IntelliSlot IS-IPBMS Card

The Liebert RDC shall be supplied with a IS-IPBMS Card for remote communication using Modbus IP output. An RJ-45 connector shall be supplied.

2.2.9 Isolated Ground Busbar

An isolated ground busbar shall be provided for each panelboard to connect the output cable isolated ground conductor. The isolated ground busbar is in addition to the standard equipment ground busbar.

Note: Not available with GE panelboards or units with Junction Box.

2.2.10 Plug-in Main Breakers

Plug-in main panelboard circuit breakers shall be provided to allow easy replacement. The plug-in feature of the breaker shall include interlock, which prevents the breaker from being unplugged without being in the “Off” (open) position.

2.2.11 Maintenance Tie-Breakers

Plug-in tie-breakers shall be provided to connect two panelboards to a common panelboard main circuit breaker within the Liebert RDC. This allows the tie-breakers and plug-in panelboard mains to be removed for testing or replacement without interrupting power to the load. **The inputs must be fed from the same source so they can be safely tied together.** Breakers shall be located behind a side-access lockable hinged door.

Note: Maintenance tie-breakers require side access for installation and maintenance.

2.2.12 EZ-View Doors

The enclosure shall be provided with lockable, hinged removable doors containing a Plexiglas opening that allows the operator to view the branch breakers without opening the door.

Note: Not available with GE Panelboards.

2.2.13 Input Junction Box/Cable (Standard on Four-Input Unit)

An input junction box shall be provided for input power connections and output conduit connections. Power terminal blocks shall be provided for connection of the input power conductors, 173% rated neutral and a parity-sized insulated ground conductor. Junction box shall include two output conduit plates and an input conduit plate. Each output conduit plate shall have 84 knockouts for 1/2-inch (13mm) conduit. The junction box shall have maximum dimensions of: width, 21 in. (533 mm); length, 46 in. (1168 mm); height, 15 in. (381 mm). Junction box will mount below the raised floor under the Liebert RDC.

Input power cables shall be provided for connection between the Liebert RDC and the input junction box. The conductors shall be UL/CSA listed, 194°F (90°C) minimum insulation, and copper conductors, sized in accordance with the NEC. Both for reliability and per the NEC, no plug-and-receptacle connectors shall be used for the input power cables.

Note: Not available on 1 input units.

2.2.14 Under-Floor Conduit Box

An under-floor conduit box shall be provided for input power conduit and output conduit connections. The box shall have an easily removable cable plate on each side. Each plate shall have a minimum of 42 knockouts for 1/2-inch (13mm) conduit and space for input power cable. The conduit box will mount below the raised floor under the Liebert RDC. The conduit box shall have maximum dimensions of: width, 24 in. (610 mm); length, 24 in. (610 mm); height, 12 in. (305m).

Note: Not available on units with Junction Box.

2.2.15 Seismic Floor Stands

Floor Stand shall be furnished to support and level the unit and to provide bottom cabling access without relying upon a raised floor for support. The nominal height of the floor pedestals shall be [18 in. (483mm)] [24 in. (610mm)] [30 in. (762mm)] [36 in. (914mm)] with adjustment for ±1.25 in. (32mm).

2.2.16 Seismic Floor Stands with Junction Box

Floor Stand shall be furnished to support and level the unit and to provide bottom cabling access without relying on a raised floor for support. The floor stand includes an input junction box and output conduit plates on three sides. Models are available for both two- and four-input configurations. The nominal height of the floor pedestals shall be [18 in. (483mm)] [24 in. (610mm)] [30 in. (762mm)] [36 in. (914mm)] with adjustment for ±1.25 in. (32mm).

2.2.17 Seismic Floor Stands with Conduit Plates

Floor Stand shall be furnished to support and level the unit and to provide bottom cabling access without relying on a raised floor for support. The floor stand shall include three-output conduit plates and a blank input conduit plate. Each output conduit plate shall have 56 knockouts for 1/2-inch (13mm) conduit. The nominal height of the floor pedestals shall be [18 in. (483mm)] [24 in. (610mm)] [30 in. (762mm)] [36 in. (914mm)] with adjustment for ±1.25 in. (32mm).

2.2.18 Factory Witness Test

The owner and/or the owner's representative shall factory witness test each unit. The factory will perform its standard witness test to demonstrate that the unit meets the Liebert RDC specification.

2.2.19 Certified Test Report

A certified copy of the factory test report shall be provided for each unit.

2.2.20 Export Crating

Heavy-duty solid wood crating shall be provided to meet international requirements regarding package strength and special markings for overseas shipments.

3.0 EXECUTION

Factory startup, preventive maintenance and full service for the specified system shall be available and included upon request. The manufacturer shall directly employ a service organization of factory-trained field service personnel dedicated to the startup, maintenance and repair of the manufacturer's power equipment. The manufacturer shall maintain a dispatch center 24 hours per day, 365 days per year, to minimize service response time and to maximize availability of qualified service personnel.