



WATER



**DRIVE SOLUTIONS**  
EMPOWERED BY EMOTRON



# Optimise your water handling on every level

CG Drives & Automation offers complete drive solutions that ensure the safe and cost-efficient operation of your pumps and water handling systems – and a longer service life.

We have more than 30 years of experience of water handling applications – an area that is both growing in size and becoming more complex, placing additional demands on pumping robustness and reliability:

**Wastewater treatment is faced with challenging regulations on pollution and reuse of water.**

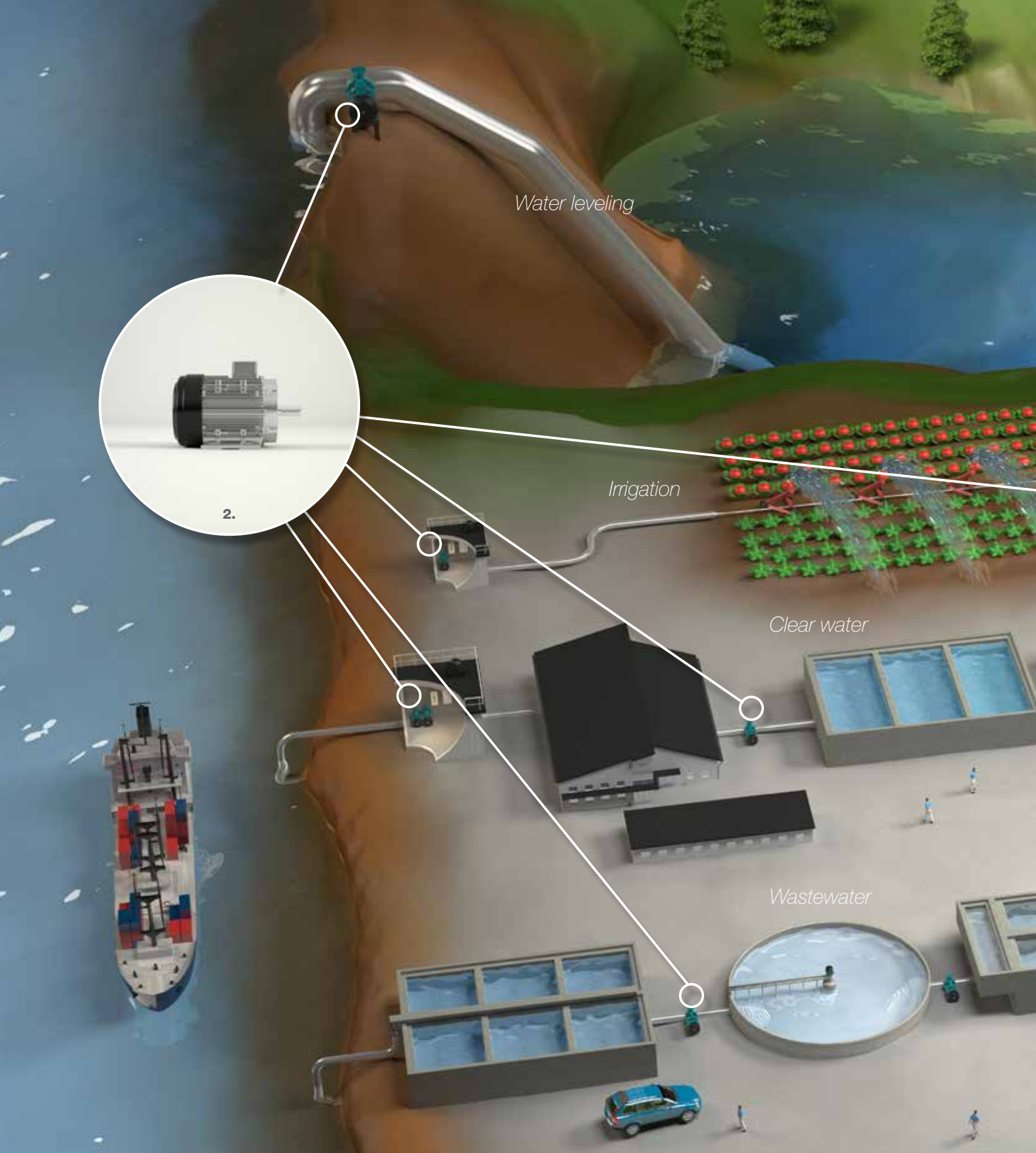
**The clean water sector is facing increasing technical requirements in the areas of disinfection and desalination.**

