MOTORTRONICS™

Solid State AC Motor Control

V MX Series

VMX Series — Solid State Soft Starter — by MOTORTRONICS

Compact soft starter

Ratings from 18 to 1250A
(up to 1200HP)

- Integrated bypass contractor
- Advanced motor protection
- Narrow-width for MCC mounting
- Low-profile for use in pump panels
- Remote keypad mounting
- Unique built-in features

CE (UL) c(UL) ABS

# The control & protection you expect in an innovative soft starter design...

Flexibility of Control

Multiple ramp profiles, Pump-Flex™ Decel, process control timers and advanced motor protection make the VMX Series soft starter adaptable to a wide variety of AC motor applications...no need for add-on modules or costly auxillary devices.

Compact packaging has become critical in more and more electrical installations. The VMX Series meets this need without compromising features and ratings.

By using a highly engineered packaging design and the latest generation microprocessor, all the control and protection features you need are in the VMX Series. Narrow and shallow dimensions are perfect for integrating the VMX Series into motor control centers (MCCs), pump control panels, and retrofit starter enclosures.

VMX Series
Compact soft starter
with the advantages of selectable control

## Choose the ramping method that works best for your load...
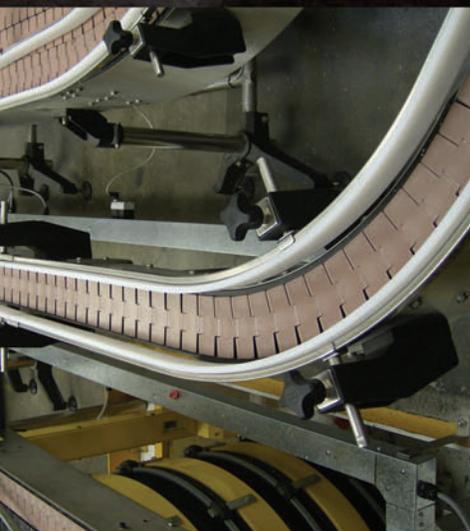
Pumps, Fans, Blowers & Conveyors

• Closed Loop Torque /Current (CLT™) Ramping provides a linear increase in output torque during acceleration. It maximizes the available torque using an internal PID feedback loop, insuring a smooth, linear r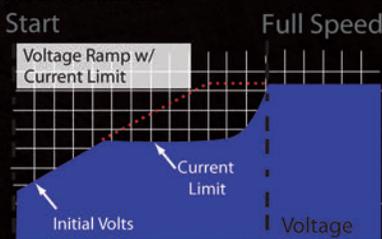amp up to full speed. Ideal for low pressure pumps where slight surges at the end of ramp may pose mechanical problems or on fans and mixers where blade warping can be an issue.

Start — Full Speed
Closed Loop Current/ Torque Ramp
Current Limit
Initial Torque — Torque
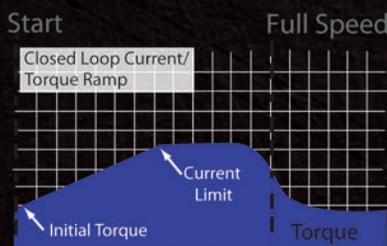
Compressors & Chillers

• Voltage Ramp with Current Limit for applications that need the smoothness of voltage ramping while maintaining the ability to start in limited power environments.

• For maximum motor power where the available power supply is severely limited, a Current Limit/Current Step start can be used.

Start — Full Speed
Voltage Ramp w/ Current Limit
Current Limit
Initial Volts — Voltage

Disconnect or Circuit Breaker

VMX Series

R/L1 S/L2 T/L3

Solid State Over Load

Integral Bypass Contactor

U/T1 V/T2 W/T3 G

Motor

Integral Bypass Contactors are standard on all sizes and provide maximum efficiency of panel space while maintaining the Motortronics reputation for being able to soft start most any load. The VMX Series is the only fully integrated, compact, world-class design offering uncompromised power and control capabilities.
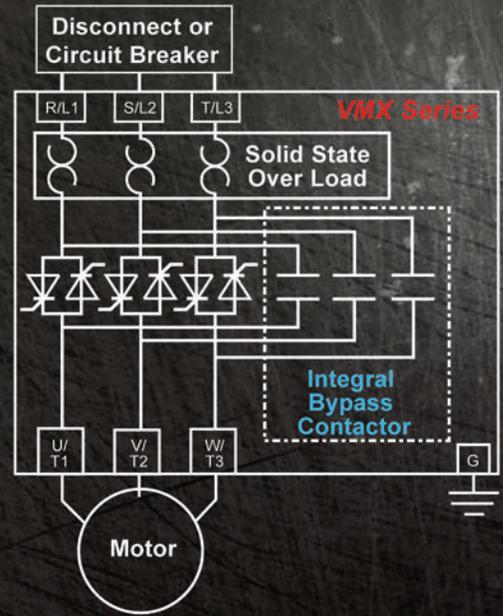
VMX Series
Compact soft starter

unique built-in features

Eliminate the damaging effects of "Water Hammer" A gradual reduction in the output torque of your pump motor is provided when a stop signal is initiated. When the motor output reaches a point where the check valve can be safely and gently closed, the Pump-FlexTM circuit automatically turns itself off.

