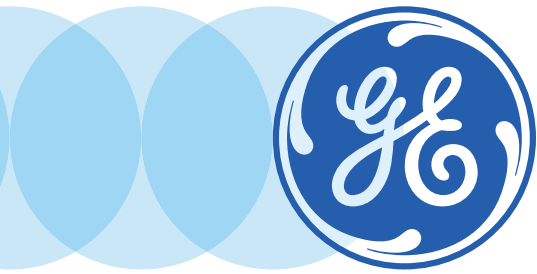


SecoGear

5kV-15kV IEEE Metal Clad Switchgear

The next generation of reliability,
performance and sustainability.



SecoGear Overview

SecoGear is designed and manufactured with advanced technology and has been comprehensively and successfully tested to current IEEE C37.20.2 and ANSI C37.55 standards.

SecoGear is rated for 5kV - 15kV applications, 1200A - 2000A and up to 40kA short circuit rating, and is designed to house GE's SecoVac embedded pole vacuum circuit breakers.

SecoGear is available in standard IEEE metal-clad construction.



Applications

Utilities and Power Plants

- Power generation stations
- Transformer stations
- Switching stations
- Main and auxiliary switchgear
- E-House

Industrial

- Oil & Gas
- Mining
- Pulp and Paper
- Cement
- Textiles
- Chemicals
- Automotive
- Petrochemical
- Data Centers
- Metallurgy

Transportation

- Airports
- Ports
- Railways
- Underground Transportation

Services

- Supermarkets
- Shopping malls
- Hospitals
- Sports stadiums
- Large infrastructure and civil works



Description and Features



Built to the Highest Current Industry Standards

SecoGear is designed and fully tested to IEEE standards. It utilizes GE's latest SecoVac vacuum circuit breaker, third-party tested in accordance with ANSI C37.54, IEEE C37.04, IEEE C37.06, and IEEE C37.09. Manufactured in accordance with high quality standards, GE engineers have integrated core technologies. Circuit breaker and mechanism design, vacuum arc control technology, insulation technology and electrical field control and analysis combine to create a highly reliable and compact system. SecoGear reflects GE's latest MV switchgear design practices.

Construction Type

SecoGear is designed and constructed to meet the requirements IEEE C37.20.2 for Indoor installations. SecoGear meets standards for NEMA 1 enclosures.

SecoVac Mechanism

The SecoVac circuit breaker utilizes a compact, spring charged operating mechanism. The trip and close mechanisms are combined into a single, small and easily replaceable module.

Automatic Shutters

SecoGear is equipped with grounded metal shutters in front of the primary bushings. The shutters are automatically operated by the circuit breaker movement. When the circuit breaker is racked out to the test or disconnect positions, the shutters automatically close to isolate the fixed primary contacts.

Standards

SecoGear complies with the following standards and specification for factory assembled switchgear:

- **IEEE C37.20.2:** Standard for metal-clad switchgear
- **IEEE C37.04:** Rating structure for AC high-voltage circuit breakers
- **IEEE C37.06:** Standard for AC high-voltage circuit breakers rated on a symmetrical current basis
- **IEEE C37.09:** Standard test procedure for AC high-voltage circuit breakers with rated maximum voltage above 1000 V
- **IEEE C37.010:** Application guide for AC high-voltage circuit breakers rated on a symmetrical current basis
- **IEEE C37.012:** Application guide for capacitance current switching for AC high-voltage circuit breakers
- **IEEE C37.11:** Standard requirements for electrical control for high-voltage circuit breakers rated on a symmetrical current basis
- **IEEE C37.100.1-2007:** Standard of common requirements for high voltage power switchgear rated above 1000
- **ANSI C37.54:** Indoor alternating current high-voltage circuit breakers applied as removable elements in metal-enclosed switchgear

Technical Characteristics

Storage Conditions

To prevent possible corrosion or deterioration of the equipment and maintain warranty when stored for prolonged periods, we recommend that the equipment is stored in its original packaging, in dry conditions, sheltered from the sun and rain between -22°F (-30°C) and 104°F (40°C).

