5kV CLASS 7kV CLASS 15kV CLASS

Medium Voltage Products

Advanced Motor Control, Protection and Monitoring

MOTORTRONICS™

MVC4 Series

MEDIUM VOLTAGE SOLID STATE SOFT STARTER

MOTORTRONICS™
Solid State AC Motor Control

MVC Series

Medium voltage solid state soft starter of Motortronics. The MVC guarantees power control and protection for your most important assets.

Motortronics MVC Series soft starters take motor control to a new level. Soft torque starting, intelligent load monitoring and smart stops are all included and accompanied by a robust and compact design.
The MVC Medium Voltage Soft Starter is designed to start AC motors in any fixed speed application. It provides maximum protection with "True Thermal Modeling," while allowing smooth, stepless control of acceleration and deceleration. The MVC Series guarantees power control and protection for your most important assets.

The Power of Performance

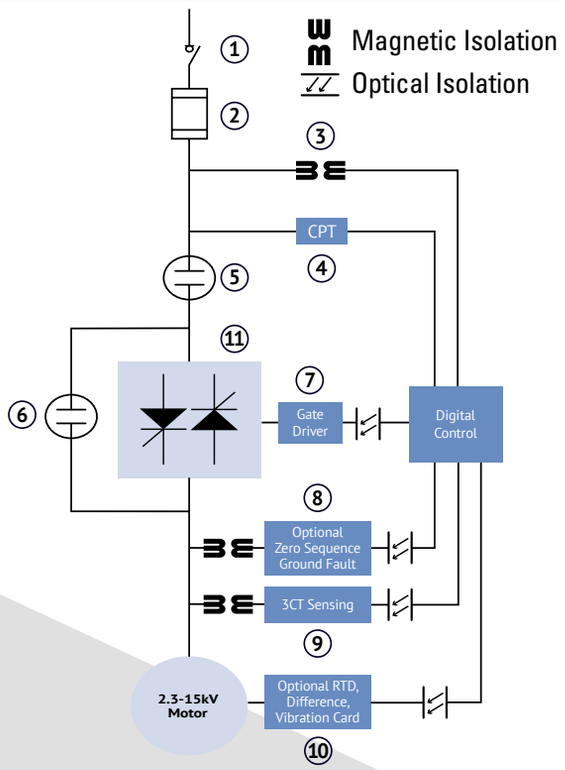
Expect peak performance from your critical medium voltage equipment when your motors are protected and controlled by MVC Series.

New Generation Enhancements

- Intelligent PFC Controller
- Energy Efficient Green Design
- Patented Design for Extended Lead Length
- Improved Power Ride-Through
- Corona Free 15kV Design
- Pump-Flex™ Control

PD Free REACTORS

Line Diagram



1. Load Break / Fault Make Disconnect Switch with Visible Ground Safety Bar
2. Coordinated Motor Fuse Protection
3. Magnetic Isolated PT for Voltage Sensing 60kV BIL up to 7.2kV, 110kV BIL up to 15kV
4. Control Power Transformer
5. Isolation Contactor Rated for Across the Line Start
6. Bypass Contactor rated for Across the Line Start
7. Sustained Pulse Fiber Optical Isolated Gate Drive
8. Optional Zero Sequence Ground Fault Fiber Optically Isolated
9. Current Sensing Card Fiber Optically Isolated
10. Optional RTD, Differential, Vibration Card Fiber Optically Isolated
11. Heavy Duty SCR Stack assembly with Ring Transformer Sustained Pule Firing

Special Motor Applications

- Synchronous Exciter
- Wound rotor
- Reversing or 2 speed
- Inching / Spotting Control
- Multiple Motor
- ARC protection cabinet
- Explosive deign panel

Smart Motor Protection

The MVC Series soft starter provides the highest standard of motor control and unsurpassed protection for critical motor applications.

The MVC Series soft starter provides the system protection features found in expensive "stand-alone" Motor Protection Relays, without costly add-on cards or discrete devices.

