



MATERIAL



DRIVE SOLUTIONS
EMPOWERED BY EMOTRON

Tough environments – **Smooth operations**

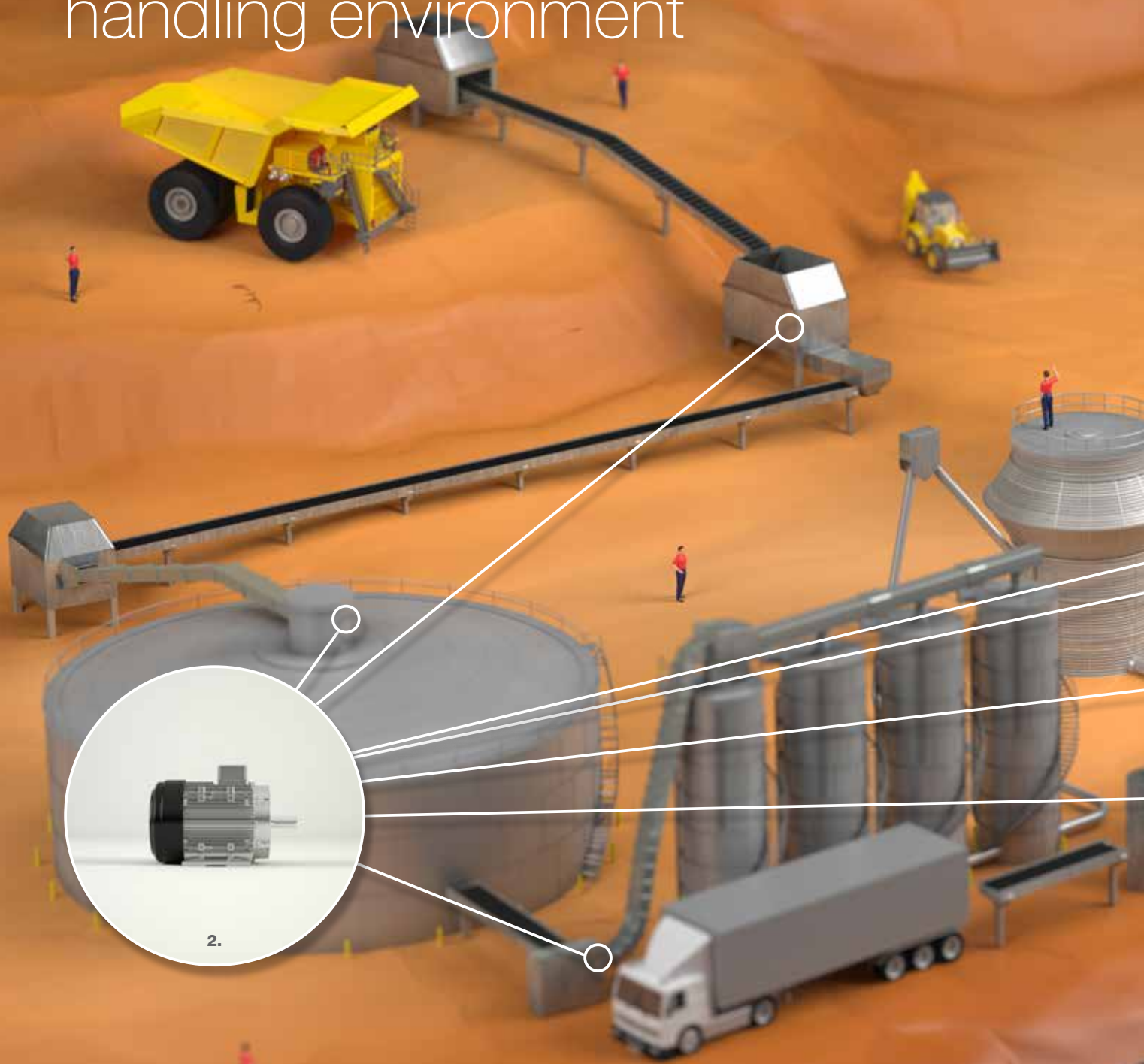
CG Drives & Automation offers complete drive solutions that ensure the safe and cost-efficient operation of your material handling systems and equipment, no matter how tough the operating environment.

