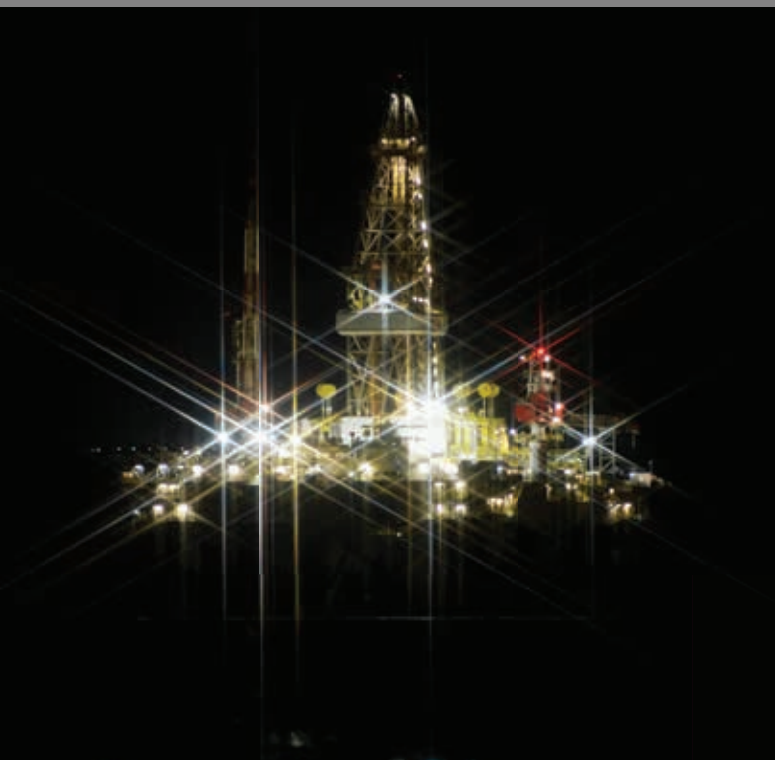


Secure Power for Hazardous Areas of Offshore Installations



CHLORIDE

The Emerson Network Power logo, featuring a stylized blue and white wave icon above the text 'EMERSON Network Power'.

EMERSON
Network Power

When one spark can turn your normal day into a big issue

Electrical energy plays an important role in your daily life, whether you are involved in studying, designing or implementing oil & gas installations

Your challenges

Electrical energy can become a danger to daily life on offshore installations that store, process and manufacture hydrocarbons.

Electricity may cause high explosion risk with serious consequences for personnel, equipment and the environment.

As a plant manager, you are solely responsible for the safety of the installation. This includes determining on-site hazardous areas, defining zone boundaries, knowing the characteristics of flammable substances present on site, etc. Obviously, you expect from the contractors as well as the equipment manufacturers that they meet your safety requirements.

When it comes to designing the electrical distribution on an offshore Oil & Gas installation, the way the level of safety per zone is defined plays an important role on many other aspects of the installation.

At the end, you need to be confident that:

- The operators will be able to do the job safely, at all time
- The safety of the process will be guaranteed
- The targeted production performance will be met
- The installation assets will be protected
- Your insurance policy will provide total coverage
- The risks will be appropriately managed.



Increased Safety 'e' or Flameproof 'd' UPS solutions to secure power in hazardous areas



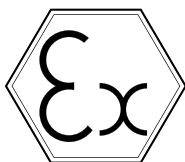
The highly critical applications at offshore Oil & Gas installations need to be secured by reliable and uninterrupted power

What you need

An Uninterruptible Power Supply (UPS) solution to fit your application

At Emerson, we have developed in-house expertise to bring our UPS Solution competencies to the 'Ex' applications. The Chloride XP systems are tailor-made solutions designed to operate in the hazardous atmosphere. Our solutions include:

- Ex d dual redundant DC UPS systems up to 30kW
- Ex d dual redundant AC UPS systems up to 15kVA
- Ex d single DC UPS systems up to 15kW
- Ex d AC and DC distribution panels
- Ex d Charger Controller Unit (CCU) with Maximum Power Point Tracker (MPPT) technology for solar arrays
- Ex e Battery cabinets
- Ex d Wall mounted battery circuit protection boxes
- Ex e Battery Monitoring System



Compliance to ATEX/IECEx

The Chloride XP systems from Emerson Network Power are designed to meet the requirements of the ATEX/IECEx standards:

- Ability to self-contain an inside explosion
- Acceptance of over-pressure routine tests at 1.5 time calculated test pressure

Adaptability to project needs

The Chloride XP UPS systems are designed in compliance with your ATEX/IECEx project specific requirements.

