

# Vertiv™ Liebert® RX GUIDE SPECIFICATIONS

## 1.0 GENERAL

### 1.1 Summary

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

### 1.2 Standards

The Liebert® RX 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)

The Liebert® RX shall be UL listed under UL 60950 Standard for Information Technology.

The Liebert® RX shall comply with latest FCC Part 15 EMI emission limits for Class A computing devices.

The RX 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 10kV at any point on the exterior of the unit
- 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 (415/240V, 50Hz) (400/230V, 50Hz) (380/220V, 50Hz) (208/120V, 60Hz) (415/240V, 60Hz) (400/230V, 60Hz)(480/277V, 60Hz) AC, three-phase, four-wire-plus-ground.

### 1.3.2 Environmental Requirements

1. Storage temperature range: -67° to +185°F (-55° to +85°C).
2. Operating temperature range: +32° to 104°F (0° to 40°C).
3. Relative humidity: Operation shall be reliable in an environment with 0% to 95% noncondensing relative humidity.
4. Operating altitude: Up to 6,600 ft. (2,000m) above Mean Sea Level; derated for higher altitude applications.
5. Storage/transport: Up to 40,000 ft. (12,200m) above Mean Sea Level.
6. 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 shipping date, whichever occurs first. (Refer to the Warranty Statement for details.)

### 1.6 Quality Assurance

The Vertiv™ Liebert® RX 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 Liebert® RX 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 to provide a strong substructure. The cabinet shall be a NEMA Type 1 enclosure and meet IP20 requirements. The unit shall have a lockable, removable, hinged door. The unit shall have top and bottom input/output cable trays with a minimum of 84 cable/conduit openings. All service shall be capable of being performed with access to the front. Retrofitting additional power distribution cables shall require access to the front of the unit only. Hinged door shall provide access to the main panelboard circuit breaker and to all output circuit breakers. The color of the exterior door and panels shall be the manufacturer's standard color, black gray matte.

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 protective top that prohibits entry of foreign material.

The cabinet dimensions shall be a maximum of 24 in. wide by 13 in. deep by 78.7 in. high (610 x 328mm x 2000). The weight shall be 225 lb. (102 kg). The Vertiv™ Liebert® RX must be back-supported by column, unistrut, or wire cage or two units can be installed back-to-back as a single unit that is a drop-in replacement for a 24 in. x 24 in. (610 x 610mm) raised floor tile.

#### 2.1.2 Input Power Connections

Input three-phase power conductors shall connect to the (main panelboard circuit breaker [with main panelboard breaker]) (panelboard input busbars [with no main panelboard breaker]). Input neutral conductor shall connect to a 173% rated neutral busbar and the ground conductor to a parity-sized insulated ground busbar.

#### 2.1.3 (No) Main Panelboard Circuit Breaker

(The 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. (Panelboard is protected by a 400A continuous current rated circuit breaker with an interrupting rating of 35kA RMS.) The Liebert® RX shall be supplied with no main panelboard breaker.)

#### 2.1.4 Distribution Panelboards

The Liebert® RX shall contain one vertically mounted (Square D bolt-in/plug-in) (ABB Finger-Safe) panelboard for distribution to the intended loads. The panelboard shall be totally enclosed with a hinged accent panel that provides access to the panelboard. The panelboard shall have a rating of 400 amperes, with an interrupting rating of (22kA with Square D 22kA rated branch breakers)(10kA with Square D 10kA rated branch breakers) (35kA with ABB with panelboard main breaker)(10kA with ABB without panelboard main breaker) [kA rating not available @380-415V]) RMS. The panelboard shall provide a total of (84 [Square D or ABB]) (42 [ABB]) single-pole branch circuit breaker positions. The panelboard shall include separate, isolated neutral and safety-ground busbars for the neutral and safety-ground connections for at least 84 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.

#### 2.1.5 No Monitoring

The Liebert® RX shall be supplied with no monitoring.

## 2.2 Accessories (Optional Components)

### 2.2.1 Current Plus Monitoring with Display

The Current Plus Monitoring (CPM) shall monitor the current and voltage of the panelboard and include a monochrome Liquid Crystal Display (LCD) with oval bezel, power and alarm LED's and audible alarm. The CPM shall display the power parameters and alarms listed below. A display shall be mounted on the front door, the display and switches shall be 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 the following conditions and annunciate them by alarm message:

- 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 DB-9 setup 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 a Form C (one NO and one 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.

## Communication

CPM shall have two Vertiv™ Liebert® IntelliSlot ports; up to two Liebert® IntelliSlot cards can be added for customer connections to a Building Management System (BMS) or Vertiv™ Liebert® SiteScan™ monitoring interface.

### 2.2.2 Vertiv™ Liebert® Distribution Monitoring with Display (LDMF)

Liebert® LDMF shall be capable of providing monitoring of the panelboard main breaker and branch circuit breakers and includes a monochrome Liquid Crystal Display (LCD) with oval bezel, power and alarm LED's and audible alarm. The Liebert® LDMF shall display the power parameters and alarms listed below. A display shall be mounted on the front door. The display and switches shall be accessible without opening the door.

The Liebert® LDMF system shall monitor up to 84 poles. Each sensor module shall contain twenty-one 100A current transformers (CT) encapsulated 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. The sensor module shall be designed to work with Square D 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.

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

- **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 LDMF DB-9 setup 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

- **Overcurrent 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 a Form C (one NO and one NC) summary alarm contact for remote alarm status. The contacts are rated at 24VAC @ 1A. There shall be one alarm contact per panelboard. 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 for protection against erasure by a power outage. Alarms shall be manually reset after the alarm condition has been corrected.

### **Communication**

The Liebert® LDMF shall have two Vertiv™ Liebert® IntelliSlot ports; up to two Liebert® IntelliSlot cards can be added for customer connections to a Building Management System (BMS) or Vertiv™ Liebert® SiteScan™ monitoring interface.

#### **2.2.3 Vertiv® Liebert® SiteScan™ Monitoring Interface**

Monitoring interface module shall allow the Vertiv™ Liebert® LDMF to communicate with Liebert® SiteScan™ Web 4.0 or later. The module shall include software and graphics that support up to 84 branch breakers using an Ethernet connection.

#### **2.2.4 Vertiv™ Liebert® IntelliSlot IS-UNITY-DP Card**

The Vertiv™ Liebert® RX shall be supplied with an IS-UNITY-DP Card for remote communication using two of the following protocols: HTTP/HTTPS, Vertiv Protocol, Email, SMS, SNMP v1/v2c/v3, BACnet IP/MSTP and Vertiv™ Liebert® Modbus TCP/RTU output. A serial RS-485 two wire connector shall be supplied.

**NOTE:** Two of the 3<sup>rd</sup> party protocols (SNMP, Modbus or BACnet) may be configured and used simultaneously. Liebert® Modbus RTU and BACnet MSTP cannot both be enabled simultaneously.

#### **2.2.5 Factory Witness Test**

Vertiv shall permit the owner or a representative to witness the factory test of each unit. The factory shall perform its standard witness test to demonstrate that the unit meets the Liebert® RX specifications.

#### **2.2.6 Certified Test Report**

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

#### **2.2.7 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.