Full control of your power

Emotron VFX 2.0 Variable Speed Drive

emotron®
DEDICATED DRIVE

Safe and efficient co

Emotron VFX 2.0 variable speed drives ensure you get the most out of your applications, whether they are cranes, crushers, mills or mixers. With full control of the process you will benefit from reliable, cost-efficient and user-friendly operation, protected against damage and downtime.

The combination of direct torque control, accurate speed control and efficient vector braking makes Emotron VFX the ideal alternative to costly servo systems and DC motor drives.

With all its functions included in a compact IP54 cabinet, the VFX is cost-efficiently installed close to the application. An intuitive user and process interface makes it easy to communicate critical parameters to other parts of your process.
Fit-for-purpose is the key term for Emotron VFX.

ntrol of movements

Protective and efficient starts
Protective starts are ensured with Emotron VFX. Reduced start currents result in smaller fuses, cables and energy bills. A crusher or a mill loaded with material can be difficult to start. This is dealt with efficiently by Emotron VFX boosting the torque to overcome initial peak loads. Starting a heavily loaded crane without jerky movements is also critical. The VFX gives an instant, yet soft, start by ensuring the pre-magnetized motor has enough power to deliver the torque needed to start the movement at the very moment the mechanical brake is released.

Controlled ramping for safe start-up
Emotron VFX offers a unique function that protects your equipment by ensuring a controlled ramping up of the DC link voltage. This so called HCB ramping (Half Controlled Bridge) offers a safe start-up, and detects phase failure and asymmetries. As there are no built-in resistors or bulky contactors, both size and maintenance are reduced.

You can safely turn the variable speed drive on and off with an external contactor, as often as needed. In other drives this could cause breakdowns or serious damage.

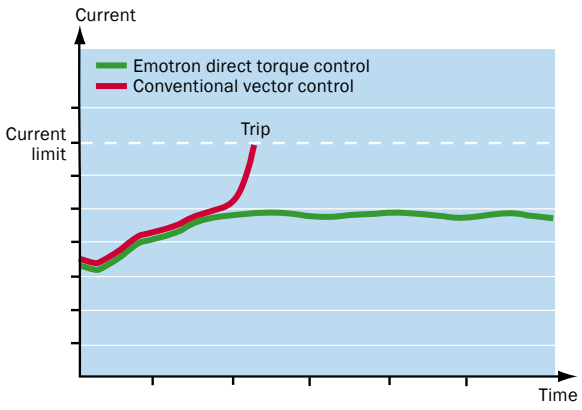
Optimized operati

Direct torque control eliminates disturbances
With its direct torque and speed control, the Emotron VFX is the choice for all dynamic applications. Operation is optimized and you are in full control of the process.

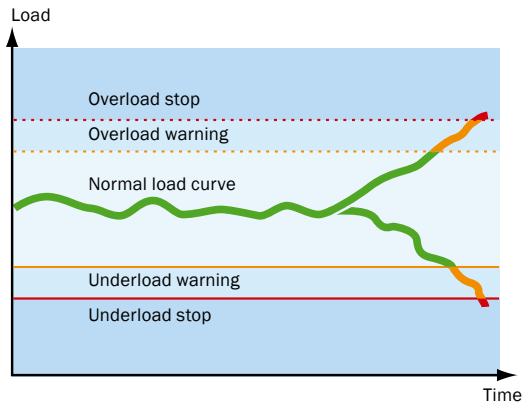
Emotron VFX protects the operation from interruptions thanks to a very accurate and quick speed and torque control. The torque control reacts extremely quickly and eliminates disturbances due to peak loads, abrupt load changes or inaccurately set ramp times.

The fast torque response results in safer, more cost-effective operation, e.g. of a crane where frequent and critical starts and stops demand instant high torque, or of a crusher where speed quickly needs to be adjusted to changes in load or type of material.

Protection against damage and downtime
A built-in shaft power monitor and a unique Load Curve Protection function protect your process against damage and downtime. The load curve of the controlled equipment is monitored across the whole speed range. Any over or underload situation that could cause inefficiency or damage is detected immediately. You can easily set the warning and safety stop levels that allow you to take preventive action before damage is done. There is no need to worry about jamming crushers or mills, a mixer running with a broken blade or a crane not operating at optimal speed. A warning is sent, or a safety stop activated, before any damage can occur. Emotron VFX protects the process and makes sure it works as efficiently as possible.



