MSF SOFT STARTERS

BIG SAVINGS FOR A LOT MORE APPLICATIONS

Unique features built into Emotron MSF Soft Starters reduce costs significantly for many more applications when compared with conventional soft starters.

Everything you need

What makes MSF Soft Starters unique is that they incorporate the three functions needed to maximize the control of diverse equipment and processes:

- Ultrasmooth starting through torque ramping
- Continuous machine/process protection against underload and overload situations
- Advanced braking techniques
- Special pump control features eliminate water hammer.

More outstanding features

Other major benefits of MSF Soft Starters that cut costs and equipment wear and tear are:

- Further 20% reduction in starting current
- Elimination of external tachometers and other devices
- Continuous self-diagnosis
- Thermal and PTC motor protection
- Forward/reverse jogging
- Slow speed for convenient positioning or sequencing

Outstanding features are standard with Emotron – the leading innovator in soft starter technology.

TORQUE CONTROL STARTING MAKES LIFE A LOT SMOOTHER

The major advantages of using torque ramps are much greater control over starting and stopping, and approximately a further 20 % reduction in starting current compared with conventional soft starters incorporating only voltage ramping.

Precise torque control provides ultrasmooth starting and stopping of asynchronous motors. The result is an extremely linear speed ramp that eliminates the typical jolts experienced with conventional soft starters.

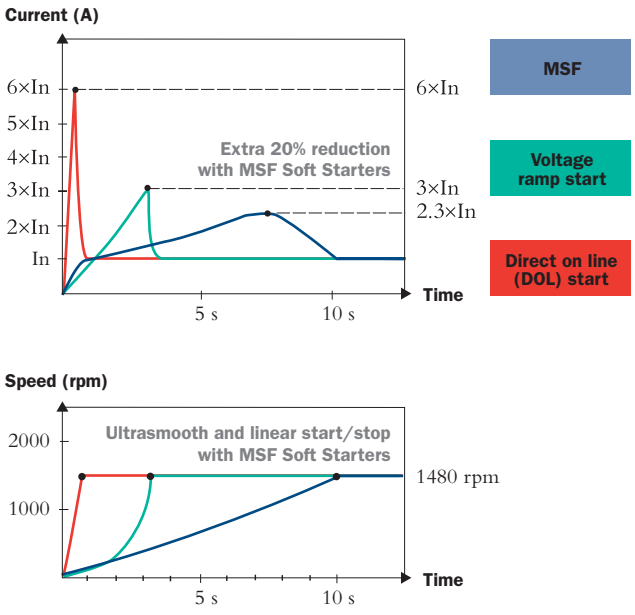
No more tachometers

The torque control of MSF Soft Starters enables loads to be started and stopped with a linear change of speed. This eliminates the need for installing an external tachometer connected to the soft starter.

Flatten out the peaks

The graphs opposite show how torque ramping in an MSF Soft Starter gives much smoother starting than that obtained using voltage ramping.

The benefits of torque ramping



A COMPLETE PACKAGE OF ADVANCED FEATURES

Installation benefits

Installation of an MSF unit is facilitated by eliminating the need to connect a number of extra devices and cables usually required to complement soft starter functions. Devices eliminated by the MSF Soft Starter series include:

- Contactor
- DC brake
- Motor protection relays
- Mains failure relays
- Load monitors
- Meters
- Display
- Switches
- Cables

Protects your complete process

Machine protection results from an MSF unit using the asynchronous motor as its own sensor to continually measure motor shaft power – the load placed on a motor by the machine or process that it drives.

When a preset maximum or minimum load limit on the motor is exceeded, the MSF Soft Starter initiates an alarm signal and/or shutdowns the machine.

Continuous self-checking

During system operation, a constant check is carried out on selected parameters, and a rolling events list is kept of the 15 latest alarm situations.

At-a-glance motor status

Only a few parameters are needed for menu setting in the "Quick set up mode".
The display can show values for:

- Three-phase current
- Three-phase voltage
- Power, kW
- Energy consumption, kWh
- Power factor
- Torque, Nm
- Elapsed time
- Motor thermal capacity

Versatile networking

An MSF soft starter can be supplied with the following communication options:

- Serial interface, RS-232/-485, protocol Modbus RTU
- Field buses such as Profibus-DP, DeviceNet, Interbus-S, LonWorks, FIPIO, etc.
- External display.

Unbeatable braking

The new Dynamic DC brake catches all types of load without requiring an external contactor:

- Dynamic DC brake without contactor for medium loads
- Controlled sensorless soft brakes with reversing contactor for heavy loads

The method measures the braking speed and shifts to the conventional DC brake when appropriate. The MSF Soft Starter detects when the motor is standing still, thereby allowing fast restarting.