Since no two pumps or pump applications are exactly the same, the flexible settings of Pump-FlexTM decel control allow you to tailor the output to precisely match your application requirements. No need for external timers or auxiliary controls.
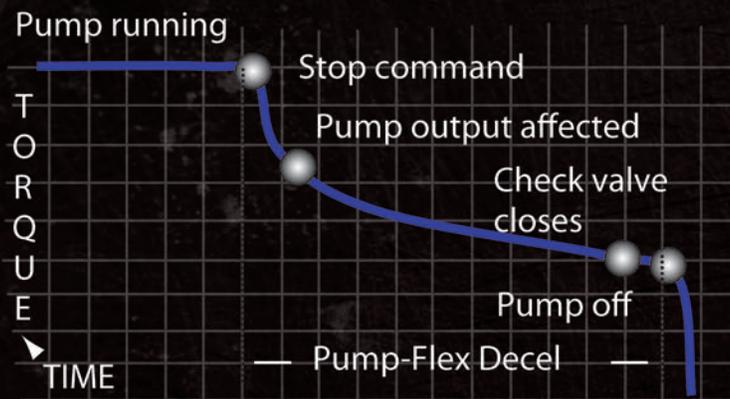
When traditional electro-mechanical motor controls are used, motor torque is immediately lost when the power is turned off. The fluid that is flowing through the system, and the kinetic energy associated with it, immediately reverses direction. To prevent the reverse flow, a check valve typically is slammed shut, trapping the kinetic energy in the piping system. This shock wave, often referred to as "Water Hammer," is no longer a problem when you use Pump Flex™ decel control.

Minimize maintenance costs & downtime By gradually reducing motor torque using Pump-FlexTM decel control, the potentially destructive pump output pressure is allowed to slowly dissipate in the system during the stopping process. Check valves close gently and other fluid system components including pipes, valves, flanges, couplings and hangers are no longer subjected to the shock and destructive potential of water hammer.

Pump running

TORQUE ▸

TIME

Stop command

Pump output affected

Check valve closes

Pump off

— Pump-Flex Decel —

The VMX Series also includes...

Process Control Timer Ideal for irrigation pumps when a specific amount of water needs to be pumped even if a power failure or a fault trip occurs during operation
- 24 hour/ 7 day Time Clock Controller Built-in time clock with selectable days-to-minute feature
- Batch Process Timer Run for a set time after starting, even after power outage
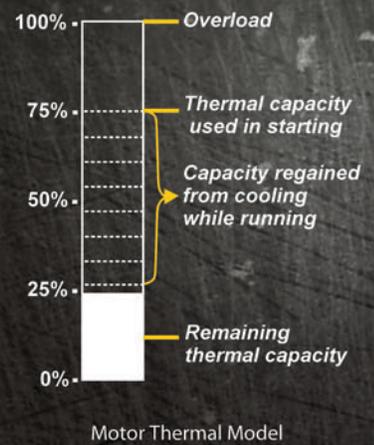
Metering
Elapsed time meter, run cycle counter, remaining lock-out time and fault history for maximum control and status of your pumps or processes.

World-class motor & system protection...

Separate Start & Run Overload Protection Two programmable overload trip curves allow for the thermal capacity required to start the load, while providing more closely matched overload protection during the run time.

Real-Time Thermal Modeling a dynamic thermal register continuously calculates motor operating temperature even when your motor is not running. Knows when the motor is cool enough for a successful restart.

