Secure the flow and protect your equipment

Emotron FDU 2.0 variable speed drive

emotron®
DEDICATED DRIVE

Full control and reliable operation

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 enclosure, the Emotron FDU is costefficiently 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.

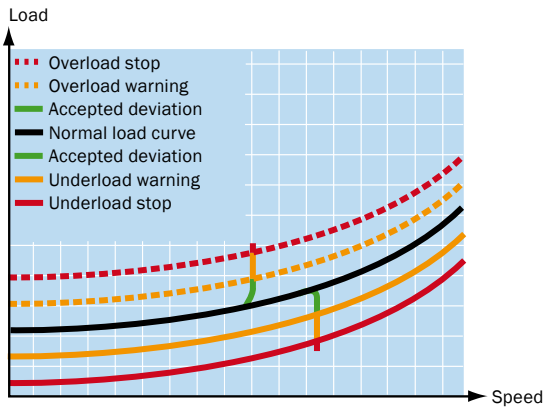
Protective starts and stops
Emotron FDU variable speed drives offer soft starts and stops that protect your equipment. Reduced start currents result in smaller fuses, cables and energy bills. Controlled stops eliminate the risk of water hammer and other costly damage. In addition, you no longer need 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.

Emotron FDU has been developed to control flow and pressure, for example in pump systems. The complete range covers motors with output from 0.18 kW to 1,500 kW and mains voltage from 230 V to 690 V.

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 entire 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 entire speed range, and sends a warning or stops the process before any damage is done (patent EP 1772960).

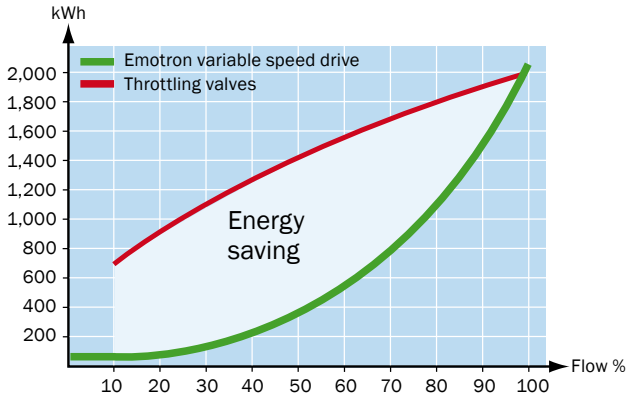
Save energy and optimize operation

Save energy with speed control
Emotron FDU has been specially developed to regulate flow and pressure. Being able to continuously adapt the operation of your pumps and fans to match demand by controlling motor speed results in considerable energy and maintenance savings, compared to the use of throttling valves or dampers. The latter is like running a car at full throttle while controlling the speed using the brakes.

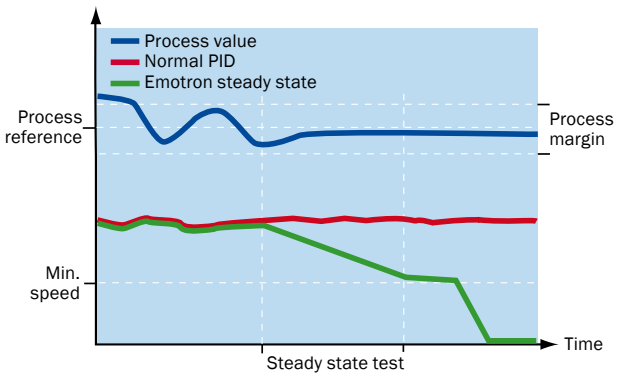
Further energy savings, as well as reduced motor noise, are offered thanks to flux optimization. This function increases motor efficiency by adjusting the output voltage to the actual load, improving the motor's actual power factor.

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.

You can also set the sleep mode to be activated in low flow or no flow situations that are not detected by the PID control, for example due to valves which are closing too slowly. This avoids the pump and motor overheating and energy being wasted.