Nils-Erik Eriksson, Technical Administration Department of Boden Municipality.

Installing MSF Soft Starters to control pumps resulted in several benefits for the Boden Municipal waterworks in Sweden. Gradual stopping of a high-pressure pump prevented water hammer, thereby prolonging its operational lifetime significantly. Since the pump starting current was reduced by more than 50 %, the main fuses could be downsized. And motor-operated valves could be replaced by ordinary reverse valves. These benefits resulted in savings of Euro 6 000 for pump renovation.

To supply hillside houses north of Barcelona, Spain, a waterworks uses two submersible pumps to raise water from sea level up to the top of a hill in several steps.

To ensure pumping reliability, MSF Soft Starters were chosen to control the pumps. The MSF units not only minimize pump failure and prolong pump lifetime by eliminating pump-related problems like water hammer, but also cut electricity consumption through ultrasmooth pump starting and stopping.

A tobacco company in England, installed larger condenser pumps to drive the chillers of their up-graded air-conditioning plant.
As any three pumps can be started simultaneously, a control system was needed to prevent uncontrolled current inrushes, initial high torque, and water hammer when stopping pumps. This is why MSF Soft Starters were chosen.

emotron®

MAXIMIZING UPTIME

PROTECTING AND ENHANCING PRODUCTION

In addition to MSF Soft Starters, other Emotron products that protect and enhance production by using the motor as its own sensor include frequency inverters, motor load monitors and drive systems designed and built for specific applications. Drive systems include innovative switched reluctance motors.

If you are interested in one or more of these product types, contact your local Emotron representative or Emotron's head office directly at the address below. Further information about us as a company, our product selection and our services is presented on our website.

Original manufacturers of soft starters since 1983.

For more information on MSF Soft Starters visit our website: www.emotron.com

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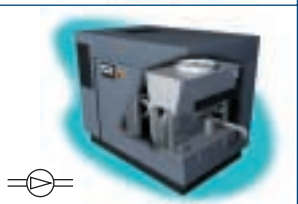
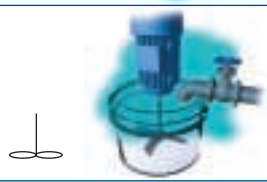
Application	Problem	MSF solution
Pump Normal 	Too fast starts and stops. Nonlinear ramps. Water hammer. High current and peaks during starts. Pump motor is going in wrong direction. Dry running, cavitation. High load due to dirt in pump.	MSF Pump application with following start/stop features: – linear ramps without tachometer – torque ramps for quadratic load. Phase sequence alarm. Shaft power underload. Shaft power overload.
Compressor Normal 	Mechanical shock for compressor, motor and transmission. Small fuses and low current available. Compressor screw going in wrong direction. Damaged compressor if liquid ammonia enters the compressor screw. High energy consumption due to compressor running unloaded.	Linear torque ramp or current limit start. Phase sequence alarm. Shaft power overload. Shaft power underload.
Conveyor Normal/heavy 	Mechanical shocks for transmission and transported goods. Filling or unloading conveyors. Conveyor jammed. Conveyor belt or chain is off but the motor is still running. Starting after screw conveyor has stopped due to overload. Conveyor blocked when starting.	Linear torque ramp. Slow speed and accurate position control. Shaft power overload. Shaft power underload. Jogging in reverse direction and then starting in forward. Locked rotor function.
Fan Normal 	High starting current at end of ramps. Slipping belts. Fan is going in wrong direction when starting. Belt or coupling broken. Blocked filter or closed damper.	Torque ramp for quadratic need. Gradually slows the motor to zero speed and then starts in right direction. Shaft power underload.
Planer Heavy 	High inertia load with high demands on torque and current control. Need to stop quickly both for emergency and production efficiency reasons. High-speed lines. Worn out tool. Broken coupling.	Linear torque ramp gives linear acceleration and lowest possible starting current. Dynamic DC brake without contactor for medium loads. Controlled sensorless softbrake with reversing contactor for heavy loads. Conveyor speed set from planer shaft power analog output. Shaft power overload. Shaft power underload.
Rock crusher Heavy 	High inertia. Heavy load when starting with material. Low power if a diesel-powered generator is used. Wrong material in crusher. Vibration during stop.	Linear torque ramp gives linear acceleration and lowest possible starting current. Torque boost. Shaft power overload. Dynamic DC brake without contactor.
Bandsaw Heavy 	High inertia load with high demands on torque and current control. Need to stop quickly both for emergency and production efficiency reasons. High-speed lines. Worn out sawblade. Broken coupling, sawblade or belt.	Linear torque ramp gives linear acceleration and lowest possible starting current. Dynamic DC brake without contactor for medium loads. Controlled sensorless softbrake with reversing contactor for heavy loads. Conveyor speed set from bandsaw shaft power analog output. Shaft power overload. Shaft power underload.
Centrifuge Heavy 	High inertia load. Too high load or unbalanced centrifuge. Controlled stop. Need to open centrifuge in a certain position.	Linear torque ramp gives linear acceleration and lowest possible starting current. Shaft power overload. Dynamic DC brake without contactor for medium loads. Controlled sensorless softbrake with reversing contactor for heavy loads. Braking down to slow speed and then positioning control.
Mixer Heavy 	Different materials. Need to control material viscosity. Broken or damaged blades.	Linear torque ramp gives linear acceleration and lowest possible starting current. Shaft power analog output. Shaft power overload. Shaft power underload.
Hammer mill Heavy 	Heavy load with high breakaway torque. Jamming. Fast stop. Motor blocked.	Linear torque ramp gives linear acceleration and lowest possible starting current. Torque boost in beginning of ramping. Shaft power overload. Controlled sensorless softbrake with reversing contactor for heavy loads. Locked rotor function.