The electrotechnical design is based on our proven range of systems:

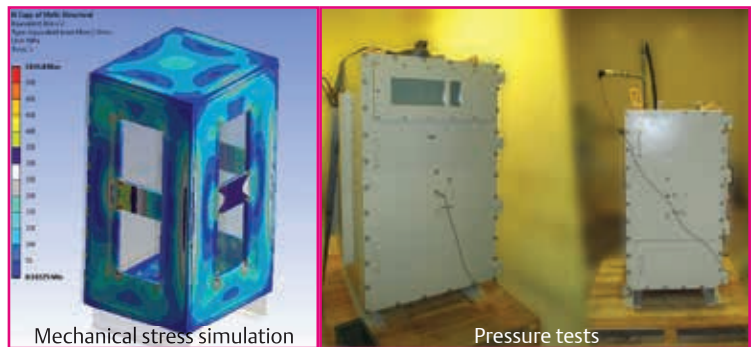
- The Chloride XP-90R is based on our SCR-based chargers of the Chloride CP-70R range
- The Chloride XP-90Z is based on our SCR/IGBT AC UPS systems of the Chloride CP-70Z range.

The enclosure is designed to best fit your application with a choice of materials and mechanical configurations:

- Stainless steel enclosure
- Carbon steel (Mild steel) enclosure
- Baseframe ready to be bolted or welded
- Sunshade canopy
- Specific mechanical adaptation to meet footprint constraints

Project Management for the complete cycle

From project conceptual study to the procurement stage, you need special skills for the Explosion-proof power protection part of your project



Feasibility Study

Our consulting engineers work alongside you, from FEED to EPC, to analyze your oil and gas project data, including:

- Existing technical specification, if any
- Low voltage electrical distribution network analysis
- Load flow studies and load shedding
- Short-circuit analysis
- Power quality analysis
- Noise rejection analysis (Harmonic current and voltage distortion)
- Grounding/Neutral networking
- Failure modes and effects analysis
- Battery type and configuration under all load, environmental and aging conditions
- Mechanical environment
- Health and safety requirements

System Design

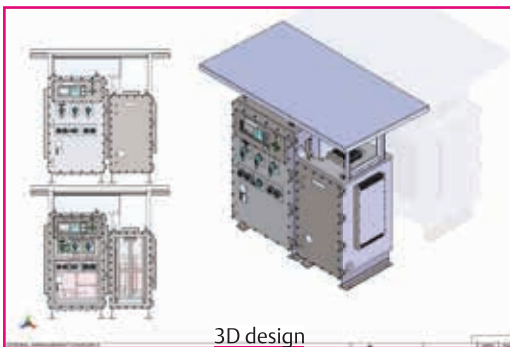
Our application engineers support you in conceptualizing your system needs by:

- Understanding the on-site needs for proper installation and operation
- Clarifying the technical specification if needed
- Submitting a technical and commercial offer
- Supplying all the relevant calculation notes, e.g. battery calculation as per required environmental conditions
- Providing the statement of compliance
- Providing a detailed draft of technical solutions, including the single line diagrams and general arrangement drawings
- Answering all the technical queries you may have

The Emerson experience

At Emerson, we have been able to consolidate the successive acquisitions of ATX, Appleton, Chloride Industrial Systems and Masterpower into the Ex Solution expertise to offer:

- Compliance to customer's specifications
- Critical Electrotechnical-Mechanical-Thermal design expertise
- Global Ex installed base since 2001
- Regional commissioning and training support
- Financially viable for long-term support



