

GEIS

SecoGear MCC Medium Voltage Soft Starter

GEIS Electrical Protection

Safer Smarter Greener



In 1879,
Thomas Edison
devised The very first
circuit breaker...



**I find out what the world needs...
then I proceed to invent it.**

—— Thomas A. Edison

About GEIS

GEIS was established in 2019 following the spin-off of several businesses and assets that ABB had acquired from GE on July 1, 2018, include 3 manufacturing centers, Warehousing & Trading business at FTZ, China Technology Center.

- Components: Full range of circuit breakers up to 40.5kV: Medium voltage vacuum circuit breakers, LV circuit breakers: ACB, MCCB, MCB, RCD, RCBO: Control components.
- Equipment: MV switchgear (Air insulation and Gas Insulation Technology), LV switchgear, switchboard.
- Medium voltage cast coil dry type transformer.
- Medium voltage ATS system (Paralleling Switchgear).

After the separation, all the above product lines were rebranded as AEG for the China market and GEIS for global markets.



Note: GEIS brand is also used in China

Quality is Built-in

The Vertical Integrated Manufacturing Center

- Established in 2000, the 1st North Asia facility of GE Industrial Solutions
- Localize US and European products to serve the local market
- Evolving into a Global platform of Cast Coil Dry-Type Transformer, Air Circuit Breaker, IEC and NEMA medium voltage VCB and switchgear for GE Industrial Solutions
- A GE Global Star Facility



GEIS deliver complete range of products for the evolving electrification needs:



SecoVac VCB



M-PACT Plus ACB



Elfa Series MCB/RCBO



EV Charger



SecoGear MV Switchgear



RMU Gas Insulated Switchgear



WaveCast Transformer



MLS LV Switchgear

Medium Voltage Solid-State Soft Starter

SecoGear MCC Series — Medium Voltage Soft Starter

The SecoGear MCC Series Medium Voltage Soft Starter Cabinet integrates an advanced solid-state soft-starting system engineered for intelligent, reliable, and efficient motor control. Driven by a high-performance processor, the soft starter provides precise centralized control, high-speed fiber-optic triggering, and comprehensive dynamic/static voltage-balancing protection. These features ensure smooth motor acceleration and deceleration, reduce mechanical and electrical stress, and maintain continuous safety monitoring for optimal long-term motor performance.

At the core of this solution is a fully integrated motor-starting architecture that combines both primary protection and bypass control within a single compact cubicle. The system incorporates a SecoVac vacuum circuit breaker (VCB) for incoming line protection and isolation, while the VCR193 vacuum contactor serves as the bypass circuit for efficient motor operation after soft starting. This tightly integrated design delivers enhanced system safety, greater stability, improved energy efficiency, and significant reductions in footprint and installation cost—ideal for modern medium-voltage motor applications.

Built on the proven SecoGear medium-voltage switchgear platform, the MCC Series ensures the highest standards of safety and reliability. The cabinet features full internal segregation between high-voltage compartments and low-voltage control sections, supported by a comprehensive mechanical and electrical interlocking system. The enclosure is constructed from high-strength aluminum-zinc coated steel using precision multi-bend forming, providing outstanding mechanical integrity, dimensional accuracy, and maximum operational safety even under demanding industrial conditions.

SecoGear MCC is engineered for maximum personnel and equipment safety. The design has been type-tested to Internal Arc Classification (IAC) AFLR, 40 kA for 1 second, ensuring robust protection against internal arc faults from the front, lateral, and rear of the soft starter.



SecoGear MCC Series meets IEC 60289, IEC 60470, IEC61000 Standard

- IEC 60298: A.C.metal-enclosed switchgear and controlgear for rated voltages above 1kV and up to and including 52kV
- IEC 60470: High-voltage alternating current contactors and contactor-based motor-starters
- IEC 61000: Electromagnetic Compatibility (EMC) Standard

Medium Voltage Solid-State Soft Starter

How SecoGear MCC Work

The SecoGear MCC medium-voltage soft starter is built around the GEIS AST-MV power electronics platform, which employs high-performance silicon-controlled rectifier (SCR) modules in combination with an advanced microprocessor-based control system. This design delivers smooth, fully controlled acceleration and deceleration of medium-voltage motors.

