

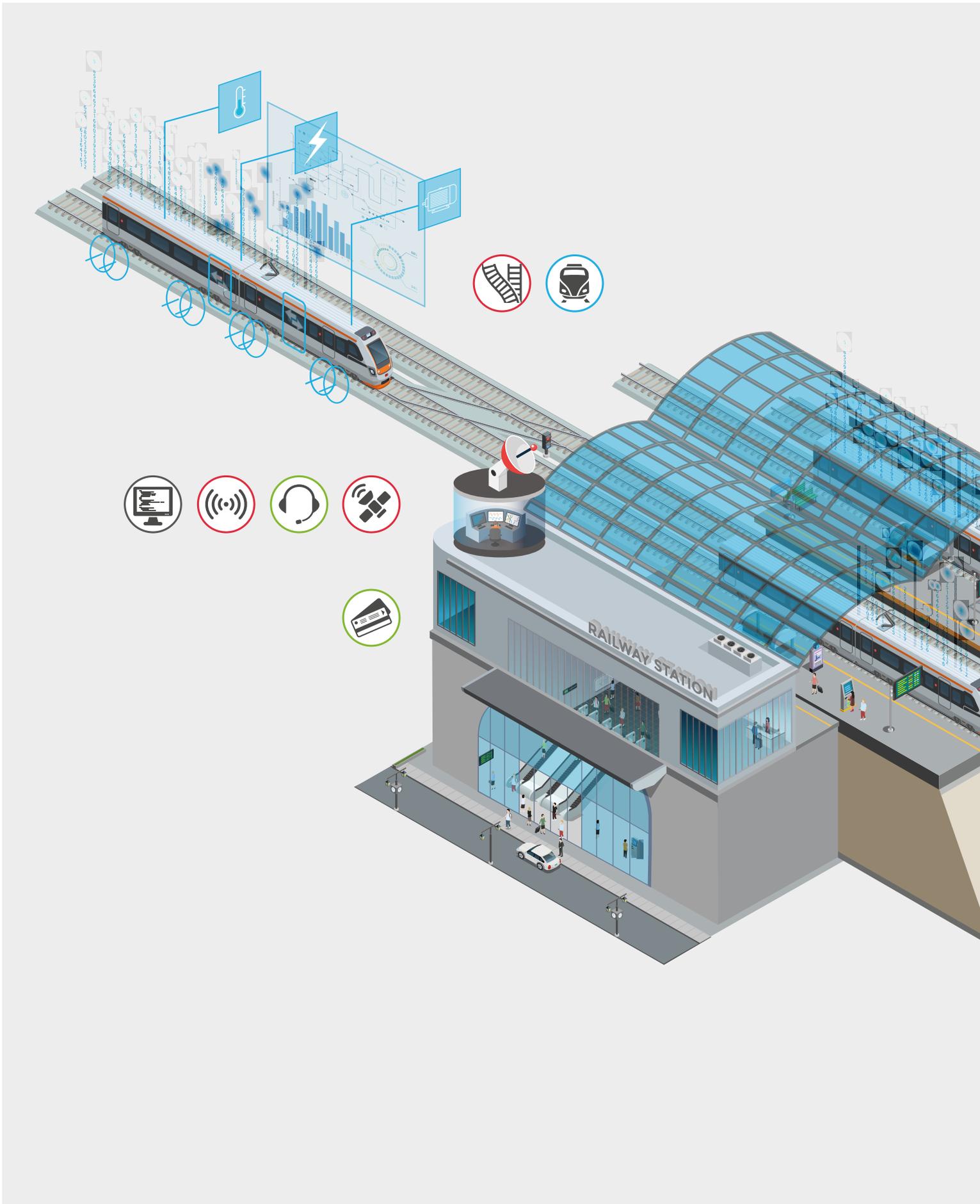


**VERTIV™**

# **SECURING YOUR RAIL INFRASTRUCTURE**



# SECURING YOUR RAIL INFRASTRUCTURE





## SIGNALLING AND CROSSING



### TRACK SAFETY

- Signalling and crossings



### TUNNEL SAFETY

- Power back-up for ventilation
- Emergency lighting
- Solutions for video, signaling, fire detection

## TRACKSIDE



### COMMUNICATION

- Solutions for the Telecommunications network



### TRACKSIDE IT INFRASTRUCTURE AND TRACK SAFETY

- Signalling and crossings



### POWER AND TRANSFORMER STATIONS

- Power back-up



### SWITCH CONTROL

- Traffic management

## STATIONS



### CONTROL ROOMS

- Passenger information
- Line monitoring systems



### PLATFORM VIDEO AND VOICE SYSTEMS

- Monitoring system announcements



### PASSENGER INFORMATION AND ACCESS CONTROL

- Secure power for station control and equipment protection

## ROLLING STOCK



- On-board power back-up

With billions of passengers, millions of journeys and tonnes of freight moving each year, the rail industry is both a vibrant and challenging environment.

You, as a rail operator, are expected to:

- Deliver **reliable service**
- Ensure **the safety of passengers and operative personnel**
- Minimize **operating and maintenance costs**
- Guarantee **a more efficient and resilient system**

Continual progress in Information and Communication Technology means that your customers require information on demand and have ever greater expectations of punctuality, value and amenities.

These same advances in technology open up opportunities for truly intelligent rail networks:

- Smart ticketing enables improved mass data capture and passenger flow
- In-cabin signalling systems allow for optimized command and control
- Remote condition monitoring supports safer and proactive maintenance

We have a proven track record of helping some of the largest rail operators in the world to leverage these opportunities, meet operational challenges and protect their infrastructure.

Our engineers and project managers have a comprehensive knowledge gained from **many**

**years of experience in designing, building and servicing mission-critical solutions for rail and transport applications**, just like yours.

While you ensure the best experience for your customers, we keep your infrastructure up and running with standard and industrial-grade solutions designed to meet your needs:

- **AC and DC power protection solutions**
- **Thermal management for critical systems**
- **IT infrastructure management devices**
- **Modular and scalable options**
- **Remote diagnosis and monitoring**
- **Energy and asset management services**
- **Battery maintenance services**

We have **a wide range of products that are included in numerous industry approved registers** across Europe, Middle East and Africa. Our products **are compliant with Rail Standards for Surface Rail and Underground** applications:

- EMC compliance (BS EN 50121 & S1222)
- BS EN 62040
- CE marked
- ECA listed products

By placing your trust in Vertiv you can leverage extensive experience in infrastructure support, thus guaranteeing your passengers **a safe journey, a smarter experience and a future-proof service.**

## REFERENCES

Vertiv has completed projects for a number of rail operators around the world, including:

- **Alstom**  
France
- **Ansaldo ST** (Hitachi)  
Italy
- **Bombardier**  
Germany
- **Bombardier Transportation** (Signal)  
Russia
- **DB Netz**  
Germany
- **Istanbul Ulasim A.S.**  
Turkey
- **London Underground**  
UK
- **Network Rail**  
UK
- **ÖBB**  
Austria
- **Major Australasian Rail Network Provider**



### Chloride CP-60Z, Industrial UPS System Result of Latest Industrial Requirements Combined with R&D Innovations

The Chloride CP-60Z is available from 5 to 60kVA in single-phase or three-phase output configuration and offers 110Vdc, 220Vdc, and 400Vdc battery voltages.

The UPS uses patented digital Vector Control technology which increases the UPS performances, enables active conditioning of the load and allows personalised system settings.

The Chloride CP-60Z can be adapted for project-specific requirements. A wide choice of industrialized extras allows system customization according to the most demanding technical specifications. To further improve load availability and process reliability, the system is able to operate in dual parallel configuration, centralized or distributed, with single or dual batteries, and can include AC bus-tie.

#### BENEFITS

- Energy Savings: Improved efficiency means reduced power consumption and smaller air conditioning system
- Project Savings: Higher input power factor and lower inrush current allow smaller upstream transformer, switchgear and cables and reduce line current and losses in the cables.
- Safe and Easy Maintenance: Segregated manual bypass and front access to major components improve safety and reduce MTTR
- Smart Access to UPS Data:
  - Large graphical user interface with touch screen
  - Embedded event logger (up to 2000 events) and capability to export the recorded events via USB drive

#### KEY FEATURES

- Low Ripple Voltage to reduce battery stress and optimize its lifetime
- Low Inrush Current < 4In (12-pulse) to not oversize mains power supply
- SCR-Based Rectifier, 6 or 12 Pulses, with improved operation to significantly reduce the mains' pollution (THDi) and the input RMS current
- Proven Reliability: The unique design allows the UPS to continuously operate at full load at 140°F / 40°C
- Galvanic Isolation: Input and Output transformers are standard on the complete range
- Ingress Protection NEMA 1/2 is provided as standard to operate in the most demanding environments
- Full Battery Compatibility: lead-acid and nickelcadmium batteries, sealed or vented



Chloride CP-60Z

# Technical Specifications

RATINGS - Output Power <sup>(1)</sup> (kVA) vs DC Intermediate Voltage (Vdc)							
125 Vdc	5	10	20	30	-	-	-
220 Vdc	5	10	20	30	40	50	60
400 Vdc	-	-	-	-	40	50	60

(1) at Power Factor 0.8 Lagging

INPUT	
AC Voltage	3 x 480V, 3 x 208V, 3 x 400V <sup>(2)</sup>
Voltage Tolerance	+/- 10%
Frequency	60Hz
Frequency Tolerance	+/- 5%
Inrush Current	< 8 x In (6-pulse version) < 4 x In (12-pulse version)
Power factor	up to 0.94

BATTERY DC CIRCUIT	
Nominal DC Voltage	125 / 220 / 400 V
Voltage Stability	+/- 1% in Float Mode
(Input within Tolerance)	+/-1.5% for Parallel Rectifiers
Voltage Ripple	0.25% RMS, in Float Mode, Battery Connected
Current Limitation	I Nominal

OUTPUT	
Available Ratings	see table (at PF 0.8 Lagging)
AC Voltage:	
Single Phase	1 x 120V , 1 x 220V
Three Phase	3 x 480 VAC, 3 x 208 VAC, 3 x 400 VAC
Frequency	60Hz
Frequency Stability:	
with Internal Oscillator	+/- 0.05%
with Reserve Synchronism	+/- 3% (from 0.2 to 6% Adjustable)
Voltage Stability (for 0-100% load variation):	
Static	+/-1% (+/-2% for Parallel Systems)
Dynamic	+/-5%
Overload Inverter:	
1 minute	150% of Nominal Power
10 minutes	125% of Nominal Power
Short Circuit Clearance:	
1-ph Output (in % of Nominal Current)	250%/100 ms - 175%/5 s
3-ph Output (in % of Nominal Current)	315%/100 ms - 220%/5 s (Ph-N)
Harmonic Voltage Distortion:	
with 100% Linear Load	< 3%
with 100% Non-Linear Load	≤ 5%
Allowable Power Factor	0.5 Lagging to 0.5 Leading
Allowable Crest Factor	up to 3/1

BATTERY	
Type	Lead Acid or Nickel Cadmium Vented or Recombination
Autonomy	From few minutes to several hours, as per Customer Requirement
Battery Current Limitation (typical, float & charge modes)	0.1C (Lead Acid Battery) 0.2C (Nickel Cadmium Battery)
Battery Current Limitation (typical, boost mode)	0.05C (Lead acid Battery) 0.1C (Nickel Cadmium Battery)

GENERAL DATA	
Operating Temperature	32 to 140°F / 0 to 40°C <sup>(2)</sup>
Storage Temperature	-4 to 158° F / -20 to +70°C
Relative Humidity	<90% Non Condensing
Operating Altitude	3200 feet / 1000 m max without Derating <sup>(2)</sup>
Cooling	Fan-assisted with Redundant Monitored fans
Efficiency	Up to 90% according to Rating and Configuration
External Ingress Protection	NEMA 1/2
Noise (at 3.3 feet in front of the unit)	Less than 66 dB
Frame Color	Light Gray RAL 7035 <sup>(2)</sup>
Dimensions	Varying According to Ratings & Options

STANDARDS	
Compliance	UL 1778, NEMA PE1, ISO 9001 and ISO 14001

OPTIONS	
Rectifier	12-pulse SCR Rectifier Special 3-ph Input Voltage Surge and/or Lightning Protections Input Circuit Breaker
Battery	External Battery Protection (Fuse or Circuit Breaker) Battery Reversed Polarity Detection Battery Low Voltage Disconnection (LVD) Battery Black Start Battery Room Temperature Sensor for Battery Compensated Recharge DC Earth Fault Detection
Output	AC Earth Fault Detection
Bypass	Bypass Input Circuit Breaker Bypass Transformer Bypass Voltage Regulator (servo-controlled)
System	Dual Configurations AC Distribution (Circuit Breakers) Backfeed Protection Internal Cabinet Lighting Auxiliary Power Socket Space Heater UPS Cabinet Temperature Monitor Special Cabinet Identification (Tag, Nameplate)
Mechanical	Top Cable Entry Other Enclosure Colors Various Feet Height Special Keylock Special Gland Plate Lifting Eyes 12 Gauge Panel Thickness
Communication	Front Panel Analog Meters (2.8x2.8 inches, class 1 or class 1.5) Transducers 4-20mA Additional Volt-Free Contacts Modbus RTU (RS232 or RS485) Modbus / TCP Profibus PPVis Monitoring Software Passive Mimic Panel Active Mimic Panel with Integrated LEDs Special Lamp Indicator on Front Panel (0.9 inches diameter)

(2) other available on request

### Chloride FP-60Z, a True Industrial UPS System Offering a Full-IGBT Innovative Design and Embedding all the Latest Technologies

The Chloride FP-60Z is available in standard range from 5 to 160 kVA in single-phase or three-phase output configurations and can be adapted to reach up to 250kVA output power.

The Chloride FP-60Z is available in standard range from 5 to 160 kVA in single-phase or three-phase output configurations and can be adapted to reach up to 250kVA output power. It offers a wide choice of DC battery voltages (110V, 220V or 400V) and of output voltages (from 1x110 V to 3x415V).