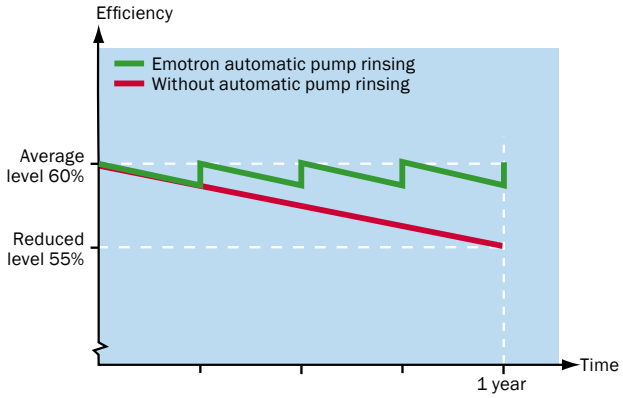


Speed control offers considerable energy savings. In this pump application, energy consumption is reduced by up to 50% compared to throttling valves. Calculation is made using Emotron Energy Saving Calculator and assumes a 2.2 kW motor.



Emotron FDU saves energy by pausing the motor whenever it does not need to be run in order to keep up the required pressure. The sleep mode can also be activated in low flow situations not detected by the PID control, thus avoiding overheating and energy waste.

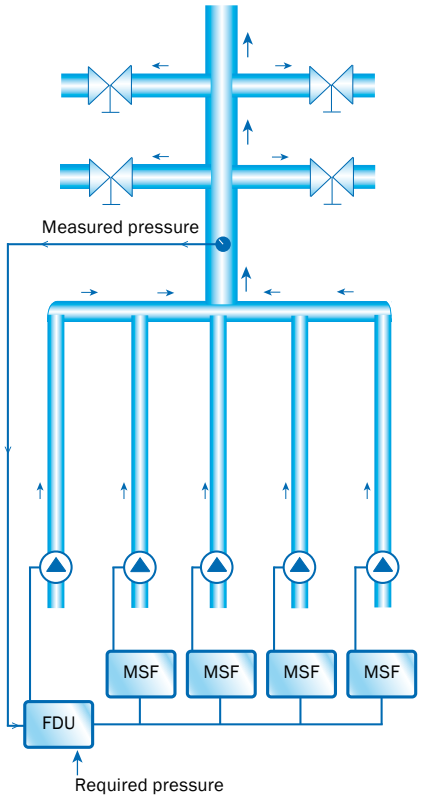
Automatic pump rinsing increases efficiency
Emotron FDU can be set for automatic pump rinsing using a timer. When a pump is running at low speed or standing still, sludge often sticks to the impeller, reducing the pump's efficiency. With an Emotron FDU variable speed drive you can set the pump to run 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 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 Emotron FDU starts or stops more pumps. Which pumps to start or stop is decided by the variable speed drive, 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.



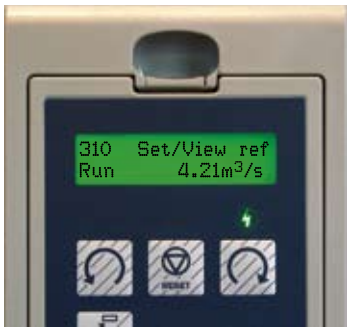
Multiple pump or compressor control is a reliable and cost-efficient method of keeping a constant flow/pressure despite varying demands. One Emotron FDU can control up to seven units in a master/slave solution, with, for example, Emotron MSF softstarters working as slaves.