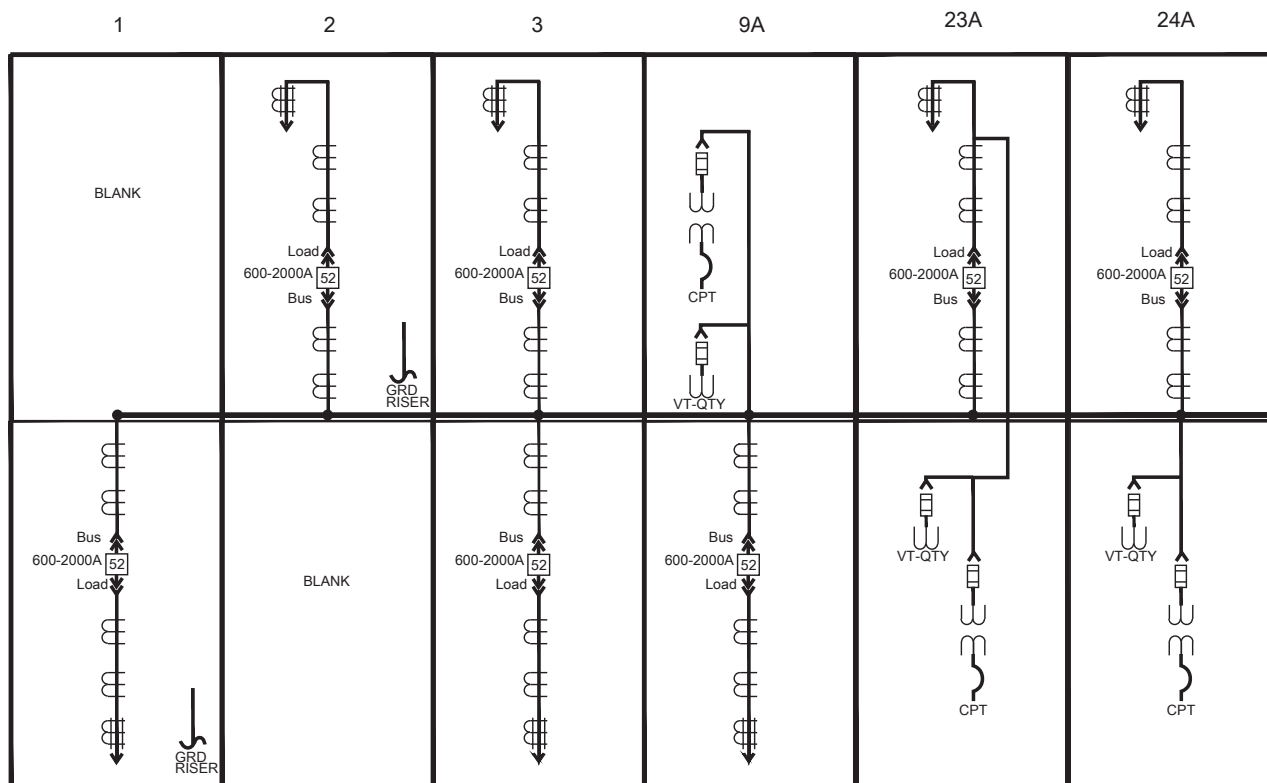
Normal Operating Conditions

SecoGear is designed for the normal service conditions of indoor switchgear per IEEE Standards:

- Temperature
 - Maximum Ambient: 104°F (40°C)
 - Minimum Ambient: -22°F (-30°C)
- Humidity
 - Maximum Relative: 95%
- Altitude
 - Maximum: 3300ft (1000m) a.s.l.
 - High Altitude: At altitudes above 1000m, consult IEEE C27.20.2 for derating factors applicable to dielectric and current values.



Configurations Sample



Features

Interlocking Systems

SecoGear is designed with a number of interlocking systems to help prevent mis-operation:

- The circuit breaker can only be moved from test to connect position and vice versa when the circuit breaker is in the Open position.
- The secondary disconnect plug can only be inserted or removed when the circuit breaker is in the test position.
- The circuit breaker cannot be closed when it is in between the connected, test or disconnect positions.
- When the circuit breaker is moved from the connect position, the metal shutters will close automatically.
- For our Arc Resistant design, the circuit breaker can only be racked-in while the Breaker Compartment door is closed.
- For our Arc Resistant design, the Breaker Compartment door can only be opened when the circuit breaker is in test position.

