

Secure the flow and protect your equipment



Emotron FDU 2.0 Variable Speed Drive

Full control and r



Emotron FDU 2.0 variable speed drives offer reliable, cost-efficient and user-friendly operation of your pumps, fans, compressors and blowers. Full control of flow and pressure ensures an optimized operation, with reduced energy consumption and less downtime. The Emotron FDU also protects your equipment from damage and unnecessary wear.

With all its functions included in a compact IP54 cabinet, the FDU 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 FDU.

reliable operation



Protective starts and stops

Emotron FDU variable speed drives offer soft starts and stops that protect your equipment. Reduced start currents result in smaller fuses, cables and energy bills. Controlled stops eliminate the risk of water hammer and other costly damage. In addition, you no longer need expensive motor-controlled valves to reduce pressure spikes. The result is reduced installation, energy and maintenance costs.

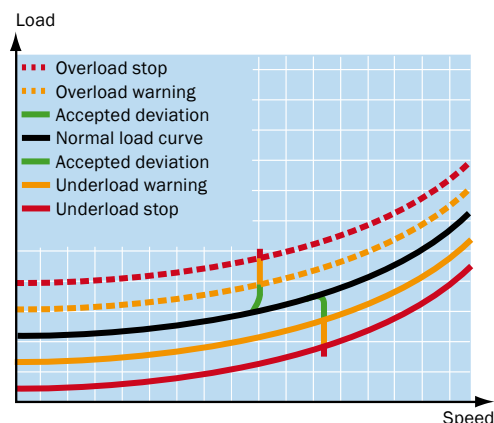
Controlled ramping for safe start-up

Emotron FDU 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.

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 occurs. There is no need to worry about dry-running, cavitation, overheating or blocked pipes. And you will be warned if, for example, your compressor is idling, a fan belt is broken or a valve has not fully opened. Emotron FDU protects the process and makes sure it works as efficiently as possible.



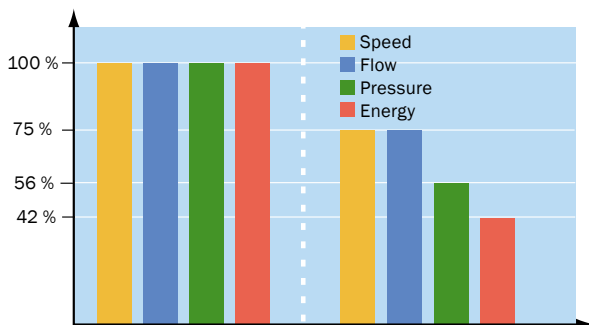
The unique Load Curve Protection detects any deviation from normal load across the whole speed range, and sends a warning or stops the process before any damage is done (patent pending EP 05109356).

Save energy and



Save energy with variable speed control

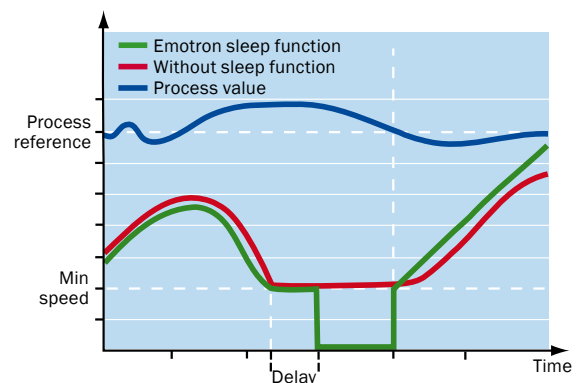
Emotron FDU is specially developed for regulating the flow and pressure of pumps, compressors, fans and blowers. Speed is continuously adapted to the level required. Controlling the equipment with motor speed means considerable energy and maintenance savings in comparison to opening and closing valves or dampers. The latter is like running a car at full throttle while controlling the speed using the brakes. Investing in a variable speed drive has in most cases a very short payback time.



Using an Emotron variable speed drive to control the flow/pressure will help you to make considerable energy savings. For example, reducing the speed of a centrifugal pump or fan to 75% results in 75% of the flow and 56% of the pressure, but only 42% of the energy consumption.

Sleep function optimizes operation

A built-in sleep function optimizes the process by lowering the motor speed to zero when it does not need to be run in order to keep up the required pressure. The motor is restarted when the need occurs again. This reduces energy consumption and equipment wear.



