

# High Power Switches and Contactors

SOLUTIONS GUIDE

Expertly engineered for reliable performance



FERRAZ SHAWMUT IS NOW MERSEN

**merseN**

# Mersen's High Power Switches are engineered to meet your needs

High Power Switches are necessary and critical to your operation. Not only do they help protect your people from injury, they help protect your equipment and processes, and minimize the risk of costly downtime and repairs.

For more than **100 years**, Mersen has provided the market with safe, reliable and longer life on-load switches and off-load disconnectors. These devices offer high performance, robust operation for heavy duty requirements with very limited maintenance.

Mersen offers one of the largest product ranges and is the **worldwide leader in the market**. Mersen has the switch solution that will meet your unique needs.

Our standard High Power Switches are rigorously engineered to meet your technical specifications. Mersen's High Power Switches encompass different range of proven technologies (Fouilleret, Soule, Berg and Hundt & Weber) that gives us **worldwide recognized expertise in Switching and Disconnecting**. This expertise includes a wide range of DC and AC switches and disconnectors designed to handle high current/low voltage and high voltage/low current applications. Our offerings include rectifier output switches, disconnect switches in both AC and DC, transfer switches for AC and DC, cell switches and medium voltages AC switches, and AC earthing switches.

Innovative High Power Switch systems and assemblies are custom made. When you need more than just a switch, Mersen's world-class engineering team is ready to provide custom engineering and fabrication to build the High Power Switch system or assembly you need, exactly the way you need it. Mersen's team of design engineers are bold problem-solvers who enjoy meeting your High Power Switch challenges head on with innovative engineering and creative solutions. Our engineers incorporate design and construction features that ensure each switch performs reliably, whether it's a rectifier output switch operated once a year or a change-over switch system in an enclosed panel actuated dozens of times a day.

So whether your High Power Switch needs are simple or complex, you can rely on Mersen to deliver the best solution. We'll show you all the ways we're your safest connection for electrical protection.



# Power Conversion

## DC Power Conversion 1kV to 2kV – 2kA to 160kA

### Power Conversion DC

A leader in this market, Mersen is supplying technologies (Fouilleret, Soule and Hundt & Weber) that are proven and recognized worldwide.

Our line of switches provides superior performance in the demanding and heavy duty environments at the output of rectifiers, for electrolytic cell applications, for metals refining, plating, specialty metal melting furnaces (aluminium, chlorine, copper, zinc, plating) and graphite applications. Encapsulated contact technology protects switches in aggressive or dirty environments.



NORDRA 128KA SC400+4



PBD10A1 120KAV7C 415+4



Encapsulated contacts (Hundt & Weber technology)

#### Application:

##### Isolate safely large rectifier, circuit isolation

- DC Disconnect switch
- Up to 2kV DC
- Rating from 6kA to 160kA
- Aluminium or copper connections
- Deformable switches
- Self supporting, can be installed in Copper or Aluminium Bus Systems without additional support
- Manual, motorized or pneumatic drive
- Low contact drop, low watt loss
- Large number of operations
- Possibility of having protected (encapsulated) contacts with Hundt & Weber technology
- Customized motorisation and signalisation
- Possibility to put in enclosure
- Heavy Duty cycles
- High operating speed

## DC LV Modular Contactors Up to 3000VDC – 7500A



CERN – LHC particles accelerator – Switzerland

Mersen was chosen as a solutions provider for the CERN-LHC particles accelerator: reliability, simplicity, and robustness.

Thanks to their modular design, Mersen bar contactors can adapt to customer specific needs and can meet most of the requirements that block contactors cannot meet.

Present in petrochemicals, automotive, glass & extractive industries, Mersen relies on its experience to satisfy its customers whatever the constraints or the conditions of use may be.