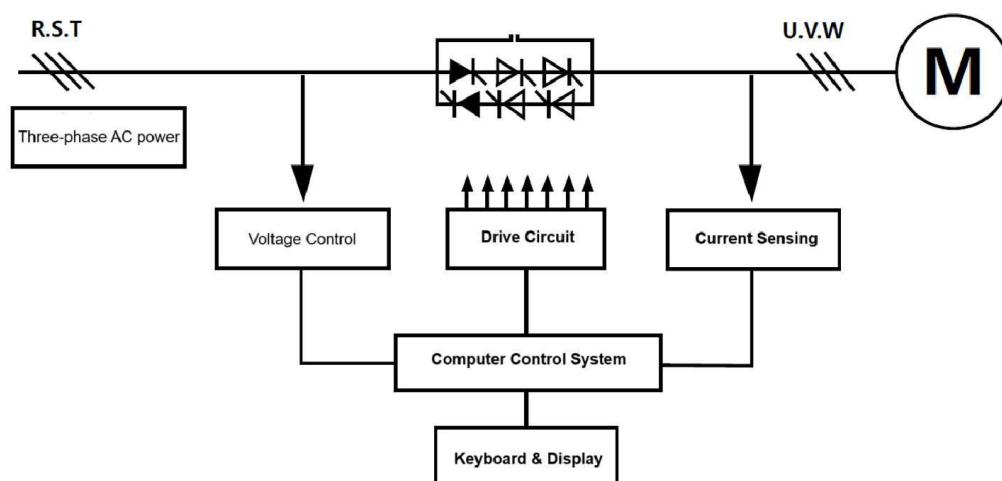
Specifically engineered for demanding applications such as pumps, fans, compressors, conveyors, and a broad range of industrial loads, the SecoGear MCC significantly reduces mechanical stress and electrical inrush during startup, thereby improving overall equipment performance and reliability.

During the starting sequence, line voltage is applied through anti-parallel SCR modules connected in series within each phase. The intelligent controller precisely modulates the SCR firing angle to progressively increase the voltage applied to the motor. This controlled phase-angle advancement results in a smooth, predictable rise in motor voltage, current, and torque, enabling the motor to accelerate from standstill to full speed without the excessive mechanical shock and high inrush currents associated with direct-on-line starting.

Throughout the acceleration process, the AST-MV control system continuously monitors critical parameters, including phase currents, voltages, motor temperature, and acceleration profile. Once the motor reaches nominal speed and operating current stabilizes, the integrated bypass contactor is automatically engaged. This action connects the motor directly to the supply, effectively removing the SCRs from the power circuit, minimizing heat generation within the starter, reducing power losses, and enhancing long-term reliability.

For controlled stopping or deceleration, the soft starter offers programmable voltage ramp-down or torque-control algorithms, ensuring smooth shutdown and protecting driven equipment from abrupt torque transients, pressure surges, or water hammer phenomena.

By effectively managing both electrical and mechanical stresses during starting and stopping cycles, the SecoGear MCC medium-voltage soft starter enhances overall system stability, reduces maintenance requirements, and substantially extends the service life of motors and mechanically coupled equipment.



AST-MV Control System

Medium Voltage Solid-State Soft Starter

Features and Highlights

- **AST-MV Advanced Control System**

AST-MV State-of-the-art SCR power module technology High-capacity, anti-parallel SCRs with precise phase-angle firing deliver exceptionally smooth and stable acceleration while protecting motors against excessive inrush currents and mechanical stress.

AST-MV High-performance microprocessor-based digital control Real-time monitoring and processing of motor voltage, current, torque, and temperature enable precise, fully programmable starting and stopping profiles.

- **Integrated Heavy-Duty Bypass System**

Upon reaching full speed, the motor is automatically transferred to the internal bypass contactor. This eliminates continuous conduction through the SCRs, dramatically reducing heat generation, minimizing power losses, and extending semiconductor lifespan.