**For surface water applications – drainage, irrigation, water levelling and industrial – systems must be tuned to the water quality and the degree of monitoring required.**

Whether you are operating in sewage treatment, flood control, drinking water or a process industry, our Emotron-empowered solutions add value to your equipment and your business. Simply and reliably.







## Control the flow in your process – clean water, waste water or surface water

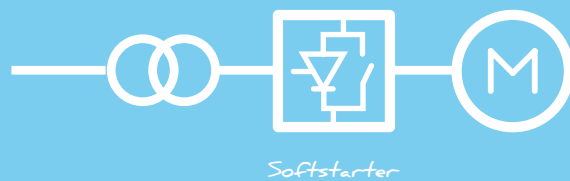
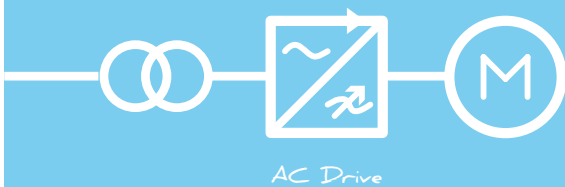
**1. AC Drives:** Optimised operation and full control. Variable speed control of your electric motors minimises power consumption and wear. **Softstarters:** Ensure smooth operation. Our intelligent Emotron softstarters ensure smooth starting and stopping to avoid water hammering. The power losses are minimal. Built-in monitor functionality protects your machine investment. **2. Our motors** provide max-

imum output with minimum power consumption. We offer robust aluminium and cast iron motors suitable for water handling. For compact and easy connection we also offer motors with drive mounted directly on the motor. **3. Automation.** Monitoring and information systems provide complete drive status for operators and maintenance crews. Complete drive status information available.

# Drive solutions for the water world



Typical motor controls  
for water handling

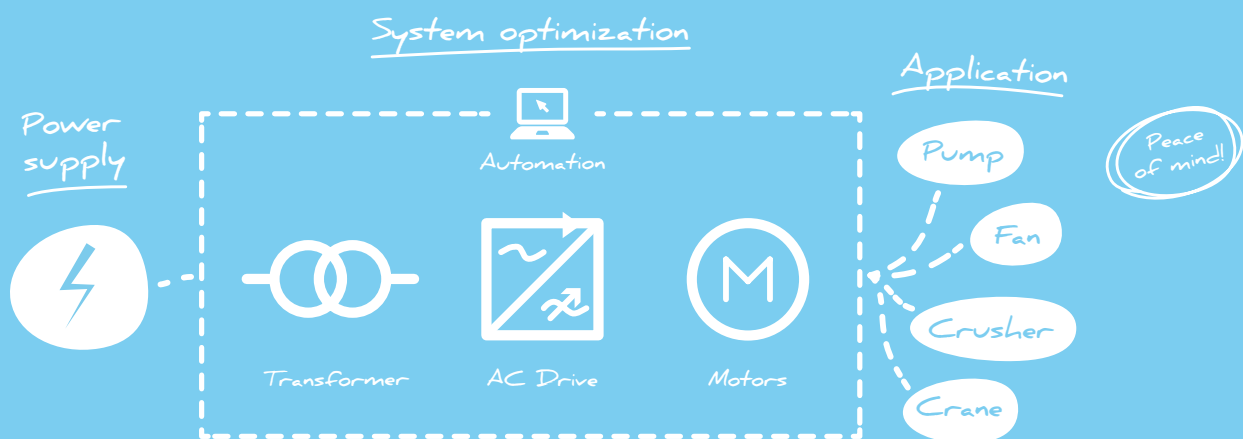


# Complete drive solutions for water handling systems

Creating and maintaining a complete drive solution will give your pumps and water handling systems the best total performance and give you peace of mind.

