



DEA-614 Brochure

SecoVac^{*} R Retrofill

5kV-15kV Replacement Vacuum
Circuit Breakers: The Next Generation of
Reliability, Performance and Sustainability



GE

GE is a diversified organization covering myriad market segments, including infrastructure and finance. From energy, water, transportation and health to access to money and information, GE serves customers in more than 100 countries and employs more than 300,000 people worldwide.

The company traces its beginnings from Thomas A. Edison, who established the Edison Electric Light Company in 1878. In 1892, a merger of Edison General Electric Company and Thomson-Houston Electric Company created the General Electric Company. GE is the only company listed in the Dow Jones Industrial Index today that was also included in the original index in 1896.

Industrial Solutions

Industrial Solutions, a GE heritage business, is leading the future of electrification with advanced technologies that protect and control the distribution of electricity throughout a facility's infrastructure. We provide customers across various industries with end-to-end product and service solutions that ensure the reliability and protection of the electrical infrastructure; from the substation, to a facility's critical equipment, and all the power technologies in between.

Honors



2013 World's Most Admired Companies



2012 Best Global Brand

FINANCIAL TIMES

2010 World's Most Respected Companies



2010 World's Most Innovative Companies

BARRON'S

2012 World's Most Respected Companies

SecoVac R Retrofill

SecoVac R breakers are designed and manufactured with advanced technology and have been comprehensively and successfully type-tested. Designed to easily replace vacuum circuit breakers in existing switchgear, it is a streamlined solution with front access mechanism design for easier in-the-field maintenance. SecoVac R Retrofill breakers feature smart, reliable design, and are fully tested and GE-manufactured. They are rated for 5kV and 15kV applications, 1200A to 2000A and up to 40kA short circuit rating. The SecoVac R Retrofill is a direct replacement for existing vacuum circuit breakers.



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

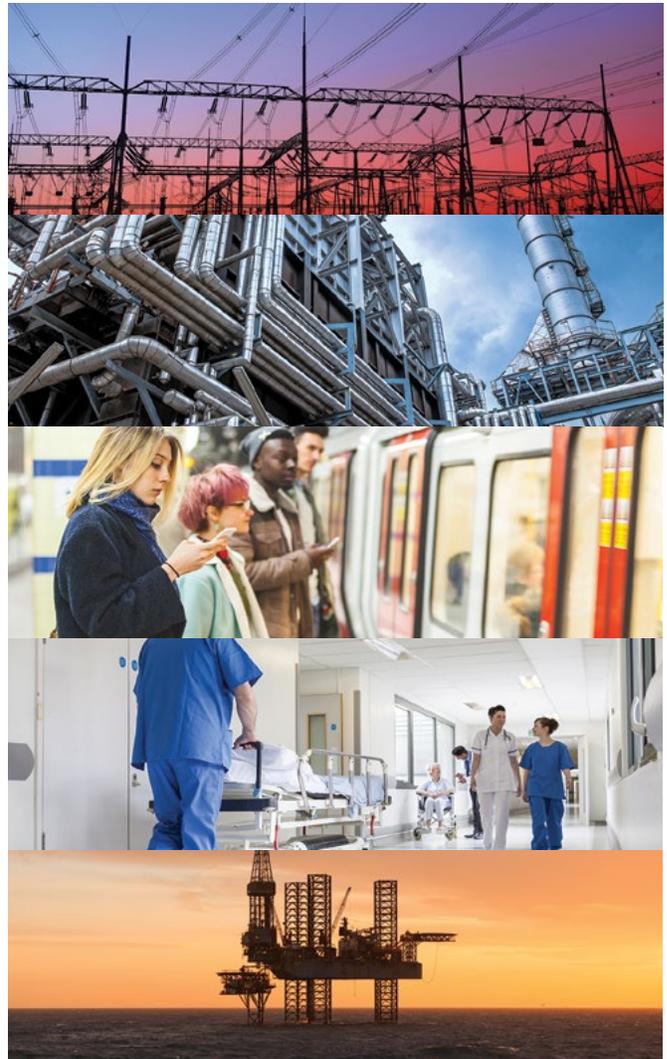
- Airports
- Ports
- Railways
- Underground Transportation

