



High dynamics for demanding applications

A complete range, IP20-IP54, to suit all needs

Emotron VFX 2.0 AC drive





ООО «МАН-СТРОЙ»
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Safe and efficient motion control

Emotron VFX 2.0 AC drives ensure you get the most out of your 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 enclosure, the Emotron VFX is cost-efficiently installed close to the application. The complete range covers motor powers from 0.55 to 3,000 kW.

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 Emotron 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 charging for safe start-up

Emotron VFX from 30 kW 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 AC drive on and off with an external contactor, as often as needed. In other drives this could cause breakdowns or serious damage.



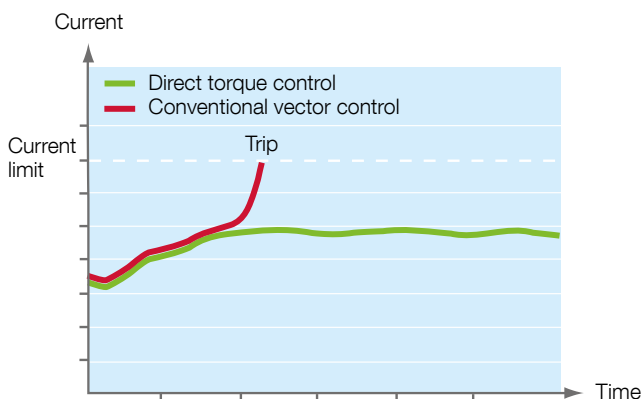


Optimized operation and full control

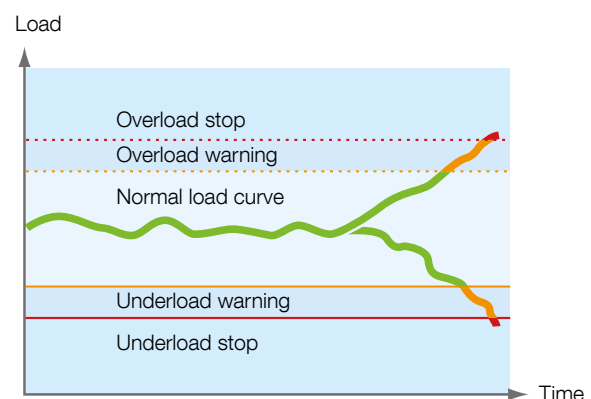
Direct torque control eliminates disturbances
 With its direct torque control, the Emotron VFX is the choice for all dynamic applications. Operation is optimized and you are in full control of the process. Emotron VFX protects the operation from interruptions thanks to the very accurate and quick speed and torque control. The torque control reacts extremely quickly and eliminates disturbances due to peak loads, abrupt load changes or incorrectly set ramp times. The fast torque response results in safer, more cost-effective operation, for example 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 load monitor protects your process against damage and downtime. The load curve of the controlled equipment is monitored across the entire speed range. This is achieved by activating an automatic curve identification during commissioning. Any over or underload situation that



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 monitor 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 EP 1772960).

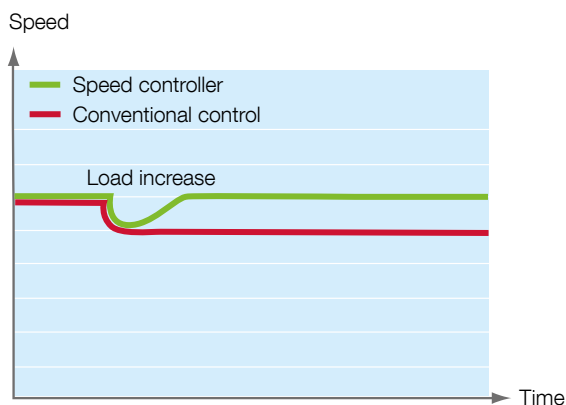
could cause inefficiency or damage is detected immediately. You can easily set the warning and safety stop levels that allow you to take preventive action before damage is done. There is no need to worry about a crusher jamming or a mixer running with a broken blade. A warning is sent, or a safety stop activated, before any damage can occur. Emotron VFX protects the process and makes sure it works as efficiently as possible.

Speed controller increases efficiency

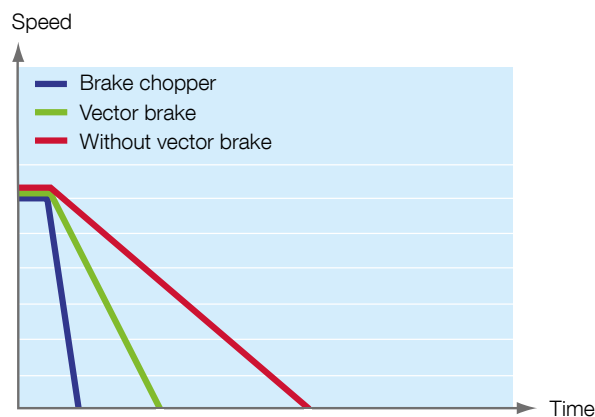
Emotron VFX has an internal speed controller that increases efficiency. It reacts immediately to load changes that cause deviation in motor speed, and quickly adjusts speed to the set reference value. The controller works without an external feedback and an autotune function reduces set-up time.