The proven GEIS VCR193 vacuum contactor is specifically engineered for severe industrial duty, offering ratings up to 12 kV / 600 A, proven field experience exceeding 20 years, and a mechanical/electrical life of over 1 million operations.

- **Comprehensive Real-Time Motor Monitoring**

Continuous measurement of phase voltages, currents, motor temperature, and power factor enables immediate fault detection, rapid protective response, and detailed diagnostic logging.

- **Controlled Deceleration and Driven-Equipment Protection**

Programmable voltage or torque ramps provide smooth, controlled deceleration eliminates water hammer, pressure surges, reverse rotation, mechanical shock, and load transients during stopping.

- **Optional Integrated SecoVac VCB in the Same Cubicle**

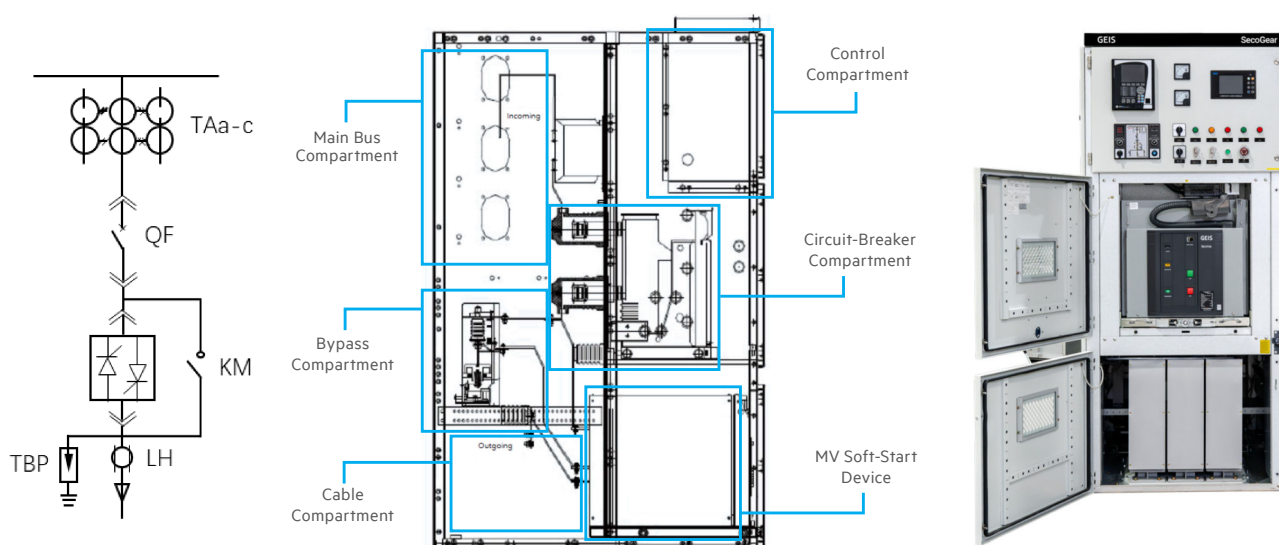
Combines primary circuit protection, control and protection relays with the soft starter in a single compact assembly, significantly reducing overall system footprint and installation costs.

The SecoVac VCB employs advanced ASP embedded-pole technology for superior environmental resilience (temperature and humidity), short-circuit breaking capacity up to 50 kA, and mechanical endurance of 60,000 operations.

The SecoGear MCC medium-voltage soft starter delivers unmatched performance, reliability, and space efficiency for the most demanding industrial applications.