Marine

- Drilling & Exploration
- Merchant
- Cruise
- FPSO
- Naval

Services

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



SecoVac R Vacuum Circuit Breaker

4.76kV, 8.25kV & 15kV

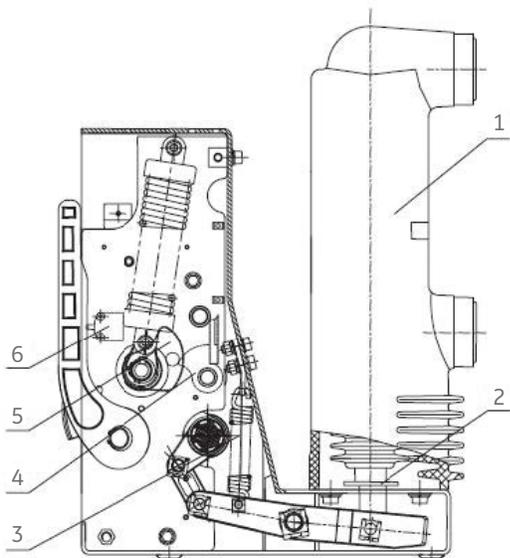
Safety, Enhanced Reliability and High Performance in a Compact Package

SecoVac R Offers Modular Design



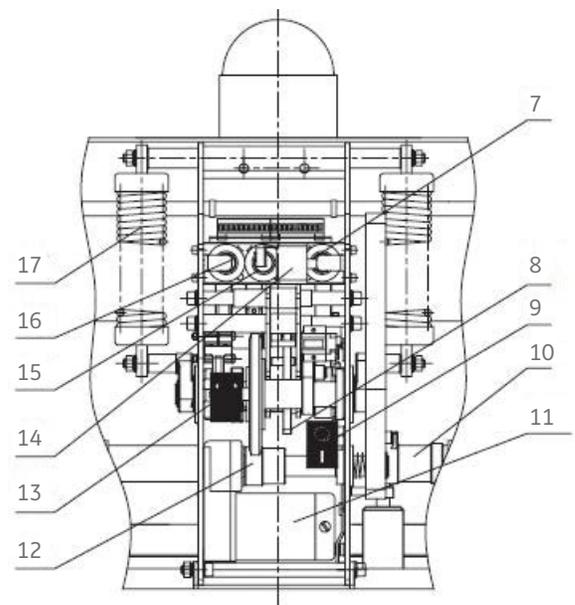
Features

- Direct replacement retrofit
- Designed with fewer parts to reduce equipment downtime and simplify maintenance
- Utilizes the latest design of embedded pole SecoVac Vacuum Circuit Breakers
- Tested in accordance with IEEE standards
- Numerous safety features for maximum personnel protection
- User friendly operation with easy access and minimal inspection required



- | | |
|------------------|-------------------|
| 1 Embedded Pole | 4 Holder |
| 2 Insulating Rod | 5 Cam |
| 3 Opening Spring | 6 Position Switch |

Figure 1 Cut-Away Side View of Breaker



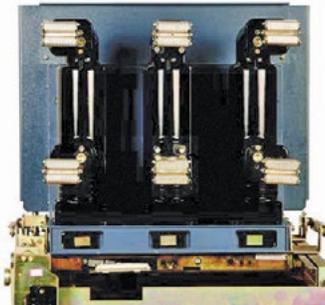
- | | |
|------------------------|-------------------------|
| 7 Closing Coil | 13 Charging Indicator |
| 8 Holder | 14 Lock Electromagnet |
| 9 Close/open Indicator | 15 Over-current Release |
| 10 Main Shaft | 16 Tripping Coil |
| 11 Motor | 17 Closing Spring |
| 12 Output Shaft | |

Figure 2 Cut-Away Front View of Breaker Mechanism



Built to the Highest Quality Standards

SecoVac R is a fast-acting, 3-cycle breaker utilizing GE's latest SecoVac vacuum circuit breaker. Using GE's state-of-the-art technology, and manufactured in accordance with the highest quality standards, our engineers have integrated core technologies. These technologies such as circuit breaker and mechanism design, vacuum arc control technology, insulation technology and electrical field control and analysis combine to build a highly reliable and compact system. SecoVac R benefits from GE's best medium voltage switch-gear design practices.



Construction Type

SecoVac R breaker is designed and constructed to meet the requirements of IEEE C37.20.2 for indoor installations. Primary disconnect finger cluster is built of silver plated copper and tested for continuous and short time current ratings.

Roll-In Option

A roll-in breaker designed for use in the lower compartment of indoor switchgear or outdoor walk-in is available in all breaker ratings. The roll-in feature eliminates the need for a lift truck and reduces the required front aisle space.

SecoVac R Circuit Breaker

The SecoVac R vacuum circuit breaker has been tested to the 2014 IEEE standards, including continuous current, short circuit and short-time current, capacitive switching and endurance.

SecoVac R Mechanism

The SecoVac R vacuum circuit breaker utilizes a compact, spring-charged operating mechanism. The open and close mechanisms are combined into a single, small, easily replaceable module. Type testing results demonstrate SecoVac R will operate well beyond the IEEE standards requirement of 10,000 operations.