We can deliver the engineering, automation, transformer, AC drive or softstarter, motor and cabinets.

Our modular design philosophy lets us deliver complete solutions – based on standard products – for demanding pumps and water systems, as well as for e.g. cranes and material handling systems.







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## Simplicity and reliability

We offer solutions, products and know-how that enable you to get the most from your pumps. We provide a complete solution where other companies need to add external equipment. This makes installation and commissioning not only easy but also cost-efficient. Simplicity and reliability are keywords for CG's drive solutions, no matter what pumping application.

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## Protection

Pump installations need to be protected from dry-running, cavitation, water hammering and other unexpected situations that may cause unplanned stops and downtime. Our built-in load monitoring function will detect any inefficiency caused by, for example, a worn-out pump impeller, a valve not fully opened or a blocked pipe.

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## Control

You must have full control of your pumps every single second from start to stop, so that you are the one who decides what should happen and when. Standardised control packages with hardware and software offer plug-and-play solutions.

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## Cost-efficiency

Your pump investment should be optimised so that you get the best return when it comes to total investment costs, energy consumption, maintenance costs, reliability and flexibility.

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## From design to commissioning

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

# Protection from damage **and** downtime

Did you know that you can automatically protect your pumps from the most common causes of pump damage and downtime? You no longer have to worry about dry-running, overheating or blocked pipes and valves.

CG products that include load monitoring ensure smooth operation and prevent unnecessary downtime, energy loss, equipment wear and breakdown. If operation is not optimal or a problem occurs the monitor reacts immediately by sending out a warning or stopping the process. Early warnings allow preventive action – if a pipe is blocked, an impeller worn-out or a valve not fully opened.

Our Emotron AC drives has built-in load monitoring offering all the above advantages. In addition, it allows you to fully control and optimise operation. The AC drive quickly detects any deviation from the normal pump load curve, over the entire speed range. It is easy to set warning and stop levels to match your specific needs.

**Protection against abnormal operating conditions**

**Reliable and efficient operation**

**Reduced downtime**

**Early warnings and safety stops**

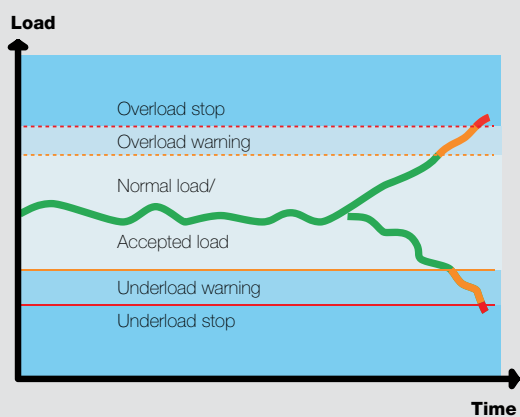


CG products will reduce cavitation damage to pump impellers.



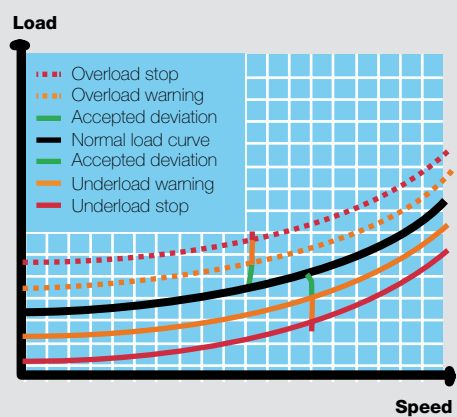


#### PROTECTION FOR PUMPS RUNNING AT FULL SPEED



Our softstarters and shaft power monitors offer protection from unnecessary downtime, energy loss and equipment damage. Warning and safety stop levels are easy to set.