Description of Interlock System	Key Condition
Functional truck racking-out lock	Key will be free when the truck is in the connected position
	Key will be trapped when the truck is in the disconnected/test position
Functional truck racking-out lock	Key will be free when the truck is in the disconnected/test position
	Key will be trapped when the truck is in the connected position

Optional Features

Emergency Pushbutton

- Provides a mechanical trip of the circuit breaker with the apparatus door closed. It is typically used to open the breaker in case of loss of auxiliary voltage.

Mechanical Interlocks

Optional safety interlocks for increased operational safety:

- Shutter Interlock: Prevents manual activation of the shutters, which will be only activated by the apparatus truck.

Key Interlocks

Key interlocks provide the capability to have operation logic between multiple SecoGear lineups or upstream/downstream elements of the system. Available selections include Castell, Fortress and Ronis commercial brands.

- VCB Key Interlock: Up to two locks are available for the VCB condition. Either one or both of the two locks can be configured, providing multiple possible combinations for the condition of the key, trapped or released, when the VCB is in test position.

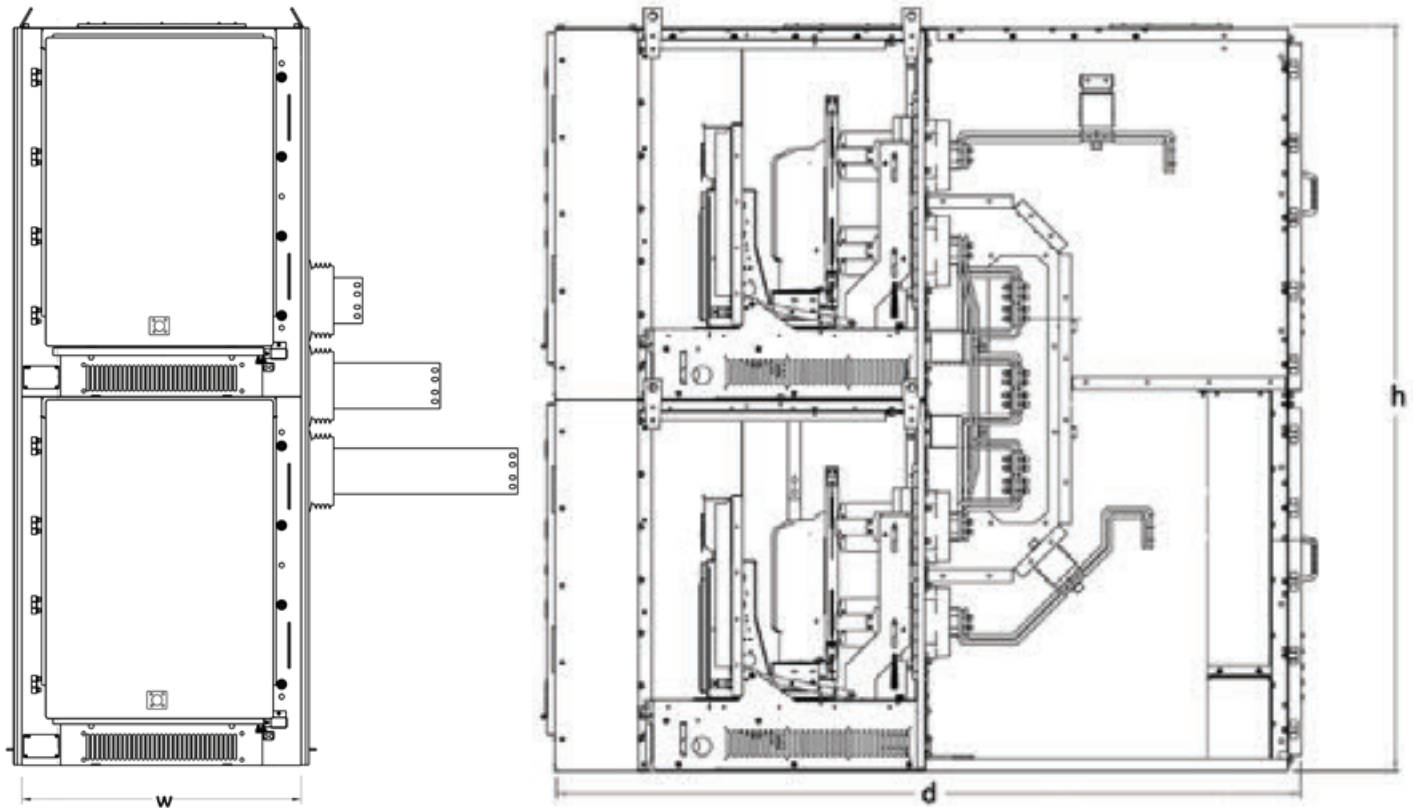
Technical Data

SecoGear Characteristics

Specification		1200/31.5	1200/40	2000/40
Rated Continuous Current (A)		1200	1200	2000
Rated Maximum Voltage (V)		4.76/8.25/15	4.76/8.25/15	4.76/8.25/15
Rated Power Frequency (1 min)	Phase to Phase and to Earth (kV)	36	36	36