Project Management

Our project management teams are fully accountable for:

- Submitting timely drawings as per agreed supplier document schedule
- Providing timely documentation as per customer specifications
- Ensuring adjustments are fulfilled accordingly with customer's expectations and defined scope of supply
- Providing the best technical advice for revised requirements
- Ensuring factory acceptance tests are 100% compliant with our customer's requests
- Handling packing and logistics issues
- Understanding the project commissioning requirements

Services

To ensure system start-up is achieved on-time, our *Start-up services* include:

- Product warranty extensions
- Supervision of installation
- Systems commissioning and testing
- Project training
- Load bank rental and supply
- Commissioning spare parts

To ensure the complete reliability of the system over its entire lifetime, our *Operate and Maintain services* include:

- Spare parts
- Preventive maintenance
- Repair services and third-party maintenance
- Site maintenance training
- Shutdown and turnaround services
- System upgrades

...no matter the challenge!

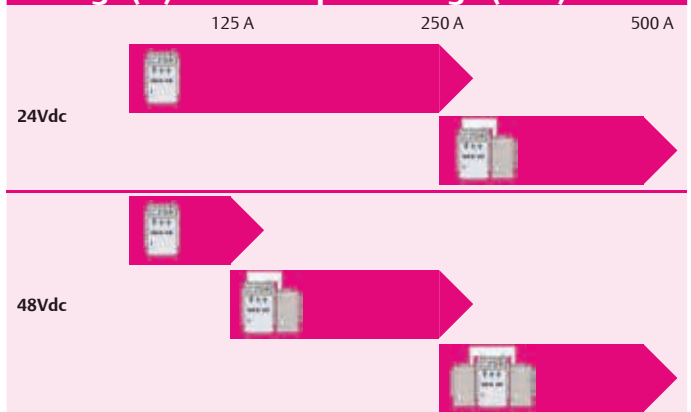
Chloride XP-90R Ex d rectifiers - chargers



Highlights

- **Small footprint** - High power DC UPS system available in small size to optimize space on offshore platform
- **Optimized thermal management** - The Chloride XP-90R uses our latest **patented** Exd enclosure cooling system
- **Strong immunity to perturbations** - The Chloride XP-90R integrates an isolating input transformer
- **Safe control, door closed** - The Chloride XP-90R allows the user to operate the switches and circuit breakers, as well as the control buttons with door closed
- **Smart access to UPS data:**
 - Large graphical user interface providing **access with closed door**
 - Embedded event logger (up to 2000 events)
- **Safe and easy maintenance** - Once open, the front door gives access to all internal components from the front

Ratings (A) vs DC output voltage (Vdc)



Technical Data

Input	
AC voltage	3 x 400V (380, 415) ⁽¹⁾
Voltage tolerance	+/- 10%
Frequency	50Hz (60Hz)
Frequency tolerance	+/- 5%
Output	
DC voltage (nominal)	24 / 48 V ⁽¹⁾
Voltage stability (Input within tolerance)	+/- 1% in float mode +/-1.5% for parallel rectifiers
Voltage ripple	0.1% RMS, in float mode, battery connected
Current limitation	I nominal / up to 150% for 1 minute
Charging characteristic	IU according to DIN 41773
Battery	
Type	Valve Regulated Lead Acid (VRLA) Recombination Nickel Cadmium
Autonomy	From few minutes to several hours, as per customer's requirement
Battery current limitation (typical, float mode)	0.1C (Lead Acid or Nickel Cadmium battery)
Battery temperature compensation	-3 mV/°C/cell
General Data	
Operating temperature	up to 55°C
Relative humidity	100%
Operating altitude	1000 m max without derating
Cooling	Natural
Efficiency	Up to 90% according to rating and configuration
Enclosure	
Design	ATEX/IECex certified for Zone 1, II 2G Ex d IIB+H2 T3 (IEC 60079)
Material	Stainless steel (SS316L) or Carbon steel (mild steel)
External ingress protection	IP 66 according to IEC 60529
Dimensions	Varying according to ratings & options