The UPS uses patented digital Vector Control technology which increases the UPS performances, enables active conditioning of the load and allows adaptability to different application needs.

The Chloride FP-60Z features a wide input voltage tolerance, which makes the system compatible with the harshest industrial power grids.

To further improve load availability and process reliability, the Chloride FP- 60Z is able to operate in dual distributed parallel configuration, with one or two reserve supplies, with single or dual batteries, and can include an AC bus-tie.

#### BENEFITS

- Best-in-class performance to optimize expenses:
  - Reduced CAPEX - Upstream transformer, switchgear and cables are downsized thanks to high input power factor, low THDi rejection and low inrush current
  - Controlled OPEX - Lower power consumption thanks to high efficiency
  - Proven digital Vector Control technology to control the output waveform in real time, even on non linear loads
- Industrial-grade maintainability:
  - Innovative design without heavy power modules and allowing an easy front access to all components
  - Removable ID Cards which safeguard the UPS parameters and facilitate control board replacement
- Smart access to UPS data:
  - Large colour LCD touch-pad for user interface
  - Embedded event logger (up to 2000 events) and capability to export recorded events via memory stick
- Industrial flexibility:
  - Fit-for-purpose battery selection
  - Galvanic isolation: either output or input and output transformers
  - Wide range of electrical and mechanical options

#### KEY FEATURES

In addition to the below, the Chloride FP-60Z features:

- Bi-directional rectifier to perform battery deep discharging tests into the mains
- Ingress Protection IP42 as standard for harsh environmental conditions
- Robust design to continuously operate at full load at 40°C



Chloride FP-60Z

# Technical Specifications

RATINGS - Output Power at cos phi 0.8 (kVA) vs battery voltage (Vdc)											
110 Vdc	5	10	20	-	-	-	-	-	-	-	-
220 Vdc	-	10	20	30	40	60	-	-	-	-	-
400 Vdc	-	-	-	-	40	60	80	100	120	160	250

## INPUT

Input voltage (other voltage on request)	3ph+N x 400 VAC (380; 415) ±10%
Inrush current (without input transformer) (with input transformer)	≤ I <sub>n</sub> ≤ 8 x I <sub>n</sub>
Power factor	up to 0.98
Frequency range	50 Hz (60 Hz factory setting) ±5%

## INTERMEDIATE DC CIRCUIT

Nominal DC voltage	110 / 220 / 400 VDC
Voltage stability	±1% in float mode, input within tolerance
Voltage Ripple (battery connected)	≤1% RMS, in float mode
Current limitation	I nominal
Charging characteristic	IU according to DIN 41773

## OUTPUT

Available ratings (see table above):	from 5 to 160 kVA (at PF 0.8 lagging)
AC Voltage:	
Single Phase	230 VAC (220, 240) / 110 VAC (115, 120)
Three Phase	400 VAC (380, 415) / 220 VAC (190, 210)
Frequency	50 Hz (60 Hz factory setting)
Frequency Stability:	
with internal oscillator	±0.1%
with reserve synchronism	±1% (from 1 to 4% factory setting)
Voltage Stability (for 0-100% load variation):	
Static	±1%
Dynamic	VFI SS 111 - complies to IEC62040-3, class 1
Overload Inverter:	
10 minutes	125% of Nominal Power
1 minute	150% of Nominal Power
Short Circuit Clearance (in % of nominal current):	
1-ph output	250%/100 ms - 150%/5 s
3-ph output	250%/100 ms - 150%/5 s
Harmonic Voltage Distortion:	
with 100% Linear Load	< 2%
with 100% Non-Linear Load	≤5% (complies with IEC 62040-3)
Allowable Power Factor	0.5 Lagging to 0.5 Leading
Allowable Crest Factor	3/1

## BATTERY

Type	Type Lead Acid or Nickel Cadmium (vented or recombination)		
Recommended number of cells:	110 Vdc	220 Vdc	400 Vdc
Lead Acid	54 to 72	108 to 144	192 to 228
Nickel Cadmium	88 to 98	176 to 200	320 to 323
Battery Current Limitation:			
Lead Acid		0.1C	
Nickel Cadmium		0.2C	

## STANDARDS

Compliance	IEC 62040 (-1, -2, -3) / 60146 / IEC 60950 IEC 60529 / IEC 60439 / IEC 60076 / IEC 60332-1-2
Conformity	EMC Directive 2004/108/CE Low Voltage Directive (LVD) 2006/95/CE - CE Mark

## GENERAL DATA

Operating Temperature	From 0 to 40°C (without system derating)
Storage Temperature	From -20 °C to +70 °C (battery excluded)
Relative Humidity	<95 % non condensing at 20 °C
Operating Altitude	3200 feet / 1000 m max without Derating
Cooling	Fan-assisted
Efficiency	up to 92 % (in online mode and according to rating and config.)
External Ingress Protection	IP 42
Noise (at 3.3 feet in front of the unit)	62 to 72 dB
Isolation	Input - Output 2500VAC / 1 minute
Feet height	100mm
Gland plate thickness	3mm aluminium non-magnetic
Dimensions	Varying according to ratings and options from 1x800mm to 2x1000mm width

## OPTIONS

Rectifier	Input isolation transformer Special 3-ph input voltage (up to 3x690Vac) Lightning protections Input switch / input circuit breaker with aux. contact
Battery	Internal battery protection (switch/circuit breaker) Battery circuit protection box (circuit breaker) Battery reversed polarity protection and indication Battery Low Voltage Disconnection (LVD) Battery black start Battery room temperature sensor for battery charge compensation DC earth fault detection Battery matching cabinet (for limited autonomies)
Output	Output switch / circuit breaker with pos. contact
Reverse	Reserve input switch / circuit breaker with aux. contact Reserve isolation transformer (H class) Reserve voltage stabilizer (servo-controlled) Stabilizer output isolator
System	Parallel configurations (distributed parallel) Operating temperature up to 50°C with system derating AC distribution - Backfeed protection tripping device Internal cabinet lighting Anti-condensation heater with thermostat Auxiliary power socket Redundant monitored fans Special cabinet identification (Tag number, nameplate)
Mechanical	Top cable entry Special frame color (RAL paint standards) Special feet height 200mm Special gland plate (2mm, 5mm thickness) Antivibration pads _ Lifting eyes G3 conformal coating on electronic cards against dust and humidity
Communication	Additional volt-free contacts (up to 20 relays) Modbus RTU (RS232 or RS485) Modbus / TCP-IP / Profibus / SNMP

\* Available according to ratings

### Liebert® 80-eXL, Secure Power and Maximized Energy Quality for Railway Applications

Liebert 80-eXL Traction Rectifier (TR) is the innovative solution for railway applications based on Liebert EXL UPS. It is specifically designed to deliver continuous, safe and high quality power under the most severe conditions to always protect the rail network's critical loads.

#### Innovative Design

Based on a product platform with a wide installed base, the new Liebert 80-eXL TR is a monolithic product that combines a modern transformer free design with an innovative state-of-the-art three-level topology full IGBT rectifier able to provide clean and reliable power from overhead contact lines and catenary sources.

Liebert 80-eXL TR features a fully integrated energy management system with priority based source selection which optimizes operation costs while ensuring maximum availability.

Thanks to the innovative IGBT rectifier control Liebert 80-eXL TR is able to maximize battery life, filtering out all catenary disturbances thus optimizing the overall total cost of ownership.

Furthermore, its unique design allows for easy and concurrent serviceability still maintaining the highest reliability levels on the market.

#### Availability - Uptime Enhancement:

- Advanced diagnostic; making your mission critical space a peaceful place
- Enhanced DSP control board and intelligent colored multi-language touch-screen display
- Enhanced event analysis and waveform capturing highlights external phenomena that may impact availability
- Vertiv™ LIFE™ Services remote diagnostic and preventive monitoring service increases system uptime and operational efficiency.

#### Capacity - Installation Flexibility

- Compact footprint for optimum space utilization
- Maximized power factor operation permits compatibility with modern mission critical loads - both leading and lagging - without derating
- UPS power ratings: 30, 40, 60 and 80 kVA.

#### Performance - Serviceability

- 1-phase input rectifier from catenary in combination with 3-phase bypass input
- Easy serviceability of building blocks
- Suitable for both L-N and L-L catenary derived input
- Extremely low inrush current for effective sizing of cables/breakers
- Adoption of three-level full IGBT NPC2 inverter and rectifier topology
- Excellent input performances allow for significant electrical infrastructure saving.



Liebert 80-eXL TR

## Technical Specifications

UPS RATING (kVA)	30	40	60	80
Nominal output active power (kW)	27	36	54	72
<b>INPUT</b>				
Nominal DNO (Distribution Network Operator) AC input voltage / voltage range* (Vac)	400±15% @100% load, 3Ph + N + G, TN TT IT power distribution system compatibility			
Nominal OHL (OverHead Line) input voltage (Catenary) / voltage range* (Vac)	400 (-24% +16% @100% load), 2Ph or 230 (-24% +16% @100% load), 2Ph, Earthed/Unearthed power distribution system compatibility			
Nominal bypass input voltage / voltage range* (Vac)	400±10%, 5% to 15% selectable, 3Ph + N + PE			
Nominal DNO and OHL input frequency / frequency tolerance (Hz)	50±6%			
Nominal bypass input frequency / frequency tolerance (Hz)	50±1% (2%, 3%, 4% selectable)			
Input Power Factor	≥ 0.99			
DNO AC Input current distortion (THDi) (%)	≤4 at full linear load			
OHL input current distortion (THDi) (%)	≤3 at full linear load			
<b>OUTPUT</b>				
Nominal output voltage (V)	400 (380/415 selectable), 3Ph or 3Ph + N			
Nominal output frequency (Hz)	50			
Output voltage stability by load variation 0-100% (%)				
• static	±1			
• dynamic	Complies with IEC/EN 62040-3, Class 1			
Output frequency stability				
• synchronized with bypass mains (%)	±1			
• synchronized with internal clock (%)	±0.01			
Inverter Overload Capacity	125% for 10mins, 150% for 1min			
Short circuit current in battery mode (%)	2 In			
Load crest factor handled without derating the ups (Ipk/Irms)	3:1			
Compatibility with loads	0.6 lag to 0.9 lead handled without Apparent Power derating			
<b>BATTERY</b>				
Nominal battery voltage (Vdc)	480V			
Float voltage for VRLA @ 20 °C (V/cell)	2.27			
End cell voltage for VRLA (V/cell)	1.65			
Ripple voltage (%C10)	≤0.05			
<b>GENERAL AND SYSTEM DATA</b>				
Classification according to IEC/EN 62040-3	VFI-SS-111			
Operating Temperature (°C)	0-40			
Maximum relative humidity @ 20 °C (non condensing) (%)	up to 90			
Protection degree with open doors	IP 20			
Frame colour (RAL scale)	7021			
Noise @ 1 metre as per ISO 3746 (dBA ± 2dBA)	70 52 dBA @partial load			
Access	Front and Top (no rear access required)			
AC/AC efficiency in normal mode, DNO input (%)	Up to 94%	Up to 94,5%	Up to 95%	Up to 95.5%
<b>DIMENSION AND WEIGHT</b>				
Height (mm)	1950 On request			
Width (mm)	1000 On request			
Depth (mm)	900 On request			
Net Weight (kg)	670 (without batteries) On request			

\*Conditions apply

### Chloride CP-70Z, Industrial UPS System combining Conservative Design Topology with Proven Digital Control Technology

Associated with an industrial stand-by battery, the Chloride CP-70Z protects critical industrial AC equipments and processes from the damaging effects of power interruption and losses.

It uses the patented digital Vector Control technology which increases the performances of power components and enables an active conditioning of the load. The result is improved reliability for the process enhanced safety for the personnel.

The CP-70Z is a range of three-phase input / single-phase output or three-phase output AC UPS systems available from 2.5kVA to 120kVA. It offers a wide choice of DC battery voltages and of output voltages. The CP-70Z range can be customized to meet higher power needs, up to 250kVA single-phase output or 500kVA three-phase output.

To further improve load availability and process reliability, the CP-70Z is able to operate in dual parallel configuration, with single or dual batteries, with centralized or distributed bypass line, and can include a DC and/or AC bus-tie.