Emotron FDU saves energy by pausing the motor when it does not need to be run in order to keep up the required pressure.

optimize operation



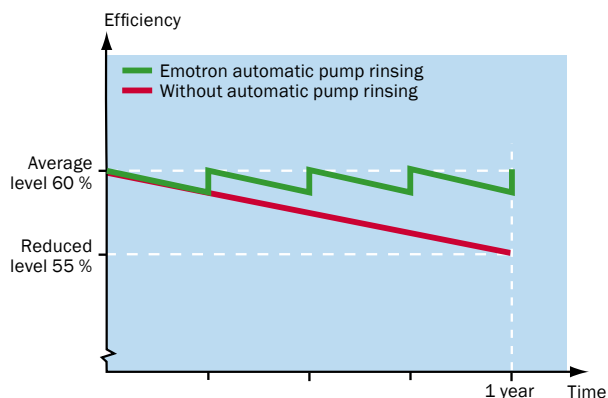
Multiple control for efficiency and reliability

Using multiple pumps or compressors to keep a constant flow or pressure despite varying demands is a flexible, reliable and cost-efficient method. At all times you only use the number of pumps or compressors needed and thus the amount of energy required.

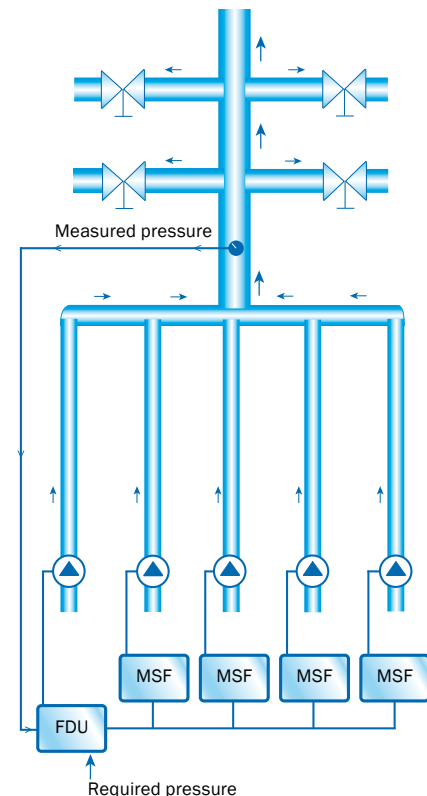
An Emotron FDU controls up to seven drives without PLCs or other external equipment. When, for example, one pump reaches its limit, or when the demand decreases, the FDU starts or stops more pumps. Which pumps to start or stop is decided by the FDU, giving them all equal running time. Should one pump or motor break down, the system automatically switches over to the next in line, avoiding unnecessary downtime.

Automatic pump rinsing increases efficiency

Emotron FDU can be set for automatic pump rinsing using a timer. When a pump is running at low speed or standing still, sludge often sticks to the impeller, reducing the pump's efficiency. With a FDU variable speed drive you can set the pump to run at full speed for certain intervals or for a certain time at start-up, before returning to normal operation. This cleans the pump and pipes and increases efficiency.



Emotron FDU offers automatic pump rinsing. In this example a centrifugal pump at a sewage treatment plant is set to run at full speed for certain intervals to rinse out sludge, thereby increasing efficiency.



Multiple pump or compressor control is a reliable and cost-efficient method of keeping a constant flow/pressure despite varying demands. One Emotron FDU can control up to seven units in a master/slave solution, with, for example, Emotron MSF softstarters working as slaves.

The answer to a ra



Pumps

Challenge	Emotron FDU 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.
Dry-running, cavitation and overheating damage the pump and cause downtime.	Load Curve Protection function detects deviation. Sends warning or activates safety stop.	Preventive action before damage. Extended equipment lifetime and reduced downtime.
Sludge sticks to impeller when pump has been running at low speed or been stationary for a while. Reduces the pump's efficiency.	Automatic pump rinsing: pump can be set to run at full speed for a certain time before turning to normal speed.	Higher process efficiency and reduced maintenance costs.
Motor runs at same speed despite varying demands in pressure/flow. Energy is lost and equipment stressed.	PID function continuously adapts speed to the level required. Sleep function can be activated when motor does not need to be run.	Optimized energy consumption and increased efficiency. Reduced maintenance costs. Quicker set-up.
Process inefficiency due to e.g. a blocked pipe, a valve not fully opened or a worn impeller.	Load Curve Protection function quickly detects deviation from normal load. Warning is sent or safety stop activated.	Optimized operation. Preventive action before damage. No energy is lost and downtime is reduced.
Water hammer damages the pump when stopped. Mechanical stress on pipes, valves, gaskets, seals.	Smooth linear stops protect the equipment. Eliminates need for costly motorized valves.	Reduced maintenance costs and less downtime, extended equipment lifetime. Lower installation costs.