Our Emotron-empowered solutions can help you reduce energy and maintenance costs, and ensure a longer service life for your equipment. Our drive solutions add value to your equipment and your business.

Simply and reliably.



Drive solutions for the harsh material handling environment



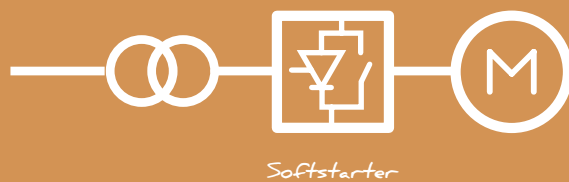
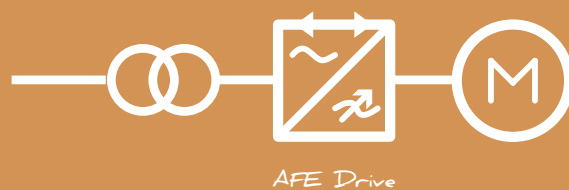
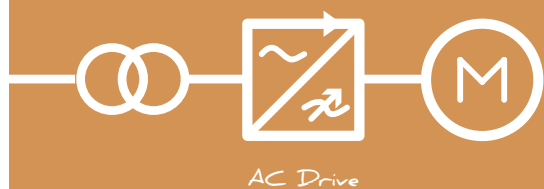
Robust and compact motor control equipment protects your investments

1. AC Drives: Optimised operation and full control. Variable speed control of your electric motors minimises power consumption and wear. Designed for use in harsh environments. **Softstarters:** Ensure smooth operation. Our intelligent Emotron softstarters ensure smooth starting and stopping with minimal power losses. Built-in monitor functionality protects your machine investment.

2. Our motors provide maximum output with minimum power consumption. We offer robust cast iron and aluminium motors suitable for material handling. Motors available for hazardous areas; for example dust ignition proof motors. **3. Automation.** Monitoring and information systems provide complete drive status for operators and maintenance crews. Complete drive status information available.



Typical motor controls
for material handling



Getting into **tough** territory

Working in mining, mineral processing and cement production always means harsh operating and environmental conditions. Heavy loads. Abrasive dust and dirt. Extreme weather and temperatures. Remote locations with undependable power supplies, as often as not.

These conditions make it difficult to maintain machinery in anything like a peak performance level. Unplanned downtime is a constant risk – and it costs money. In addition, high energy prices and increasingly stringent regulations are forcing reductions in energy consumption.

Cement

Cement plants, like other mineral processing plants, face the challenges that come with crushing, conveying, vibrating and grinding applications. They must also contend with the extreme heat of large rotary kilns and coolers, which involves maintaining a range of auxiliary fans, compressors and pumps. And since kiln maintenance is usually time-based, any hard-working material handling components must wait their turn until the next planned service for the kiln.

Mining

Mines operate in polar cold and desert heat, on mountaintops and thousands of metres below ground. Punishing weather and abrasive contaminants take their toll on machinery and energy consumption, which is strongly dependent on ore quality, composition and location. Large machines – like bucket-wheels, bucket-chain excavators, stackers, reclaimers, crushers, draglines, belt-conveyor systems and belt wagons – have to withstand dust, severe vibrations and extreme temperature variations.

Minerals

For producers of metal ores, industrial minerals, coal and aggregates, keeping productivity high and costs low is essential to staying in business. Reliability and safety are critical for uptime and plant profitability. Reducing tons of raw materials to useable product takes a heavy toll on equipment like crushers, vibrating screens, grinding mills and slurry pumps. High vibration, shocks and heavy loads – along with exposure to dust, dirt and the elements – lead to premature component failures, resulting in costly shutdowns and lost productivity.