#### BENEFITS

- Tailor-made Systems to comply with all customer specifications
- Rugged Solutions for demanding environments: high temperatures, vibrations, dust, elevation, dripping water and moisture
- Efficient Maintenance:
  - Easy front-access to all critical modules
  - Removable ID Cards to safeguard the UPS parameters and facilitate control board replacement
- Smart Access to UPS Data:
  - Large color LCD touch-pad for user interface
  - Embedded event logger (up to 2000 events) and capability to export recorded events via USB drive

#### KEY FEATURES

- Reliability: Unique design which allows the UPS to continuously operate for at least 20 years at full load at 140°F / 40°C
- Robust Mechanical Design: The system withstands vertical and horizontal acceleration stress tests 0.5g as standard
- Galvanic Isolation: Input and Output transformers as standard
- Remote Monitoring Capabilities: Modbus, Profibus, ethernet, volt-free contact, monitoring software
- Full Battery Compatibility: Lead-acid and nickelcadmium batteries, sealed or vented



Chloride CP-70Z

# Technical Specifications

RATINGS - Output Power <sup>(1)</sup> (kVA) vs DC Bus Voltage (Vdc)										
125 Vdc	5	10	20	30	40	50	60 <sup>(2)</sup>	-	-	-
220 Vdc	-	10 <sup>(2)</sup>	20	30	40	50	60	80	100	120 <sup>(2)</sup>
400 Vdc <sup>(3)</sup>	-	-	-	-	40	50	60	80	100	120

(1) at power factor 0.8 Lagging

(2) 1-ph Output only

(3) Up to 250 kVA 1-ph Output or up to 500kVA 3-ph Output on Request

INPUT	
AC Voltage	3 x 480V, 3 x 208V, 3 x 400V <sup>(4)</sup>
Voltage Tolerance	+/- 10%
Frequency	60Hz
Frequency Tolerance	+/- 5%

INTERMEDIATE DC CIRCUIT	
Nominal DC Voltage	125 / 220 / 400Vdc
Voltage Stability	+/- 1% in Float Mode (Input within Tolerance) +/-1.5% for Parallel Rectifiers
Voltage Ripple	1% RMS, in Float, Battery Connected

OUTPUT	
Available Ratings	see table (at PF 0.8 Lagging)
AC Voltage:	
Single Phase	1 x 120V, 1 x 220V <sup>(4)</sup>
Three Phase	3 x 480 V, 3 x 208 V, 3 x 400 V <sup>(4)</sup>
Frequency	60Hz

Frequency Stability:	
with Internal Oscillator	+/- 0.05%
with Reserve Synchronism	+/- 4% (from 1.2 to 6% Adjustable)

Voltage Stability (for 0-100% load variation):	
Static	+/-1% (+/-2% for Parallel Systems)
Dynamic	+/-5%

Overload Inverter:	
1 minute	150% of Nominal Power
10 minutes	125% of Nominal Power

Short Circuit Clearance:	
100 ms	250% (1ph) or 315% (Ph-N; 3ph) of Nominal Current
5s	175% (1ph) or 220% (Ph-N; 3ph) of Nominal Current

Harmonic Voltage Distortion:	
with 100% Linear Load	< 3%
with 100% Non-Linear Load	≤ 5%

Allowable Power Factor	0.5 Lagging to 0.5 Leading
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Allowable Crest Factor	up to 3/1
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## BATTERY

Type	Lead Acid or Nickel Cadmium Vented or Recombination
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Autonomy	From few minutes to several hours, as per Customer Requirement
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Battery Current Limitation (typical, float & charge modes)	0.1C (Lead Acid Battery) 0.2C (Nickel Cadmium Battery)
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Battery Current Limitation (typical, boost mode)	0.05C (Lead acid Battery) 0.1C (Nickel Cadmium Battery)
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## GENERAL DATA

Operating Temperature	32 to 140°F / 0 to 40°C <sup>(4)</sup>
Storage Temperature	-4 to 158° F / -20 to +70°C
Relative Humidity	<95% Non Condensing
Operating Altitude	3200 feet / 1000 m max without Derating <sup>(4)</sup>
Cooling	Forced Ventilation
Efficiency	Up to 90% according to Rating
External Protection	NEMA 1/2
Noise (at 3.3 feet in front of the unit)	60 – 75 dB according to Rating
Frame Color	Light Gray RAL 7035 <sup>(4)</sup>
Dimensions	Varying According to Ratings & Options

## STANDARDS

Compliance	UL 1778, NEMA PE1, ISO 9001 and ISO 14001
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## OPTIONS

Rectifier	12-pulse Rectifier Harmonic Filter Ripple Voltage Filter Blocking Diode Other Input Voltages Inrush Current Limitation 8x Nominal Current Surge and Lightning Protections
Battery	External Battery Protection (Fuse or Breaker) Battery Cabinet Low-Voltage Disconnect Contactor Battery Management System Battery Room Temperature Sensor
System	Dual Configurations Input / Output Circuit Breakers Dropping diodes AC Distribution Earth Fault Monitoring Internal Lighting Space Heater Temperature Monitor Special Cabinet Identification Bypass Transformer Voltage Regulator
Mechanical	Top Cable Entry Other Enclosure Colors Various Feet Height Special Keylock Special Gland Plate Lifting Eyes 12 Gauge Panel Thickness
Communication	Front-Panel Analog Meters (2.8x2.8 inches, class 1.5) Transducers Additional Volt-Free Contacts Remote Monitoring via Modbus Remote Monitoring via other Protocol PPVIs Monitoring Software Passive or Active Mimic Panel

(4) other available on request

### Chloride FP-30ZM, an Efficient and Space Saving Solution for Your Mission-Critical Industrial Applications

The Chloride FP-30ZM is available from 10 to 50 kVA in single-phase output configuration and from 30 to 150 kVA in three-phase output configuration.

The Chloride FP-30ZM pushes the limits ahead: when kept in an controlled temperature environment, it behaves like an almost ideal power source. It delivers the same amount of kVA regardless of the PF nature of the loads. And even in a non controlled temperature environment (40°C), it achieves amazing behaviour, showing just an extremely limited kVA derating.

And above all, the Chloride FP-30ZM offers a selection of options to best cope with on-site requirements. For example, the wrap-around bypass option allows to safely maintain the equipment while keeping the load fully operational.

To further improve load availability and process reliability, the Chloride FP-30ZM is able to operate in dual distributed parallel configurations.

#### BENEFITS

- A full IGBT technology
  - Best in class input performances in any condition
  - Modular design approach, with hot-swappable modules, which lowers mean time to repair (MTTR)
  - Unity output power factor to offer more real power to support mission critical loads
- Optimized expenses
  - CAPEX savings thanks to the high input power factor, the low THDi rejection and the low inrush current which allow downsizing upstream transformer, switchgear and cables
  - Controlled OPEX thanks to the utmost efficiency which significantly reduces power consumption
- Minimized footprint
  - The Chloride FP-30ZM optimizes the space within technical room. It can deliver up to 150kVA with a 3-phase output in only 0.54m<sup>2</sup>

#### KEY FEATURES

In addition to the above outstanding characteristics, the Chloride FP-30ZM also features:

- Wide input and frequency range to cope with the worst utility conditions
- Large display that leads the user through logical menu sequences to view the required information. Information is available in 12 languages.
- Compliant with Rail Industry EMC requirements standard EN50121-5



Chloride FP-30ZM

# Technical Specifications

RATINGS									
1-ph output power at cos phi 1 (kVA)	10	20	30	40	50	-	-	-	-
3-ph output power at cos phi 1 (kVA)	-	-	30	-	-	60	90	120	150

INPUT	
Input voltage (other voltage on request)	400 VAC (380; 415)*
Input voltage range	305 - 477 VAC at full load 304 -228 with linear load derating
Inrush current	≤ I <sub>n</sub>
Power factor	up to 0.99
Input THDi	<3%
Frequency	50 Hz (60 Hz)*
Frequency range	40Hz to 70Hz

INTERMEDIATE DC CIRCUIT	
Nominal DC Voltage	432 VDC
DC voltage range	400 - 616 VDC
Voltage stability	±1% in float mode, input within tolerance
Voltage ripple (battery connected)	≤1% RMS, in float mode
Current limitation	I nominal
Charging characteristic	IU according to DIN 41773

OUTPUT	
Available ratings (see table above):	
Single Phase	from 10 to 50 kVA (at PF 1)
Three Phase	from 30 to 150 kVA (at PF 1)
AC Voltage:	
Single Phase	230 VAC (220, 240)*
Three Phase	400 VAC (380, 415)*
Neutral configuration	output neutral shared with input neutral
Frequency	50 Hz (60 Hz)*
Voltage Stability (for 0-100% load variation):	
Static	±1%
Dynamic	VFI SS 111 - complies to IEC62040-3, class 1
Overload Inverter:	
60 minutes	<105% of Nominal Power
10 minutes	125% of Nominal Power
1 minute	150% of Nominal Power
Short-circuit clearance:	
1-ph or 3-ph (in % of nominal current)	>310%/200 ms
Voltage Distortion:	
with 100% Linear Load	< 2%
with 100% Non-Linear Load	≤ 5% (complies with IEC 62040-3, CF 3:1)
Allowable Power Factor	0.5 Lagging to 0.5 Leading
Allowable Crest Factor	3/1

BYPASS	
Input Voltage	400 VAC (380; 415)*
Default Voltage Range	-20% to +15% of nominal voltage*
Overload Capacity	135% long term, 170% / 1 hour, 1000% / 100ms

BATTERY	
Type	Lead Acid (vented or recombination)
Recommended number of cells:	
Nominal	216
Maximum	240
Minimum	180
Battery Current Limitation	up to 11A per power module*
Temperature compensation	0 to -5mV/°C

GENERAL DATA	
Operating Temperature	From 0 to 40°C
Storage Temperature	From -20 °C to +70 °C (battery excluded)
Relative Humidity	<95 % non condensing at 20 °C
Operating Altitude	3200 feet / 1000 m max without Derating
Cooling	Fan-assisted
Efficiency	Up to 96% according to Rating and Config.
External Ingress Protection	IP 21
Noise (at 3.3 feet in front of the unit)	53 – 62 dB according to Rating
Frame Color	Light Gray RAL 7035
Dimensions (H x W x D)	1950 mm x 600 mm x 900 mm

STANDARDS	
Compliance	IEC 62040 (-1, -2, -3) / IEC 60950 IEC 61000-6-2 - IEC 61000-6-4 IEC 60529 / IEC 60332-1-2 EN 50121-5 (EMC requirements for Rail applications)
Conformity	EMC Directive 2004/108/CE Low Voltage Directive (LVD) 2006/95/CE CE Mark

OPTIONS	
Rectifier	Input isolation transformer (external cabinet) Special 3-ph input voltage (up to 3x690Vac) Surge and/or lightning protections Input fuse switch Input circuit breaker with pos. contact
Battery	Battery circuit protection box (Fuse or circuit breaker) Battery Low Voltage Disconnection (LVD) DC earth fault detection
Output	Output isolation transformer AC earth fault detection Output fuse switch Output circuit breaker with pos. contact
Reverse	Reserve input switch / fuse switch / circuit breaker with pos. contact Reserve transformer (H class) - in external cabinet Reserve stabilizer (servo-controlled) - in external cabinet Stabilizer output isolator
System	Parallel configurations AC distribution (external cabinet) External bypass switch (wrap-around bypass)
Mechanical	External ingress protection IP31 (contact us for other requirement) Top cable entry Special frame color Lifting eyes
Communication	Modbus RTU (RS232 or RS485) Telephone switch for LIFE.net remote monitoring service SNMP protocol

\* Commissioning engineer setting

(1) Even with 1-phase output, all 3 phases must be present at the bypass input

### Liebert® NXC, Compact and Reliable Power in a Fully Integrated Packaged Solution

To ensure superior protection for critical loads, the Liebert® NXC range has been designed to optimize specific rating requirements, thus enhancing flexibility and installation space needs.

#### Continuous Reliability

The Liebert NXC 10 - 200 kVA range offers reliable and flexible secure power in a fully integrated package solution. Its highly efficient transformer-free double conversion technology delivers installation and running cost savings. With a rated output power factor up to 1, Liebert NXC is also able to provide greater active power than a traditionally rated 0.9 power factor UPS. Liebert NXC achieves up to 96% efficiency in double conversion mode and up to 99% in ECO mode, thus ensuring effective load protection, while reducing the total cost of ownership (TCO) Continuous Reliability.

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Liebert NXC achieves up to 96% efficiency in double conversion mode and up to 99% in ECO mode, thus ensuring effective load protection, while reducing the total cost of ownership (TCO) and environmental impact. Liebert NXC's combination of performance features, impressive integrated autonomy and compact footprint make it ideal for guaranteeing clean, continuous power for a wide range of applications from IT and manufacturing to retail and transport.

Its low THDi and active input power factor correction ensure that the current absorbed from the upstream distribution network is near equal to its nominal

output current, hence eliminating the need for oversizing gensets and other equipment.

#### Features and Performances

- Output power factor up to 1
- Double conversion efficiency up to 96%
- ECO mode efficiency up to 99%
- Input current total harmonic distortion correction (THDi) < 3%

- Battery charger up to 50 A
- Integrated manual bypass
- Integrated input and output breakers/switches (10-60 kVA)
- Integrated parallel load bus and synchronization port (LBS)



Liebert NXC Family

## Technical Specifications

RATINGS (KVA)	10	15	20	30	40	60	80	100	120	160	200	
<b>INPUT</b>												
Nominal input voltage (V)	380/400/415											
Input voltage range without battery discharge (V)	305 to 477											
Nominal frequency (Hz)	50/60											
Input frequency range (Hz)	40 to 70											
Input power factor (kW/kVA)	0.99											
Current THD at full linear load (THDI%)	<5							<3				
Bypass voltage tolerance (%)	selectable from +20 to -40											
Bypass frequency tolerance (%)	±20 (±10 selectable)											
<b>BATTERY</b>												
Number battery cells per string	Max: 240; Min: 180			Max: 240; Min: 192			Max: 264; Min: 180					
Voltage temperature compensation (mV/°C/Cell)	-3.0 (selectable 0 to -5.0 around 25°C or 20°C or inhibit)						-3.0 (selectable from 0 to -5.0 around 25°C to 30°C, or inhibit)					
Battery charger max. power (kW)	4.5		6		7.5		12		18		24 30	
<b>OUTPUT</b>												
Nominal output voltage (V)	380/400/415 (three-phase) or 220/230/240 (single-phase)					380/400/415 (three-phase)						
Nominal output frequency (Hz)	50/60											
Nominal active power (kW)	9	13.5	18	27	36	54	80	100	120	160	200	
THDv with 100% linear load (%)	2											
Inverter overload capacity	105% for 60 min; 125% for 5 min; 150% for 1 min; >150% for 200ms						105% with continuous operation; 125% for 10 min; 150 for 1min; >150% for 200ms					
Double conversion efficiency	100%	94.4%	94.5%	94.2%	94.7%	94.4%	95.3%	95.7%	95.7%	95.6%	95.5%	95.3%
	75%	94.0%	94.4%	94.5%	94.8%	94.7%	95.5%	95.9%	95.9%	95.8%	95.7%	95.7%
	50%	93.5%	94.0%	94.4%	94.6%	94.8%	94.0%	95.9%	95.8%	95.9%	95.8%	95.8%
	25%	90.5%	92.9%	93.5%	91.7%	93.6%	94.0%	95.0%	94.7%	95.0%	94.9%	94.9%
ECO mode efficiency (%)	98.0%						99.0%					
<b>DIMENSIONS</b>												
Dimensions (W x D x H) mm	500 x 860 x 1240			600 x 850 x 1600			600 x 1000 x 1600			600 x 1000 x 2000		
<b>WEIGHT</b>												
(excluding battery) kg	115/145			210/245			225/260		385/435		430/480 475/525 520/570	
(including 32 batteries) kg	215/245			600/635			615/650		N/A			
<b>GENERAL</b>												
Noise at 1 m (dBA)	≤56	≤56	≤58	≤56	≤58	≤58	≤59	≤60	≤60	≤61	≤62	
Protection level IEC (60529)	IP20											
General and safety requirements for UPS	EN/IEC/AS 62040-1											
EMC requirements for UPS	EN/IEC/AS 62040-2											
UPS classification according to CEI EN 6240-3	VFI-SS-111											

### Chloride CP-70R, Industrial Rectifier-Battery Charger offering the Best Performances in Any Electrical and Environmental Condition

Associated with an industrial stand-by battery, the Chloride CP-70R rectifier-charger protects DC critical industrial equipments and processes from the damaging effects of power interruptions and losses.