ANSI / IEEE / IEC	System / Protection Features	Standard
19	Reduced voltage softstart	✓
27	Under voltage	✓
37	Under current	✓
46	Current Imbalance	✓
47	Phase rotation	✓
48	Locked rotor / incomplete sequence	✓
49	I^2t electronic motor overload	✓
50	Instantaneous electronic over current trip	✓
51	Over current	✓

ANSI / IEEE / IEC	System / Protection Features	Standard
55	Power factor trip	✓
59	Over voltage protection	✓
66	Starts per hour and time between starts	✓
81	Frequency variance	✓
86	Lockout /start inhibit	✓
50N/ 51G/N	Ground fault detection, instantaneous and current	Optional
49/38	Stator and bearing RTD protection	Optional
14	Speed switch and tachometer trip	Optional
87M	Differential Protection	Optional

Ground fault option

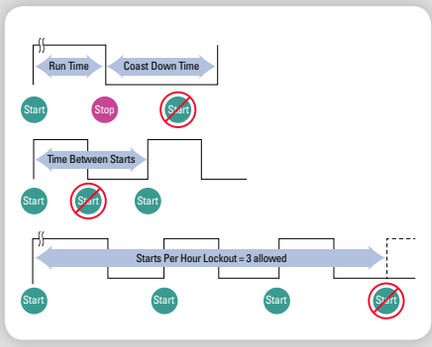
Zero Sequence ground fault protection can be provided to protect equipment from damage due to faulty grounded conductors or motor windings. Separate High (fast) and Low (slower) trip points and alarm levels are available to help prevent nuisance trips. The ground fault protection CT uses a fiber optic connection for safety isolation.

RTD Input Option for Precise Thermal Management

Thermally biased, programmable RTD inputs can be multiple types and can be individually named. Each RTD can be assigned to an output relay with different value for alarm or trip. Temperatures are recorded to the fault history and can be used to activate warning or trip relays based on setpoints. 12 RTD inputs can be configured in software to match the RTD material used and can be monitored at the keypad or remotely.

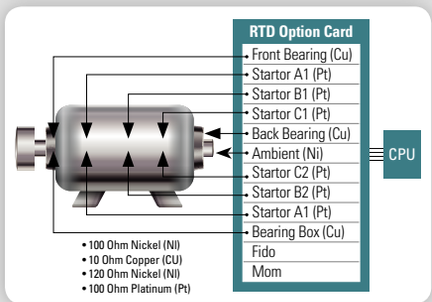
Real-time Clock Features

- Coast Down / Back Spin Lockout (programmable up to 60 minutes) prevents a start attempt when the motor / load is backspinning when the motor is turned off.
- Elapsed time Metering indicates run time for scheduled maintenance or trouble shooting help.
- Time Between Starts Lockout eliminates motor and equipment damage caused by repeated start commands.
- Time and Date Stamping of faults for precise recording of what happened when.
- Starts-per-Hour Lockout/Short Cycle Timer allows you to program the maximum number of start per hour and provides a programmed "wait time" (0 – 60minutes) between start attempts.



TE-RTD12 for RTD and 87M

The TE-RTD12 Relay device adds advanced RTD (Resistor Temperature Detector) and differential current monitoring capability to your new or existing motor system. The TE-RTD12 Relay device offers 12 built-in RTD inputs, 3 programmable output relays (5A), 2 isolated analog inputs (4-20mA), 1 isolated analog output (4-20mA), 3 isolated digital inputs, and differential current feedback monitoring



Advanced Protection

Every facility has equipment critical to its operation and productivity. This equipment is often controlled by medium voltage AC motors.