Safety and Reliability

SecoVac R is designed with a number of interlocking systems to help prevent misoperation:

- The circuit breakers can only be moved from test to connect position and vice versa with the circuit breaker opened.
- The circuit breaker cannot be closed when it is in-between the connected, test or disconnected positions.
- A positive mechanical stop is provided when the breaker reaches the CONNECT or TEST/DISCONNECT positions.
- When the circuit breaker is moved from the connect position, the metal shutters will close automatically.

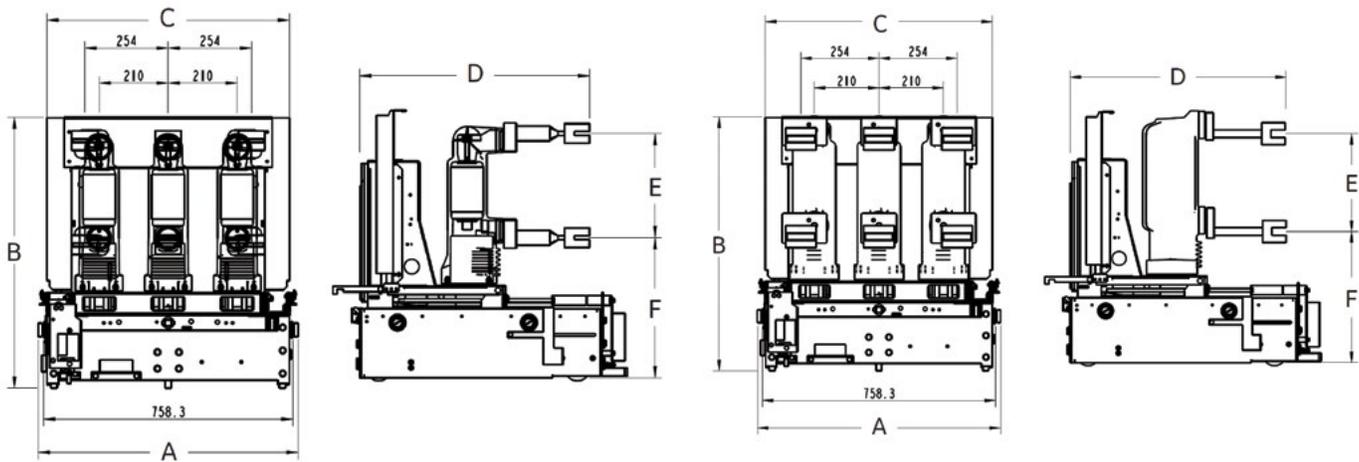
Technical Data

SPECIFICATION	1200 / 20	1200 / 25	1200 / 31.5	1200 / 40	2000 / 40	3000 / 40 [†]
Rated Continuous Current (A)	1200	1200	1200	1200	2000	3000
Rated Maximum Voltage (kV)	15	15	4.76 / 8.25 / 15	4.76 / 8.25 / 15	4.76 / 8.25 / 15	
Rated Power Frequency (1 min)	36	36	19 / 36 / 36	19 / 36 / 36	19 / 36 / 36	
Rated Lighting Impulse (1.2/50µs)	95	95	60 / 95 / 95	60 / 95 / 95	60 / 95 / 95	
Rated Frequency (Hz)	50/60	50/60	50/60	50/60	50/60	
Rated Short Time Withstand (kA)	20	25	31.5	40	40	
Rated Peak Value Withstand Current (kAp)	52	65	82	104	104	
Rated Duration Time for Short-Circuit (s)	2	2	2	2	2	

DIMENSIONS	1200 / 20	1200 / 25	1200 / 31.5	1200 / 40	2000 / 40	3000 / 40 [†]
Weight (kg/lbs)	210 / 463	210 / 463	210 / 463	210 / 463	270 / 596	
Phase to phase Distance (in)	10	10	10	10	10	
A (in)	31.1	31.1	31.1	31.1	31.1	
B (in)	32.5	32.5	32.5	32.5	32.5	
C (in)	29.1	29.1	29.1	29.1	29.1	
D (in)	27.6	27.6	27.6	27.6	27.6	
E (in)	12.5	12.5	12.5	12.5	12.5	
F (in)	16.8	16.8	16.8	16.8	16.8	

[†]Available 2Q16

Rear/Side View



1200A/31.5kA or 1200A/40kA

2000A/40kA

Normal Operating Conditions

Temperature

- Maximum Ambient: +40°C
- Minimum Ambient: -30°C

Humidity

- Maximum Relative: 95%

Altitude

- Maximum: 1000m a.s.l.
- High Altitude: At altitudes above 1000m, consult IEEE C37.20.2 for derating

Storage Conditions

In order to retain all of the functional unit's qualities when stored for prolonged periods, GE recommends that the equipment be stored in its original packaging, in dry conditions sheltered from the sun and rain between -15°C and +40°C.