⁽¹⁾ other available upon request

Chloride XP-90Z Ex d AC UPS systems



Highlights

- **Small footprint** - High power AC UPS system available in small size to optimize space on offshore platform.
- **Optimized thermal management** - The Chloride XP-90Z uses our latest **patented** Exd enclosure cooling system.
- **Strong immunity to perturbations** - The Chloride XP-90Z integrates input and output isolating transformers
- **Safe control, door closed** - The Chloride XP-90Z allows the user to operate the switches and circuit breakers, as well as the control buttons with door closed
- **Smart access to UPS data:**
 - Large graphical user interface providing **access with closed door**
 - Embedded event logger (up to 2000 events)
- **Safe and easy maintenance** - Once open, the front doors give access to all internal components from the front

Ratings (kVA) vs DC intermediate voltage (Vdc)

110Vdc	5 kVA	10 kVA	15 kVA
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Technical Data

Input	
AC voltage	3 x 400V (380, 415) ⁽¹⁾
Voltage tolerance	+/- 10%
Frequency	50Hz (60Hz)
Frequency tolerance	+/- 5%
Battery DC Circuit	
Nominal DC voltage	110 V ⁽¹⁾
Current limitation	I nominal / up to 150% for 1 minute
Charging characteristic	IU according to DIN 41773
Output	
AC Voltage	1 x 230V (220, 240) ; 1 x 110V (115, 120) ⁽¹⁾
Frequency	50Hz (60Hz)
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)
Power factor	0.8 lagging
Allowable crest factor	3/1
Battery	
Type	Valve Regulated Lead Acid (VRLA) Recombination Nickel Cadmium
Autonomy	From few minutes to several hours, as per customer's requirement
Battery current limitation (typical, float mode)	0.1C (Lead Acid or Nickel Cadmium battery)
Battery temperature compensation	-3 mV/°C/cell
General Data	
Ambient temperature	up to 55°C
Relative humidity	100%
Operating altitude	1000 m max without derating
Cooling	Natural
Efficiency	Up to 85% according to rating and configuration
Enclosure	
Design	ATEX/IECex certified for Zone 1, II 2G Ex d IIB+H2 T3 (IEC 60079)
Material	Stainless steel (SS316L) or Carbon steel (mild steel)
External ingress protection	IP 66 according to IEC 60529
Dimensions	Varying according to ratings & options

⁽¹⁾ other available upon request

Chloride XP AC or DC Distribution Ex d Distribution Panels



Technical Data

Electrical data

Rated operational voltage	690 V AC/DC (50-60Hz)
DC voltage	24 / 48 Vdc
AC voltage:	
• single phase	1 x 230V (220, 240) ; 1 x 110V (115, 120) ⁽¹⁾
Neutral point arrangement	TT, TNS, TNC, IT according to specification
Type of feeder	MCB or MCCB
Number of poles (for feeders)	2, 3 or 4

General Data

Operating temperature	-25 to 55°C
Relative humidity	100%
Cooling	Natural convection
Internal segregation	Form 1 or Form 2B
External ingress protection	IP 66 according to IEC 60529
Dimensions	Varying according to number of feeders and ratings. Full details provided at engineering stage

Customization Capability

Electrical	DC earth fault detection AC earth fault detection DC earth leakage monitoring (global or per feeder) AC earth leakage monitoring (global or per feeder) Load shedding
System	Internal cabinet lighting Anti-condensation heater Special cabinet identification (Tag, nameplate)
Mechanical	Form 2A, 2B Top cable entry Special frame color
Communication	Front panel analogue meters (72x72, class 1.5) Volt-free contacts Special lamp (or LEDs) indicator on front panel (22mm diameter) Fiber Optic Patch Panel (FOPP) Integration of IEC 61850 monitoring protocol, including UPS

Highlights

- **Safe Control, door closed** - The distribution panels from the Chloride XP range allow the user to operate the switches and circuit breakers with door closed
- **Easy visualisation** - The local visualisation instruments are visible **from the front, door closed**
- **Monitoring capability** - The distribution panel can be remotely monitored via Modbus or via IEC 61850 protocol thanks to the optional Fiber Optic Patch Panel. This solution may also integrate the monitoring of the UPS as well