Direct torque control means that abrupt load changes do not cause disturbances and downtime. The response time is extremely short since the Emotron VFX compares actual and required torque 40,000 times a second.



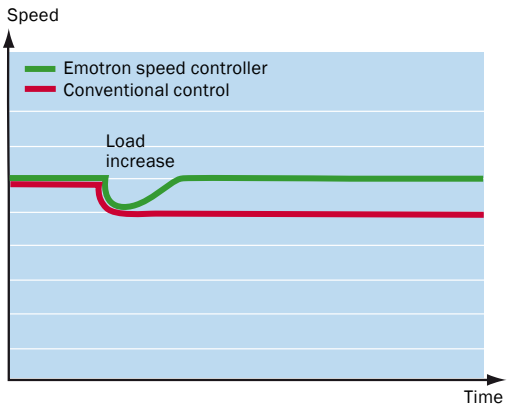
The unique Load Curve Protection detects any deviation from normal load across the whole speed range, and sends a warning or stops the process before any damage is done (patent pending EP 05109356).

on and full control

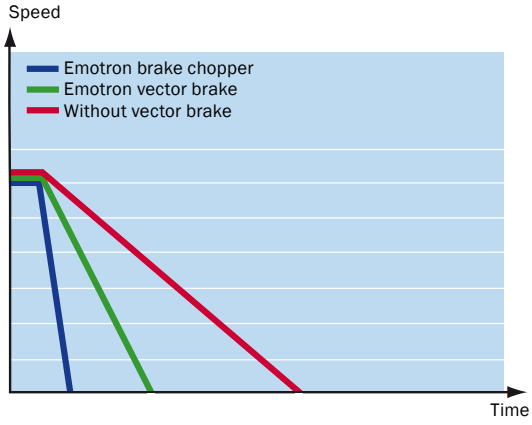
Speed controller increases efficiency
Emotron VFX has an internal speed controller that increases efficiency. It reacts immediately to load changes that cause deviation in motor speed, and quickly adjusts speed to the set reference value. The controller works without an external feedback and an autotune function reduces set-up time.

Safe and efficient braking
An integrated vector brake function offers rapid and protective braking. No mechanical brakes are required. The braking energy is dissipated through the motor itself, which helps avoid interruptions due to excessive brake voltage.

In mill applications quick and secure stops are often needed for safety or productivity reasons. These are ensured by using the vector brake. For a heavily loaded crane a brake chopper, available as an option, guarantees very rapid but soft braking without any jerky movements.



A speed controller ensures efficient operation by immediately adapting speed to meet load changes.



An integrated vector brake function halves the braking time. A brake chopper is available as an option when extremely short braking time is required. The example shown is true when full braking power is used.

The answer to a ra

Cranes

Challenge	Emotron VFX solution	Value
Starting with a heavy load is difficult and risky. Can lead to jerks causing swinging load.	Direct torque control, motor pre-magnetization and precise brake control gives instant yet soft start with heavy load.	Shortened cycle time and increased safety. Less stress on equipment reduces maintenance costs and downtime.
Unsynchronized riding of railbound crane causes noisy operation and stress on wheels.	Speed of wheels is fully synchronized. Crane rides parallel to the rail.	Less maintenance and downtime. Less noise improves working conditions.
Crane is driven slowly when returning empty or with a light load. Valuable time is lost.	Speed can be increased by operating the motor in the field weakening area.	Reduced cycle time and optimized operation.
Crane and grabber cannot be controlled independently. Stress on wires and longer cycle times.	Crane and grabber can be operated simultaneously. Grabber can be opened and closed while being hoisted.	Reduced cycle time. Lifting while closing grabber puts less stress on wires, reducing maintenance costs and downtime.
Braking with heavy load is difficult and risky. Can lead to jerks causing swinging load.	Direct torque control and vector brake gradually reduce speed to zero before mechanical brake is activated.	Increased safety. Less stress on equipment reduces maintenance costs and downtime.
Operator starts braking long before end position to avoid jerks. Valuable time is lost.	System automatically stops crane at end position. Operator can safely drive at full speed.	Reduced cycle time. Increased safety when jerks or swinging loads are avoided.