#### PROTECTION FOR PUMPS RUNNING AT VARIABLE SPEED



Our AC drives adapt the pressure/flow to the level required. Deviations from normal operation are quickly detected over the whole speed range, thanks to the unique pump load curve protection (Patent EP1772960).







# Smooth starts and gentle stops

Starting and stopping a pump may be easy, but the consequences may not always be the ones you wanted. It can result in high start currents that require large fuses and cables, resulting in high energy bills. Or pressure surges known as “water hammer” can cause stress and damage to pipes, valves, gaskets and seals.

For pumps that operate at full flow, an Emotron softstarter offers a cost-efficient solution to these problems. Apart from pump protection, it provides smooth start and stop control, preventing both water hammer and expensive high start currents. In addition, there is no need for costly motor-controlled valves that are often used to reduce pressure spikes at starts and stops.

For pump systems that provide a variable flow or a constant pressure, the above challenges are most efficiently met by the use of an Emotron AC drive.

**Low start currents give lower energy bills**

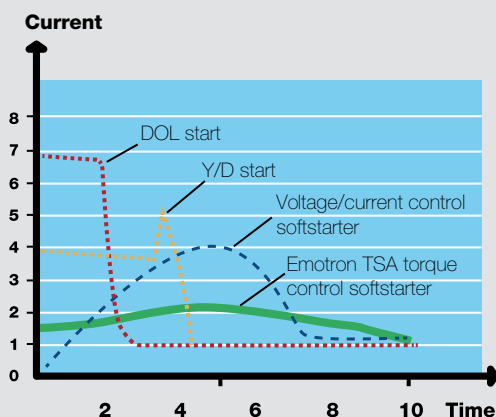
**Linear starts reduces pressure spikes and extends mechanics lifetime**

**Linear stops eliminate water hammer**



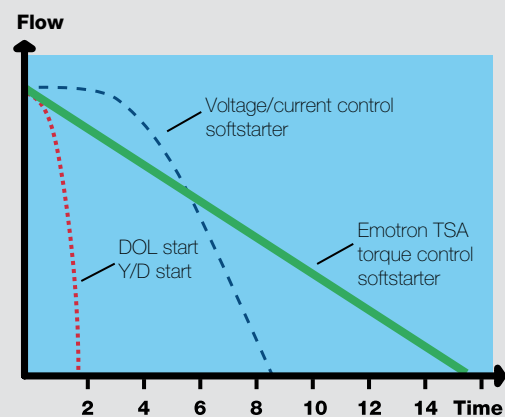
Smooth starts, safe operation and gentle stops. These irrigation pumps benefit from several Emotron softstarter advantages.

LOWER START CURRENT GIVES LOWER ENERGY COSTS



Start current is greatly reduced with the Emotron softstarter. You can use smaller fuses and cables and thus benefit from reduced installation and energy costs.

LINEAR STOPS ELIMINATE WATER HAMMER



Unlike conventional softstarters, our softstarter enables smooth and linear stops with no risk of water hammer, just like a motor-controlled valve or an AC drive – but at a lower cost.





# Full control of pressure and flow

There are still many pump systems where the flow or pressure is controlled with valves. This corresponds to running a car on full throttle and regulating the speed using the brakes. Energy is wasted and the maintenance costs are high.

By using an Emotron AC drive to control your pumps, you benefit from considerable savings. The speed is automatically adapted to the desired flow or pressure, thus optimising the energy consumption and minimising the impact on surrounding equipment such as seals, impellers, pipes and valves. For example, reducing the speed with 25% results in 58% energy savings. The lower the static pressure demand, the more profitable the speed control.

Our Emotron FDU is especially developed for pumps. It provides unique functions such as automatic pump rinsing. When a pump stands still or runs at low speed, there is often a build-up of sludge that will reduce the pump efficiency. Using a timer, the pump can be set to run at full speed for a certain time, before returning to normal operation. This rinses out sludge and increases efficiency.