Powerplex™ increased safety circuit breaker housing

Increased Safety 'e' Battery Enclosures



Highlights

- **ATEX/IECex certified**- Enclosure certified for use in Zone 1 and Zone 2 gas hazard areas
- **Easy battery installation** - The front panel of the enclosure can be unscrewed to ease the installation of the battery cells inside the enclosure
- **Easy maintenance** - Once installed, the battery cells can be accessed for normal maintenance and checks using the hinged lid

Technical Data

Battery	
Type	Valve Regulated Lead Acid (VRLA) Recombination Nickel Cadmium
Autonomy	From few minutes to several hours, as per customer's requirement
Enclosure	
Material	316L Stainless steel
Storage temperature	-20 to +70°C
Relative humidity	100%
Design	ATEX/IECex certified for Zone 1 and Zone 2
Material	Stainless steel (SS316L)
External ingress protection	up to IP 56 according to IEC 60529
Dimensions	Varying according to number of cells and battery capacity. Full details provided at engineering stage

Customization Capability

Electrical	Temperature sensor for compensated battery charging
Mechanical	Special cabinet identification (Tag, nameplate) Special frame color Removable lids or hinged lids gas struts Bolted front cover Side or rear connection box in stainless steel 316L Side isolator switch box in stainless steel 316L (with Powerplex™ panel board offering component level flamepaths) Integration and interconnection of the battery cells at the factory level, prior to delivery, thanks to the highly robust enclosure



Example of hinged lid design

Chloride XP Ex d or Ex e Battery Circuit Protection Box



Technical Data

Battery circuit protection	
Type	MCB, MCCB, Fuse, Fuse-switch
Enclosure	
Relative humidity	100%
Design	ATEX/IECex certified for Zone 1 and Zone 2
Material	Stainless steel (SS316L)
External ingress protection	IP 56 according to IEC 60529 (Stainless steel) IP 65 according to 60529 (Carbon steel)
Dimensions	Varying according to requirements. Full details provided at engineering stage

Customization Capability

Electrical	MCB, MCCB, Fuse, Fuse-switch position contact, trip contact Shunt trip Battery black start (after Emergency shutdown ESD) Override feature (ESD reset) via external key switch
System	Internal cabinet lighting Anti-condensation heater Box identification (Tag, nameplate)
Mechanical	Top cable entry Special frame color
Communication	position contact fuse failure contact

Highlights

- **ATEX/IECex certified** - the battery circuit protection box is certified for use in Zone 1 and Zone 2 gas hazard areas
- **Versatility of the offering** - Customization according to the requirements and the application
- **Black start option** - Capability to restart the connected UPS thanks to the battery capacity available, after an ESD



Example of battery circuit protection box with ESD override

Chloride XP-BMS Increased Safety (Ex eb mb) Battery Monitoring System



Technical Data

Battery String measure values

String voltage range	2V - 600V
String current:	
• Measurement Range	0A - 2000A
• Number of string current measures	up to 5 (scaleable to 16)
String ambient temperature:	
• Measurement range	0°C to 50°C
• Number of measures	up to 5. Only 1 sensor per battery room if several strings in the same battery room

Battery blocks or cells measured values

Number of monoblocks ⁽¹⁾	up to 160 (scaleable to 1280)
Voltage (depending on battery type and m-Sensor type)	from 1V to 12V
Impedance ⁽²⁾ (depending on block voltage and m-Sensor)	from 0.15 to 40 mΩ - for Lead Acid batteries ONLY
Temperature ⁽²⁾	from -10°C to +70°C

General Data

Battery sensor design	Ex eb mb IIC T6
Battery room temperature sensor	Ex d IIC T6

⁽¹⁾A monoblock represents one or more battery cells in a container.

⁽²⁾Available as option.