User-friendly and reliable operation

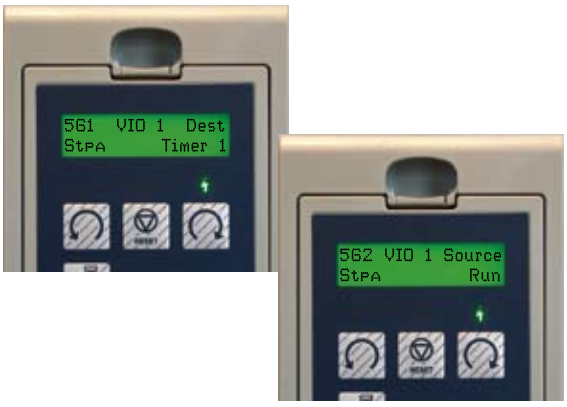
Emotron FDU 2.0 offers several user-friendly features that make both the operator's and the installation engineer's work easier and more reliable.

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. In addition to selecting the language to be displayed, you can easily set operation parameters in the units of your specific process, for example m³/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.

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 Emotron 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.



Operation parameters can be set in your own process units – m³/s, bar, Pascal, etc. This makes monitoring easier and more reliable.



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.

Full process control – local or remote
All the data available in the variable speed drive can be used for your process control via fieldbus communication. You can easily switch between local and remote control of the variable speed drive simply by pushing a button on the control panel. The existing settings remain in place while switching over and the process is not affected.

By connecting the variable speed drive to an Industrial Ethernet network you can perform your control via any communication interface or using a PLC. This facilitates commissioning and reduces set-up time. Remote monitoring and configuration via, for example, a PC in a control room provide a comprehensive and informative operator interface and give easy access to the connected units for setting process parameters, viewing process status, etc.

Informative manuals help you achieve optimal use
Studying our manuals helps you achieve optimal use of the variable speed drive and its functionality in your specific application. The manuals are 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 Emotron FDU units. Just remove the panel, attach it to the next drive and transfer the settings. This saves a lot of time and ensures that the drives have exactly the same settings.

Flexible and easy setup
Emotron variable speed drives offer easy programming and commissioning. Up to four parameter sets can be used to create settings for different modes, for example when switching between different motors or from automatic to manual process control. Very short response times increase availability and reliability.

When updating a parameter, you can opt to have the change applied to all sets automatically. In addition, only one setting is required to set the variable speed drive in speed, torque or frequency mode. Parameters are loaded directly to/from the variable speed drive by connecting a standard RS232 cable between the PC serial communication port and a contact under the control panel on the front.

Emotron FDU offers easy programming and commissioning. Up to four parameter sets can be used and parameters are loaded to/from the variable speed drive by connecting an RS232 cable directly to the front.

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

Maintain pressure and save energy

Pumps

- Motor speed is continuously adapted to maintain the required pressure, minimizing energy consumption and wear. A sleep function stops the motor whenever it does not need to be run.
- Smooth linear stops eliminate water hammer, without the need for costly motorized valves. The result is less mechanical stress and lower installation costs.
- The load curve function sends a warning or stops the pump in situations that could cause damage or reduce efficiency, for example if a pipe is blocked or the pump is at risk of running dry. Operation is more reliable, no energy is wasted and downtime is reduced.
- Automatic pump rinsing maintains efficiency by cleaning out sludge when the pump has been running at low speed or been stationary for a while.

Fresh air with minimal effort

Fans

- Lower start currents mean you can use smaller fuses. The result is less stress and lower investment and energy costs.
- The spin start feature handles a turned-off fan that is rotating in the wrong direction due to a draught. This prevents high current peaks that could result in blown fuses and mechanical stress.
- Motor speed is continuously adapted to maintain the required pressure/flow, minimizing energy consumption and wear.
- The load curve function sends a warning or stops the fan in situations that could cause damage or reduce efficiency, for example if a filter is blocked or a damper is not fully opened. Operation is more reliable, no energy is wasted and downtime is reduced.

Efficient and reliable compressing

Compressors

- Lower start currents mean you can use smaller fuses. The result is less stress and lower investment and energy costs.
- Motor speed is continuously adapted to the amount of air to compress, minimizing energy consumption and wear.
- The load curve function sends a warning or stops the compressor in situations that could cause damage or reduce efficiency, for example if the compressor is idling, if cooling agent enters the compressor screw or if air leaks out. No energy is wasted and downtime is reduced.