nge of challenges

Crushers

Challenge	Emotron VFX solution	Value
High start currents require larger fuses and cables, or for mobile crushers larger diesel generators. Causes stress on equipment and higher energy costs.	Speed control reduces start current. Same fuses can be used as those required for the nominal motor current, or a smaller generator.	Lower investment and energy costs, extended equipment lifetime.
Abrupt load change or torque peak when starting heavily loaded crusher. Causes mechanical stress and false trips.	Direct torque control adjusts the torque to handle load changes and overcome initial peak loads.	Reliable operation without interruptions. Reduced mechanical stress and less downtime.
Material that could cause damage gets into the crusher.	Load Curve Protection function quickly detects deviation. Warning is sent or safety stop activated.	Early warning allows preventive action before damage or breakdown.
Motor runs at same speed despite varying demands.	Motor speed is continuously adapted to the amount and size of rock. Speed of feeder is adapted to load variations.	Increased efficiency. Reduced maintenance costs.
Process inefficiency due to e.g. broken feeder or worn jaw. Energy wasted, mechanical stress and risk of process failure.	Load Curve Protection function quickly detects deviation from normal load. Warning is sent or safety stop activated.	Preventive action before damage or breakdown. No energy is lost and downtime is reduced.

The answer to

Mills

Challenge	Emotron VFX solution	Value
High start currents require larger fuses and cables. Causes stress on equipment and higher energy costs.	Speed control reduces start current. Same fuses can be used as those required for the nominal motor current.	Lower investment and energy costs, extended equipment lifetime.
Abrupt load change or torque peak when starting heavily loaded mill. Causes mechanical stress and false trips.	Direct torque control adjusts the torque to handle load changes and overcome initial peak loads.	Reliable operation without interruptions. Reduced mechanical stress and less downtime.
Material that could cause damage gets into the mill.	Load Curve Protection function quickly detects deviation. Warning is sent or safety stop activated.	Early warning allows preventive action before damage or breakdown.
Motor runs at same speed despite varying demands.	Motor speed is continuously adapted to the amount and size of material. Speed of feeder is adapted to load variations.	Increased efficiency. Reduced maintenance costs.
Process inefficiency due to broken or worn equipment. Energy wasted, mechanical stress and risk of process failure.	Load Curve Protection function quickly detects deviation from normal load. Warning is sent or safety stop activated.	Preventive action before damage or breakdown. No energy is lost and downtime is reduced.

more challenges

Mixers

Challenge	Emotron VFX solution	Value
High start currents require larger fuses and cables. Causes stress on equipment and higher energy costs.	Speed control reduces start current. Same fuses can be used as those required for the nominal motor current.	Lower investment and energy costs, extended equipment lifetime.
Difficult to determine when mixing process is ready.	Built-in shaft power monitor determines when viscosity is right.	Optimized operation and higher product quality.
Motor runs at same speed despite varying demands.	Speed is continuously adapted to viscosity level.	Reduced mixing time and improved product quality. Reduced maintenance costs.
Process inefficiency due to e.g. a damaged or broken blade. Energy wasted, mechanical stress and risk of process failure.	Load Curve Protection function quickly detects deviation from normal load. Warning is sent or safety stop activated.	Preventive action before damage or breakdown. No energy is lost and downtime is reduced.

User-friendly and

Emotron VFX 2.0 offers several user-friendly features that make both the operator's and the installation engineer's work easier and more reliable.

Your own process language

Several process values and system parameters are available via the communication interface, including current, voltage, shaft power, energy consumption and operating time. With Emotron VFX you easily set operation parameters in the units of your specific process, for example m/sec, tons/hour, cycles/min or units/hour. No confusion, no time spent on translation and no risk of mistakes. The result is easier and more reliable monitoring of your process.

Virtual connection of logical functions

Emotron VFX supports the virtual connection of logical functions, comparators and timers. This opens the way for the use of more options by making more I/Os available. Different logical functions can be combined without cables or external I/Os. For example, the VFX can be set to clear a milling machine by reversing it when it begins to lose speed because of excessive load. The destination and source of a virtual connection can be set easily using the control panel.

Operation parameters can be set in your own process units – m/sec, cycles/min, units/hour, etc. This makes monitoring easier and more reliable.

Emotron VFX supports the virtual connection of logical functions, comparators and timers. The destination and source of a virtual connection can be set easily using the control panel.

reliable operation

User-friendly software
EmoSoftCom software makes the set-up easy. Functions developed for different applications, e.g. cranes, crushers, mixers and mills, save time and effort. Parameters are loaded directly to the variable speed drive by connecting a standard RS232 cable under the control panel on the front.

Local or remote control
You easily switch between local and remote control of the variable speed drive. All it takes is the push of a key on the control panel. This facilitates commissioning and reduces set-up time. The existing settings remain in place while switching over and the process is not affected.