It features a microprocessor control which offers exceptional output stability and allows adaptability for different application requirements.

The CP-70R is a range of rectifiers-chargers available from 16A to 2500A with three-phase input, and from 25A to 250A with single-phase input. It offers several output voltages, from 24Vdc to 240Vdc.

The CP-70R three-phase input version is also available with 400Vdc output. This configuration can be combined with a CP-70i inverter in order to design specific high ratings double conversion AC UPS systems (up to 500kVA).

To further improve load availability and process reliability, the CP-70R is able to operate in dual or trial parallel configuration, with single or dual batteries, and can include a DC bus-tie.

#### KEY FEATURES

- Reliability: Unique design which allows the rectifier to continuously operate at full load at 40°C
- High MTBF: Natural cooling available on most of the range
- Reduced MTTR: Direct access to components from the front of the equipment
- Robustness: Mechanical design to withstand vertical and horizontal acceleration stress 0.5g as standard
- 20 years + life span: Designed to meet industrial requirements, with appropriate maintenance
- Isolation transformer
- Multilingual digital graphic display with embedded event log
- Remote monitoring capabilities: Modbus, Profibus, Ethernet, IEC61850, volt-free contacts, monitoring software
- Full compatibility with Lead-acid and Nickel-Cadmium batteries, sealed or vented

#### BENEFITS

- Made to order DC back-up power solutions to exactly fit the industrial application requirements
- Complete power protection solution, including switchgear, DC distribution, monitoring suite
- Ruggedized solutions for demanding environments: high temperatures, vibrations, dust, elevation, dripping water and moisture



Chloride CP-70R

# Technical Specifications

RATINGS - Output Current (A) vs Voltage (VDC)																	
24 Vdc	25 <sup>(1)</sup>	60 <sup>(1)</sup>	100	-	160	-	250	-	400 <sup>(2)</sup>	-	600 <sup>(2)</sup>	800 <sup>(2)</sup>	1000 <sup>(2)</sup>	1250 <sup>(2)</sup>	1500 <sup>(2)</sup>	2000 <sup>(2)</sup>	2500 <sup>(2)</sup>
48 Vdc	25 <sup>(1)</sup>	60	100	-	160	-	250	-	400 <sup>(2)</sup>	500 <sup>(2)</sup>	600 <sup>(2)</sup>	800 <sup>(2)</sup>	1000 <sup>(2)</sup>	1200 <sup>(2)</sup>	1600 <sup>(3)</sup>	2000 <sup>(3)</sup>	2400 <sup>(3)</sup>
125 Vdc	25	60	100	-	160	-	250	320 <sup>(2)</sup>	400 <sup>(2)</sup>	500 <sup>(2)</sup>	600 <sup>(2)</sup>	800 <sup>(2)</sup>	1000 <sup>(2)</sup>	1200 <sup>(2)</sup>	1600 <sup>(3)</sup>	2000 <sup>(3)</sup>	2400 <sup>(3)</sup>
220 Vdc	25 <sup>(2)</sup>	60 <sup>(2)</sup>	100 <sup>(2)</sup>	125 <sup>(2)</sup>	160 <sup>(2)</sup>	200 <sup>(2)</sup>	250 <sup>(2)</sup>	320 <sup>(2)</sup>	400 <sup>(2)</sup>	500 <sup>(2)</sup>	600 <sup>(2)</sup>	800 <sup>(2)</sup>	1000 <sup>(2)</sup>	1250 <sup>(3)</sup>	1600 <sup>(3)</sup>	2000 <sup>(3)</sup>	-
400 Vdc	-	-	-	-	-	-	-	-	400 <sup>(2)</sup>	500 <sup>(2)</sup>	600 <sup>(2)</sup>	800 <sup>(2)</sup>	1000 <sup>(3)</sup>	1250 <sup>(3)</sup>	-	2000 <sup>(3)</sup>	-

(1) 1-ph input only  
 (2) 3-ph input only  
 (3) Rating with 12-pulse Rectifier only

## INPUT

AC Voltage:	
Single Phase	1 x 230V (220, 240) <sup>(4)</sup>
Three Phase	3 x 400V (380, 415) <sup>(4)</sup>
Voltage Tolerance	+/- 10%
Frequency	50Hz (60Hz)
Frequency Tolerance	+/- 5%

## BATTERY DC CIRCUIT

Nominal DC Voltage	24 / 48 / 110-120 / 220-240 V
Voltage Stability	+/- 1% in Float Mode (Input within Tolerance) +/-1.5% for Parallel Rectifiers
Voltage Ripple	0.25% RMS, in Float Mode, Battery Connected
Current Limitation	I Nominal

## BATTERY

Type	Lead Acid or Nickel Cadmium Vented or Recombination
Autonomy	From few minutes to several hours, as per Customer Requirement
Battery Current Limitation (typical, float & charge modes)	0.1C (Lead Acid Battery) 0.2C (Nickel Cadmium Battery)
Battery Current Limitation (typical, boost mode)	0.05C (Lead acid Battery) 0.1C (Nickel Cadmium Battery)

## GENERAL DATA

Operating Temperature	32 to 140°F / 0 to 40°C <sup>(4)</sup>
Storage Temperature	-4 to 158° F / -20 to +70°C
Relative Humidity	<90% Non Condensing
Operating Altitude	1000 m max without derating <sup>(4)</sup>
Cooling	Natural convection on most of the range
Efficiency	Up to 96% according to rating
External Protection	IP 20 <sup>(3)</sup> according to IEC 60529
Noise (at 3.3 feet in front of the unit)	55 – 65 dB according to rating
Frame Color	Grey RAL 7032 <sup>(4)</sup>
Dimensions	Varying According to Ratings & Options

## STANDARDS

Compliance	IEC 60146-1-1:2009 - Semiconductor converters - Specification of basic requirements IEC 62040-1:2008+AMD1:2013 - Uninterruptible power systems (UPS) - Part 1-2: General and safety requirements for UPS in restricted access locations IEC 62040-2:2006 - Uninterruptible power systems (UPS) – Part 2: Electromagnetic compatibility (EMC) requirements IEC 61439-1:2011- Low voltage switchgear and controlgear assemblies - Part 1: General rules IEC 60529:1989+AMD1:1999 - degrees of protection provided by enclosures (IP Code) IEC 60076-11:2004 - Power transformers - Part 11: Dry type transformers
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European Directives	Low voltage directive: 2006/95/EC and 2014/35/EU EMC directive: 2004/108/EC and 2014/30/EU CE Mark
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## OPTIONS

Rectifier	12-pulse rectifier Harmonic filter (THDi = 5%) Ripple voltage filter Blocking diode Other input voltage (3x190 to 3x690VAC) Surge and Lightning protections
Battery	Battery circuit protection box Battery cabinet Low-voltage disconnect contactor Battery Management System Battery room temperature sensor
System	Parallel configurations (dual, trial) Input / output isolators Dropping diodes / DC/DC serial regulator isolated DC/DC converter DC distribution Earth fault monitoring Internal lighting Anti-condensation heater Enclosure temperature monitor Special cabinet identification
Mechanical	Up to IP42 external ingress protection Top cable entry Special frame colour Special feet height Special keylock Special gland plate Lifting eyes 2mm panels thickness Anti-seismic design
Communication	Front-panel analog meters (72x72 class 1.5) Transducers Additional Volt-free contacts Remote monitoring via Modbus Remote monitoring via other bus PPVis monitoring software Passive or active (with LEDs) mimic panel

(4) other available on request

### Chloride FP-40R, Industrial Rectifier Offering an SCR Based Standardized Design with Adaptability to Industrial Requirements

The Chloride FP-40R rectifier is available from 25A to 100A in single-phase input configuration, and up to 400A in three-phase input configuration. It offers a wide range of output voltages, from 24Vdc to 220Vdc.

The Chloride FP-40R is suitable for use either as a battery charger, a rectifier or as a DC power supply. It features a microprocessor control which offers exceptional stability and allows adaptability for different application requirements.

To further improve load availability and process reliability, the Chloride FP-40R is able to operate in dual parallel configuration.

#### BENEFITS

- Improved reliability provided by a fully controlled SCR bridge and a reduced quantity of components
- Adaptability thanks to a selection of industrialized options and an easy parameter settings for quick onsite adjustments
- Simplicity of the product design to improve MTBF and to reduce MTTR

#### KEY FEATURES

- Low Voltage Ripple to optimize battery life
- Low inrush current < 8In not to oversize mains power supply (3-phase)
- Compact design with the capability to integrate the battery in the charger cabinet
- Human-Machine Interface (HMI) to deliver appropriate information level to the user
- Ingress protection up to IP55 for harsh environmental conditions\*
- Compatibility with nickel-cadmium and lead-acid batteries, vented or gas-recombination types
- Galvanic isolation between input and output
- Digital control and monitoring
- Wide choice of configurations and options



Chloride FP-40R

\* According to ratings

## Technical Specifications

RATINGS - Output Current (A) vs Output Voltage (Vdc)	24Vdc	48Vdc	110-125Vdc	220Vdc
Ratings with 1-phase input:	-	-	25	25
	-	40	40	-
	-	60	60	-
	100	100	100	-
	35	35	35	35
Ratings with 3-phase input:	65	65	65	65
	100	100	100	100
	160	160	160	160
	220	220	220	220
	300	300	300	300
	400	400	400	400

### INPUT

Model:	
Single Phase	FP-40R10
Three Phase	FP-40R30
Input voltage (other voltage on request)	
Single Phase	230VAC ± 10%
Three Phase	400VAC ± 10%
Inrush current	
Single Phase	< 15In
Three Phase	< 8In
Power factor	
Single Phase	0.7 (typical)
Three Phase	0.8 (typical)
Frequency range	47Hz to 63Hz

### OUTPUT

Available ratings	see table above
Nominal DC voltage	24, 48, 110, 125, 220 V
Static regulation	1%
Voltage Ripple:	
Single Phase	(Disconnected battery) < 2.5%
Three Phase	(Disconnected battery) < 0.7%

### SUPERVISION

Charger status and alarms on displaying unit  
 Displayed values: output voltage, output current, battery current  
 Volt free contacts  
 Event log up to 100 events

### BATTERY

Type	Lead acid or Nickel cadmium (vented or recombination)
Autonomy	from few minutes to several hours, as required

### GENERAL DATA

Operating Temperature	From 0 to 40°C (without system derating)
Storage Temperature	From -20 °C to +70 °C (battery excluded)
Relative Humidity	<95 % non condensing at 20 °C
Operating Altitude	3200 feet / 1000 m max without Derating
Cooling	Natural or fan-assisted (according to rating)
Rectifier Efficiency	from 83% to 94% (according to model)
External Ingress Protection	IP 20
Noise (at 3.3 feet in front of the unit)	≤60 dB
Isolation	Input - Output 2500VAC / 1 minute
Frame Color	Light Gray RAL 7035
Dimensions	Varying according to ratings and options

### STANDARDS

Compliance	IEC 61000-6-4 - IEC 61000-6-2 IEC 60146 - IEC 61439-1 - NFC 58-311
European Directives	EMC Directive 2004/108/CE Low Voltage Directive (LVD) 2006/95/CE

### OPTIONS

Charger	Paralleling diode Dropping diode DC earth fault monitor Customer connection on terminal blocks Ultra low voltage ripple <0.1% (48V or 110V) Isolated communication interface, RS485, Modbus Measurements of AC input voltage, current and frequency
Battery	Protection against battery reversed polarity Battery Low Voltage Disconnection (LVD) Batteries in charger cabinet (on shelves or drawers) Temperature sensor for battery charge compensation Test battery presence or test battery capacity
Mechanical	External ingress protection IP21, 23, 40, 41, 43, 55* Space heater Internal ingress protection with open door IP20 Internal lighting Other RAL painting colour 100mm or 200mm base frame Lifting eyes
DC Load	Distribution board (circuit breaker with or without contact)

\* Available according to ratings

### Chloride FP-20R, a Battery Charger for Stationary Batteries Delivered in a Compact Enclosure

It is available in several configurations: as a DC power pack with integrated battery or as a stand-alone charger with external battery, it ensures the continuity of service to critical DC loads. As a standalone rectifier, it supplies DC power supply to industrial processes.

Chloride FP-20R is supplied with a single-phase input and offers a wide choice of output voltages, from 12Vdc to 220Vdc. The range of available ratings is from 6 to 180A, according to the chosen output voltage.

Chloride FP-20R combines high frequency switch-mode technology with microprocessor control to bring a high performance level and exceptional output voltage stability in a very compact design.

To further ensure reliability of the connected load, Chloride FP-20R is provided with natural convection cooling, thus eliminating the need to replace worn mechanical parts.

#### BENEFITS

- Compact DC power pack: the capability to integrate the battery inside the charger cabinet allows to backup a 4kW load for 2 hours<sup>(1)</sup>.
- Adaptability: a wide choice of output voltages and industrialized options is available to meet your specific needs.
- Easy diagnostic: the control system offers a quick reading of the system status via the LEDs and the integrated display. Up to 4 signaling contacts ease remote diagnostic.
- Enhanced safety for the load: the integrated battery test feature checks the correct operation of the battery circuit protection device and the battery's ability to secure the load. This automatic and cyclic test is particularly useful to check the battery state after long standby periods.