#### CERN – LHC particles accelerator – Switzerland

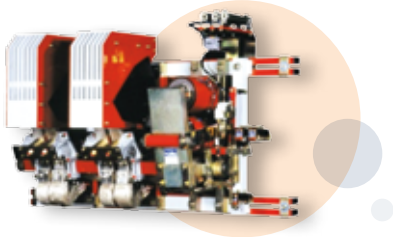
The 3 power contactors provided by Mersen are currently the largest in the world.

Taking into account the powers to be commuted, it was primarily necessary that one of the poles could withstand a load of at least 20000 Amps under 600 Volts during a few seconds.



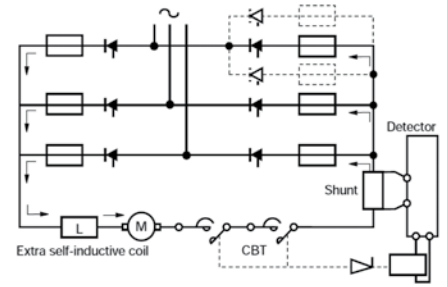
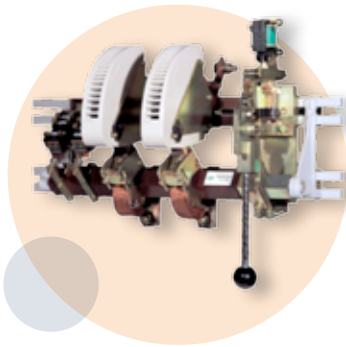
# Power Conversion

## DC Motors Supply and Control Up to 8500A



### Modular contactors from 80 to 8500A

- 1 to 6 main poles (single-pin type poles with silver pad contacts for higher reliability),
- closing electromagnet on the right side,
- control circuit supplied from an AC or DC source according to customer request,
- mechanical latching with single or double electrical release available as an option,
- auxiliary contacts up to 6NO + 6NC even more under customer request,
- locking device available as an option,
- mechanical endurance up to 3 millions operations.



High speed contactors (CBT) from 200 to 2000 A

CBT are used to complete the protection of thyristor bridges supplying DC motors, should the AC supply voltage disappear.

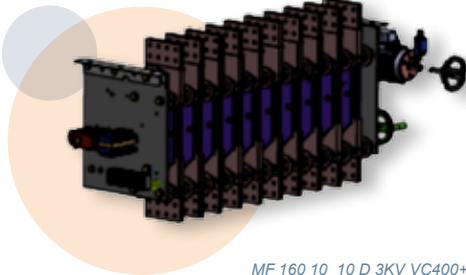
### Smelters supply (Foundries)

**Accrued performances and cost reduction:** a more than positive assessment. High performance (making and breaking capacities, short-time currents...) and reliable (mechanical endurance up to 3 millions operations) Mersen contactors considerably reduce maintenance costs.

# Power Conversion

## AC Power Conversion

Mersen offers a solution for high frequency converters for motors and induction arc furnaces used to melt iron and steel, copper, aluminium, and precious metals. This technology uses stainless steel a multiple contacts.



MF 160 10 10 D 3KV VC400+3 T

### Application: High frequency disconnecter

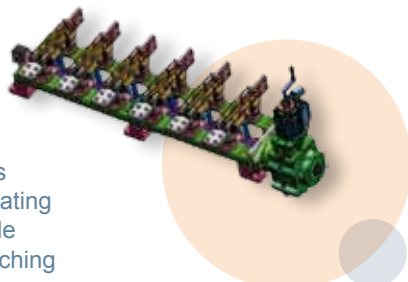
- Up to 3kV AC
- High frequency application available up to 3000Hz
- Rating up to 10kA
- Multipole arrangement
- Mechanical or electrical latching
- Auxiliary contact options
- Special configuration available

## AC Power Conversion 1kV to 12kV – 400A to 12kA

Control of large motors in the metal industry, disconnection of AC side of rectifiers... All these applications require offload disconnecting.