Smoothing out the process

Conditions like these demand equipment and suppliers that you can rely on. You need equipment that is properly dimensioned and rugged enough to stand up to dust and the elements, of course. But you also need to control all your processes – perhaps dozens or hundreds of them – in order to optimise their performance under varying input conditions and with varying demand. The best way to achieve this is to control the speed of the motor driving the process.

The use of speed control not only improves process control – it also saves energy and reduces the wear on the equipment, thus reducing maintenance needs. AC drives can also supervise the driven machine and give indications if load characteristics change over time. This alerts you to situations where you may need to intervene quickly, or where you may need to re-schedule maintenance.

OUR EMOTRON DRIVE SOLUTIONS OFFER:

Variable speed range

Design for high overload duty

High starting torque, guaranteed efficiency

Robust design with IP54 metal enclosure

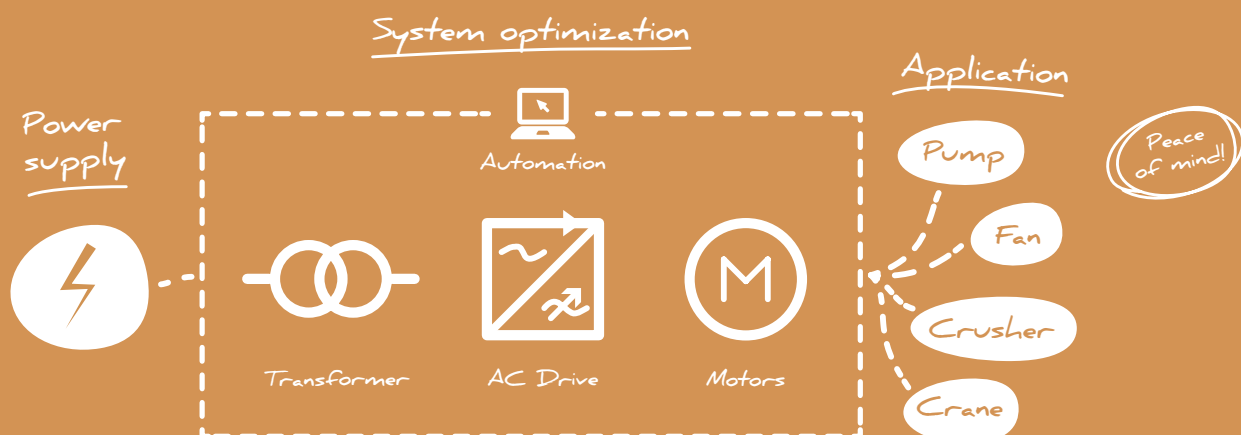
ATEX motors to handle high-dust mining conditions

Our products and services are targeted towards people who may need both conventional and special solutions. Our offering ranges from 0.5 kW to 3 MW at voltages up to 690 V.

Complete drive solutions material handling

Creating and maintaining a complete drive solution will give your equipment the best total performance and give you peace of mind. We can deliver the engineering, automation, transformer, AC drive, motor and cabinets.

Our modular design philosophy lets us deliver complete solutions based on standard products – for a variety of material handling systems. Alternatively, we can complement and upgrade your existing equipment with the drives you need – and back them up with training, support and service.



Robust solutions for harsh environments

It starts with smart electrical configuration and component selection with correct design margins for long drive lifetimes, along with isolation and thermal design rules and testing procedures. Communication options include field buses and Industrial Ethernet. Other options include liquid cooling, safe stops during mechanical maintenance without a contactor, and a built-in brake chopper for all power sizes. Coated boards are available as an option for better protection in harsh environments.

Simplicity and reliability

Material handling components demand efficient and precise control, for economical as well as for safety reasons. The challenges are: minimising cycle times, reducing mechanical wear and ensuring smooth operation. You can operate several motors with a single drive, and load monitoring detects overloads and underloads. Simplicity and reliability are keywords for CG's drive solutions.