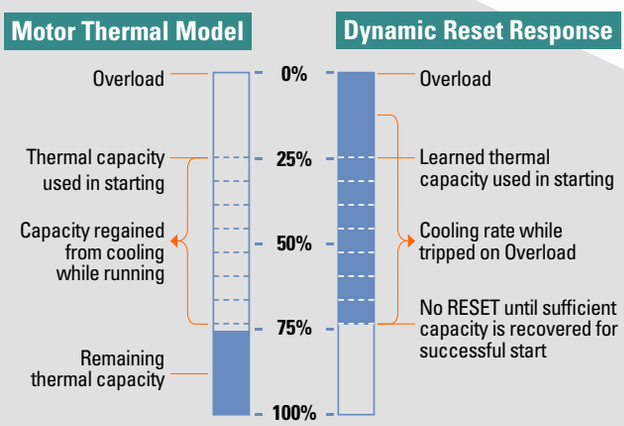
All the features of a motor protection relay without the added cost.

- True Thermal Modeling monitors the motor for excessive thermal conditions due to starting, running and even ambient conditions.
- Retentive Thermal Memory for continuous overload protection even after a complete power loss. When power is restored, the MVC Series remembers the last thermal condition of the motor, observes the off time via a real-time clock and adjusts the thermal model accordingly.
- Non-Volatile Memory stares the thermal memory without the need for batteries.
- True Time Thermal Tracking adjusts the thermal model for different cooling rates based on motor temperature, running state or power loss.
- Dynamic Reset Response Reset is only allowed after the motor has sufficient thermal capacity for a successful restart
- Thermal Model Biasing adjusts for heating effects of phase current imbalance or optional RTD inputs.

FLEXIBLE SETUP

Choose the level of overload protection

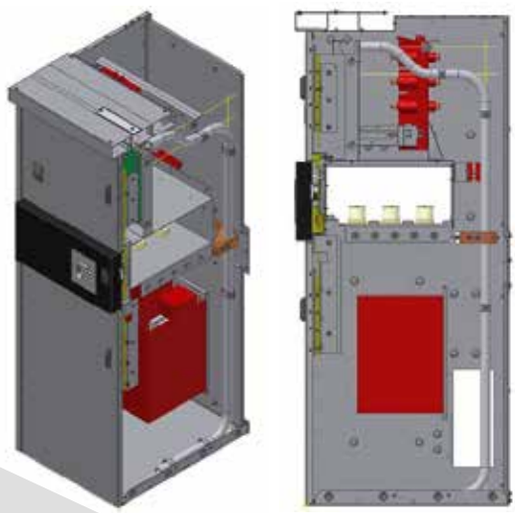
- Programmable Trip Classes selectable from NEMA/UL Classes 5-30
- Dual Mode Protection separate trip curves for start and run modes (example : Class 20 for start, Class 10 for run).
- Warning Levels can be programmed and assigned to one of six built-in output relays.
- Custom Trip Curve programmable based on the motor manufacturer's data or it can use a "Learned Overload Curve" that reflects normal running condition with a programmable trip bandwidth.
- Remote or Automatic Overload Reset can be activated for unattended operations.
- Over Current/Electronic Shear Pin trip and alarm safeguards your motor and equipment. Protects against jammed loads, sand in pumps, detects worn out blades, etc.
- Under Current/Load trip and alarm sensing detects an underloaded motor due to shaft/belt breakage or loss of prime in pumping systems.
- Dual Mode Short Circuit Trip (exclusive "toe-in the water" circuit) pre-checks the motor to prevent starting into a shorted load. In the Run mode, it becomes an "electronic fuse" tripping faster than most fuses and circuit breakers.
- Phase Rotation, Phase Loss and Current Imbalance Protection
- Under Voltage, Over Voltage and Line Frequency trips and alarms protect against power problems from the utility or generator.



ARC Protetion Design

Motortronics Medium voltage solid state soft starter designed for safety against internal ARC fault

If an arc event occurs within a Motortroncis MVC Series – ARC cabinet, the arc fault is contained by solid locking doors and heavy double layer compartment panels. During the emission phase the pressure is safely released using discharge flaps on the top of the panel (or optional ducts). These direct the explosion upwards or vent it safely outside. Arc fault events normally occur in less than a second, so not even the fastest person is able to react to protect themselves. However, pressure discharge flaps will react in milliseconds to allow the heated gases to vent. Responsible specifiers should ensure that they require all switchgear to meet IEC62271-200.