#### KEY FEATURES

- Power factor corrector to limit perturbations on the upstream network.
- Low voltage ripple to optimize battery life.
- Embedded battery test.
- Fuse or circuit breaker on the output and on the battery line.
- Up to IP41 ingress protection to meet installation requirements of industrial environments.
- Design Flexibility which allow paralleling of the internal rectifier modules to increase the available power or to ensure N+1 redundancy.



<sup>(1)</sup> Example for an FP-20R 48Vdc/90A

## Technical Specifications

INPUT	
Main supply	230Vac 1 ph
Input voltage tolerance	-20% / +15%
Power factor	>0.95
Input frequency	50/60Hz
Frequency range	47Hz to 63Hz

OUTPUT	
Nominal voltage	See selection table
Output voltage range	±15%
Static regulation	±1%
Voltage Ripple	<0.1% RMS

BATTERY	
Type	Valve regulated lead acid

MONITORING	
Type of display	Alphanumerical, 2 lines of 8 characters
Type of display	Monitoring of the DC voltage

Main functions	LED test Battery recharge current limitation
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Measurements	Output voltage Output current
--------------	----------------------------------

Remote signaling	Dry contacts
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GENERAL DATA	
Operation Temperature	From 0 to 40°C
Storage Temperature	From -5 °C to +45 °C
Relative Humidity	<95 % non condensing at 20 °C
Operation Altitude	3200 feet / 1000 m without derating
Cooling	Natural convection cooling
Rectifier Efficiency	from 83% to 91%
External Ingress Protection	IP 21
Noise (at 1m in front of the unit)	≤60 dBA
Insulation	Input - Output 2500Vac / 1 minute
Frame Colour	Light Gray RAL 7035
Dimensions (CK type)	H 850mm x L 500mm x P 420mm

STANDARDS	
Compliance	IEC/NF EN 60146-1-1:2009 IEC/NF EN 61000-6-2:2006 IEC/NF EN 61000-6-4:2007 + AMD1:2011 IEC/NF EN 61439-1:2011 IEC/NF EN 60529:1989 + AMD1:1999 NFC 58-311

European Directives	Low voltage directive: 2006/95/CE and 2014/35/UE EMC directive: 2004/108/CE and 2014/30/UE
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OPTIONS		
	400	Single-phase 400Vac input voltage
	Q	Position contact on AC input circuit breaker
	D	Paralleling diode
Change / Load	I	DC earth fault alarm
	F/J/H	Integrated distribution board, up to 6 feeders (fuses, circuit breakers or circuit breakers with contact)

	FB/ JB/ HB	Battery protection (fuse, circuit breaker or circuit breaker with contact)
	A	Low-voltage battery cut-off
Battery	B	Battery test
	C	C13-100 automatic control system - programmable 0.5 to 24 hrs (applicable in France)
	T	Temperature probe for battery charge compensation
Communication	RS	Modbus RS485

SPECIAL REQUEST	
Battery	Other types of batteries, lead-acid and nickel-cadmium, vented or recombination

Mechanical	CR cabinet dimensions: H 1200 or 1800 x W 800 x D 600mm (Height to be confirmed based on options) External ingress protection IP41 Anti-condensation heater Internal lighting Lifting rings
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## Liebert® HPF, Self-Contained Air Conditioner for Indoor Installations

Liebert HPF represents the most complete indoor Self-contained cooling system specifically designed to control the environmental conditions of technological or industrial rooms as well as of Telecom network sites.

### Freecooling System Minimizing Operating Costs

- Our solution provides enhanced energy savings with direct freecooling through the use of outside cold air as a main source of cooling.

### 48 V DC Power Supply for High Availability

- 48 V DC power supply guaranteeing emergency cooling and specifically addressing the needs of Telecom enclosures.

### Smart Control Guaranteeing Efficient Unit Regulation

- Team-working with up to 16 units exploits the benefits of standby, rotation and cascade modes
- Optional graphic display stores the last 200 events, thus enhancing data collection functions.

### Evaporator Fan with Optional EC Fan for Higher Energy Efficiency

- High External Static Pressure (ESP) for superior adaption to different layouts and site applications
- The new generation of EC fans installed in the Liebert HPF dramatically increases overall unit efficiency.

### Compressor with Cooling Capacity Modulation

- Precisely matches heat load and saves energy
- Compressor's modulating capacity and the electronic expansion valve allow continuous cooling availability thus ensuring precise control of room temperature.

### Remote Monitoring Option For Real-Time Infrastructure Optimization

- Hirolink-i Communication Interface option provides Liebert HPF with Infrastructure Management enablement (Vertiv *Trellis*, Vertiv SiteScan, Vertiv Nform, Vertiv LIFE Services) as well as third-party customer protocols compatibility; such as MODBUS, SNMP, BACNET. The interface employs Ethernet, RS-485 and MSTP networks to monitor and manage a wide range of operating parameters, alarms and notifications.



Liebert HPF from 7 to 18 kW

## Three Airflow Distributions Available Providing Cold Air Where Needed

Liebert HPF is an extremely flexible unit available in different airflow versions making it an ideal system for the most diverse site layouts:

### Downflow

Return air enters the unit from the top, while supply air is discharged from below, exiting beneath the floor.



### Upflow

Return air enters the unit from the bottom front, while supply air is discharged from the top front.



### Displacement

Return air enters the unit from the top, while supply air is discharged from the bottom front.



## Technical Specifications

TECHNICAL DATA	HPF0HO	HPF1AO	HPF1FO	HPF1DO*
Cooling Capacity [kW]	7.6	12.9	17.4	16.9
Airflow Version	Upflow	Upflow	Upflow	Upflow
Airflow [m <sup>3</sup> /h]	1955	3835	3680	2910
Refrigerant	R410A	R410A	R410A	R410A
Power Supply	400 V/ 3 ph/ 50 Hz			

### DIMENSIONS

LxHxD [mm]	650x1990x650	900x2050x750	900x2050x750	900x2050x750
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TECHNICAL DATA	HPF0HU	HPF1AU	HPF1FU	HPF1DU*
Cooling Capacity [kW]	7.6	12.6	17.1	16.9
Airflow Version	Downflow	Downflow	Downflow	Downflow
Airflow [m <sup>3</sup> /h]	2095	3370	3680	3680
Refrigerant	R410A	R410A	R410A	R410A
Power Supply	400 V/ 3 ph/ 50 Hz			

### DIMENSIONS

LxHxD [mm]	650x1990x650	900x2050x750	900x2050x750	900x2050x750
------------	--------------	--------------	--------------	--------------

TECHNICAL DATA	HPF0HD	HPF1AD	HPF1FD	HPF1DD*
Cooling Capacity [kW]	7.7	13.0	17.2	17.0
Airflow Version	Displacement	Displacement	Displacement	Displacement
Airflow [m <sup>3</sup> /h]	2289	3614	3805	3803
Refrigerant	R410A	R410A	R410A	R410A
Power Supply	400 V/ 3 ph/ 50 Hz	400 V/ 3 ph/ 50 Hz	400 V/ 3ph/ 50 Hz	400 V/ 3 ph/ 50 Hz

### DIMENSIONS

LxHxD [mm]	650x1990x650	900x2300x750	900x2300x750	900x2300x750
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(\*) = Version with modulating capacity compressors

Note: Values refer to direct expansion working conditions; 35°C outdoor temperature; nominal power supply and indoor conditions of 30 °C / 39.5 % R.H. at the evaporating suction side.

## BACKED BY THE INDUSTRY'S BEST SERVICE AND SUPPORT

- Fast and easy installation
- All components easily accessible from the front for simplified maintenance and service
- Service delivered by factory trained technicians
- 24/7 technical support.

## Liebert® HPS, High Performance Split Air Conditioner

Liebert HPS is the high performance split air conditioner designed to ensure proper environmental conditions inside technological environments, especially for mobile networks. Liebert HPS guarantees an effective air distribution, while its highly efficient components ensure energy and space saving.

The unit is available in several cooling versions thus guaranteeing extreme flexibility for any site application. Liebert HPS can be configured depending on the main application drivers (noise level, environmental conditions range etc.) and the desired options (freecooling, emergency freecooling, heating etc.).

### Optimized Air Distribution

Liebert HPS delivers cold air straight down, close to the racks suction area and intakes the hot air out coming from the heat sources, into the cabinet sides (frontal and lateral). In this way the mixing effect between conditioner cold air and electronic equipment hot air is denied resulting in a double beneficial effect: the rack is fed by cold air where it is needed and the air conditioner treats only the hot air maximizing its efficiency. This allows for proper temperature inside

the racks, high efficiency of the cooling equipment and hot spot absence in the site.

### Energy and Space Saving

The use of the optional freecooling gives the possibility to stop the compressor and use the external fresh air to cool the site: the annual energy absorption, requested to cool the site, thus decreases significantly. The 0-100% fine modulation allows to keep constantly the desired set point inside the site. No additional module is requested: the innovative rotary freecooling system keeps unchanged the requested space to install the unit.

### Maximizing Site Reliability

Remote nodes need to exchange data continuously, always working at proper

environmental conditions. The most modern design and components such as scroll compressor and plugtype fans, heat exchanger surfaces and airflows guarantee a 24/7 unit operation moreover, in case of main supply fault the air conditioner is supplied by alternative energy sources like 48 VDC batteries or independent AC generator.

### Suitable to Any Site Application

Liebert HPS ensures optimal air distribution, efficiency, energy saving, reliability and compactness independently of its configuration. More stringent requirements in terms of noise level emission and maximum external working temperature can be satisfied selecting Liebert HPS advanced version: 45 dB(A) at 3m f.f and 50° C with internal air intake conditions of 30° C, 35% R.H.



Liebert HPS



Liebert HPS



Liebert HPS

## Technical Specifications

MODEL HPSE + HPSC	06	08	10	12	14
Evaporating side installation	Ceiling mounting				
Main power supply	230/1N/50	400/3N/50	400/3N/50	400/3N/50	400/3N/50
Emergency power supply (opt)	48V DC or 230/1N/50				

### PERFORMANCES

Total cooling capacity <sup>(1)</sup>	kW	6,4	8,1	10,1	12,5	14,6
Sensible cooling capacity <sup>(1)</sup>	kW	6,4	8,1	10,1	12,5	14,6
Compressor power input <sup>(1)</sup>	kW	1,7	2,2	3,0	3,7	4,6
Condenser fan power input <sup>(1)</sup>	kW	0,24	0,24	0,12	0,15	0,15
Evaporator fan power input <sup>(1)</sup>	kW	0,18	0,35	0,35	0,33	0,33
Evaporator airflow	m <sup>3</sup> /h	1.510	2.360	2.360	2.770	2.750
Condenser max. airflow	m <sup>3</sup> /h	2.970	2.970	6.300	5.675	5.675
Outdoor sound pressure level <sup>(2)</sup>	dB(A)	48,5	48,5	52	54	56
Indoor sound pressure level <sup>(2)</sup>	dB(A)	58	62,5	62,5	63	63
Max. ambient temperature <sup>(3)</sup>	°C	52	50	50	50	50

### REFRIGERATION CIRCUIT

Compressor type/quantity	scroll / 1				
Refrigerant	R407C				
Expansion device	thermostatic valve				

### EVAPORATOR FAN

Quantity/type/poles version	1/Axial/4				
Driven/motor protection	direct / IP44		direct / IP54		

### CONDENSER FAN

Quantity/type/poles	1 / axial / 6		2 / axial / 6		
Driven/motor protection	direct / IP54				
Control system	variable speed				

### AIR FILTERY

Filter type / efficiency	pleated / G3				
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### HEATING

Electric heating (opt)	kW	1,5		4,5	
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### CABINET

Frame	galvanized steel					
Painting	polyester – RAL 7035					
Insulation type/thickness	-/mm	polyurethane class A1 /10				
Evaporator Width	mm	800		900		
Evaporator Depth	mm	800		900		
Evaporator Height	mm	310		375		
Evaporator Weight	kg	50	53	53	58	58
Condenser Width	mm	920		920		
Condenser Depth	mm	390		390		
Condenser Height	mm	840		1190		
Condenser Weight	kg	80	82	97	103	111

(1) Ref. conditions: 30°C, 35% R.H indoor air intake, 35°C outdoor.  
 (2) Measured with outdoor temperature 35°C, 2 meters from the unit, free field conditions (factory set).  
 (3) Referred to 30°C indoor air intake.  
 Data referred to HPS standard version (no options)

## Liebert HPW, high performance wall-mount cooling solution

Liebert HPW is a high performance wall-mount cooling solution ideal for remote access nodes in shelters and containers. The units are packaged, outdoor, wall-mounted with the traditional upflow or downflow air delivery solutions.

- Direct expansion solution guaranteeing the highest efficiency in a wide range of external environmental conditions as a result of its heat exchanger surface design.
- Freecooling with the highest energy saving combining the advanced circular damper system with downflow air distribution.
- Emergency freecooling with the most efficient 48V DC plug type fan to reduce the impact on the site power consumption.

### Cooling availability also in emergency situations

The Network availability must be guaranteed, especially under emergency situations. Even if the main power supply fails due to natural or accidental causes, Liebert HPW controls the internal temperature by ventilating or using the freecooling system: fans, damper and control are powered through back-up power coming from DC batteries or AC power generators.

### Site conditions always under control

The possibility to remotely monitor and control the site conditions facilitates immediate reaction to any situation by allowing the operator to timely interact with the unit. The standard on-board controls allow interaction with one or more units, optimizing the operation and enabling the connectivity to superior systems or third-party BMS (Dial up, SNMP, Modbus, IP communication).

### Solving unfavourable installation situations

Liebert HPW is available in two versions with different airflow patterns: HPW-O (Upflow) and HPW-D (Downflow). Independently of the configuration, the condensing section is installed in the cabinet upper part. This simple design feature reduces installation restrictions

due to environmental limitations: dusty environments, green areas and the proximity of adjacent buildings. The use of intelligent fan speed regulation and the possibility to utilise the most appropriate cabinet within the different sizes available for the required cooling capacity significantly reduces noise emissions thus allowing site operation in residential areas.