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. Regenerative braking with active front end technology (AFE) is available as an option, saving considerable energy costs as well as reducing harmonic distortions.



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.



User-friendly and reliable operation

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. In addition to selecting the language to be displayed, you can 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.

Customized functionality

Emotron VFX offers built-in programming blocks, such as logical functions, comparators and timers. This opens the way for customizing functionality according to your requirements. You can, for example, set the AC drive to clear a milling machine by reversing it when it begins to lose speed because of excessive load.



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



Built-in programming blocks such as timers and comparators allow you to customize functionality.



Flexible and easy setup

Emotron AC 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 speed, torque or frequency mode of the AC drive.

Full process control – local or remote

All the data available in the AC drive can be used for your process control via fieldbus communication. You can easily switch between local and remote control of the AC 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 AC 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.

Easy copying of settings

When settings have been made for one Emotron VFX via the control panel they can easily be copied to other Emotron VFX 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. A PC serial communication connection is available behind the control panel.



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



Cost-efficient and flexible installation

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 0.55-132 kW range are compact wall-mounted units, all IP54 classified and just as protected against dust and water as an electric motor. They have a robust metal 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. Emotron VFX is also available as IP20 and IP21 version for e.g. mounting in cabinets.

High power units are also compact
The 160-3,000 kW units can be mounted in compact, Emotron-designed IP54 or IP23 cabinets. This makes the Emotron VFX easier to handle and more cost-efficient to install compared to other AC drives in the same range. The cabinet has a programmable control panel on the front for easy access.



The 160-3,000 kW Emotron VFX models can be mounted in compact Emotron IP54 or IP23 cabinets with the control panel easily accessible on the front. The modular design offers redundancy and easy servicing.

Modular design

The 160 to 3,000 kW Emotron AC drives are built-up with parallel connected 3-phase power modules. This modular design offers the possibility of redundancy operation. Operation can continue by temporarily running with reduced power capacity while one of the modules is out of operation. For very critical processes, you can even equip the system with an extra power module, to ensure full capacity at all times.

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.



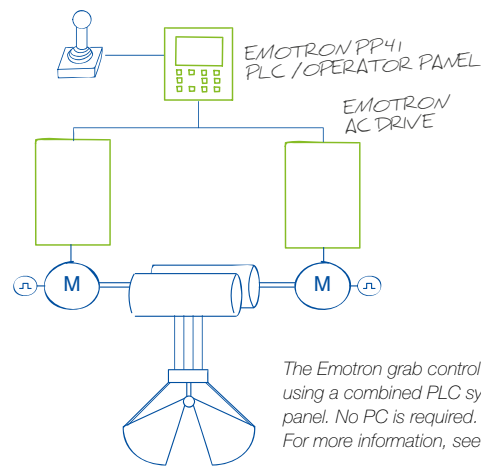
The compact wall-mounted units of 0.55-132 kW are IP54 classified, which eliminates the need for costly cabinets and long motor cables.



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

Options to customize your AC drive

A number of options are available to let you customize Emotron VFX 2.0 functionality and fully utilize the product according to your needs. The compact option boards increase flexibility and cost-efficiency. They are easy to mount and up to four options can be combined. Up to three I/O boards can be mounted, each providing three relays and three digital inputs.



The Emotron grab control is easily configured using a combined PLC system and operator panel. No PC is required. For more information, see our crane brochure.

Simple and reliable crane control

A crane option board is used to control travel and hoist motions. It also offers additional I/O:s for crane control signals. Crane functions include joystick interface, mechanical brake control, limit switch control, safety monitors and hoist field weakening operation. Other crane options include standardized plug-and-play solutions for 4-rope grab control offering simultaneous grabbing and hoisting, and electronic flange control offering synchronized travel of rail-mounted bridge cranes.

Safe and efficient braking

Emotron VFX offers very efficient vector braking. For applications that demand an even shorter braking time, a built-in brake chopper is available as a factory-installed option, used in combination with brake resistors dimensioned according to the requirements of the specific application. Models of 55-1 100 kW are available with active front end technology (AFE) for regenerative braking. Feeding energy back to the mains saves considerable energy costs, as well as the cost of investing in brake resistors.