Mersen can provide customized solutions with characteristics up to 12kV AC and Rating from 100A to 12kA including with multipole arrangement, mechanical or electrical latching and auxiliary contact options.

Special configuration available.



HAS 10 6P 2000AU28AMC400C2 NR



### Foundries of Poitou

One Mersen bar contactor supplying the 3 raw material smelters (12 Megawatts, 3200Volts, 4000Amps)

- Type: CBA 98 4500A 2.0
- Operating voltage: 3500Vac, Ith: 4500A
- Breaking current @  $\cos \varphi = 0,1$ : 25kA

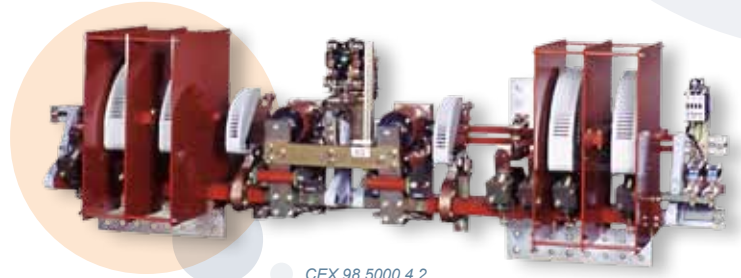
# Power Generation DC

## Excitator Contactor (Field Circuit Breakers)

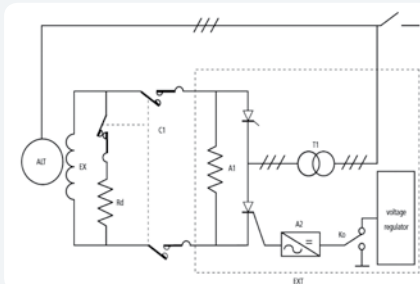
### Up to 8500A and 4500VDC

This contactor is used for switching the excitation circuit of an AC generator on and off.

This contactor is special as it has one opening pole that inserts the discharge resistor into the inductor terminals when switched off in order to facilitate breaking.



CEX 98 5000 4.2



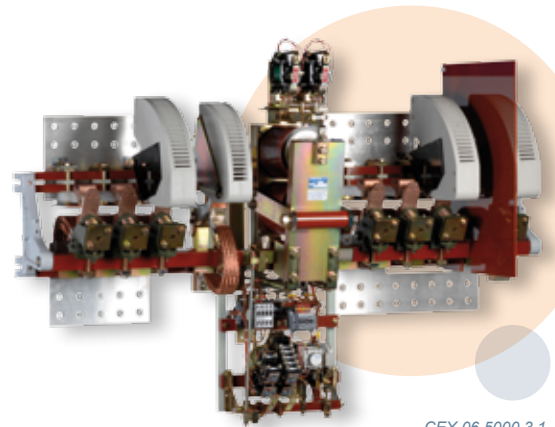
Schematic drawing of an excitation system where C1 is the excitation contactor and Rd the discharge resistor.

#### Main references:

Alstom, Andritz, BHEL, Rainpower, Voith, Basler, Siemens, ABB.

#### Description

- Rated current from 80 up to 8500 Amps
- Maximum switch-off voltage up to 4500 VDC for double CEX
- 1, 2, 3, 4 magnetic arc-blow-out contactor-poles:  
1 or 2 magnetic arc-blow-out dosing pole with overlapping with the contactor poles.
- Mechanical latching with single or double electrical release.
- Auxiliary contacts up to 6NO + 6NC even more under customer request.
- AC/DC control voltage.
- Mechanical endurance up to 3 millions operations.



CEX 06 5000 3.1

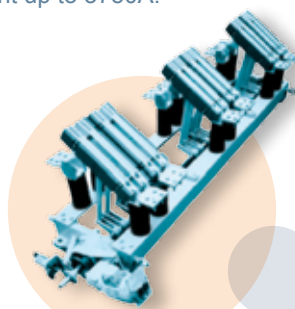
# Power Generation AC

## Up to 1kV to 40,5kV 400A to 12000A

### Power Generation AC

Hydropower plants, Wind and solar applications need to be able to disconnect when energy is not needed, for reversing (night pumping), for security reasons, and for maintenance operation. Mersen answers these requests using technologies that are proven and recognized worldwide.