Operation parameters can be set in the units of your process ( $\text{m}^3/\text{s}$ , bar, Pa etc.). This makes it easier and safer to monitor your process. Other highly appreciated benefits of Emotron FDU are the robust steel IP54 housing and the multiple pump control functionality, which can control up to seven pumps without PLCs or other external equipment.

## Energy savings with variable speed

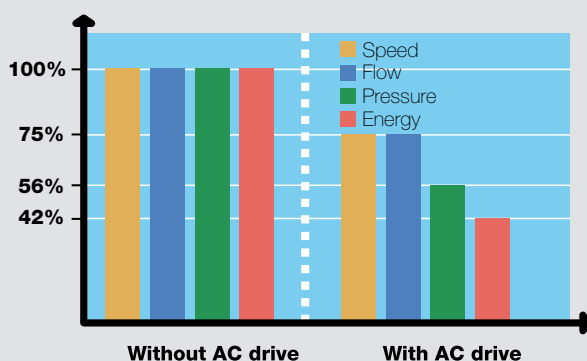
## Simple read-outs in the units of your process

## Cost-saving control of up to seven pumps

## Emotron FDU is available in IP20/21 and IP54 version.

The robust IP54 housing protects against mechanical abuse, dust and water. With optional coated boards, it complies with 3C3 levels. This option protects significantly better against chlorine, hydrogen sulphide, ammonia and other gases.

AC DRIVES LOWER ENERGY COSTS



Using our AC drives to control flow/pressure will result in considerable energy savings in comparison to opening and closing valves. This example shows savings from reducing the speed of a centrifugal fan to 75%.

YOUR OWN PROCESS PARAMETERS



Parameters can be set in units familiar to you – e.g.  $\text{m}^3/\text{s}$ , bar, Pascal – making it both easier and more reliable to monitor your process.



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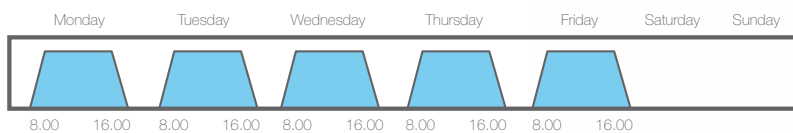
## Programming your weekly pump schedule

With our compact Emotron TSA softstarter with built-in bypass, it's possible to program your weekly pump schedule. Programming blocks, such as logical functions, comparators, timers, SR flip-flops and clock functions are built-in.

You find Real Time Clock used for date and time registration in the fault logger and to enable preprogrammed starting and stopping at certain weekdays and times (clock function).

### EXAMPLE:

Preprogrammed starting and stopping for pump operating weekdays 8:00 to 16:00.





# Communicating your process

Our products provide a single interface design for communication of critical parameters between the control devices in a process and the people controlling it. Our drives, softstarters and monitors all have a similar interface. The read-out can be set in the values of your own process, eliminating the need to calculate what the figures really mean. This promotes both usability and safety, as well as reduces commissioning and maintenance time.