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. Both TTL (5 V) and HTL (24 V) encoders can be used. The option supports differential as well as single-ended encoder signals. A +5/+24 V DC output is available for encoder power supply.

Versatile communication options

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

- Industrial Ethernet communication via Modbus/TCP, Profinet, EtherCAT and Ethernet-IP.
- Fieldbus communication via Profibus DP and DeviceNet
- 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.

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.

Motor temperature protection

An internal intelligent temperature control offers improved motor protection and ensures a stable temperature that extends equipment life. Up to six PTC sensors, via a single isolated input, 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 transducer. 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.

Motor filters

A selection of motor filters is available for improved protection of motor windings, for example, when long motor cables are used. Options include output chokes, overshoot clamps and sine wave filters. Filters are also available for protecting

motor bearings from common mode currents.

Safe stop without a contactor

A safe stop option board provides protection against 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

Emotron VFX models from 90 A can be provided with liquid cooling, offering a robust solution for harsh environments. The cabinet can have a protection class higher than IP54 since no ventilation openings are required. Operating and maintenance costs are lower since 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 AC drive. You will also reduce noise and heat in the electrical room.

Extended EMC protection

The Emotron VFX 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 VFX is then delivered with the filter built into the housing (<45 kW), 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. The 55–100 kW Emotron AC drives are available with active front end technology (AFE) for applications demanding extremely low harmonic distortions. They produce typically less than THDI 5% compared to 30-50% in conventional drives.

Synchronized bypass

Synchronized bypass is used for switching motors over to mains supply after starting to full speed with an AC drive. The function can be used with fully loaded high power motors, even in low-inertia systems.