Concise manuals help you achieve optimal use
Studying our manuals helps you to achieve optimal use of the product and its functionality in your specific application. The manuals are concise and easy to understand, with recommendations and examples that reduce set-up time.

Easy copying of settings
When settings have been made for one Emotron VFX via the control panel they can easily be copied to other VFX units. Just remove the panel, attach it to the next drive and transfer the settings. This saves a lot of time and ensures the drives have exactly the same settings.

Parameters are easily loaded to the Emotron variable speed drive by connecting an RS232 cable directly to the front. Functions developed for specific applications, for example for crane control, make the set-up with EmoSoftCom quick and easy.

The removable control panel has a copy function that allows you to transfer settings to other VFX units.

Cost-efficient and f

Installing Emotron VFX 2.0 is cost-efficient and flexible. The compact format and IP54 classification means the units can be installed close to the application. Flexible cable connection reduces the need for tools and terminals.

Compact IP54 for cost-efficient installation
Emotron VFXs in the 2.5-250 A range are compact standalone units, all IP54 classified and just as protected against dust and water as an electric motor. They have a robust steel construction and can withstand harsh environments. You can install the units close to the application, saving time and space as well as the cost of cabinets and long motor cables.

The compact standalone units of 2.5-250 A are IP54 classified, which eliminates the need for costly cabinets and long motor cables.

lexible installation

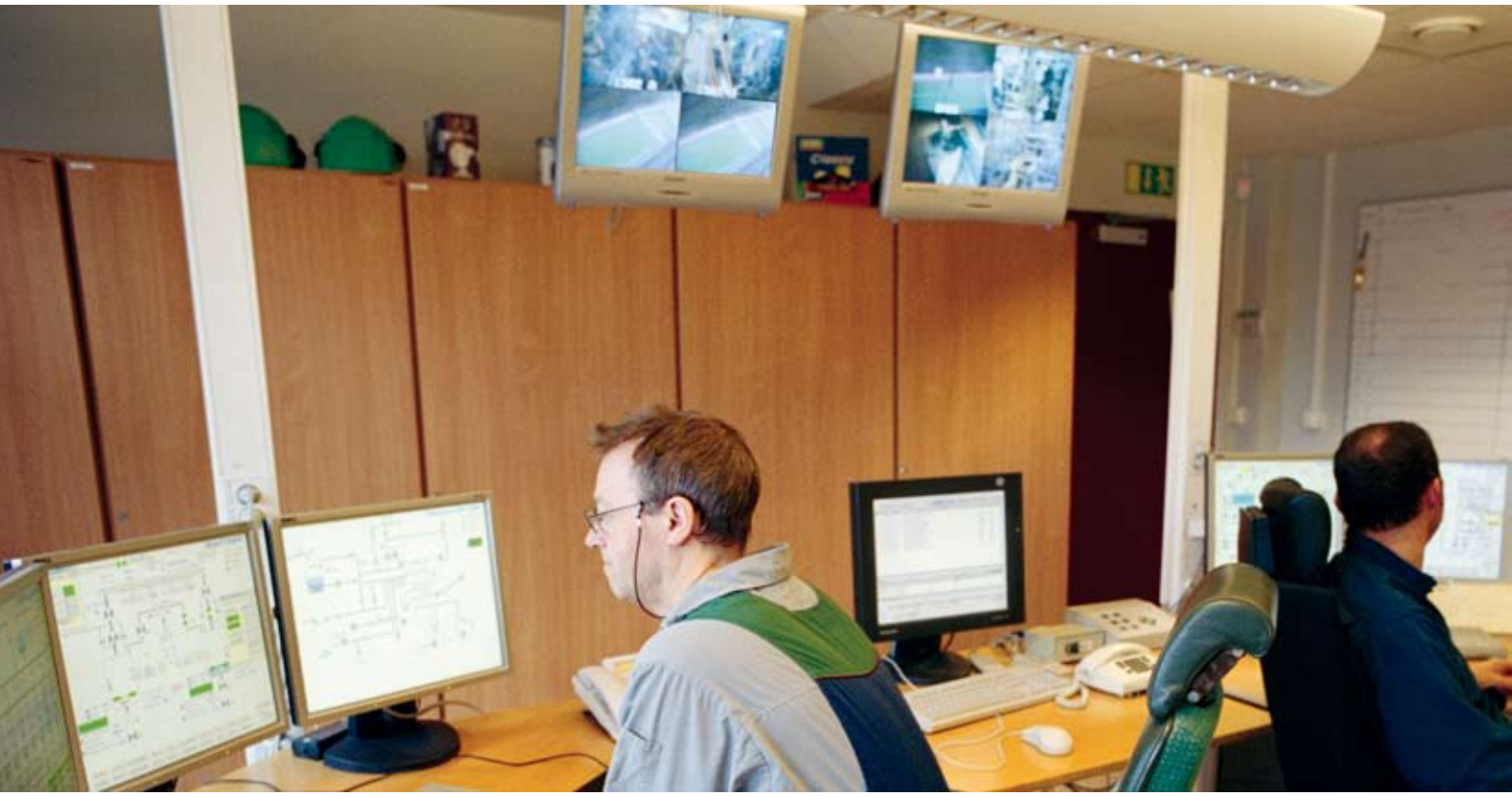
High power units are also compact
The 300-1,500 A units can be mounted in compact, Emotron-designed IP54 cabinets that are considerably smaller than most solutions on the market. This makes the VFX easier to handle and more cost-efficient to install compared to other variable speed drives in the same range. The cabinet has a programmable control panel on the front for easy access.