	Between Isolating Distance (kV)	36	36	36
Rated Lightning Impulse (1.2/50 μ s)	Phase to Phase and to Earth (kV)	95	95	95
	Between Isolating Distance (kV)	95	95	95
Rated Frequency (Hz)		50/60	50/60	50/60
Rated Short Time Withstand (kA)		31.5	40	40
Rated Peak Value Withstand Current (kAp)		82	104	104
Rated Duration Time for Short Circuits (s)		2	2	2
Breaker Weight (lbs)		375 (170 kg)	419 (190 kg)	485 (220 kg)
Dimensions – inches				
Weight (lbs) ¹		2095 (950 kg)	2183 (990 kg)	2866 (1300 kg)
Height – inches (h)		95 (2413 mm)	95 (2413 mm)	95 (2413 mm)
Width – inches (w)		36 (914 mm)	36 (914 mm)	36 (914 mm)
Depth – inches (d)		94 (2387 mm)	94 (2387 mm)	94 (2387 mm)

¹ SecoGear weights for 1200A and 2000A breakers are shown with two-high breaker configuration.

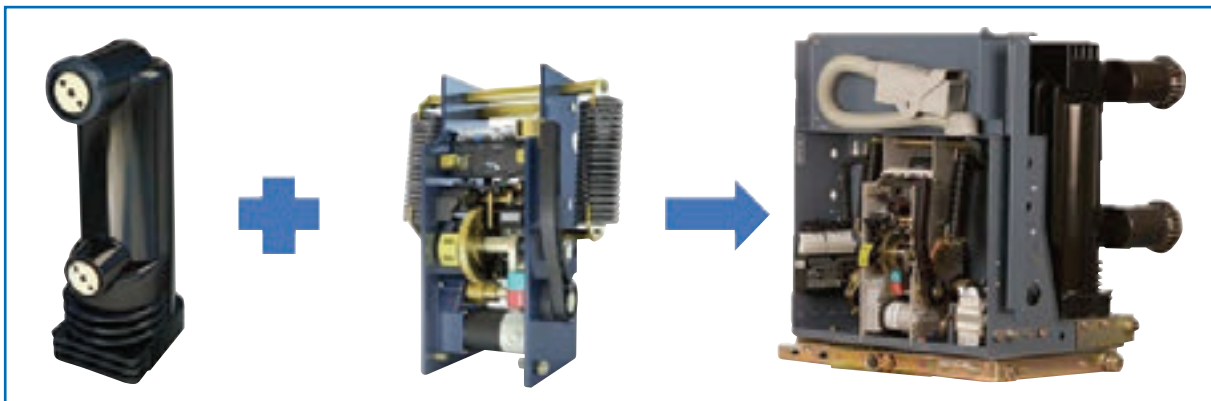
Side/Front View



SecoVac Embedded Pole Vacuum Circuit Breaker

Reliability and High Performance in a Compact Package

Modular Design



Features and Benefits

- Environmentally friendly design
- Conformance to the current IEEE standards
- Numerous safety features for maximum personnel protection
- User friendly operation with easy access and minimal inspection required
- Compact and cost effective
- Flexible with a full line of accessories



Applications

- Serving global 50 Hz and 60 Hz systems
- All segments of the electrical industry: industrial, commercial, utility, and mining
- Protecting transformers, capacitor banks, motors, busbar sections and cables
- Contact GE sales office for special environment conditions: shock, vibration and high ambient temperature