MVC-ARC designed, manufactured, assembled and tested in accordance with :

- IEC 60694
- IEC 60470
- IEC 62271-102
- IEC 60044-1
- IEC 60044-8
- IBC2000
- IEC 62271-200
- IEC 60282-1
- IEC 60255
- IEC 60044-2
- IEC 61958

- NEMA ICS 3 Part 1&2, 1993 (R2000)
- UL347, EEMAC E14-1. Arc Resistant
- ANSI C19.7
- ANSI C:37.20.7,200X, Arc Resistant

Explosion-proof enclosure

Explosion-proof enclosures of Motortronics designed for explosion area such as Mine, Oil & Gas plant, Chemical factory.

Explosion-proof enclosures of Motortronics are solid cabinets for soft-starter to keep the surroundings safe from electrical hazards. Integrated with sound technology, these boxes are resistant to spark and shock and have a high tolerance to extreme temperatures. An ideal solution for hazardous locations such as Mine, Oil & Gas plant, Chemical industries; these explosion-proof enclosures keep any interior explosion from spreading to the external environment and damaging life and property.

Advanced Integration

Specifically designed for ease of integration into automated systems, the MVC Series offers communications and flexible I/O as standard

Flexible I/O

120VAC control power input accepts long control circuit runs without the need for interposing relays. 8 programmable relay outputs for control flexibility without the need for external auxiliary relays or add-on-cards. 2 programmable analog output (0 – 10VDC or 4 – 20mA).

Communication Ready

- Built-in Communication ports

RS-232 for one on one communications with a PC
RS-485 for multi-drop communications with Modbus RTU protocol as standard

MLink Commissioning Software

The MVC MLink Windows based software offers users the ability to program, startup and trouble-shoot the MVC Series Soft Starter via the built-in RS485 connection. The MVC Series MLink reduces startup time and allows for commissioning data to be backed up and e-mailed directly from the software. Other features include :

- Parameter editing and commissioning
- E-mail and Export commissioning data directly from the software
- Parameter compare functions
- Parameter settings export to popular file format (PDF, XLS, RTF, etc…)
- Application Setup Wizard
- Visual Programming, point and click on visual terminal strip
- Monitor Panel with 4 programmable signals
- Trend-recorder with 6 programmable channels, storage, triggering and playback mode
- Status and Diagnostics Panel for quick drive status and fault history overview
- Communication connection for serial and USB
- Comprehensive help and product user manual
- Multi-drop network support for trend-recorder, monitor and diagnostics panel
- Demo modes for all interactive functions.
- Automatic Software Updates

Communication Options – Remote Monitoring

Available communication options for the MVC Series Soft Starter include DevicNet, Profibus, Ethernet (Modbus/TCP-IP) and several others, the MVC Series Starter can also be used in combination with the VirtualSCADA® VS1 remote monitoring device allowing for monitoring the MVC series via a standard web-browser or for use with the VirtualSCADA® VS2 for communication over Ethernet.

Specification

The MVC Series soft starter provides the highest standard of motor control and unsurpassed protection for critical motor applications.