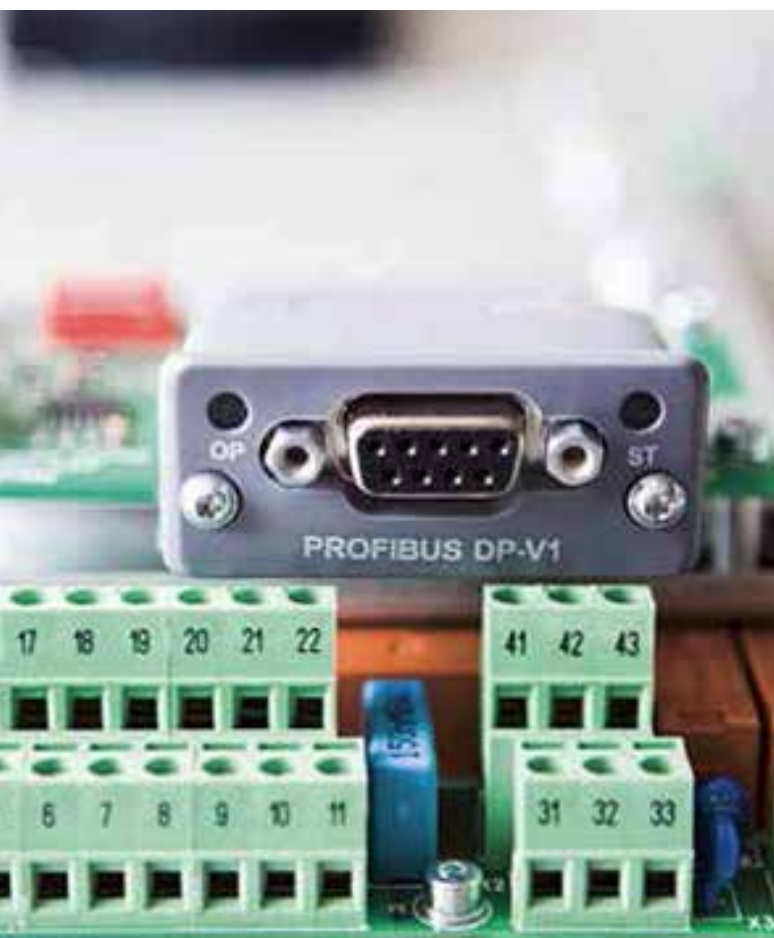
CG PROVIDES THE FOLLOWING COMMUNICATION POSSIBILITIES:

**Fieldbus (Profibus, DeviceNet)**

**Industrial Ethernet (Modbus TCP, EtherCat, ProfiNet)**

**Analogue and digital outputs**

**Modbus serial communication (RS232, RS485)**



Several process values and system parameters are made available via the communication interfaces, including current, voltage, input power, shaft power, shaft torque, energy consumption and operating time. These values and parameters can be used in your control system to achieve optimal performance at minimal cost. You will not only be warned when something is wrong, you will get a complete data log that helps you to quickly spot the fault and thereby simplifies maintenance.

You will also be alerted if your process is not running at optimal speed. Perhaps a pipe is blocked or a valve not fully opened? This is detected immediately, allowing you to take the necessary measures to achieve a smoothly running process.

Drives and softstarters from CG provide support for analogue, digital, serial, fieldbus and Ethernet communication. The read-out can be set in the values of your own process, eliminating the need to calculate what the figures really mean.

# CG water handling solutions – we go to where the water is



## Multiple pumps working together in water purification plant

This water purification plant must keep a constant pressure in the process despite large variation in demands. Using one Emotron FDU AC drive and four Emotron TSA softstarters has resulted in a very cost-efficient solution. The FDU controls five pumps without external PLCs. When the master pump reaches its capacity limit, another softstarter smoothly starts the next pump. The FDU equalises their running time and thereby simplifies servicing. When demand decreases, pumps are stopped smoothly without any water hammer. The one stopped first is the one with the longest running time. If there is a problem with a pump or motor the system automatically switches over to next pump in turn, avoiding unnecessary downtime.



## Pumps in sewage treatment plant

This sewage treatment plant used to use inefficient valves used to control the start and stop sequences and mechanical stress created maintenance issues. After they installed Emotron MSF softstarters, they experienced considerable savings and more reliable operation. Pumps are now operating at full speed, unplanned downtime is no longer a problem and they benefit from reduced operation costs. The money saved in the first year alone paid for the investment.



## Pumps in process industry – variable flow or constant pressure

The challenge at this chemical plant was to increase efficiency and reduce operating costs. Regulating the flow/pressure with motor speed – using Emotron FDU AC drives instead of valves – made the operation more efficient. Set-up was quick and easy, because after the first AC drive had been set, the settings were easily transferred to the other drives. The energy savings alone paid back the investment in less than a year. Another result was reduced maintenance costs and extended equipment lifetime.