Operation Tool Rack handle for truck

Circuit Breaker Characteristics

Specifications	1200/31.5	1240/40	2000/40
Rated voltage (A)	1200	1200	2000
Rated voltage (kV)	4.76 / 8.25 / 15	4.76 / 8.25 / 15	4.76 / 8.25 / 15
Rated power frequency (1min) (kV)	36	36	36
Rated lightning frequency impulse withstand voltage (kVp)	95	95	95
Rated frequency (Hz)	50/60	50/60	50/60
Rated short time withstand (kA)	31.5	40	40
Percentage of DC component	50%	50%	50%
Rated peak value withstand current (kAp)	82	104	104
Rated duration time for short-circuit (s)	2	2	2

Primary Circuit Resistance of SecoVac

Item	Unit	Acceptable Value	
Rated current	A	1250~1600	2000~4000
Resistance	$\mu\Omega$	≤ 45	≤ 25

Coil Characteristics

Type Name (GE)	Rated Voltage (V)	Resistance Value (Ω)	Rated Current (A)	Inrush Current (A)	Maximum Power (W)
P-C6X	48 Vdc	3.1	15.48	92.9	743.23
P-C8X	125 Vdc	45	2.78	16.67	347.22
P-CCX	250 Vdc	320	0.72-0.75	4.32-4.5	165.89-180
P-CAX	120 Vac	45	2.78	16.67	347.22
P-CBX	240 Vac	320	0.72-0.75	4.32-4.5	165.89-180

Charging Motor Characteristics

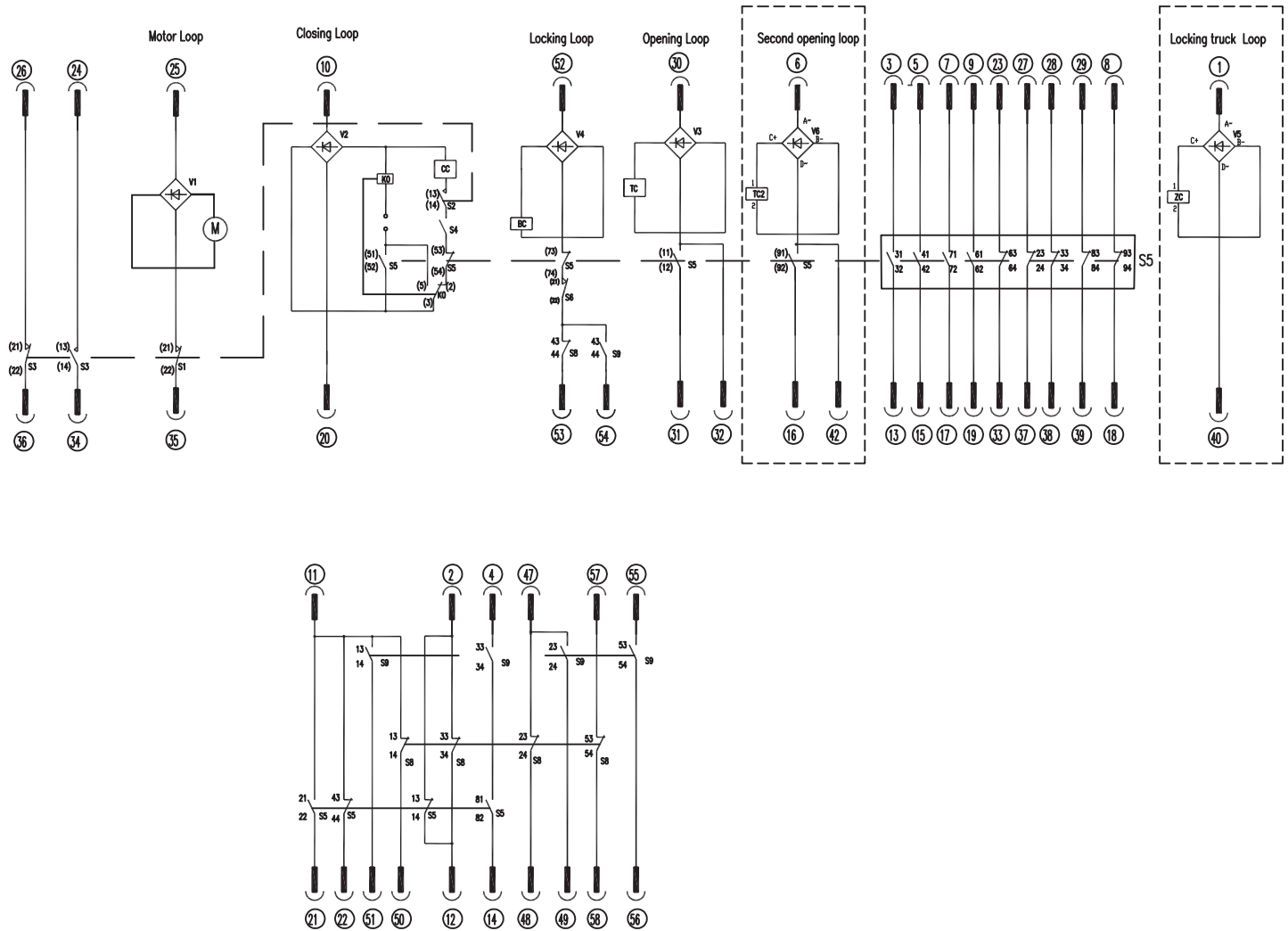
Rated Voltage (V)	Normal Operation Voltage Range (%)	Charging Time at Rated Voltage (s)	Input Power (W)
48 VDC	85-110	<15	150
125 VDC	85-110	<15	150
250 VDC	85-110	<15	150
120 VAC	85-110	<15	150
240 VAC	85-110	<15	150