Easy to setup, install and configure

We can provide a complete solution where other companies need to add external equipment. This makes installation and commissioning not only easy but also cost-efficient. Standardised control packages with hardware and software offer plug-and-play solutions. The robust and compact metal design with an IP54 enclosure offers cost-efficient installation. An integrated DC choke for maximum motor voltage and reduced harmonics is standard for all power sizes. Easy parameter backup is possible via the control panel.



From design to commissioning... and more

We take full responsibility for solutions, from design to installation, commissioning and maintenance. Our committed professionals are available directly when you need customer support, with a help desk on the front line. We offer high availability of spare parts and offer exchange units for major components, simplifying maintenance and repairs. We also offer field service, maintenance support and workshop repairs – as well as convenient service and maintenance contracts. Our technical service capacity is built on a large qualified network of partners and distributors worldwide.

Interested in training or simulation? Our training centres let you experience the unique functionality and user-friendliness of Emotron drives and softstarters in a variety of applications. We can assist you with dimensioning, programming, configuration and service training.



Experience the difference in the field

CG products are well proven in material handling applications around the world, particularly in mines. Robust construction and advanced functionality means they handle your heavy operations in a reliable and efficient way, whether they are crushers, conveyors, pumps or fans.

Speed control benefits

Using Emotron AC drives to control the speed of the motor driving your process gives you several benefits:

Start-up takes place without mechanical strain, reducing the strain on gearboxes and other power transmission equipment.

Start-up occurs without electrical strain, allowing you to start your motors on weak grids without risk of voltage dips or the need to start additional generators.

Improved process control, as controlling the speed of the motors is often the best way to achieve process control.

You save energy compared to other control schemes. For pumps and fans the energy savings can be as much as 50%, depending on the drive train sizing and the actual demand.

The use of AC drives with large motors optimises diesel fuel usage

Direct torque control

The direct torque control offers high accuracy in dynamic applications, for example crushers where speed needs to be quickly adjusted to the amount and size of rock. The exact control is achieved without encoder feedback, using only the motor as a sensor. Actual and required torque is compared 40,000 times a second. The crusher is efficiently started by dynamically controlling the torque needed to overcome initial peak loads.

Patented monitoring technology prevents damage

An integrated patented monitoring function protects the handling process against damage and inefficiency. Any over or underload situation is detected immediately, across the entire speed range. This allows for preventive action if a crusher is jamming, a pump is running dry or a pipe is blocked. Wasted energy and unplanned downtime are reduced.



Making a difference **to your processes**



PUMPS

Pumps are rarely run at their rated speed. Our variable speed drives offer considerable electric energy savings in pumping systems. Speed control can reduce energy consumption in pumps by up to 50% by continuously adapting operation to demand. A sleep function saves further energy and automatic pump rinsing enhances efficiency. Soft starts reduce the hydraulic and mechanical stress on pipes and gaskets. Linear stops eliminate the risk of water hammer, without costly motor-controlled valves.

VENTILATION, FANS, BLOWERS

Controlling your ventilation, fans and blowers with our solutions ensures efficient, reliable and user-friendly operation. Damage and downtime are prevented, maintenance is reduced and energy consumption is minimized. Energy savings and minimized wear are achieved thanks to the Emotron AC drives continuously adapting flow/pressure to the level required. Inefficiency due to, for example, a blocked filter, a worn belt or a damper not fully opened is detected immediately.

CONVEYORS

Efficient conveyor systems are critical to many industrial processes. Optimized control is required in order to ensure the right rate and quantity when feeding material to and from the process. Costly interruptions and downtime need to be prevented. This is ensured with a solution from CG. Emotron AC drives ensure the right feeding rate at all times by adapting motor speed. They ensure optimized operation regardless of the quantity or type of material, minimizing energy consumption and wear. The AC drive can also be set to reverse the conveyor in the case of an overload or jamming.