# Optimised operation and full control



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



## EMOTRON FDU/VFX FEATURES

**Globally well-proven**

**Robust and complete drive**

**High level of component integration**

**Smart control functions**

**Full control with direct torque control**

**Built-in DC choke and EMC filter as standard**

**Speed controlled fans extend equipment lifetime**

**Few critical parts, easily accessible**

**Available in IP20/21 and IP54 versions – for cabinet mounting as well as harsh environments**

## EMOTRON AFE DRIVES

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

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

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





# Ensure smooth starting **and** controlled stops



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



## EMOTRON TSA

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

### FEATURES

**Soft torque control start**

**Robust and compact design**

**Integrated bypass contactors**

**3-phase torque control**

**Coated boards as standard**

**Real time clock**

**Programmable logical blocks and timers**

**Load monitoring function**

## EMOTRON MSF

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

### FEATURES

**Optimised start and stop sequences**

**Advanced braking techniques**

**Solid state type softstarter**

**Heavy duty rated**

**Built-in load monitor functionality**

**Easy installation and set-up**

**3-phase torque control for ultra-smooth start with constant acceleration**

**Start currents up to 30% lower than with conventional softstarters**

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

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

# The complete system



Our engineering skills help you to improve the efficiency of your processes. We can supply complete drive systems, variable-speed drive units and motor systems. CG motors are built for maximum output with minimum power consumption, with rated power from 250 W to 1000 kW (standard motors). All motors comply with the most stringent IEC standards and are ISO certified. Motors with higher power ratings, up to 25 MW, are available on request.



	Motor power kW	IP rating	Motor family
A wide range of standard motors available	0.25 kW - 1000 kW	IP55 / 56 / 65	General performance motors Process performance motors Hazardous area motors - flameproof Hazardous area motors - non sparking NEMA motors

Size	56	63	71	80	90	100	112	132	160	180	200	225	250	280	315	355	400	450		
General performance motors		Aluminum motors																		
			Cast iron motors																	
Process performance motors			Premium efficiency motors																	
			Cast iron motors																	
Motors for hazardous areas				Flameproof motors																
				Increased safety motor																
				Non-sparking motors																
			Dust ignition proof motors																	
Marine motors			Process performance motors (cast iron)																	
Motors for additional applications		Brake motors																		
								High ambient motors												
		Single phase motors																		
																Water cooled				
																Wind turbine				





# We put all our energy into saving yours

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

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

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

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



**DRIVE SOLUTIONS**  
EMPOWERED BY EMOTRON

CG Application brochure Water handling 01-5470-01 2013-11

SWEDEN (Head office)  
Drives & Automation  
Mörsaregatan 12, Box 222 25  
SE-250 24 HELSINGBORG

Phone: +46 (0)42 169900  
Fax: +46 (0)42 169949

info.se@cgglobal.com  
www.cgglobal.com  
www.emotron.com

GERMANY  
Drives & Automation  
Goethestraße 6  
D-38855 WERNIGERODE

Phone: +49 (0)3943-92050  
Fax: +49 (0)3943-92055

info.de@cgglobal.com  
www.cgglobal.com  
www.emotron.de

THE NETHERLANDS  
Drives & Automation  
Polakkers 5  
5531 NX BLADEL

Phone: +31 (0)497 389 222  
Fax: +31 (0)497 386 275

info.nl@cgglobal.com  
www.cgglobal.com  
www.emotron.nl

INDIA  
Crompton Greaves Ltd.  
Drives & Automation Division  
Plot. No. 09, Phase II,  
New Industrial Area,  
Mandideep – 462046

Phone 1 : + 91-7480 42 6433,  
Phone 2 : + 91-7480 42 6440

drives.mktg@cgglobal.com  
www.cgglobal.com  
www.emotron.com