Flexible cable connections
Emotron VFX offers flexible connection of a large number of cables and a wide range of cable types. You can easily mount different cable sizes or double cables. The connectors are easily accessible by removing the bottom plate of the housing.

Emotron VFX models 300-1,500 A can be mounted in compact Emotron IP54 cabinets with the control panel easily accessible on the front. They are considerably smaller than most other solutions on the market.

You can easily connect a large number and a wide range of cables to Emotron VFX.

Options add



Emotron VFX offers versatile communication options with the other control devices in the process or, for example, a control room.

A number of options are available to let you customize the Emotron VFX 2.0 functionality and fully utilize the product according to your needs. Four different options can be combined.

Combine more options

The compact option boards for the Emotron VFX increase flexibility and cost-efficiency. They are easy to mount and up to four options can be combined, for example fieldbus communication, motor protection, encoder feedback and crane control. Up to three I/O boards can be mounted, each providing three relays and three digital I/Os.

Safe and efficient crane control

A crane I/O expansion board increases the safety and efficiency of your crane. It offers precise riding, lifting and speed control, as well as a safety system that activates the mechanical brakes should dangerous loads be detected. The application is easily configured according to individual needs, for example with speed control using 4-speed, 3-position or analogue control.

The compact option boards are easily mounted and allow you to combine up to four different options, e.g. fieldbus communication, motor protection, encoder feedback and crane control.

functionality

Fieldbus communiation via Profibus, DeviceNet and Ethernet is supported, as well as analogue, digital and serial communication.

Shortened braking time
Emotron VFX offers very efficient vector braking. For applications that demand an even shorter braking time a brake chopper is available as a factory-installed option, used in combination with brake resistors dimensioned according to the specific application demand.

Versatile communication options
Like all Emotron products, the Emotron VFX provides for versatile communication options with the other control devices in your process or, for example, a control room. The communication possibilities include:

- Fieldbus communication via Profibus, DeviceNet and Ethernet
- Serial communication via RS232, RS485 and Modbus
- Analogue and digital outputs

Several process values and system parameters are available via the communication interfaces, including current, voltage, power factor, shaft power, shaft torque, energy consumption and operating time.

Efficient motor protection
An internal intelligent temperature control offers improved motor protection and ensures a stable temperature that extends equipment lifetime. One PTC or up to three PT100 sensors can be connected to control motor temperature and give temperature feedback. You can also connect two PT100 sensors for motor protection and one PT100 for process feedback, measuring temperature without using a transmitter.

Encoder for higher speed accuracy
An encoder can be connected for more accurate speed control or for increased safety with deviation control in crane applications.

Safe stop without a contactor
A safe stop option card provides protection against unexpected starts during mechanical maintenance, in accordance with the EN954-1 Category 3 standard. This cost-efficient solution saves both money and space since you no longer need a contactor to disconnect the motor. The EMC performance is also improved since the motor cable shield is not interrupted.

Liquid cooling saves energy and space
Emotron VFX models from 90 A can be provided with liquid cooling, offering considerable savings. Operating and maintenance costs are lower since ventilation or air conditioning is no longer needed to cool the cabinet and the surrounding room. Energy consumption can be reduced by recycling the heat produced by the variable speed drive. For units from 300 A mounted in cabinets, space is also saved. In addition, the cabinet can have a protection class higher than IP54 since no ventilation openings are required.