COMPRESSORS

Emotron drive solutions ensure that compressor operation is continuously adapted to demand, minimising energy consumption and wear. Inefficiency due to air leakage or compressor idling is detected immediately. Energy savings and minimised wear are achieved thanks to the Emotron AC drives continuously adapting flow/pressure to the level required. Parameters can be set in your own process units, for example m³/s or bar, making monitoring easier and safer. Up to seven compressors can be controlled without using PLCs or other external equipment.

MILLS

Controlling your mills with CG solutions ensures efficient, reliable and user-friendly operation. Damage and downtime are prevented, maintenance is reduced and energy consumption is minimized. Emotron AC drives offer considerable energy savings by regulating the operation of your mills to the demand. Motor speed is continuously adapted to the size and type of material and the feeder speed is adapted to load variations. Inefficiency due to, for example, broken or worn equipment, is detected immediately. Preventive action means no energy is wasted and unplanned stops are eliminated.

CRUSHERS

Emotron AC drives offer considerable energy savings by regulating the operation of your crusher to the demand. The feeder speed is continuously adapted to the crusher's load variations. Direct torque control handles abrupt load changes and overcomes initial peak loads, preventing interruptions and false trips. A heavily loaded crusher is efficiently started by utilising the full motor capacity from standstill. Inefficiency is detected immediately, for example if a feeder is broken, a jaw is worn or the material is running out. Preventive action means no energy is wasted and unplanned stops are reduced.

MIXERS

Emotron AC drives offer considerable energy savings by regulating the operation of your mixers to meet demand. Motor speed is continuously adapted to the viscosity level. Inefficiency due to, for example, a damaged blade is detected immediately. Preventive action means no energy is wasted and unplanned stops are eliminated. You can also rely on the system determining when the mixing process is ready and the viscosity just right. This ensures high productivity and product quality.

Emotron softstarters ensure soft starts and stops, reducing mechanical stress. Reduced start currents allow you to use smaller fuses and less expensive cables. This will save you maintenance, installation and energy costs. A loaded mixer can easily be started by boosting the torque. Built-in braking functionality offers quick stops without the need for mechanical brakes. This enhances efficiency and ensures safety.

Material handling around the world



A movable gold mine

The Yanacocha gold mine in Peru presented a real challenge: The 4200m altitude is extra tough on electrical equipment, because thin air reduces cooling capacity and electrical isolation. Power comes on cables 30-50 km long, and then there are the standard conditions for mining: huge temperature variations, humidity, rain, dust and sand. In 2009 CG provided drives and soft starters for deep well pumps that dry out parts of the mountain before blasting. These pump systems are “portable”, and move every 3-4 weeks to a new location. Ruggedness and ease of maintenance are key items in keeping this operation going strongly.



The long black line

The Baltic Coal Terminal in Ventspils, Latvia, has been handling coal since 2009, with a series of train wagon tipplers, scrapers, conveyors and ship loaders. A total of 33 Emotron AC drives have been delivered for this highly productivity coal terminal.



Typical Cement plant

Cement takes the heat

Cement plants contend with the usual rugged conditions, plus the extreme heat of large rotary kilns and the extra equipment to deal with that heat. CG has delivered large motors and drives to Lafarge, the large global manufacturer of cement and building materials. These motors power kilns, mills, fans, crushers, conveyors and grinders in 27 installations in 9 countries where Lafarge operates. We have also supplied over 20 cement plants in South Asia with motors and controls.

Monster transport

This huge machine operating about 1000 km east of Moscow mines and crushes limestone for cement production in one of the largest cement plants in the region, run by JSC Mordovcement. Commissioned in 2009, this 202m long and 48m high giant can handle 1700 tonnes per hour, with the help of 18 Emotron automated drives – four for steering alone.







Optimised operation and full control

Variable speed control of electric motors minimises power consumption and wear. Our AC drives offer high efficiency and reliability, whether you need to adjust a pump by varying the flow or control a crane or other highly dynamic applications.