### Limited energy consumption

The downflow air distribution guarantees unit Energy Efficiency Ratio values close to or higher than 3, even in critical environmental conditions (ambient temperatures higher than 40°C). This, combined with the innovative freecooling system, can drastically reduce yearly energy consumption.

### Reduced installation impact

The cooling system is pre-charged and no pressure test is required on site. The installation is simplified as a result of pre-arranged air ducts (standard) and fast plug electrical connections (optional). Using the commissioning software, installation and start-up can be completed without the need for specialized personnel on site.



Liebert® HPW - WM06SD Model

## Technical Specifications

MODEL DOWNFLOW AND OVER		05S	06S	06M	08M	10M	13M	15M
Main power supply		230V/1N/50Hz			400V/3N/50Hz			
Emergency power supply		48VDC or 230V/1N/50Hz						
<b>PERFORMANCES DOWNFLOW (D VERSION)</b>								
Total cooling capacity <sup>(1)</sup>	kW	5.5	6.3	6.5	8.9	11.7	13.0	14.9
Sensible cooling capacity <sup>(1)</sup>	kW	5.5	5.8	6.2	8.9	10.9	13.0	14.0
SHR <sup>(1)</sup>	-	1	0.92	0.95	1	0.93	1	0.94
Compressor AC power input	kW	1.26	1.63	1.46	1.90	2.66	2.56	3.29
Evaporator fan DC power input	kW	0.10	0.10	0.10	0.28	0.45	0.45	0.82
Condenser fan AC power input	kW	0.25	0.25	0.20	0.22	0.72	0.68	0.69
Evaporator airflow	m <sup>3</sup> /h	1110	1110	1300	1950	2300	2615	2820
Freecooling airflow	m <sup>3</sup> /h	1310	1310	1440	2420	2420	2850	3000
Condenser max. airflow	m <sup>3</sup> /h	2610	2610	3710	3710	5660	5880	5880
Outdoor SPL <sup>(2)</sup>	dB(A)	52.5	54.0	50.0	52.0	55.0	55.0	58.0
Indoor SPL <sup>(2)</sup>	dB(A)	57.0	57.0	57.0	60.0	64.0	59.0	63.0
Max. ambient temperature <sup>(3)</sup>	°C	49.0	47.0	52.0	50.5	50.0	51.0	48.5
<b>PERFORMANCES OVER (O VERSION)</b>								
Total cooling capacity <sup>(1)</sup>	kW	5.3	6.0	5.7	8.2	11.1	12.0	13.8
Sensible cooling capacity <sup>(1)</sup>	kW	4.6	5.0	5.4	8.0	9.5	10.2	11.2
SHR <sup>(1)</sup>	-	0.87	0.83	0.95	0.98	0.86	0.85	0.80
Compressor AC power input	kW	1.25	1.63	1.49	1.93	2.68	2.60	3.30
Evaporator fan DC power input	kW	0.10	0.10	0.10	0.45	0.45	0.45	0.78
Condenser fan AC power input	kW	0.25	0.5	0.20	0.22	0.72	0.68	0.72
Evaporator airflow	m <sup>3</sup> /h	1060	1060	1360	2130	2300	2300	2450
Freecooling airflow	m <sup>3</sup> /h	1090	1090	1360	2400	2400	2700	2840
Condenser max. airflow	m <sup>3</sup> /h	2610	2610	3710	3710	5660	5880	5880
Outdoor SPL <sup>(2)</sup>	dB(A)	52.5	54.0	49.5	52.0	55.0	55.0	58.0
Indoor SPL <sup>(2)</sup>	dB(A)	57.0	57.0	57.0	64.0	64.0	64.0	67.0
Max. ambient temperature <sup>(3)</sup>	°C	49.5	47.5	52.0	50.0	50.0	51.0	48.5
<b>REFRIGERATION CIRCUIT</b>								
Compressor type/quantity		scroll / 1						
Refrigerant		R407C						
Expansion device		thermostatic valve						
<b>EVAPORATOR FAN</b>								
Quantity/type AC					1/Plug	2/Plug		
Quantity/type DC (48V)					1/Plug	2/Plug		
<b>CONDENSER FAN</b>								
Quantity/type		1 / Axial						
Speed control		variable (option)						
<b>AIR FILTERY</b>								
Filter type / efficiency		pleated / G3						
<b>HEATING</b>								
Electric heating (opt)		1.5			3.0			6.0
<b>CABINET</b>								
Frame		galvanized steel						
Painting		polyester – RAL 7035						
Insulation type/thickness	-/mm	polyethylene foam class 1						
Width	mm	800			932			
Depth	mm	450			640			
Height	mm	1690			1901			
Weight	kg	170	175	195	205	220	250	260

Data refers to 48 VDC emergency version.

(1) Values refer to 35°C outdoor temperature, nominal power supply and the following indoor conditions:

- 30°C/39,5%R.H. at the evaporating air intake side for WM 05-15 D models
- 27°C/47%R.H. at the evaporating air intake side for WM 05-15 O models

(2) Measured with 35°C outdoor temperature, at 2m from the unit, in free field conditions

- (3) • 30°C/39,5%R.H. at the evaporating air intake side for WM 05-15 D models
- 27°C/47%R.H. at the evaporating air intake side for WM 05-15 O models

## Liebert® FCM, Advanced Direct Freecooling Module

Liebert FCM represents the most complete direct freecooling module specifically designed to control the environmental conditions of technological rooms as well as of Telecom network sites.

### Independent Solution Maximizing Freecooling Operation

- Liebert FCM exploits cold external air to cool equipment placed inside technological rooms or shelters for superior energy savings
- Designed to operate 24/7 all year round.

### Smart Control and Advanced Software Features Guaranteeing Efficient Unit Regulation

- The unit has built-in temperature sensors, thus maintaining the temperature within defined limits
- The dedicated 'Delta T' software function controls the delta T between external and internal air allowing for efficient fan speed modulation
- The module can manage up to two comfort AC units, thus significantly reducing energy consumption
- With the advanced control, the unit can also manage an external motorized damper and external heaters.

### EC Fan Technology Included for Higher Energy Efficiency

- EC fans installed in the Liebert FCM automatically adjust the fan speed according to cooling requirements, thus increasing overall efficiency.

## THIS COMPACT MODULE CAN BE INSTALLED BOTH INSIDE AND OUTSIDE A TECHNOLOGICAL ROOM

- Independent Solution Maximizing Freecooling Operation
- Smart Control and Advanced Software Features Guaranteeing Efficient Unit Regulation
- EC Fan Technology Included for Higher Energy Efficiency
- Compatible with All Our Mobile Units for Enhanced Energy Savings.
- Backed by the Industry's Best Service and Support.

## BACKED BY THE INDUSTRY'S BEST SERVICE AND SUPPORT

- Fast and easy installation
- All components easily accessible from the front for simplified maintenance and service
- Service delivered by factory trained technicians
- 24/7 technical support.



Liebert FCM

## Technical Specifications

### TECHNICAL DATA

Electrical Power Supply [V DC]	48
Net Freecooling Capacity [kW]	5
Airflow [m <sup>3</sup> /h]	1,518
Power Input [kW]	0,034
Maximum Airflow [m <sup>3</sup> /h]	3,686
Maximum Unit Power Input [kW]	0,48

### DIMENSIONS

LxHxD [mm]	650x610x597
Weight [kg]	28
Type of Fans	EC

Note: Values refer to an internal temperature of 30°C and an external temperature of 20°C.

### Compatible with All Our Mobile Units for Enhanced Energy Savings

Liebert FCM is an extremely flexible unit available in different layouts, making it an ideal system for the most diverse applications:



With Liebert HPF



With Liebert HPS



With Liebert HPW



Liebert FCM - Installed Outside a Technological Room



Liebert FCM - Installed Inside a Technological Room

## Liebert® FCM Air Economizer, The Flexible Solution for Any Application

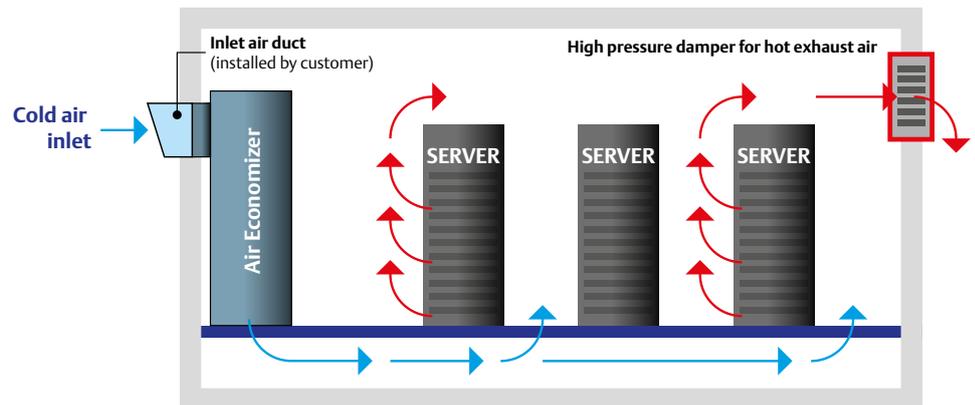
Liebert FCM remote economizer minimizes compressors' operation of the main cooling unit through the use of cold external air to cool technological equipment.

Although this remote economizer has no mechanical cooling component, it still shares similar characteristics with the main air conditioning unit in terms of ventilation, filtration and dampening.

The unit has an integrated microprocessor that automates the freecooling system and further provides a cleaning function to treat exhaust gases emitted from the fire suppression system. The economizer module additionally provides a fresh air recharge with an adjustable timer and air delivery.

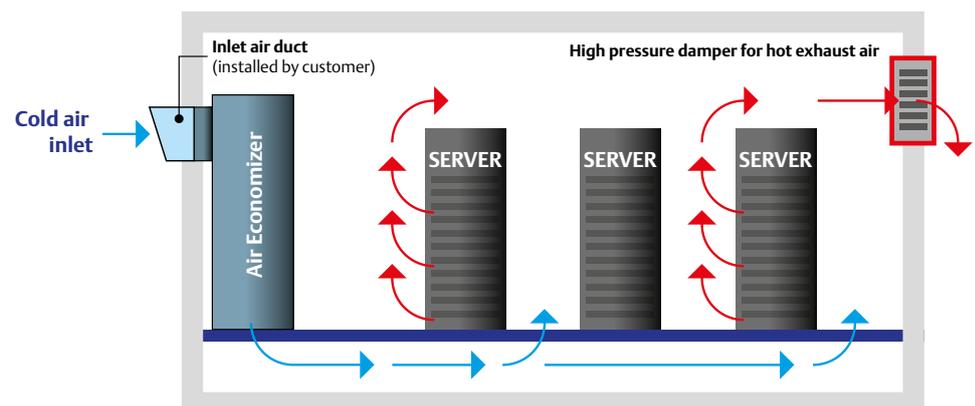
### Cooling Mode and Installation Options

- For Shelter applications and small rooms (Liebert® FCM)
- For small and medium data centers with an economizer module from 3.000 to 23.000 m<sup>3</sup>/h and an overpressure damper for exhaust air
- For small and medium data centers with an economizer module from 3.000 to 23.000 m<sup>3</sup>/h and additional fans, controlled by the air economizer for forced air extraction.



Configuration with passive hot air exhaust (grill)

The above configuration is applicable in cases where humidity control is needed. Due to an inevitable mixing of air, the integrated economizer module also requires a plenum to be installed on top of the unit in order to guarantee the required conditions..



Configuration with extraction fan

## Liebert® FCM Product Family

The basic configurations of the air economizer are presented below, however, these may vary due to the versions and capacities that are available. Moreover, the performance and flexibility of Vertiv™ units allows for a unique configure, design and order mode.



FCM006 Model



FC030 Model



FC060 Model



FC080 Model



FC120 Model



FC180 Model

## Technical Specifications

CHARACTERISTICS		FCM006	FC030	FC060	FC080	FC120	FC180
Main power supply		48 VDC			400- 3N- 50 + N + PE		
<b>PERFORMANCE</b>							
Nominal ari flow at 24°C	m <sup>3</sup> /h	1.500	3.000	6.000	8.000	12.000	18.000
External Static Pressure (ESP)	Pa	70	70	70	70	70	70
Nominal net cooling capacity (*)	kW	6,0	11,6	22,7	30,8	46,2	70,0
Unit power input (*)	kW	0,08	0,43	1,40	1,40	2,00	2,35
EC Fan	No.	1	1	1	1	1	2
Full load amps	A	10,2	3,00	4,00	5,00	5,00	10,00
<b>DIMENSIONS</b>							
Dimensions (mm)		650 x 610 x 597	500 x 750 x 1950	750 x 750 x 1950	844 x 890 x 1970	1200 x 890 x 1970	1750 x 890 x 1970
Operating conditions (°C)		-25 / 40	-20 / 40	-20 / 40	-20 / 40	-20 / 40	-20 / 40

\*Delta T 12K

## Liebert® DCL, Granting Continuous Availability for Modular Rack Cooling

The Liebert DCL is the Thermal Management unit for lateral attachment to server cabinets offering a wide range of features designed specifically for data center applications. The unit is available in two different architectures, closed or hybrid loop, and in multiple combinations of up to four server racks to match any customer needs.

### Closed Loop Cooling Architecture

- Fully contained airflow inside the cabinet or the cabinet row
- No heat load, no airflow in the room, significant noise attenuation
- Complete separation of IT equipment from room, accurately controlled cooling air temperature
- No special requirements for the room - raised floor is not required.

### Hybrid Cooling Architecture

- “Hybrid” configuration - airflow is contained in the cabinet or cabinet row and room
- Cooling units and cabinets are open at the front and closed at the back
- No heat load in the room, warm air remains inside cabinets
- Distribution of cold air throughout the room, cold air reserve in case of cooling system failure
- Better alternative to hot aisle containment
- No raised floor required.