Extended EMC protection
The Emotron VFX is delivered with a built-in 2nd environment EMC filter. A 1st environment EMC filter is available as an option. The VFX is then delivered with the filter built into the housing, which means the protection class of the unit is not affected.

Reduced harmonic distortions
A 12-pulse rectifier offers a cost-efficient reduction of harmonic current distortions. It reduces power losses in equipment such as transformers and conductors, and eliminates the need to over dimension these components.

Standby supply
This option makes it possible to supply the control circuits of the Emotron VFX unit via an external 24 V AC/DC supply in order to maintain communication and set up the system without the 3-phase mains being connected. Communication backup is also provided should the 3-phase main power supply fail.

A comple

Technical data

Emotron VFX 2.0 variable speed drives are available in the following range:

Rated power	0.75-1,500 kW
Supply voltage	380-690 V, 3-phase
Rated current	2.5-1,500 A
Protection class	IP54
Approvals	Global standards

For further technical information, please see the Emotron VFX 2.0 data sheet.

te series

Simplified maintenance

Maintenance is simplified and downtime reduced thanks to a number of features. Fewer critical parts, which are easy to access, increase reliability. Detailed alarms help you identify the process problem quickly in order to take preventive action.

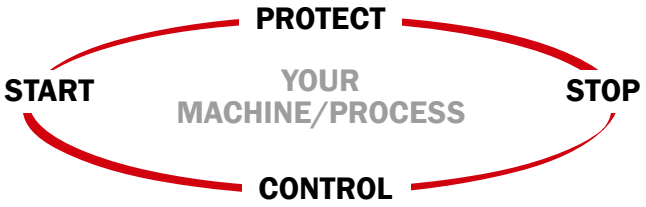
Detailed alarm codes simplify troubleshooting
Efficient alarm detection and detailed codes help you to achieve reliable operation and simplify troubleshooting. Should a problem occur in the process, a full status report will then be generated detailing all activities and values at the time of the alarm. You can quickly identify the cause of the problem and can take corrective measures without experiencing unnecessary downtime.

Fan control extends equipment lifetime
Emotron VFX has speed controlled fans. This ensures a stable temperature that extends equipment lifetime. The fans are the only moving mechanical parts and easy to replace. In addition, Emotron VFX has fewer and more accessible boards than most other variable speed drives. This increases reliability, facilitates maintenance and reduces downtime.

Fold out for easy access
The power modules of the Emotron VFX models 300-1,500 A can easily be folded out of the cabinet and unhitched, because they are attached with hinges. This makes the units easy to access and facilitates maintenance and service. Components can be replaced quickly on site without taking the drive apart, thereby greatly reducing downtime.

Detailed alarm codes simplify troubleshooting. Should a problem occur in the process, a full status report will help you to quickly identify the cause and take corrective measures.

A dedicated product portfolio



Emotron's product portfolio meets all levels of need for machines and processes driven by electrical motors. You will always find the optimum solution for your specific situation. When choosing Emotron, you will also benefit from cost-efficient installation and commissioning through built-in functionality that is otherwise provided by additional equipment. You will also find intuitive user and process interfaces with the possibility of communicating critical parameters to other parts of your process, using analogue, digital, serial or fieldbus communication.

- *PROTECT*

Emotron Shaft Power Monitors
when you wish to protect your application from over- and underload situations

- *START*
- *PROTECT*
- *STOP*

Emotron Softstarters
when you wish to protect your application from over- and underload situations, as well as to optimize the start and stop sequences of your application

- *START*
- *PROTECT*
- *CONTROL*
- *STOP*

Emotron Variable Speed Drives
Emotron Compact Drives
when you wish to protect your application from over- and underload situations, optimize the start and stop sequences of your application, as well as be in full control of your process values – flow, pressure, speed, torque, etc.

Dedicated Drive

Emotron focuses on solutions for starting, protecting, controlling and stopping machines and processes driven by electric motors.

Our drive is to create measurable benefits for our customers and their customers to achieve their and our business goals, thus creating a win-win relationship for all parties involved with Emotron.

We have been developing our product portfolio during over 30 years towards carefully selected applications. As a result we have built up specialist competence and can therefore offer our customers the optimum solution for their specific application needs.

Emotron is a Swedish company with manufacturing and development resources in Helsingborg, Sweden and in Bladel, the Netherlands. We have sales and service organisations in Sweden, Benelux and Germany, offices in China and Latin America, as well as a global network of distributors and service partners.

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DEDICATED DRIVE

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