For Hydro power plants, this modular technology allows an off load disconnection of 12, 17,5, 24, 36 and 40.5 kV voltage ratings with a max voltage of 12.000 Amp AC (higher ratings on demand). For solar DC application, 1500V with current rating up to 3750 Amp. For wind DC application, 3600V with current up to 3750A.



#### Application:

#### Circuit isolation, reversing or grounding

- AC Disconnect switch
- Up to 40.5kV AC
- Rating from 400 to 12.000A
- Manual, motorized
- Low contact drop, low watt loss
- Large number of operations
- Modular engineering
- Customized closing and motorisation
- Large isolation air and creepage path
- Self cleaning blade contacts
- True opening and visible distance
- Rugged anti-torsion construction

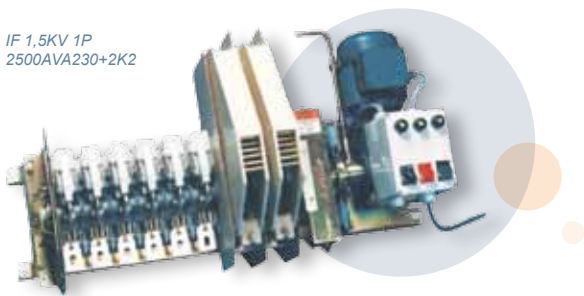
HAS 10 3P 8000AU72AMA230W3 L

# Traction

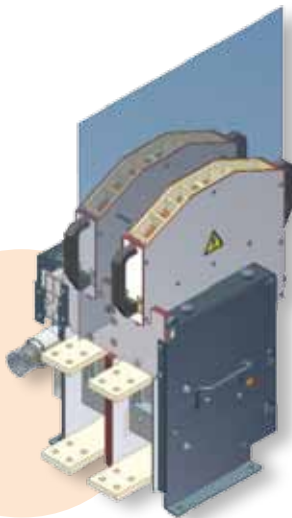
## Onboard Rolling Stock Disconnectors Fixed Stock - On-Load Switches Fixed Stock - Off-Load Switches

Mersen provides a complete solution for the traction market for onboard and fixed stock applications and also for on-load and off-load applications using Soule, Berg and Hundt & Weber. These on-load switches and off-load disconnectors are used in substations under 750, 1500 and 3000V or inside the rolling stocks at higher voltage level.

IF 1,5KV 1P  
2500AVA230+2K2



DE-LB 600 Amp

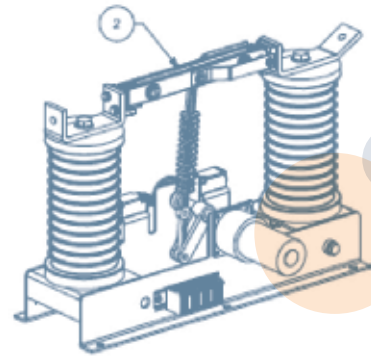


### Fixed Stock - On-Load Switches

#### Application:

#### On-load switching, grounding or changeover in substation

- Up to 2kV DC
- Rating up to 6300A
- Manual, motorized
- Large number of operations
- Modular engineering
- Customized closing and motorisation
- Cost saving against DC circuit breakers
- True opening and visible distance
- High loadbreak and loadmake performances
- Closing under large short circuit current
- Compactness



