

Medium-voltage controllers

Series 81000™ Voltages 2.3 kV to 6.9 kV

What is a MVC?

In a medium-voltage controller (MVC), one or more vacuum controllers are used to start and stop medium-voltage motors, switch small medium-voltage transformers, or switch small capacitor banks. The controllers employ fuses for short circuit protection and in combination with a contractor are suitable for frequent load switching.

Why Siemens?

Siemens' experience as one of the largest manufacturers of motors worldwide provides us with the knowledge to design and manufacture one of the leading motor controllers. The benefits of this experience result in control scheme flexibility and increased safety, while simplifying operations and maintenance and minimizing installation costs. This experience, which has been gained in over 50 years of supplying MVCs in the U.S., has been captured in the design of the Siemens Series 81000™ MVC. These are designed for use in industrial plants, commercial buildings, electric utility generating plants, cogeneration installations, and other electrical systems. Siemens has a large product offering for MVCs including:

- Motor control
- Switchgear
- Motors
- Drives
- Relays
- Meters
- and Automation.

Series 81000™ MVCs Overview

The Siemens Series 81000™ MVC has a modular design consisting of one or more contactors, housed in a free-standing sheet steel enclosure. Each controller is NEMA Class E2 and includes three current-limiting fuses. The enclosure is designed for front access, allowing the equipment to be located against a wall or back-to-back.

The design and manufacture of the Series 81000™ MVC unit is based on our experience as a leading manufacturer of motors worldwide. The benefits of this experience result in control scheme flexibility and increased safety. Typical applications include:

- Squirrel-cage induction motors (non-reversing, reversing, or multi-speed)
- Reduced-voltage starters (auto-transformer, reactor, or solid-state type)
- Synchronous motors (brush or brushless type)
- Transformer feeders
- Capacitor bank feeders
- and power bus feeders (tie).

The utilization voltage range for controllers is 2.3 kV through 13.8 kV. The Series 81000™ MVC can be used as a retrofit of older MVCs such as the 456 SpaceMaker and older series 81000 models through the latest 96H and 97H starters.

The Series 81000™ MVC allows the user to combine vacuum contactors,

latched contactors, and load-break switches in one lineup. The user can also connect directly to Siemens type GM-SG medium-voltage metal-clad switchgear with a transition section. This provides extreme flexibility in systems design.

Stationary controllers include:

- Full Voltage (FVNR)
- Reduced Voltage Primary Reactor (RVPR)
- Reduced Voltage Autotransformer (RVAT)
- Load Break Switches (LBS).

Drawout Controllers include:

- Full Voltage (FVNR)
- Reduced Voltage Primary Reactor (RVPR)
- Reduced Voltage Autotransformer (RVAT)
- Reduced Voltage Solid State (SSRV)
- Brushless Synchronous (BL-SYNCH)
- Brush type Synchronous (BT-SYNCH)



360A Vacuum Contactor

- Two Speed Two Winding (2S2W)
- Two Speed One Winding (2S1W)
- Wound Rotor (WR)
- Reversing.

Latched Contactor

MVCs utilize a latched contactor. The contactor remains closed on loss of power. Per NEMA, the front panel mechanical release is standard. The latched contactor has an electric release or trip push button. There is also an optional capacitor trip. This design is appropriate for non-motor loads.

Solid State Reduced Voltage

A solid state reduced voltage controller design is available for the full HP range. This uses a standard drawout contactor or fuse carriage as a means for main isolation. There is a standard fixed-mounted bypass contactor. Motortronics heavy duty Soft Start module employs Silicon Controlled Rectifiers (SCRs) to vary the starting voltage to provide stepless acceleration and uses standard Series 81000™ construction. The heavy duty chassis ratings are 500% for 60 seconds, which is 30 seconds longer than the nearest competitor. At 600% for 30 or more seconds, the controller is capable of starting Class 30 "Mill Duty" motors. Operating at 200% for up to two minutes allows for long acceleration times.

Why Soft Start?

- Eliminate torque shock damage
- Increase motor and drive train reliability
- Keep starting kVA to a minimum
- Maintain future flexibility
- Soft start and soft stop pumps to control water hammer
- Reduce hydraulic/mechanical problems
- 10:1 cost ratio vs. MV VFDs.

The Solid State Reduced Voltage Con-

troller has built in "dual adjustment" control. Heavy duty design allows ramp 2 to be FVNR if needed. The second ramp is able to be selected as "loaded start" or any other operation change. A solid state reduced voltage controller is able to eliminate torque shock. Soft starting provides smooth, stepless increase in torque. This is adjustable over time and strength with little or no mechanical damage.

Drawout Contactor

- Minimum downtime
- Fully interlocked
- Convenience, ease of maintenance
- Single stroke handle action for racking
- Positive interlocks.

The drawout contactor is available in three-high construction if the main bus is in the top hat. There is minimum floor space and steel barriers throughout. The materials used for the structures are #11GA steel frames, #12GA steel doors, and #14GA end sheets, top sheets, and back sheets.

The Siemens Vacuum Interrupter contains a ceramic insulator, stainless steel bellows, and a visible contact wear mark so that no special tool is required.

720A Vacuum Starter

- Siemens 96H6 (Toshiba 720A vacuum contactor)
- Control Power Transformer 750VA (optional up to 3kVA) and primary fuses
- Drawout fuse carriage
- Fixed vacuum contactor
- Silver plated disconnect fingers.

Power Fuses

- ANSI Class R fuses for motor protection
- ANSI Class E for non-motor loads
- Blown fuse trip bar (optional on drawout unit)

- Mounted on wheeled drawout carriage for easy access
- Fuse Pullers not required.

Blow Fuse Protection (Optional)

- Protects against single phasing
- Mechanically driven
- One open fuse de-energizes main coil circuit.

Racking Interlocks

The racking interlocks have closed door operation and cannot be opened, inserted, or racked out when the contactor is closed. They are padlockable in the OFF position with up to three padlocks. The automatic shutter is driven by racking operation. The insulating material is non-metallic. The shutters are contactor driven and not gravity or spring operated. Dual shutter design is available for generator or tie applications.

Stationary Controller

- 400A visible blade disconnect (non-load break isolation)
- Fixed power fuses (bolt-in)
- Fixed 360A vacuum contactor
- Ideal for stand-alone applications
- Ideal for customers who prefer isolation switches to drawout controllers
- Specifically developed for compressor OEM and export market
- Optional horizontal bus.

Take Away

- 3 - high starter arrangement
- Latched contactor as alternative to circuit breaker for smaller loads
- Ease of maintenance through proven design
- No special tools required
- Wide product range (starter types and ratings)
- Large Siemens product offering.

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