Type of Load
3-phase medium voltage AC induction or synchronous motors AC Supply Voltage 2300, 3300, 4160, 6000/6600, 11-15kVAC +10% to -15%, 50/60Hz line voltages

Ratings
1500Amps up to 7.2kV
1400Amps up to 15kV
Contact factory for higher rating requirements

Overload Rating AC53b 600% for 30 sec; OFF time 60min

Power Circuits Series strings of SCR power modules (1,2 or 3 matched pairs of SCRs per phase depending on voltage rating)

SCR Peak Inverse Voltage(V)

Line Voltage	PIV Rating	Line Voltage	PIV Rating
2300	6500	6500	19500
3300	9000	6900-7200	19500
4160	13000	11000	27000
6000	18000	13-15kV	39000

BIL Rating 60kV up to 7.2kV , 110kV up to 15kV

Transient Voltage Protection dv/dt circuits (1 per SCR pair)

Vacuum Bypass Contactor
Standard on all models, line start rated

Ambient Operating Conditions
0 - 50˚C (82˚F to 122˚F) (Optional -20˚ to 50˚C with heaters)
5 - 95% relative humidity
0 - 3300 ft (1000m above sea level without derating)

Digital Control Unit (DCU)
Programmable keypad/operator with 2 lines x 20 character backlit LCD display. Status/Alarm LEDs (indicate: Power, Run, Alarm, Trip, Aux 1- 8)

Auxiliary Contacts
Multiple Form C contacts rated 5A @ 250VAC max.
6 fully programmable relays (including fail-safe operation)
5 dedicated relays (fault, at-speed, etc.)

Programmable Features
Motor FLA, service factor, insulation class
Dual Ramp Adjustments - Two independent settings for:
- Initial Torque 0-100% of nominal torque, voltage or current
- Current Limit 200-600% of motor FLA
- Acceleration Time 1-120 seconds

Power Ramp Function
Three Custom Curves Via plotted torque/time axis points
Pump-Flex™ Decel 1-60 seconds with begin & end torque adj
Kick Start 0.1-2.0 seconds (10-100% voltage)
Tacho Feedback (option) Closed loop speed ramp

Motor and Starter Protection

Electronic Overload	Phase Loss
Phase Imbalance	Phase Reversal
Short Circuit Detection	Over / Under Current
Over / Under Voltage	Shorted SCR / Shunt Trip
Starter Over-Temp	Coast Down Lockout
Starts per Hour Lockout	Time between starts
RTD Input (Option)	Ground Fault (Option)
Differential (Option)	

Statistical Data
Elapsed run time, last start time, average starting current, stores history of up to 60 events (data includes date & time, phase & grounds fault current). Also displays time-to-trip, remaining inhibit time and starts/hour values.

Metering (Voltage & Current)
Percent of FLA, phase currents, kVAR, KVA, kW, power factor, avg. start current, remaining thermal register, thermal capacity to start, measured capacity to start, time since last start, line frequency, phase order ; (Option : RTD Values, Gound Fault, 87M Differential)

Enclosure
NEMA 12 with 3R or IP4X up to IP52

Model Number

MVC4 – □□□□□□ – E – □□□ – □□

CAT.1 CAT.2 CAT.3 CAT.4 CAT.5

CAT. 1

Generation 4

CAT. 2 Voltage

23	2,300V
30	3,000V
33	3,300V
41	4,150V
60	6,000V
66	6,600V
72	7,200V
110	11,000V
138	13,800V
150	15,000V

CAT. 3 SCR Current

100	100A
200	200A
400	400A
600	600A
800	800A
1000	1000A
1200	1200A
1400	1400A
1500	1500A

CAT. 4 Configuration

SWG	Disconnect Switch + Power Fuse + Vacuum Contactor
K	Vacuum Contactor
VCS	Vacuum Contactor Switch
VCB	Vacuum Circuit Breaker

CAT. 5

EX	Explosion-proof Cabinet
(None)	Non Ex-proof Cabinet (Standard)

Company Profile

About Motortronics

Motortronics is a worldwide-leader specializing in the manufacturing of solid state AC motor controls and motor protection products. Founded in 1982, the company's headquarters are located in Clearwater, Florida, USA and have additional facilities in the British West Indies, China and South Korea.

The company has shipped over 1 million solid state starters and controllers to virtually all industries around the world, amassing more real world experience than any other manufacturer in the business. With many employees in multiple facilities and authorized sales & service representatives located around the world Motortronics is now one of the largest manufacturer of solid state power controls in the world.