Blowing the right amount of air

Blowers

- Lower start currents mean you can use smaller fuses. The result is less stress and lower investment and energy costs.
- Pressure is continuously adapted to demand, compensating for fluctuations. Operation is more reliable and no energy is wasted.
- Motor speed is continuously adapted to demand, minimizing energy consumption and wear. A sleep function can be activated whenever the motor does not need to be run.
- The load curve function sends a warning or stops the blower in situations that could cause damage or reduce efficiency, for example if a valve is not fully opened or a belt is broken. No energy is wasted and downtime is reduced.

Cost-efficient and flexible installation

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.

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.

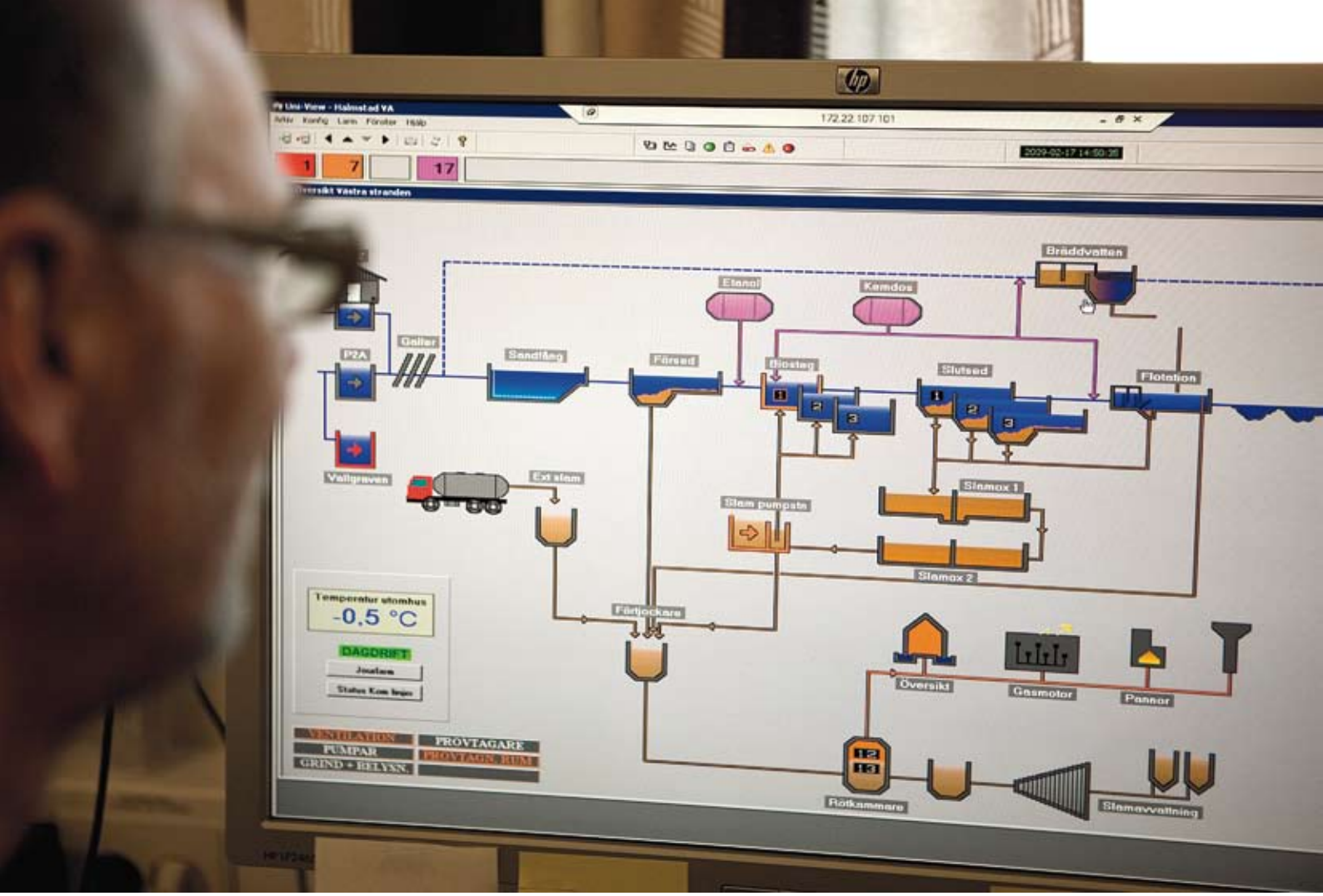
High power units are also compact

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 Emotron 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.

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.



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

Options add functionality

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 DP and DeviceNet
- Industrial Ethernet communication via Modbus/TCP
- Serial communication via RS232 or RS485 with Modbus RTU
- Analogue and digital outputs

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

Fieldbus communication, Industrial Ethernet communication and serial communication are supported.

Efficient motor protection
An internal intelligent temperature control offers improved motor protection and ensures a stable temperature that extends equipment lifetime. Up to three PTC and up to three PT100 sensors can be connected to monitor 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. For units up to 46 A, an isolated motor thermistor input offers a low-cost solution approved in accordance with the DIN 44081/44082 standard.

Safe stop without a contactor
A safe stop option board provides protection from unexpected starts during mechanical maintenance, in accordance with the EN 13849-1 and EN 62061 standards. 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 category C3 EMC filter as standard. A 1st environment category C2 EMC filter is available as an option. The Emotron 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.

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

Simplified troubleshooting and 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 make troubleshooting easier