### Ensuring Endless Availability Under All Working Conditions

- “Fail-safe” functioning (“safe despite faults”) in the event of a controller failure, the control valve switches the full volume of the chilled water flow to heat exchangers and the fans to full speed
- With integrated Vertiv ICOM Control, the Liebert DCL is able to monitor variations in temperature and humidity, instantly adapting its performance to meet variations in heat load
- Access control and data security guaranteed by HTTPS and SNMP V3
- Local and remote (via BMS) alarm management
- Fan speed automatically adjusted in real time to follow changing airflow requirements of IT equipment
- Even air distribution to all internal IT components
- Even temperature profile in the air supply
- n+1 fan redundancy means that the remaining fans support the volume flow required for cooling in the event of a fan failure



Liebert HPW

#### Modularity

- Two cooling architectures for medium to high heat-load density
- Easy to retrofit on site
- Multiple combinations of up to four server racks.

#### Reliability

- N +1 fan redundancy
- M multi-level “fail-safe” controller
- Comprehensive alarm and monitoring functions
- Automatic emergency door opening.

#### Energy Efficiency

- Minimized power consumption through EC fans and dynamicfan control
- Long freecooling times thanks to a generously dimensioned heat exchanger.

- Non return flaps to avoid bypass of cold air through stand-by unit or through a failed fan
  - Redundant A/B power supply with automatic operation
  - Dual-circuit heat exchanger option ensures redundancy of the water supply if two independent chilled water circuits are installed
  - Automatic door opening provides additional overheating protection in case of cooling system failure.
- ### Top-Tier Efficiency and Adaptability
- Greater power density in the data center results in better utilization of space and reduced building costs
  - High chilled water supply temperature increases the proportion of freecooling during refrigeration and improves the energy efficiency rating (EER) of the chiller
  - The control valve adjusts cold water volume flow for the current operational situation
  - Low water-side pressure drop leads to reduced pump power consumption
  - Energy cost savings by adjusting the fan speed to the airflow level actually required using the embedded controller
- Low air pressure drop leads to the fans using less power
  - EC fans guarantee energy efficient operation with maximum performance over the entire range of fan speeds
  - Optional cooling capacity meter to inform the operator about cooling output of the unit (kW)
  - Minimum possible investment for cooling components thanks to the option to use up to four server racks for each Liebert DCL
  - Facilitates data center upgrade through its gradual expansion with no need to invest further in different cooling infrastructures
  - Can be adapted to different shapes and spaces
    - Heights 2000 mm and 2200 mm
    - Depths 1200 and 1300 mm
  - Simple switchover between 2-way and 3-way valve by means of a ball valve in the bypass line.

## STANDARD FEATURES AND OPTIONS

- Field adjustable 2 way / 3 way valve
- 0-10V valve actuator
- Top / Bottom piping connections
- Energy efficient EC Fans
- Vertiv ICOM Control with large coldfire display "Fail Safe" design
- Unit provided with castors and levelling feet
- Return and supply air temperature sensors
- Rack temperature sensors
- Alarms monitoring.

## ADDITIONAL OPTIONS

- Smoke detection
- Leak detection
- Automatic door release in case of cooling failure
- Door status monitoring
- Double CW feed version
- Condensate pump
- Double Power Supply
- BMS monitoring via multiple communication protocols
- Cooling capacity meter

## Technical Specifications

MODEL		DC032	DC038
Net Sensible Cooling Capacity	kW	30,0	34,6
Airflow	m <sup>3</sup> /h	4.850	6.000
Number of Fans	Nr	4	6
Vertiv Knürr DCM Units Height		42 U / 47 U	

DIMENSIONS		
Unit Height	mm	2000 / 2200
Unit Width	mm	300
Unit Depth	mm	1200 / 1300

Note: The performances shown above refer to an air inlet temperature of 37°C and chilled water temperature of 10/15°C for a closed loop configuration with racks on both sides.

## Liebert® HPM, Air Conditioning Units designed for Top Level Performance and Reliability

The Liebert HPM direct expansion cooling unit is equipped with the most advanced industry technology, guaranteeing precise cooling of small data centers and server rooms. It comes complete with R410A refrigerant which allows the unit to reach significant levels of efficiency.

Liebert HPM incorporates a unique range of cabinet air coolers designed to ensure performance and reliability. The range comes complete with EC Fans as standard, thus ensuring top energy efficiency. The complete unit design has furthermore been optimized with enhanced heat exchangers, delivering a high level of overall efficiency and cooling capacity.

### R410A Refrigerant

Designed for R410A Refrigerant.

### Copeland Digital Scroll Technology

The best solution in terms of variable cooling capacity.

### Precise Temperature Control

Digital Scroll based technology allows for close monitoring and control of room temperature.

### Liebert EC Fan 2.0

The new generation of Liebert EC Fan 2.0 is the core of the Liebert HPM, significantly minimizing noise levels and increasing the efficiency of the unit.

### Vertiv ICOM Control - When Smart Means Efficient

Smart mode is a control algorithm developed for Vertiv SmartAisle containment applications, meeting the cooling and airflow needs of the servers while ensuring only necessary kilowatts are invested in targeted cooling.

### European ErP 2015 Directive

Precision cooling floor mount products comply with the European ErP 2015 Directive requirements, respecting environmental commitments while reducing operating costs.

### Energy Efficiency

First-class energy efficiency achieved through the combination of market leading technologies.

### Heat Load Monitoring

Continuous monitoring of heat load ensures that only necessary kilowatts are invested in targeted cooling, thus conserving energy.



Liebert HPM

## Technical Specifications

MODEL SINGLE CIRCUIT		S0F	S0H	S1A	S1D	S1E	S1G	S2E	S2G
Sel. Condenser		HCR10	HCR14	HCR17	HCR24	HCR24	HCR24	HCR43	HCR43
PERFORMANCES									
Total cooling capacity	kW	5,6	7,2	10,6	13,0	15,6	17,4	23,1	25,0
Net sensible cooling capacity	kW	5,1	7,0	9,8	10,9	13,8	15,6	19,9	21,5
SHR*	-	0,93	1,00	0,94	0,86	0,93	0,95	0,90	0,92
Net sensible EER	-	2,6	3,0	3,1	2,9	3,3	3,1	3,1	3,0
Airflow	m <sup>3</sup> /h	1.560	2.500	2.680	2.750	4.200	4.930	5.200	5.750
Max. ESP	Pa	300	240	190	140	400	380	280	190
Sound pressure level	dB(A)	56,2	50,8	52,9	53,3	48,8	49,4	52,7	50,0
UNIT									
Internal Unit Dimensions (W x D)	mm	750 x 400	750 x 500	750 x 500	750 x 500	750 x 750	750 x 750	750 x 750	750 x 750
External Unit Dimensions (W x D)	mm	701 x 599	1050 x 891	1050 x 891	1112x1340	1112x1340	1112x1340	1112x1340	1112x1340
Weight Internal Unit	kg	170	195	210	215	240	250	260	270
Weight External Unit	kg	16	44	44	75	75	75	92	92
Airflow Delivery (downflow, upflow, displacement/frontal)		D, O, U*	D, O, U*	D, O, U*	D, O, U*	D, O, U*	D, O, U*	D, O, U*	D, O, U*

\*Performance at 24°C 50% - Nominal ESP 20 Pa - External Temperature 35°C - System able to work at up to 40°C external temperature - Internal Unit Height 1950 mm; External Unit Height 907 mm\*  
 \*SHR: sensible heat ratio D: displacement, U: Under, O: Over

### Application Scenarios

#### Liebert HPM Downflow

Downflow units are ideal for raised floor installation environments which are commonly found in data center applications. The Downflow unit optimizes performance in all such applications, delivering the highest efficiency of the Liebert HPM range. Suitable for:

- Raised Floor

#### Liebert HPM Upflow

Upflow units are designed for use in applications with top directed air distribution, including or excluding ducting systems. The inclusion of EC Fans means that the Liebert HPM Upflow is able to deliver the highest

External Static Pressure (ESP), while limiting power input and maximizing output. This combination allows the Liebert HPM to deliver optimized cooling requirements, while at the same time providing the most suitable airflow and ESP to meet individual installation requirements.

Suitable for:

- Ducted Applications
- Application with limited raised floor air distribution capabilities or where raised floor is not available
- Technical room

#### Liebert HPM Displacement

Displacement units take their name

from the displacement effect. It consists of the stratification of cold air in the lower section of the room, and hot air in the upper section. This is achieved by delivering cooled air at a very low speed. The displacement effect considerably contributes to system efficiency. The Liebert HPM Displacement unit is best suited to small applications where scalability and capacity growth are key.

Suitable for:

- Application without raised floor
- Technical rooms
- Small data rooms with cooling installed opposite racks



Liebert HPM Downflow



Liebert HPM Upflow



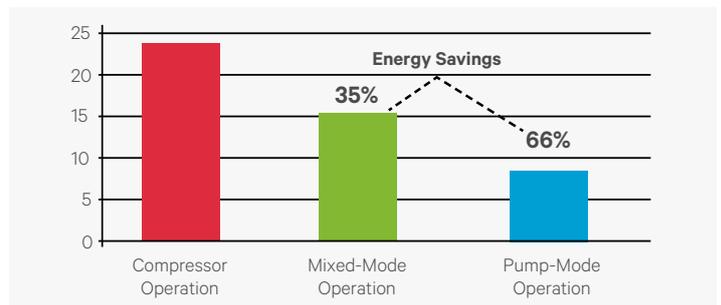
Liebert HPM Displacement

## Liebert® EconoPhase, the First Ever Pumped Refrigerant Economizer System for Enhanced Energy Savings

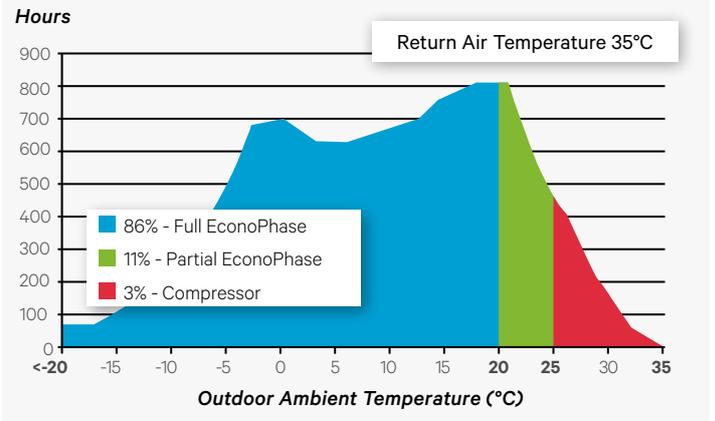
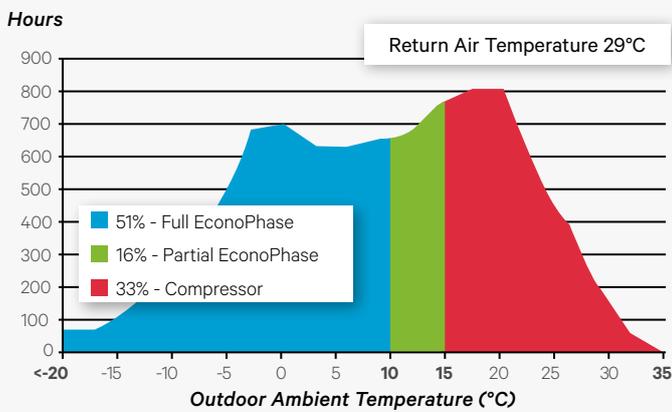
The Liebert EconoPhase pumped refrigerant economizer significantly improves data center efficiency - without bringing in outside air and without using water.

- Industry-leading efficiency
- Simplified operation
- Next generation Vertiv ICOM Control
- Refrigerant carries 2x as much heat as water and 40x as much heat as air
- Freecooling is available to reduce or eliminate compressor usage

	AIR	WATER	PUMPED REFRIGERANT
Fluid Heat Density	18.65 kJ/m <sup>3</sup>	1,722 kJ/m <sup>3</sup>	3,466 kJ/m <sup>3</sup>
Heat Removal Coefficient of Performance (COP)	29.5 kW/kW	591 kW/kW	1,188 kW/kW
Increase in Heat Removal Efficiency compared to air	Base %	+2,000 %	+4,023 %



### Gains in Freecooling with Temperature Increase



Liebert EconoPhase usage increases significantly as return air temperatures increase, providing more cost-effective cooling.

Liebert EconoPhase Economizer

Liebert MC Microchannel Condenser

Liebert PDX Floor-Mount Unit



The Liebert EconoPhase pumped refrigerant economizer is compatible with the Liebert PDX and Liebert MC to improve thermal management and control, while drastically cutting energy costs and lowering pPUE.