MVA to kA Conversion

MVA	kA
4.16kV-250MVA	40kA
4.16kV-350MVA	50kA
4.16kV-450MVA	63kA
7.2kV-500MVA	50kA
7.2kV-750MVA	63kA
13.8kV-500MVA	25kA
13.8kV-750MVA	40kA
13.8kV-1000MVA	50kA
13.8kV-1500MVA	63kA

SecoVac Vacuum Circuit Breaker

Internal Wiring Diagram



KO: Anti-pumping relay (optional)	CC: Closing coil	SC: Over current release coil (optional)
S4: Electromagnet for locking's auxiliary switch	M: Charging motor	BC: Electromagnet for locking
S5: Auxiliary switch	V1-V4: Rectifier	ZC: Electromagnet for locking truck (optional)
S1-S3: Energy storing limit switch	TC: Opening coil	S6: Limit switch for trip free

Notes:

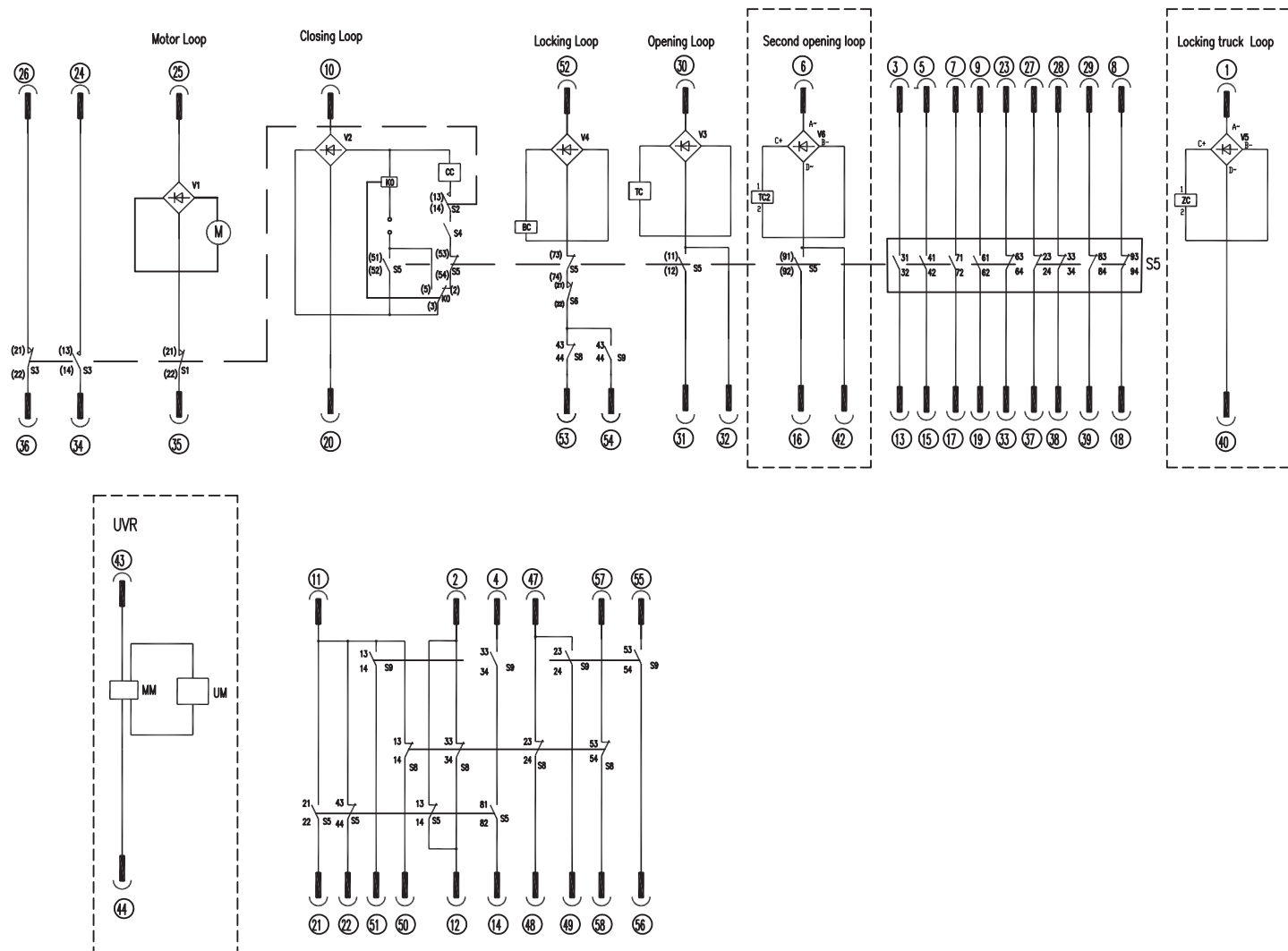
¹ This wiring diagram describes that a breaker is open, racked to test position with spring in discharge state.

² The polarity in dashed frame should be connected to common DC voltage terminal.

³ Rectifier will be removed if DC supply voltage is being used.

SecoVac Vacuum Circuit Breaker

Internal Wiring Diagram (UVR)



KO: Anti-pumping relay (optional)	TC: Opening coil	SC: Over current release coil (optional)
S4: Electromagnet for locking's auxiliary switch	M: Charging motor	BC: Electromagnet for locking
S5: Auxiliary switch	CC: Closing coil	ZC: Electromagnet for locking truck (optional)
S1-S3: Energy storing limit switch	V1-V4: Rectifier	S6: Limit switch for trip free

Notes:

¹ This wiring diagram describes that a breaker is open, racked to test position with spring in discharge state.