Customization Capability

Electrical	Compatibility with Lead Acid or Nickel Cadmium Block by block or cell by cell monitoring Ex d Temperature sensor
Mechanical	Ex d enclosure for monitoring modules Mechanical kit for the installation of Ex e battery sensors on racks

Highlights

- **ATEX/IECEx certified** - the battery measurement sensor is certified for use in Zone 1 and Zone 2 gas hazard areas
- **Reduced maintenance costs** through preventive maintenance instead of emergency replacement
- **Maximized battery life** through smart diagnostics, regular data analysis and on-time remedial action
- **Increased safety on site** as back-up power remains available when most needed and less human presence is required in battery room



Understanding Hazardous Areas and Related Equipment

Definition of hazardous Areas

According to the IEC international standard IEC 60079, a hazardous area is a three dimensional region or space in which an explosive gas atmosphere is, or may be expected to be present, in quantities such as to require special precautions for the construction installation and use of equipment. Hazardous areas are classified in three zones based upon the frequency of the occurrence and duration of an explosive gas atmosphere:

- **Zone 0:** Area in which an explosive gas atmosphere is present continuously or for long periods or frequently.
- **Zone 1:** Area in which an explosive gas atmosphere is likely to occur occasionally in normal operation.
- **Zone 2:** Area in which an explosive gas atmosphere is not likely to occur in normal operation but, if it does occur, will persist for a short period only.
- **Non hazardous area (safe area):** A non hazardous area is an area in which an explosive atmosphere is not expected to be present.

The manager of the plant is solely responsible for determining the hazardous areas. The electrical engineer can not be the designer of the area classification.

The Chloride XP range of UPS systems is for use in Zone 1 and Zone 2

Gas and Vapor classification

The IEC defines different groups of gases and vapors, based on how volatile the gas or vapor would be if it was ignited. These groups also indicate how much energy is required to ignite the gas by a spark.

Group IIA: Propane, Ethane, Butane, Benzene, Pentane, Heptane, Acetone, Methyl Ethyl, Methyl Alcohol, Ethyl Alcohol

Group IIB: Ethylene, Ethyl Ether, Cyclopropane, Butadiene 1-3

Group IIC: Acetylene, Hydrogen.

Group IIC includes the most volatile gas and the one that requires the least energy to ignite.

The Chloride XP range of UPS systems is certified IIB+H2, i.e. suitable for battery protection (MCCB, LVD, ESD reset)

Temperature classification

It is a system of classification by which electrical equipment is assigned one of six temperature classes according to its maximum component surface temperature.

Temperature in °C	IEC classification
450	T1
300	T2
200	T3
135	T4
100	T5
85	T6

The Chloride XP range of UPS systems is temperature class T3 (T4 or T5 on request)



Protection modes

The IEC defines several protection modes. The two most common protection modes applicable to UPS are:

- «d» Flameproof
- «e» Increased Safety

Flameproof «d» equipment

A flameproof enclosure must be able to fulfil three criteria :

- It contains an internal explosion without permanent distortion.
- It guarantees that the explosion cannot be transmitted to the surrounding atmosphere.
- It exhibits a temperature at all points on the surface which is lower than the spontaneous ignition temperature of the surrounding gases or vapors.

Recommendation to install Flameproof «d» equipment

In order to successfully retain the flameproof character of the equipment, care must be taken before starting up to ensure that all the screws for closing the covers and cable entries are firmly tightened. Moreover, modification of the original pre-drilled holes is prohibited.

The Chloride XP ranges of AC UPS, DC UPS and Distribution panels are Flameproof «d»

Increased Safety «e» equipment

An increased safety « e » equipment is designed such that it does not cause arcs or excessive temperatures likely capable of igniting an explosive atmosphere. It prevents any accidental ignition.

Recommendation to install Increased Safety «e» equipment

The equipment has a protection index of at least IP 54 ; it is therefore important to ensure that the weatherproof seal is in good condition when the product is installed. Defective seals must be systematically replaced.

The Battery enclosures and the sensors of the Chloride XP-BMS are Increased Safety «e» equipment

Better understanding leads to better choice

Emerson has developed in-house expertise to help you understand all the key points related to increased safety areas. We can help you design the best suited Uninterruptible Power Supply system (UPS) according to the type of hazardous atmosphere.

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