- 100% — Overload
- 75% — Thermal capacity used in starting
- Capacity regained from cooling while running
- 50%
- 25%
- Remaining thermal capacity
- 0%

Motor Thermal Model

✔ **Equipment ground fault trip and monitoring** (residual current method)

✔ **PTC thermistor input** for use on motors with embedded PTC temperature sensors

✔ **Current imbalance trip** and biasing of the thermal register

✔ **Phase loss protection** based on current and voltage

✔ **Electronic shear pin trip** (overcurrent) with trip delay

✔ **Load loss trip** (under current) with trip delay

✔ **Phase rotation protection**

✔ **Pre-start shorted load protection** checks for motor lead or winding damage

V MX Series
Compact soft starter

In a soft starter that is easy to install

Unique, Compact Design

- Narrow width for MCC (motor control center) mounting
- Integrated bypass contactor
- Low profile for use in pump panels & other shallow enclosures
- Remote mount keypad capability
- Generous power terminal landing pads
- Pull apart control terminals for easy assembly & wiring
- Built-in features eliminate adding discreet devices
- Process control timers, metering, decel control, communications, and more

Remote Mount Keypad Option

Remotely mount the keypad and display up to 10 feet from the base unit, with NEMA 1 or NEMA 4/12 bezels
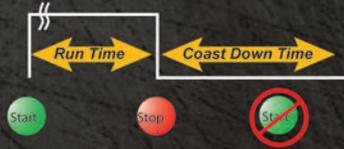
Retentive Thermal Memory
Remembers the motor thermal condition even in the event of a power loss or blackout. Extrapolates motor temperatures using a real-time clock.

Dynamic Reset Capacity
Overload will not reset until thermal capacity in the motor is sufficient for a successful restart. Starter learns and retains this information from previous starts.

✔ **Running short circuit trip** acts like a high speed "electronic fuse"

✔ **Shorted SCR lockout**, defeatable for "must run" situations

✔ **Bypass discrepancy monitoring** ensures the Bypass Contactor closes

Back-spin timer ensures coast-down before restart

Run Time | Coast Down Time
Start · Stop · Stop ⊘

Starts-per-hour lockout to prevent motor damage

Starts Per Hour Lockout = 3 allowed
Start · Start · Start · Start ⊘

Minimum time between starts lock-out

Time Between Starts
Start · Stop ⊘ · Start
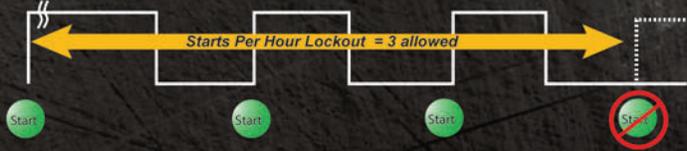
✔ **Over temperature trip** keeps track of heat sink temperature to avoid SCR damage

✔ **Shunt trip** detects welded contactor or multiple shorted SCRs (when used with shunt trip breaker)

✔ **Remaining thermal capacity** metering, to predict overloads

✔ **Metering** of A, B, C phase and ground fault currents

✔

The features of a protection relay at no additional cost!

V MX *Series*
Compact soft starter

Easy to wire & easy to use

Flexible Inputs & Outputs Put You in Control!

Emergency Bypass Input simple contact closure allows for independent control of the Bypass contactor when emergency across-the-line starting is needed. (For applications requiring full voltage, line start capability, select model based on HD ratings shown on page 6).
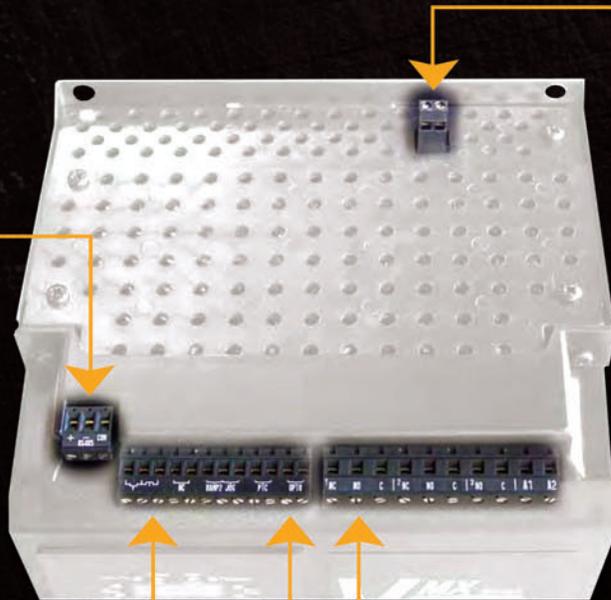
Easy access RS-485 comm port with Modbus RTU protocol built-in, no add-on communications module needed.

3 dry contact relays: 2 FORM C and 1 FORM A, all fully programmable for over 30 functions including, Run, At Speed, End of Decel, nine other status indicators and 13 trip indicators, including an option to flash on certain faults.

Simple control wiring: 2 or 3 wire Start/Stop, N.C. Interlock, PTC /E-Stop, Jog and Dual Ramp, all operated at 24VDC for safety.