HAS 1E 1P  
1000AU74  
MG110W2 R

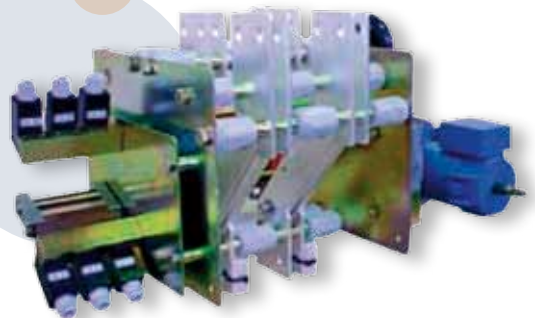
### Rolling Stock Disconnectors

#### Application:

#### Circuit isolation and grounding

- DC Disconnect switch
- Up to 25kV DC
- Rating to 1000A
- Manual, motorized
- Low contact drop, low watt loss
- Large number of operations
- Modular engineering
- Customized closing and motorisation
- Large isolation air and creepage path
- Self cleaning blade contacts
- True opening and visible distance
- Rugged anti-torsion construction
- Compactness

FA 10 2P 6300AT1DC VA230+3



### Fixed Stock - Off-Load Switches

#### Application:

#### On-load switching, grounding or changeover in substation

- Up to 3,6kV DC
- Rating to 8000A
- Single or double isolation
- Manual, motorized
- Large number of operations
- Modular engineering
- Customized closing and motorisation
- True opening and visible distance
- Compactness
- Long distance between contacts
- Self cleaning blade contacts
- Reliable high short-circuit currents withstand

# Traction

## Bar Contactors and Systems for DC Networks

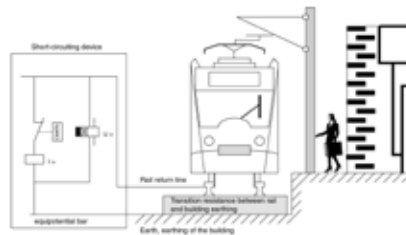
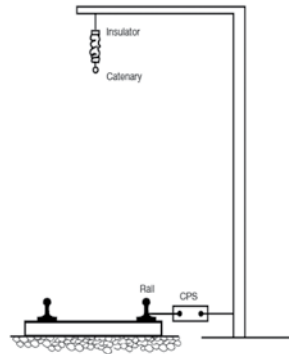
### Energy accumulation contactor (CMA) from 1250 to 5500 Amps with high making (up to 100 kA) and breaking capacities

Bar contactors ensure the division of track portions into sections by opening a motorized bi-stable energy accumulation contactor on DC distribution circuits. Energy accumulation control block with abrupt closing, manual and electrical control, tripping coil, under-voltage coil, auxiliary contacts free for customer use, locking facilities...



### For over voltage protection Mersen has developed a new device: the CPS.

This is a device whose original concept gives it very interesting characteristics i.e.:



### Earthing contactor (CMATN) for DC Railway installations

In compliance with the EN 50122-1, the CMATN is a voltage limiting device to be installed in DC traction systems to protect people from some dangerous touch voltages which may occur between the return circuit and the earth structure.

## DC cubicles for metros and tramways substations and on-line equipment

### References in Metro

- Alger
- Amsterdam
- Bucarest
- Jerusalem
- Kairo
- Lyon
- Marseille
- Mexico
- RATP
- Rotterdam
- Singapore
- Tunis

### References in Tramways

- Amsterdam
- Angers
- Barcelona
- Clermont-Ferrand
- Grenoble
- Lyon
- Marseille
- Montpellier
- Mulhouse
- Nice
- Strasbourg
- Rabat
- Reims
- Tenerife







**MERSEN**  
Expertise, our source of energy

**A WORLD LEADER  
in safety & reliability  
for electrical power**

## A GLOBAL PLAYER

Global expert in materials and equipment for extreme environments and in the safety and reliability of electrical equipment.

Mersen designs innovative solutions to address its clients' specific needs to enable them to optimize their manufacturing process in sectors such as Energy, Transportation, Electronics, Chemical, Pharmaceutical and Process Industries.

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