range of challenges



Fans

Challenge	Emotron FDU 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.
Draught causes turned-off fan to rotate the wrong way. Starting causes high current peaks and mechanical stress. Can result in blown fuses and breakdown.	Spin start ensures that the motor is picked up at its present speed and direction, gradually slowed to zero speed and then started in the right direction.	Reduced cycle times, extended equipment lifetime and less downtime.
Regulating pressure/flow with dampers causes high energy consumption and equipment wear.	Automatic regulation of pressure/flow with motor speed gives a more exact control.	Optimized energy consumption and minimized impact on equipment.
Motor runs at same speed despite varying demands in pressure/flow. Energy is lost and equipment stressed.	PID function continuously adapts speed to the level required. Sleep function can be activated when motor does not need to be run.	Optimized energy consumption and increased efficiency. Reduced maintenance costs. Quicker set-up.
Process inefficiency due to e.g. a blocked filter, a damper not fully opened or a broken belt.	Load Curve Protection function quickly detects deviation from normal load. Warning is sent or safety stop activated.	Optimized operation. Preventive action before damage is done. No energy is lost and downtime is reduced.

The answer to



Compressors

Challenge	Emotron FDU 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.
Compressor is damaged when cooling agent enters the compressor screw.	Overload situation is quickly detected and safety stop can be activated to avoid breakdown.	Extended equipment lifetime, reduced maintenance costs and less downtime.
Pressure is higher than needed causing leaks, stress on the equipment and excessive air use.	Load Curve Protection function detects deviation. Warning is sent or safety stop activated.	Preventive action before damage or breakdown. No energy is lost and downtime is reduced.
Motor runs at same speed when no air is compressed. Energy is lost and equipment stressed.	PID function continuously adapts speed to the level required. Sleep function can be activated when motor does not need to be run.	Optimized energy consumption and increased efficiency. Reduced maintenance costs. Quicker set-up.
Process inefficiency and energy wasted due to e.g. the compressor idling.	Load Curve Protection function quickly detects deviation from normal load. Warning is sent or safety stop activated.	Optimized operation. Preventive action before damage is done. No energy is lost and downtime is reduced.

more challenges



Blowers

Challenge	Emotron FDU 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 compensate for pressure fluctuations. Energy wasted and risk of production stop.	PID function continuously adapts pressure to the level required.	Reliable operation and no energy wasted. Always keeps the required pressure.
Motor runs at same speed despite varying demands. Energy is lost and equipment stressed.	PID function continuously adapts speed to level required. Sleep function can be activated when motor does not need to be run.	Optimized energy consumption and increased efficiency. Reduced maintenance costs. Quicker set-up.
Process inefficiency due to e.g. a broken damper, a valve not fully opened or a broken belt.	Load Curve Protection function quickly detects deviation from normal load. Warning is sent or safety stop activated.	Optimized operation. Preventive action before damage is done. No energy is lost and downtime is reduced.

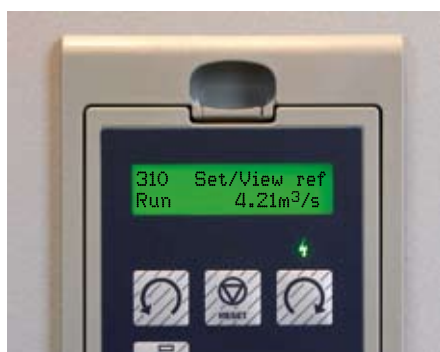
User-friendly and



Emotron FDU 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 FDU you easily set operation parameters in the units of your specific process, for example m^3/s , bar or Pascal. No confusion, no time spent on translation and no risk of mistakes. The result is easier and more reliable monitoring of your process.



Operation parameters can be set in your own process units – m^3/s , bar, Pascal, etc. This makes monitoring easier and more reliable.