Circuit Breaker Characteristics

Primary Circuit Resistance of SecoVac R

SPECIFICATION	1200 / 20	ACCEPTABLE VALUE	
Rated Current	A	1250~1600	2000~4000
Resistance	$\mu\Omega$	≤ 45	≤ 25

Coil Characteristics

TYPE NAME (GE)	RATED VOLTAGE	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

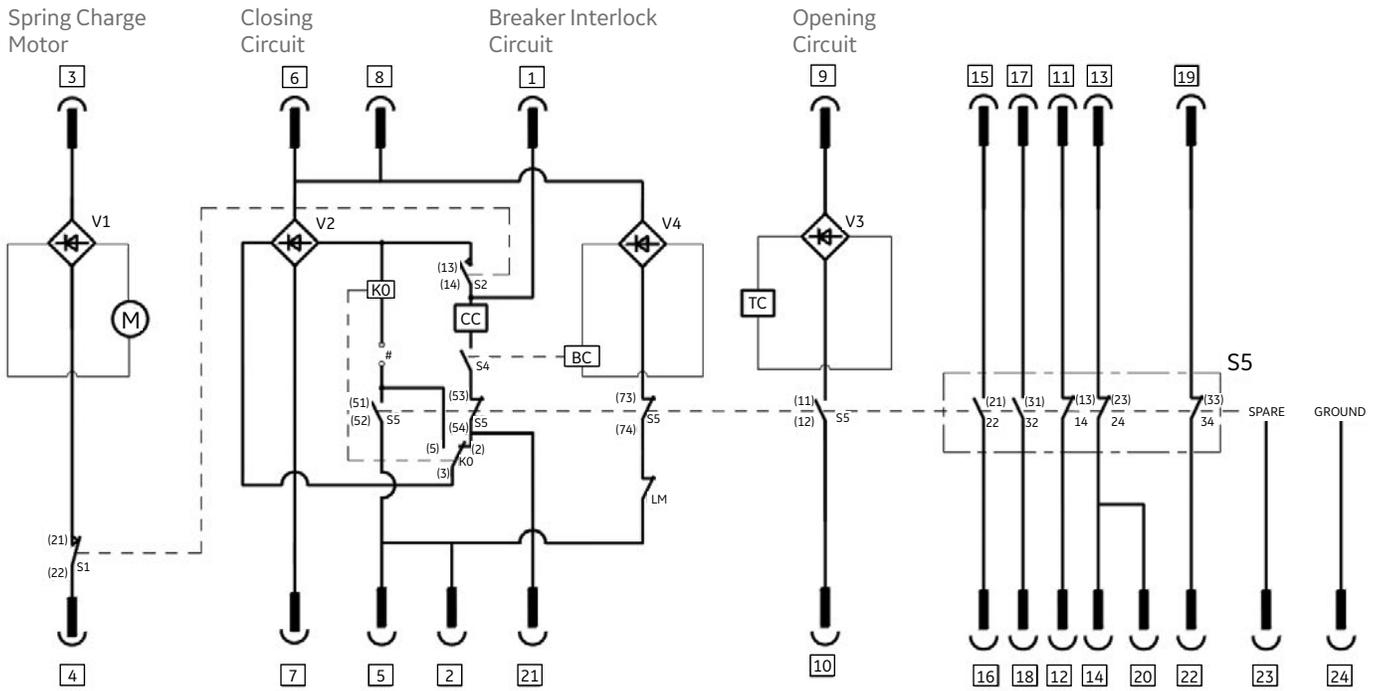
Motor Characteristics

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-785MVA	=	63kA
13.8kV-500MVA	=	25kA
13.8kV-750MVA	=	40kA
13.8kV-1000MVA	=	50kA
13.8kV-1500MVA	=	63kA