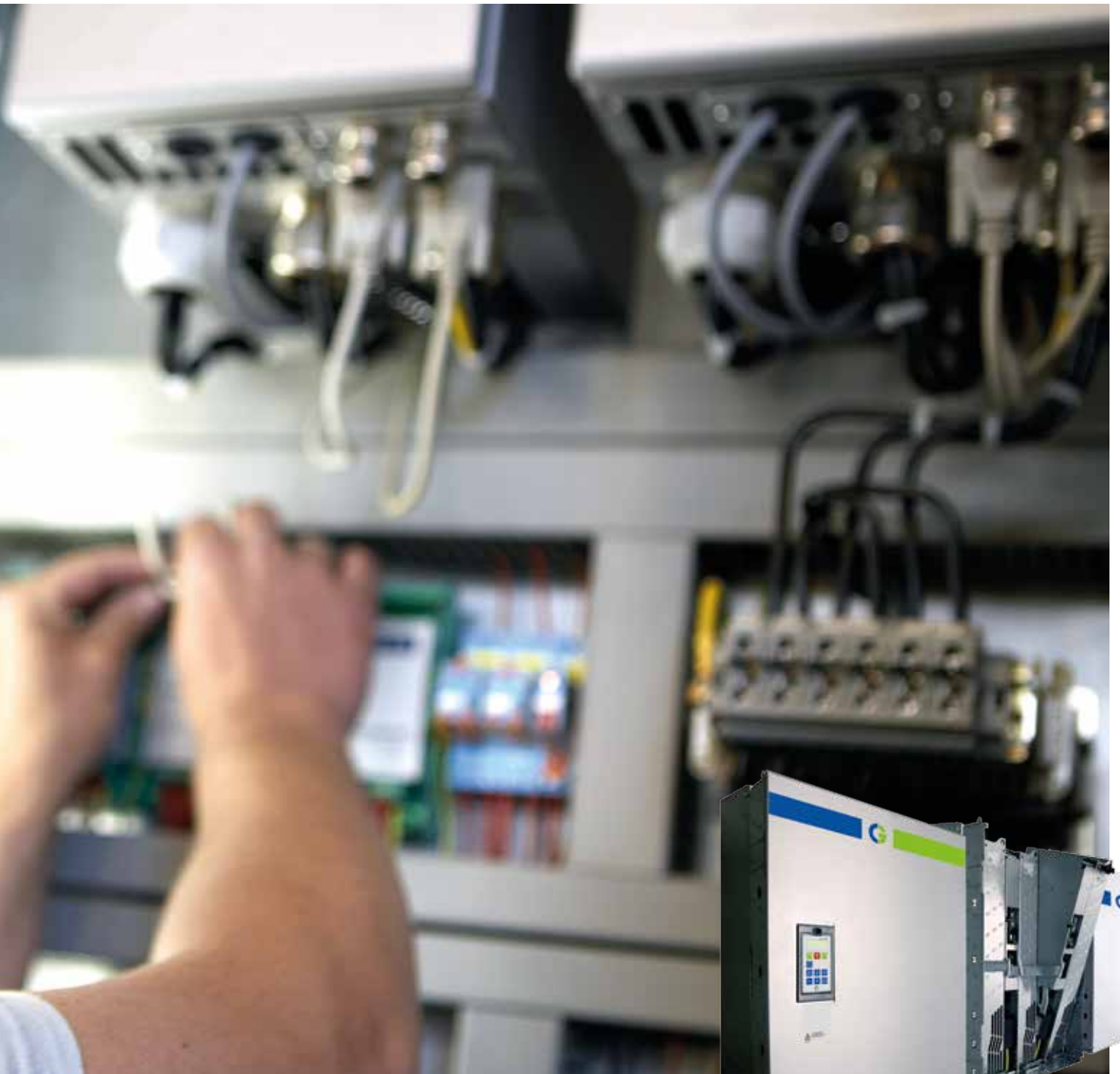


Detailed alarm codes simplify troubleshooting. Should a problem occur in the process, a full status report will help you to quickly identify the cause and take corrective measures.

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.

Full status reports 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 then be generated and stored in the AC drive, detailing all activities and values at the time of the alarm. You can quickly identify the cause of the problem and take corrective measures without experiencing unnecessary downtime. Connecting the Emotron VFX to an Industrial Ethernet network further simplifies fault-finding and offers the option of remote supervision.

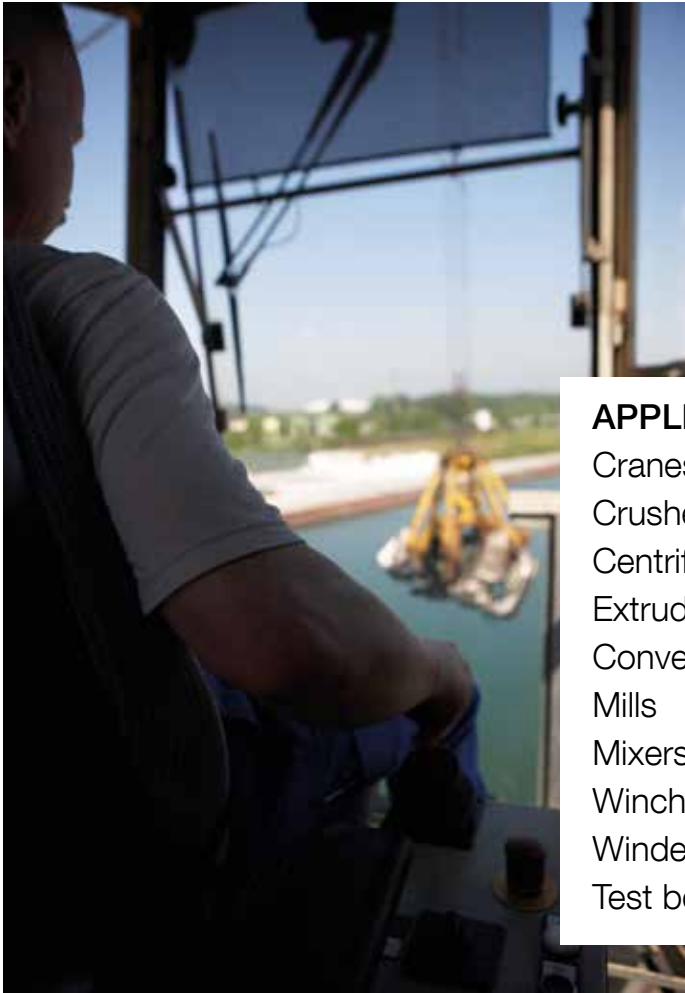


Fan control extends equipment lifetime

Emotron VFX 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. Emotron VFX has fewer and more accessible boards than most other AC drives. This increases reliability, facilitates maintenance and reduces downtime. Connecting the Emotron VFX to an Industrial Ethernet network further simplifies fault-finding and offers the option of remote supervision.

Fold out for easy access

The modular design of the 160 to 3,000 kW Emotron AC drives gives easy access for servicing. The power modules can be folded out, which means repairs can be done without taking the whole drive apart. A complete power module can be kept as a spare part for maximum security.



APPLICATIONS

- Cranes
- Crushers
- Centrifuges
- Extruders
- Conveyors
- Mills
- Mixers
- Winches
- Winders
- Test benches



A wide and complete range to suit your needs

TECHNICAL DATA

Emotron VFX 2.0 AC drives are available in the following range:

Rated power	0.55-3,000 kW
Supply voltage	230-690 V, 3-phase
Rated current	2.5-3,000 A
Protection class	IP20, IP21, IP54
Approvals	CE, UL, DNV, GOST R (DNV pending for IP20/21)

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



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