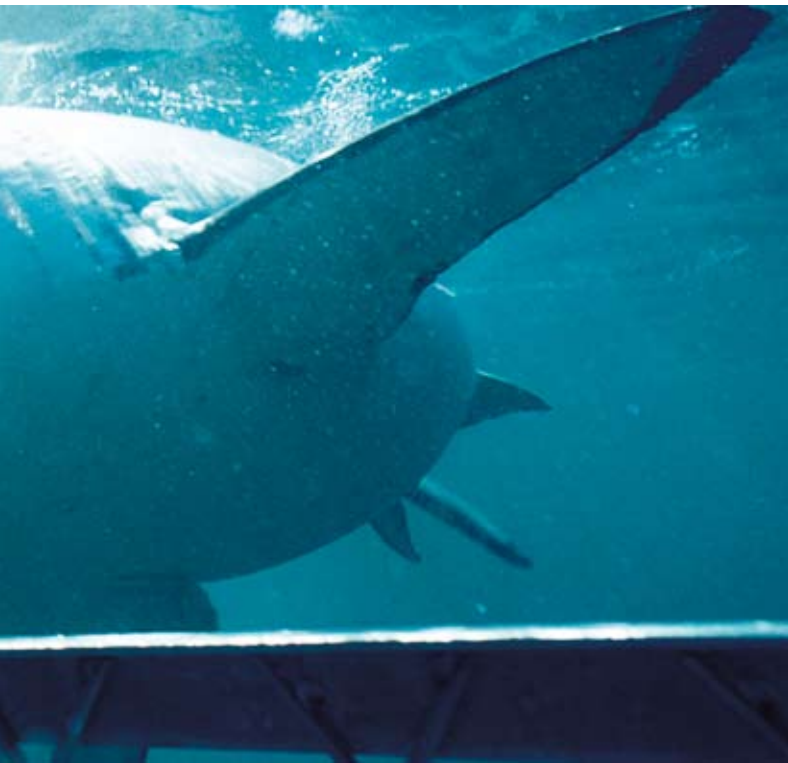
Virtual connection of logical functions

Emotron FDU 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. The FDU can, for example, be set to automatically clean a pump using a timer. The pump is run at full speed for a certain time to rinse out sludge. The destination and source of a virtual connection can be set easily using the control panel.



Emotron FDU 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 specific applications, e.g. pumps, fans, compressors and blowers, 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.



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 pump control, make the set-up with EmoSoftCom quick and easy.

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 FDU via the control panel they can easily be copied to other FDU 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.



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

Cost-efficient and f



Installing Emotron FDU 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 FDUs 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.

flexible 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 FDU 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.



Emotron FDU 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.

Flexible cable connections

Emotron FDU 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.



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

Options add



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



The compact option boards are easily mounted and allow you to combine different options, e.g. fieldbus communication, motor protection and multiple pump control.

functionality



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

A number of options are available to let you customize Emotron FDU 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 FDU increase flexibility and cost-efficiency. They are easy to mount and up to four options can be combined, for example fieldbus communication, motor protection and additional I/Os for multiple pump control. Up to three I/O boards can be mounted, each providing three relays and three digital I/Os.

Versatile communication options

Like all Emotron products, the Emotron FDU 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, for example in dosing pump applications.

Safe stop without a contactor

A safe stop option card provides protection from 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 FDU 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 FDU is delivered with a built-in 2nd environment EMC filter. A 1st environment EMC filter is available as an option. The FDU 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 FDU 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.

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Technical data

Emotron FDU 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 FDU 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

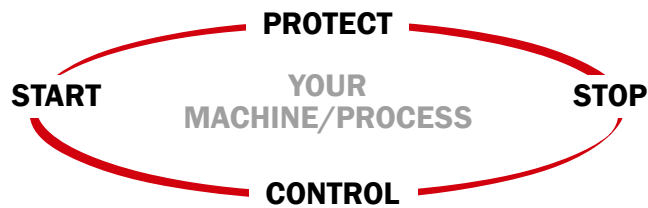
Emotron FDU has speed controlled fans. This ensures a stable temperature that extends equipment lifetime. The fans are the only moving mechanical parts and easy to replace. In addition, Emotron FDU has fewer and more accessible boards than most other variable speed drives. This increases reliability,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

Fold out for easy access

The power modules of the Emotron FDU 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.



Emotron AB, PO Box 222 25, SE-250 24 Helsingborg, Sweden

Phone: +46 42 16 99 00, Fax: +46 42 16 99 49

www.emotron.com

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