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 be generated and stored in the variable speed drive, 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. Connecting the Emotron FDU to an Industrial Ethernet network further simplifies fault-finding and offers the option of remote supervision.

Fan control extends equipment lifetime
Emotron FDU has speed controlled fans as standard. This ensures a stable temperature that extends equipment lifetime and also reduces noise. 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 be folded out of the cabinet and unhitched, since 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 wide range to suit your needs

Technical data

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

Rated power	0.75-1,500 kW
Supply voltage	230-690 V, 3-phase
Rated current	2.5-1,500 A
Protection class	IP54
Approvals	Global standards

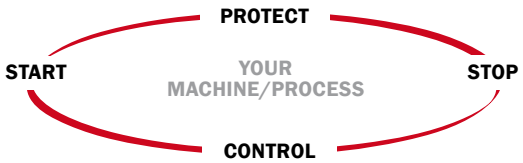
For further technical information, please see the Emotron FDU 2.0 data sheet.

Dedicated drive

Emotron develops products for starting, protecting, controlling and stopping machines and processes driven by electric motors. Our drive is to create measurable benefits for our customers through reliable, cost-efficient and user-friendly solutions. By focusing on selected applications, such as pumps, cranes and lifts, we can offer functionality optimized for specific needs.

Since 1975 we have established a solid position as an innovative and pioneering company. Research and development takes place at our head office in Sweden and at our subsidiaries in Germany and the Netherlands. Germany is also the location for the Emotron technical centres for lift and crane solutions. We have sales offices in Sweden, Germany, the Netherlands, China and Latin America, as well as a worldwide network of distributors and service partners.

Products for your specific needs



Our complete product portfolio offers optimum solutions for your specific needs. The products are all based on the same technology platform and can easily be integrated in complete solutions. Wide power range, high protection class and compliance with global standards mean they fulfil the highest demands.

- *Shaft power monitors* – protect your process from damage and unplanned downtime.
- *Softstarters* – ensure smooth starts and safe stops.
- *Variable speed drives* – minimize energy consumption and wear.

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