² The polarity in dashed frame should be connected to common DC voltage terminal..

³ Rectifier will be removed if DC supply voltage is being used.

Components and Controls



Ring Type CT

Frequency of 50-400 Hz, and insulation level of 0.6 kV, BIL 10 kV full wave. The current transformers are designed to meet or exceed the requirements of ANSI/IEEE C57.13.

For 1200/2000A, GE ITI CT 780 & 781 (standard accuracy) and 785 & 786 (high accuracy), for 3000A, GE ITI CT 680, 681, 685 & 686. For detailed information refer to GE ITI technical specs.



Indoor Voltage Transformer

Frequency of 60 Hz, maximum system voltage of 15.5kV, BIL 110 kV and thermal ratings of 1500 VA at 30°C amb, 1000 VA at 55°C amb.

GE ITI VT PTG5-1-110, PTG5-2-110, PTW5-1-110, PTW5-2-110.

For detailed information refer to GE ITI technical specs.



LV Components

GE Industrial Solutions offers additional LV components for the completion of the switchgear control compartment, such as the voltage presence indicator display and a complete range of LV modular and control products.



Multilin Protection and Control Solutions

GE Grid Solutions offers our Multilin protection and control solutions. From Generators to transmission lines to motors and beyond, we help ensure dependable, safe power worldwide.



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Seco Cube



Seco RMU



SecoGear



SecoBloc



SecoVac

SecoVac Reference Publication

SecoVac – Instruction Manual PUB#DEH-50001

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