EMOTRON FDU/VFX FEATURES

- Globally well-proven**
- Robust and complete drive**
- High level of component integration**
- Smart control functions**
- Full control with direct torque control**
- Built-in DC choke and EMC filter as standard**
- Speed controlled fans extend equipment lifetime**
- Few critical parts, easily accessible**
- Available in IP20/21 and IP54 versions – for cabinet mounting as well as harsh environments**

EMOTRON AFE DRIVES

Emotron Active Front End drives are available in two versions: Low harmonic drives and Regenerative drives. Both are based on standard Emotron AC drives, providing the same benefits in reliability, easy handling and advanced functionality, as well a wide range of options. Emotron AFE units are delivered as complete solutions in IP54 classified cabinets. Setup is easy thanks to the plug-and-play type of control.

Emotron Low harmonic drives produce typically less than THDI 5% compared to 30-50% in conventional drives, thereby fulfilling the IEEE-519 standard. Reduced power losses eliminate the need to overdimension cables and transformers. Lower distortions also cause fewer malfunctions in other electronic equipment.

SPECIFICATIONS	Emotron FDU 2.0 Square torque Emotron VFX 2.0 Constant torque		Emotron AFE AC Drives Active Front End for regeneration and/or low harmonics
Power	11 - 132 kW	0.55 - 3 000 kW	55 - 1100 kW
Power supply	3-phase 230 - 480 V	3-phase 230 - 690 V	3-phase 380-690 V
Rated current	25 - 244 A	2.5 - 3 000 A	109 - 1750 A
Protection class	IP20, IP21	IP54	IP23, IP54



Ensure smooth starting and controlled stops



Starting and stopping a pump or fan often involves mechanical stress. Softstarters from CG ensure smooth operation. Built-in monitor functionality protects your investment.



EMOTRON TSA

Emotron TSA softstarter starts, stops, protects and reduces your power supply needs in your applications.

FEATURES

- Soft torque control start**
- Robust and compact design**
- Integrated bypass contactors**
- 3-phase torque control**
- Coated boards as standard**
- Real time clock**
- Programmable logical blocks and timers**
- Load monitoring function**

EMOTRON MSF

Softstarter Emotron MSF 2.0 offers optimised start and stop sequences, advanced braking technology and built-in monitoring function.

FEATURES

- Optimised start and stop sequences**
- Advanced braking techniques**
- Solid state type softstarter**
- Heavy duty rated**
- Built-in load monitor functionality**
- Easy installation and set-up**
- 3-phase torque control for ultra-smooth start with constant acceleration**
- Start currents up to 30% lower than with conventional softstarters**

SPECIFICATIONS	Emotron TSA
Rated power	7.5 - 1800 kW
Power supply	200 – 690 V, 3-phase
Rated current	17 – 1800 A
Protection class	IP20, NEMA 1 (up to 800 A) IP00, NEMA 0 (up to 1 800 A)

SPECIFICATIONS	Emotron MSF 2.0
Rated power	7.5 - 1600 kW
Power supply	200 to 690 V, 3-phase
Rated current	17 – 1650 A
Protection class	IP20, NEMA 1 (up to 960 A) IP00, NEMA 0 (up to 1650 A)



We put all our energy into saving yours

Commitment and positive attitude are always included. At CG Drives & Automation we use our know-how to create the technical solutions, and our personal commitment to make them work according to your requirements. Simplicity and reliability are keywords applying to our products as well as our people.

This will save you energy in all senses of the word!

CG Drives & Automation, former Emotron, has for 35 years developed, manufactured and delivered efficient and reliable motor control equipment. Since June 2011 CG Drives & Automation is a part of Crompton Greaves (CG). CG is a global pioneering leader in the management and application of electrical energy.

With more than 15,000 employees across its operations in around 85 countries, CG provides electrical products, systems and services for utilities, power generation, industries, and consumers.



DRIVE SOLUTIONS
EMPOWERED BY EMOTRON

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