MSF models for heavy and normal loads are given in the Technical Data table on page 5.

Technical data

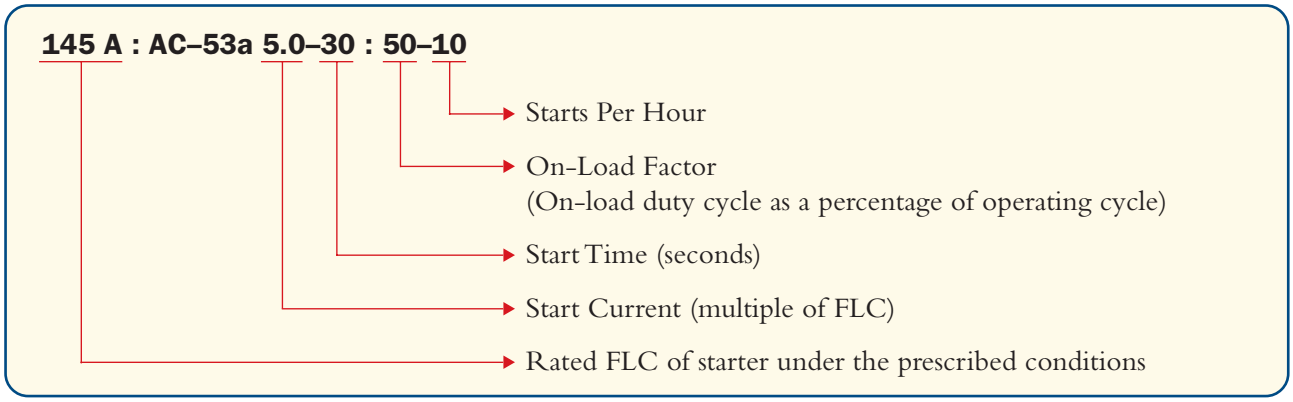
MSF Model	Heavy **AC-53a 5.0-30:50-10** Rated FLC	Normal **AC-53a 3.0-30:50-10** Rated FLC	Dimensions H×W×D, mm
MSF 017	17	22	320×126×260
MSF 030	30	37	320×126×260
MSF 045	45	60	320×126×260
MSF 060	60	72	320×126×260
MSF 075	75	85	320×126×260
MSF 085	85	96	320×126×260
MSF 110	110	134	400×176×260
MSF 145	145	156	400×176×260
MSF 170	170	210	500×260×260
MSF 210	210	250	500×260×260
MSF 250	250	262	500×260×260
MSF 310	310	370	532×547×278
MSF 370	370	450	532×547×278
MSF 450	450	549	532×547×278
MSF 570	570	710	687×640×302
MSF 710	710	835	687×640×302
MSF 835	835	960	687×640×302
MSF 1000	1000	1125	900×875×345
MSF 1400	1400	1650	900×875×345

Motor voltage: *1)* 200-525 VAC *2)* 200-690 VAC

Control voltage: *1)* 100-240 V *2)* 380-500 V

Protection class: MSF 017-835 IP 20 / MSF 1000-1400 IP 00

AC53a (running through Soft Starter)



MSF approvals: CE, UL, CuL, GOST, IEC 947-4-2