# Liebert® PDX - Scroll Technical Specifications

SINGLE CIRCUIT													
Model		PX015	PX021	PX025	PX031	PX033	PX041	PX045	PX059	PX047	PX051	PX057	
Total Gross Cooling Capacity	kW	13.9	19.1	25.0	30.1	34.2	40.41	44.6	57.3	46.28	53.1	59.0	
Net Sensible Cooling Capacity	kW	13.4	18.2	23.2	26.5	28.7	35.8	39.1	45.1	43.8	50.0	54.6	
SHR		1.00	1.00	0.98	0.94	0.90	0.93	0.93	0.82	1.00	1.00	0.98	
Net Sensible EER		4.37	3.93	3.53	3.21	3.09	3.51	3.33	2.99	3.70	3.47	3.40	
Airflow	m³/h	4462	5672	6792	7752	7944	10000	10900	11200	14500	15800	16300	
Max. ESP	Pa	250	250	250	220	180	250	100	80	300	300	300	
Dimensions (W x D)	mm	844 x 890	1200 x 890	1200 x 890	1200 x 890	1750 x 890	1750 x 890	1750 x 890					
Height (H)	mm	1970	1970	1970	1970	1970	1970	1970	2570	1970	1970	1970	
Weight	kg	290	300	320	340	340	452	456	593	620	621	675	
Number of Capacity Steps		1	1	1	1	1	1	1	2	1	1	2	
Airflow Delivery													
Down Flow UP - Fans Over the Raised Floor													
Up Flow													
Frontal													
Downflow Down - Fans in Raised Floor													
Cooling Version:													
Air Cooled													
Water Cooled													
Dual fluid (Chilled water + DX Air Cooled)													
Dual fluid - Chilled water + DX Water Cooled													
Freecooling													
EconoPhase													
DOUBLE CIRCUITS													
Model		PX044	PX054	PX062	PX068	PX074	PX092	PX082	PX094	PX104	PX120		
Total Gross Cooling Capacity	kW	44.8	55.1	62.5	66.1	74.8	92.5	85.7	94.5	106.5	123.9		
Net Sensible Cooling Capacity	kW	42.3	51.2	55.6	62.2	62.9	72.2	78.4	84.9	91.7	100.7		
SHR		0.99	0.99	0.95	0.98	0.90	0.82	0.97	0.96	0.92	0.86		
Net Sensible EER		3.79	3.53	3.35	4.08	3.09	2.93	3.60	3.38	3.10	2.95		
Airflow	m³/h	12500	15500	16300	18500	17600	17950	24000	26000	27000	27000		
Max. ESP	Pa	300	200	200	300	80	180	250	150	100	100		
Dimensions (W x D)	mm	1750 x 890	1750 x 890	1750 x 890	2550 x 890	1750 x 890	1750 x 890	2550 x 890	2550 x 890	2550 x 890	2550 x 890		
Height (H)	mm	1970	1970	1970	1970	1970	2570	1970	1970	1970	1970		
Weight	kg	638	642	680	887	680	776	901	901	901	954		
Number of Capacity Steps		2	2	2	2	2	2	2	2	2	4		
Airflow Delivery													
Down Flow UP - Fans Over the Raised Floor													
Up Flow													
Frontal													
Downflow Down - Fans in Raised Floor													
Cooling Version:													
Air Cooled													
Water Cooled													
Dual fluid (Chilled water + DX Air Cooled)													
Dual fluid - Chilled water + DX Water Cooled													
Freecooling													
EconoPhase													

Performances at 24°C 50% - 45°C condensing temperature - Nominal ESP 20 Pa

SIGNALLING AND CROSSING

TRACKSIDE

# Liebert® PDX - Digital Scroll - Vertiv™ SmartAisle™ - Technical Specifications

SINGLE CIRCUIT											
Model		PX021	PX025	PX031	PX033	PX041	PX045	PX059	PX047	PX051	PX057
Total Gross Cooling Capacity	kW	24.9	32.4	37.8	41.9	50.3	55.4	68.8	63.0	67.4	74.6
Net Sensible Cooling Capacity	kW	24.1	31.1	36.0	39.9	48.4	53.0	66.4	60.5	64.3	71.3
SHR		1.00	1.00	0.98	0.94	0.90	0.93	0.93	1.00	1.00	1.00
Net Sensible EER		4.79	4.65	4.24	4.18	4.62	4.36	4.35	4.58	4.53	4.37
Airflow	m³/h	5672	6792	7752	7944	10000	10900	11200	14500	15800	16300
Max. ESP	Pa	250	250	230	200	250	100	80	300	300	300
Dimensions (W x D)	mm	844 x 890	844 x 890	845 x 890	844 x 890	1200 x 890	1200 x 890	1200 x 890	1750 x 890	1750 x 890	1750 x 890
Height (H)	mm	1970	1970	1970	1970	1970	1970	2570	1970	1970	1970
Weight	kg	300	320	340	340	452	456	593	635	637	675
Minimum Nominal Capacity Modulation		1	20%	20%	20%	20%	20%	25%	25%	25%	25%
Aiflow Delivery											
Down Flow UP - Fans Over the Raised Floor											
Up Flow											
Frontal											
Downflow Down - Fans in Raised Floor											
Cooling Version:											
Air Cooled											
Water Cooled											
Dual fluid (Chilled water + DX Air Cooled)											
Dual fluid - Chilled water + DX Water Cooled											
Freecooling											
EconoPhase											

DOUBLE CIRCUITS											
Model		PX044	PX054	PX062	PX068	PX074	PX092	PX082	PX094	PX104	PX120
Total Gross Cooling Capacity	kW	61.0	72.8	80.4	90.1	94.5	113.3	111.8	126.3	133.4	153.4
Net Sensible Cooling Capacity	kW	59.0	69.3	76.6	87.5	89.8	109.3	106.6	120.1	126.5	146.5
SHR		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Net Sensible EER		5.19	4.80	3.28	5.60	4.34	4.38	4.46	4.33	4.35	4.22
Airflow	m³/h	12500	15500	16300	18500	17600	17950	24000	26000	27000	27000
Max. ESP	Pa	300	200	200	300	80	180	250	150	100	100
Dimensions (W x D)	mm	1750 x 890	1750 x 890	1750 x 890	2550 x 890	1750 x 890	1750 x 890	2550 x 890	2550 x 890	2550 x 890	2550 x 890
Height (H)	mm	1970	1970	1970	1970	1970	2570	1970	1970	1970	1970
Weight	kg	638	642	680	887	680	776	931	931	931	954
Minimum Nominal Capacity Modulation		10%	10%	10%	10%	10%	10%	12,5%	12,5%	12,5%	12,5%
Aiflow Delivery											
Down Flow UP - Fans Over the Raised Floor											
Up Flow											
Frontal											
Downflow Down - Fans in Raised Floor											
Cooling Version:											
Air Cooled											
Water Cooled											
Dual fluid (Chilled water + DX Air Cooled)											
Dual fluid - Chilled water + DX Water Cooled											
Freecooling											
EconoPhase											

Performances at 37°C 24% - 45°C condensing temperature - Nominal ESP 20 Pa - Fan over the floor



### NetXtend™ M Series, Robust Outdoor Solution for Radio and Transmission Equipment

A cost-efficient outside plant solution, the NetXtend M Series enables you to quickly and economically create the ideal operating environment for your sensitive electronic equipment.

Featuring a robust enclosure design with insulated, single-skin aluzinc walls treated with advanced corrosion resistant powder paint, this solution is extremely durable in tough environments and withstands heavy rain, wind, dust, lightning and electromagnetism. Available in three standard sizes offering internal space of 20U, 35U and 44U for customer equipment (19"), power and batteries. Multiple thermal options include fan filter, air-conditioners, heat exchangers and thermal electrical coolers that are integrated in the door and easy to upgrade onsite. The enclosure door includes a three point locking system and hidden stainless steel hinges for added security.

The NetXtend M Series is ideally configured with the NetSure 5100 or the NetSure 7100 DC power system, both available in several models; a compact series of power dense systems for applications where space is limited, a high temperature series with environmental endurance up to +65 °C without deration, a hybrid series with pluggable DC-DC and solar converters, and a standard series for maximum cost efficiency. All NetSure 5100 and NetSure 7100 systems are equipped with the latest NetSure Control Unit (NCU), where data and control is available for all aspects of the power chain, including AC mains, DC power plant, battery backup, diesel generator and the local site environment.

The NetXtend M Series offer several options for DC distribution, surge protection, battery shelves, racks, lighting, locking cylinders and other accessories, as well as a wide selection of batteries.

It is delivered pre-cabled, tested, and fully integrated for rapid deployment. Thanks to predefined modular options, along with production in central Europe, there's no

need to choose between customization and speed to market - the NetXtend M Series provides both.

#### Application

The NetXtend M Series is specifically designed for wireless access networks and the need for power density, cost efficiency and speed to market that is characteristic of these types of applications. With a variety of NetSure DC power systems to choose from, the NetXtend M Series supports on-grid, bad-grid and off-grid applications.

#### KEY FEATURES

- Standardized enclosure platform with predefined modular options enables cost effective, fast and reliable network implementation
- Robust construction in three standard models; M20, M35 & M44
- Reliable & efficient power supply with NetSure DC power systems
- Advanced and secure monitoring including start up wizard and user-friendly web-interface
- Multiple climate management solutions optimizes energy efficiency for any application and environment
- Reliable backup with wide variety of battery options
- Standardized modularity with several options of AC and DC distribution, surge protection, etc.
- Adheres to international standards.



*NetXtend M35 system with fan filter and separate compartment for batteries with Thermal Electrical Cooler*

## Technical Specifications

ENCLOSURE	M20	M35	M44
Dimensions, Enclosure Body (H x W x D)	1005x730x750 mm	1672x730x750 mm	2072x730x750 mm
Enclosure Body	Aluzinc and Insulated (heat transfer 2,5 W/(m <sup>2</sup> ,K), powder paint RAL 7035)		
Roof	Slanted (including closed rivet nuts for lifting eyebolts)		
Rack Width	19" for customer equipment, 19" or 23" for NetSure DC power system		
Rack Height (total)	20U	35U	44U
Battery Shelves (optional)	up to 2x8U		up to 4x8U
Weight (empty)	55 kg	75 kg	95 kg
Locking type (different cylinders available)	2- or 3-point locking	3-point locking system	
Cable Inlet Type	2xMC10/25/35/51, 1xPG21, 1xPG29, 1xPG36		
Mounting	Ground (C-bars*), height 125 mm, wall or pole	Ground (C-bars*), height 125 mm	
Accessories	Light, door contact, alarm terminal, ground, cable tray, locking handle options, document holder, smoke detector etc.		
* Front and rear cover as option			
CLIMATE SOLUTION OPTIONS			
Fan Filter (VDC)	600/1200/2000 W, ΔT 5K, (supply air vs. ambient)		
Air-conditioner (VAC/VDC) (operating up to +55 °C)	400-850 W		400-2000 W
HEX (VDC)	H65 W/K		H65/H105 W/K
Thermal Electrical Cooler (VDC)	200 W (for battery compartments)		
Heater (VAC)	250/800 W		
Thermal Zones/Compartments	One		One to two
ENVIRONMENTAL			
Temperature	-33 to +50 °C		
Operational, Transportation, Storage	ETSI EN 300 019-1-4 class 4.1, ETSI EN 300 019-1-2 class 2.3, ETSI EN 300 019-1-1 class 1.2		
Protection	IP55 (IEC 60529), rain test (IECEN/UL 60950-22 annex B)		
Impact	IK 10 (EN 50102)		
Audible Noise (fan filter and HEX)	Rural (ETS 300 753 class 4.1E)		
DC POWER EQUIPMENT			
NetSure 5100 or NetSure 7100 incl NetSure Control Unit (NCU)	6-31.5 kW combined output power Peak efficiency > 96% For operating temperature range please see respective DC Power data sheet Available with Solar and +24VDC Converters, for On-Grid and Off-Grid Applications Remote monitoring, secure connectivity, battery and alarm management, user friendly interface, etc.		
AC DISTRIBUTION			
Input, Nominal	Single Phase: 220 VAC to 240 VAC, 3-phase: 380 VAC to 415 VAC		
Surge Protection	Class C or Class B+C		
Configurable components	Main switch/circuit breaker, circuit breakers, service outlet/RCD, connection for generator		
STANDARDS COMPLIANCE			
CE, RoHS 6, REACH	Compliant		
Safety	EN60950-1 (-22)		
EMC	ETSI EN 300386 class B		
Corrosion Resistance	EN60950-22 and ISO 21207 method B (corrosion resistance 20-50 years)		

## Vertiv™ Knürr® MIR2, One System with Infinite Possibilities

Vertiv Knürr MIR2, the classic amongst innovative racks, is demonstrated by the long-standing and continuous satisfaction of our customers.

Vertiv Knürr MIR2, the classic amongst innovative racks, is demonstrated by the long-standing and continuous satisfaction of our customers. Drawing on Vertiv's extensive experience with a wide range of applications, Miracel has now been adapted for network and server applications. The innovative Vertiv Knürr MIR2 has been designed to meet current requirements in order to ensure that it will continue to meet customers' needs well into the future.

For both network and server applications, the highly versatile Vertiv Knürr MIR2 combines various

components and applications in one place. Being a modular rack system, it can easily be expanded at any time and the cable entry points can be flexibly tailored for specific needs.

With a load rating of 800 kg, Vertiv Knürr MIR2 is a cleverly designed space-saving rack that offers ample space for a wide range of equipment and, thanks to the absence of depth members, also present at the sides, it provides maximum flexibility with the greatest possible space for cables and cooling components.

This rack's integrated castors and doors also make it easy to move without needing to be tilted. Made from aluminum, Vertiv Knürr MIR2 is extremely light, minimizing raised floor loading and making it easy to transport and set up. The clever, fully-integrated T-slot system in the aluminum extrusions also allows for the free configuration of accessories and makes it easy to install each and every component.

## Technical Specifications

- **Material/finish**
  - Extruded aluminum
  - Corner piece: die-cast aluminum
  - Casing: galvanized steel sheet
  - Doors: steel sheet.
- **Installation dimensions in accordance with IEC 60297-1 and IEC 60297-2**
  - Height: 42 HE / 47 HE (1 HE (or 1U) = 44.45 mm)
  - Width: 482.6 mm (19" version).
- **Available space**
  - 80 mm jumpering space at the front, 215 mm ranges; customizable up on request
- Internal hinge: 130° for rack suites: 160° for stand-alone racks
- External hinge: 180° for stand alone racks and rack suites.
- **Installation options**
  - Stationary: on levelling feet
  - Mobile: with castor mounting and levelling feet.
- **Finish / Colour**
  - Basic rack: polished
  - Visible surface of casing, powder-coated RAL 7021 dark-grey and RAL 7035 light-grey.
- **Static load rating**
  - 8000 N (stationary version)
- 4000 N (mobile version).
- **Tests depending on the design**
  - Earthing and earth wire test in accordance with DIN EN 60950
  - Other standards and certificates upon request.
- **Rack suites**
  - To create a rack suite with "n" racks, you will need:
    - 1 x rack without side panels and one rack with side panels
    - 1 x set of rack connectors per connection.



83% Perforation offers optimal airflow



Easy access on all sides enables comfortable service and repair



Raised height from 41/46U up to 42/47U



Load rate raised from 500kg up to 800kg



Light weight aluminium construction, minimizes raised floor loading



Clicksystem, easy mounting accessories



Modular design makes it easy to combine with DCM racks and Smart Aisle Containment



Castors for easy transport



**BENEFITS OF AN ALL IN ONE RACK**







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