Motortronics Korea

2001, with the establishment of Motortronics Asia-Pacific head office in Korea, we are providing the Motortronics product and technical skills to the Asia region as well as Korea. With the theory and technical skills accumulated during past 50 years and based on the experience of a job site, we deliver the best product and system which can understand the demand of clients and can plan mutual interest and services can be satisfied.

Our Products

Motortronics manufactures one of the broadest ranges of product available on the market today. Low voltage controls range from 200 to 690VAC @ 2500A and medium voltage soft starters range from 2300V to 15kV @ 2500A. In addition to having a complete line of solid state soft starters, Motortronics also provides a variety of engineering service.

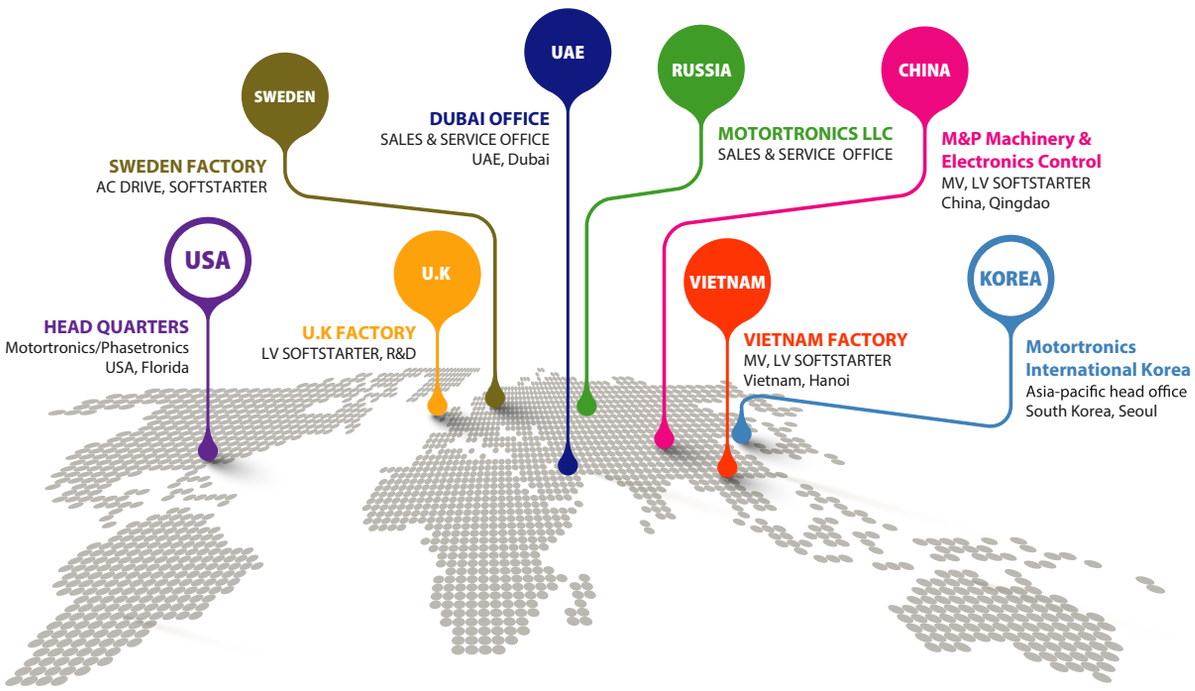
Our people

Motortronics most important assets are its people. The company has a highly dedicated and motivated staff of people and every employee strives to give their best for the growth of the organization. The company follows a policy of entrepreneurship, encouraging its people to make decisions and take actions as though the company was their own.

Our Service

With our advanced and cost-effective life cycle services and service solutions we can preserve and increase the value of your facilities. Motortronics stand by 24 hours and works 7 days in your side. Please contact local office and agents of Motortronics anytime if you need. Motortronics is closer than your expectation.

Global network



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MVC4 Series

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