Dedicated fault triac with opto-isolation for PLC interface or connecting to an external relay.

VMX Series
Compact soft starter

Ratings

VMX Series Soft Starter with Integral Bypass Contactor - NEMA & IEC Ratings

Model Number	Adjustable Range (AMPS)	Max FLA		Nominal Motor Rating (50/60 Hz) Maximum HP/Voltage (NEMA)								Nominal Motor Rating (50 Hz) Maximum kW/Voltage (IEC)					
				200V / HP		230V / HP		460V / HP		575V / HP		220V / kW		380V / kW		415V / kW	
		HD	SD	HD	SD	HD	SD	HD	SD	HD	SD	HD	SD	HD	SD	HD	SD
VMX-18-BP	9 - 18	11	18	3	5	3	5	7.5	10	7.5	15	2.2	3.7	3.7	7.5	5.5	7.5
VMX-28-BP	14 - 28	21	28	5	7.5	5	7.5	15	20	15	25	5.5	7.5	7.5	11	7.5	11
VMX-39-BP	19 - 39	27	39	7.5	10	7.5	10	20	25	20	30	7.5	11	11	18.5	11	18.5
VMX-48-BP	24 - 48	40	48	10	10	10	15	25	30	25	40	11	11	18.5	22	18.5	22
VMX-62-BP	31 - 62	45	62	10	15	15	20	30	40	30	60	11	15	22	30	22	30
VMX-78-BP	39 - 78	55	78	15	20	20	25	40	50	40	75	15	18.5	22	37	30	37
VMX-92-BP	46 - 92	68	92	20	25	25	30	50	60	50	75	18.5	22	30	45	37	45
VMX-112-BP	56 - 112	80	112	25	30	30	40	50	75	50	100	22	30	37	55	45	55
VMX-150-BP	75 - 150	96	150	30	40	30	50	60	100	60	125	22	45	45	75	55	75
VMX-160-BP	80 - 160	125	160	40	50	40	60	75	125	75	150	30	45	55	75	55	75
VMX-210-BP	105 - 210	156	210	50	60	60	75	100	150	125	200	45	55	75	110	75	110
VMX-275-BP	138 - 275	220	275	60	75	75	100	150	200	150	250	55	75	110	132	110	150
VMX-361-BP	181 - 361	248	361	75	125	100	125	200	300	200	350	75	110	132	185	132	200
VMX-450-BP	225 - 450	400	450	125	150	125	150	250	350	300	450	110	132	200	220	220	250
VMX-550-BP	275 - 550	480	550	150	150	200	200	400	450	500	500	132	160	250	285	265	305
VMX-600-BP	300 - 600	600	600	200	200	250	250	500	500	600	600	185	185	300	315	330	330
VMX-862-BP	431 - 862	690	862	250	250	250	300	500	600	600	700	200	250	360	450	380	475
VMX-900-BP	450 - 900	800	900	250	300	300	350	600	700	600	900	220	275	420	470	440	500
VMX-1006-BP	503 - 1006	960	1006	300	350	350	400	700	800	900	1000	255	310	475	525	500	555
VMX-1250-BP	625 - 1250	1080	1250	350	450	450	450	900	1000	1000	1200	330	385	565	655	600	695

Notes:
1. Data is based on NEC Table 430-150, full load current three phase motors. Size soft starter based on actual motor nameplate FLA.
2. Heavy Duty Rating (HD): 500% capacity for 60 seconds, 1.15 S.F., Line start (A-T-L) full voltage bypass (except VMX-1250 - BP which is shunt rated only)
3. Standard Duty Rating (SD): 500% capacity for 20 seconds, 1.0 S.F., shunt rated bypass. Add "-N" to the Model Number for NEMA1 or "-E" for NEMA12

Specifications

Power Components
6 SCRs in inverse parallel pairs for full phase angle soft start control (1600V PIV)
RC snubber for dv/dt protection of each SCR pair

Line Voltage Range
200 to 600 VAC, 3 phase +10% -15% , 50/60Hz

Current Ratings
18 - 1250A depending on unit selection
Range of each unit is 50-100% of max current rating

AC Supply Voltage
User supplied 120VAC +10% -15% tolerance, 60Hz
Optional 240VAC 50Hz control available

Start/Stop Control Choices
2-wire Run-Stop using dry contacts
3-wire Start/Stop with built-in seal in contact
N.C. Interlock input (dry contact) for remote devices