Structural Design

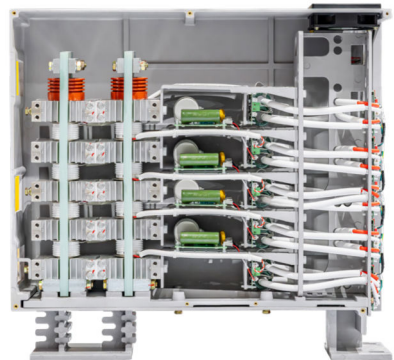
Integrated Soft Starter Cabinet SecoGear MCC-H



Medium Voltage Solid-State Soft Starter

AST-MV Soft Starter SCR Module

The core of the medium-voltage soft starter is a **high-reliability SCR power module**, designed for high-impact, high-cycle operation. It ensures smooth motor starting, controlled acceleration/ deceleration, and protection of driven equipment against mechanical shock and electrical transients.



Module Construction & Key Features

- Bidirectional SCR pairs per phase
- High thermal stability with copper-based heat spreader
- Industrial-grade insulation and creepage design
- Optimized for heavy-duty starting conditions
- Modular plug-in stack design for easy maintenance

Key Electrical Ratings

Parameter	Typical Rating		
Operating Voltage	3.3 kV / 4.16 kV	6.6 kV	10-11 kV
SCR Repetitive Voltage (VDRM / VRRM)	8.64 kV	12.96 kV	21.6 kV
Surge Voltage (VDSM / VRSM)	6.5 kV		
RMS On-State Current (IT(RMS))	500–2500 A		
Average On-State Current (IT(AV))	300–1500 A		
Surge Current (ITSM)	8–40 kA (10 ms half-sine)		
di/dt Capability	100 A/μs		
dv/dt Capability	3.2 kV	4.8 kV	8 kV
Gate Trigger Current / Voltage (IGT / VGT)	30 mA / 3 V		

Control & Protection Features

- Precise synchronous firing control to avoid phase imbalance
- Programmable voltage/current/torque ramp profiles
- Built-in overheat, overcurrent, phase-loss, trigger failure monitoring
- Supports open-loop and closed-loop control modes

Medium Voltage Solid-State Soft Starter

Soft Starter Control Method

	Benefit	Applications	Graph
Voltage Ramp Starting Classic soft start with smooth acceleration. Features adjustable initial voltage (V_0) and ramp time for optimal motor startup.	Smooth acceleration, reduces mechanical stress on motor	Pumps, fans, compressors	
Current Limit Starting Maintains a constant current during startup. Ideal for weak power networks or high-inertia loads.	Ideal for weak networks or high-inertia loads	Crushers, conveyors, mills	
Current Ramp Starting Combines voltage ramp with current limit to prevent torque and current peaks, ensuring smooth and safe motor operation.	Prevents torque and current peaks, ensures safe startup	Pumps, large fans	
Soft Stop (Voltage Ramp Down) Provides controlled deceleration, eliminating water hammer and reducing mechanical stress during stopping.	Eliminates water hammer and reduces mechanical stress	Pipeline pumps, escalators long conveyors	

Performance Comparison

Feature	Voltage Ramp	Current Limit	Current Ramp	Soft Stop
Starting torque control	Good	Excellent	Best	-
Current peak limitation	Medium	Best	Excellent	-
Suitable for weak networks	No	Yes	Yes	-
Smooth deceleration	No	No	No	Yes
Prevents water hammer	No	No	No	Yes

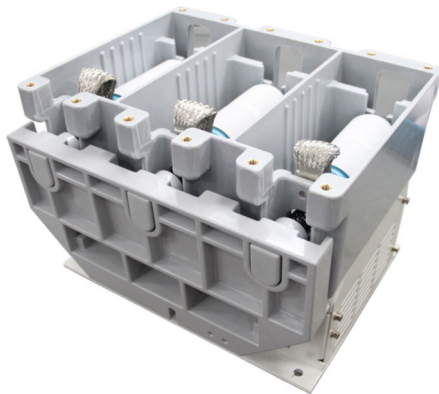
Medium Voltage Solid-State Soft Starter

SecoVac VB2 Plus Vacuum Circuit Breaker



- SecoVac Series 12~40.5kV/ 630~5,000A/ 25~50kA, 75% DC Component Breaking Capacity (Generator CB)
- Spring & Permeant Magnetic Operation Mechanism
- Altitude up to 4,700 meters, -40°C~+40°C,
- RoHS, ASP Environmental Friendly Embedded Pole Design (Recycle Material for 12KV)
- 100 Times IC Test, 60,000 Mechanical Life Test
- GB Tested @ XIHARI, IEC tested @ KEMA
- iF Design Award (SecoVac VL Model)
- Smart Grid Enabled: Smart VCB with Built in Sensors, HMI, Wave Capture, Data Intelligence, IEC61850 Protocol, Modbus/ Profibus Communication.