Ramp Control Choices (4 built-in)
Voltage Ramp
Voltage Ramp with Current Limit
CLT© Closed Loop Torque Ramp (Current Ramp)
Current Step (current limit only)
Ramp times adjustable 1 - 120 seconds
Current Limit adjustable 200 - 600% of FLA

Dual Ramps
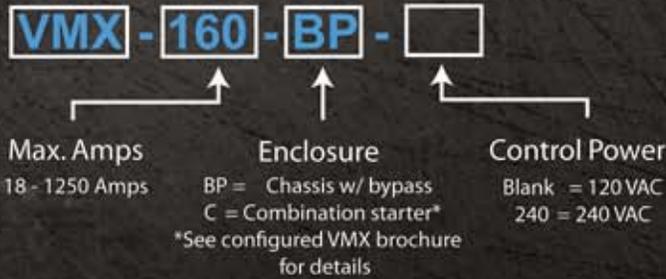Select via dry contact closure between any combinations of the above

Jog
Dry contact closure selects a non-ramping Jog function at an adjustable torque level

Kick Start
10 - 100% starting torque for 0.1 - 2 secondsa

VMX Series

Compact soft starter

Dimensions & Shipping Weights

VMX - 160 - BP - ☐

Max. Amps
18 - 1250 Amps

Enclosure
BP = Chassis w/ bypass
C = Combination starter*
*See configured VMX brochure for details

Control Power
Blank = 120 VAC
240 = 240 VAC

Bypass Packages Available in NEMA 1, 4 and 12

Model Number	H inches (mm)	W inches (mm)	D inches (mm)	Shipping Weight Approx lbs (kg)
VMX-18-BP thru VMX-48-BP	8.85 (225)	8.00 (203)	6.65 (169)	13 (5.9)
VMX-62-BP thru VMX-112-BP	14.00 (355.6)	8.00 (203)	6.65 (169)	23 (10.4)
VMX-150-BP thru VMX-160-BP	19.00 (482.6)	8.00 (203)	6.65 (169)	40 (18)
VMX-210-BP				130 (59)
VMX-275-BP	28.1 (713.7)	12.5 (317.5)	9.1 (231)	140 (63.5)
VMX-361-BP thru VMX-450-BP				145 (65.8)
VMX-550-BP thru VMX-600-BP	29.50 (749.3)	12.5 (317.5)	9.1 (231)	165 (74.8)
VMX-862-BP thru VMX-900-BP	44.25 (1124)	25.5 (647.7)	11.86 (301.3)	Contact Factory
VMX-1006-BP thru VMX-1250-BP	50.77 (1289.6)	25.5 (647.7)	13.28 (337.3)	

Note: Dimensions and weights are for reference only and are subject to change.

Pump-Flex™ Deceleration Ramp

Fully adjustable to match field conditions:
Begin Decel setting, 0 - 100% of line voltage
Decel ramp time, 1 - 60 seconds
End Decel setting (Off), 0 - 1% of Begin setting

Restart Delay Timer (Sequential Start Delay)

Programmable time delay 1 - 999 seconds after loss of control power for staggered restarts

Time Clock Controller

24 hour/7 day time clock to provide automatic start
Up to 7 start events per day
Select operation from 1 through 7 days per week
Run time determined by process control timer

RS-485 Serial Communications

Up to 247 starters per link
Modbus RTU protocol built-in

Process Control Timer (choice of either)

Minimum Run (Batch) Timer
  1- 999 minutes
  Runs until time expires, resets only if expired
  Resumes and finishes if stopped or power is lost
Permissive Run Timer
  1- 999 minutes
  Only allows operation during active run time

Operator Interface

Tactile feedback keypad
Easy to read LED display
Run and fault
status indicators
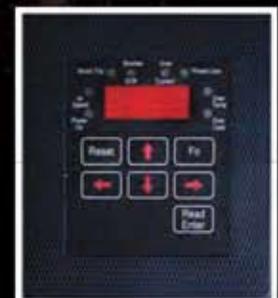
V MX *Series*

Compact soft starter

World Class Products & Service

Other soft starter products available from Motortronics

VMX "Configured" Soft Starter
• Combination starter with built-in circuit breaker
• NEMA 12 (IP54) enclosure
• "Smart Door" operator panel
  - Programming
  - Diagnostics
  - Metering
  - Pilot lights, pushbuttons and switches
• Control power transformer
• Terminal strip for customer interface

Medium Voltage Soft Starter MVC Plus Series
• 2.3 to 15kV
• Ratings up to 1500A
• Advanced motor protection
• Heavy duty design
• Stand alone units or custom lineups
• Specialty motor applications
  - multi-motor
  - synchronous
  - and more...