SecoVac CR193 Vacuum Contactor



GEIS VCR193 Vacuum Contactor is a field-proven solution for demanding applications in heavy industry, petrochemical plants, and power stations. Designed for medium-voltage motor control and capacitor bank switching.

Key Features:

- Robust electromagnetic operating mechanism.
- High-performance vacuum interrupters for reliable arc quenching.
- Exceptional mechanical life: Up to 1 million operations
- Long electrical endurance and consistent performance.

Ratings:

- Up to 12 kV (common variants at 7.2 kV or 12 kV).
- 50/60 Hz.
- Up to 400 A continuous current.
- Complies with IEC standards (e.g., IEC 62271-106 for contactors).
- Configurations: Available in fixed, plug-in, and withdrawable (draw-out) types for flexibility in switchgear design, easier installation, and maintenance.

Medium Voltage Solid-State Soft Starter

Function Table

Application

Category	Item	Basic Parameters
Voltage Range	Input Voltage	2–15 kV AC
	Power Range	110 kW – 50,000 kW
	Frequency	50/60 Hz \pm 1 Hz
Motor Type	Applicable Motors	Three-phase squirrel cage asynchronous or synchronous motors
	Phase Sequence Requirement	No phase sequence requirement
Control Power	Control Supply	User-supplied 220 VAC (optional: 220 VDC/110 VDC)
Cooling	Cooling Mode	Natural air cooling
Installation	Installation Location	Indoor (non-corrosive, non-conductive dust, low vibration)
	Outdoor Installation	Optional with protective canopy
Environment	Operating Temperature	–20°C to +50°C
	Storage Temperature	–20°C to +55°C
	Relative Humidity	5%–95%, non-condensing
	Altitude	\leq 1500 m (derate above 1500 m)

Parameter Setting

Category	Item	Basic Parameters
Start/Stop	Soft Start Time	0–120 s (default 20 s)
	Soft Stop Time	0–60 s (default 20 s)
	Voltage Ramp	20%–80% adjustable
Protection Parameters	Current Limit	Adjustable
	Jumping Start	0–30% adjustable
Starting Modes	Available Modes	Ramp voltage, Current limiting, Constant current, Ramp current
Control	Control Methods	Local start, Key-switch start, Remote start, Combined start

Medium Voltage Solid-State Soft Starter

Protections

Category	Item	Basic Parameters
Electrical Protection	Phase Loss Protection	Enabled
	Under-Voltage Protection	Enabled
	Over-Voltage Protection	Enabled
	Running Over-Current Protection	Automatic inverse-time control (CPU-based)
Thyristor Protection	Unit Protection	Dynamic or static voltage equalization
	Instantaneous Over-Voltage	dv/dt absorption
Motor Start Protection	Starting Interval Protection	Enabled
	Excess Start Time	Trip if soft-start time exceeds setting
Interlock	Mechanical Interlock	Enabled
	Electrical Interlock	Enabled

Smart Control

Category	Item	Basic Parameters
Measure	Current	Real-time monitoring
	Voltage	Input voltage measurement
Communication	Interface	RS-485 / Profibus-DP (optional)
	Protocol	Modbus RTU / Profibus-DP (optional)
User Interface	LCD Display	Multi-language, real-time parameters indication
	Indicators	Power, Running, Soft Start, Fault
Memory	Parameter	EEPROM automatic backup
	Event Records	Fault and operations history

GEIS

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This catalog may be subjected to revision without prior notice.
Version No.: GENCCPAU25V2