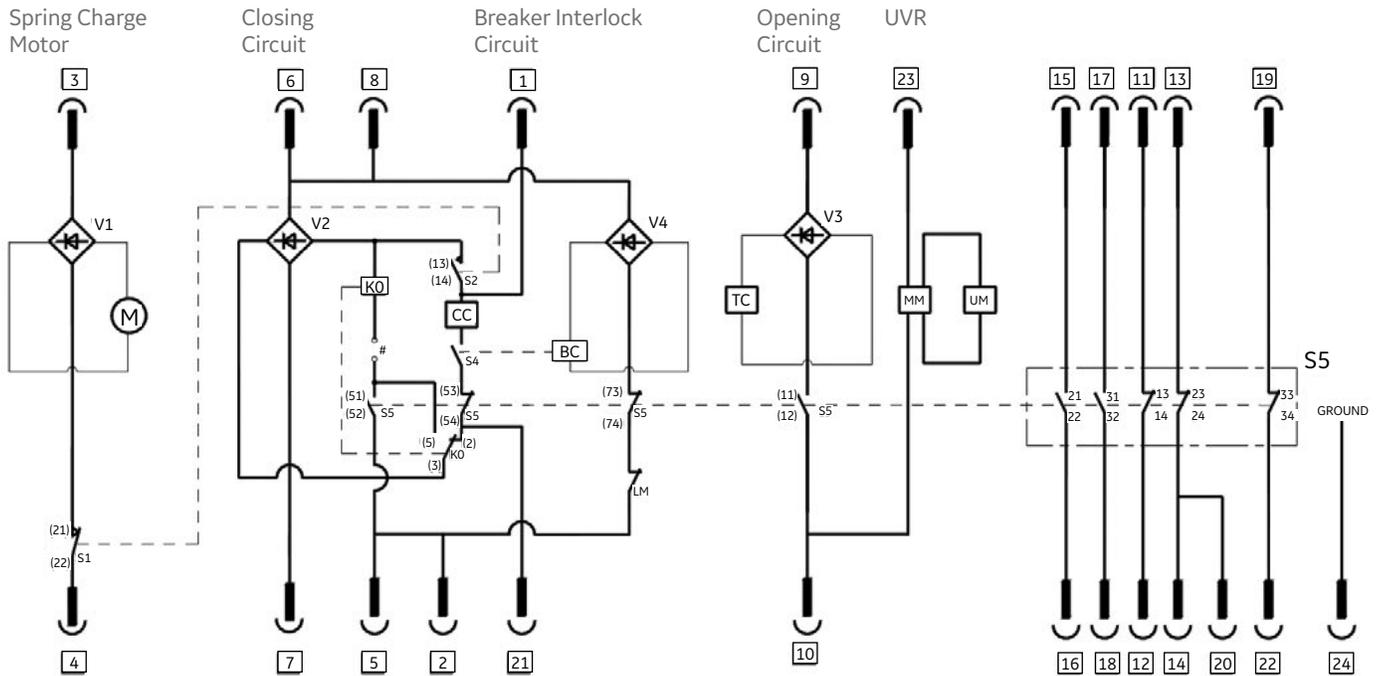
SecoVac R Vacuum Circuit Breaker Internal Wiring Diagram



- KO: Anti-pumping Relay
- S1~S2: Energy Storing Travel Switch
- S4: Electromagnet for Locking's Auxiliary Switch
- S5: Auxiliary Switch
- BC: Electromagnet for Locking (Optional)
- TC: Opening Coil

- CC: Closing Coil
- V1~V4: Rectifier
- M: Motor

SecoVac R Vacuum Circuit Breaker Internal Wiring Diagram (UVR)



- | | | | | | |
|--------|--|-----|--|--------|-----------|
| KO: | Anti-pumping Relay | S5: | Auxiliary Switch | UM: | UVR |
| S1~S2: | Energy Storing Travel Switch | BC: | Electromagnet for Locking's (Optional) | V1~V4: | Rectifier |
| S4: | Electromagnet for Locking's Auxiliary Switch | TC: | Opening Coil | M: | Motor |
| MM: | UVR PCB (Optional) | CC: | Closing Coil | | |

SecoVac R Retrofill Checklist

SECOVAC R RETROFIT	DEVICETYPE	RATED CURRENT	VOLTAGE - NOMINAL & MAXIMUM	OPEN COIL	CLOSE COIL	CHARGING MOTOR	CAP SWITCHING	CLOSE INTERLOCK	TRUCK INTERLOCK	UNDER-VOLTAGE	SECOND OPEN COIL	MOTORIZED RACK IN/OUT	SPECIAL WIRING	LABEL & REPORT REQUIREMENTS	BREAKER SPECIALS	MEANING OF CODE
SR																SecoVac R Retrofit Breaker
	P															PowerVac Retrofit
		0														1200A
		1														2000A
		2														3000A
			A													4.16kV - 250MVA, 58kA C&L
		1														4.16kV - 250MVA, 78kA C&L
			B													4.16kV - 350MVA
			C													4.16kV - 450MVA
			D													7.2kV - 500MVA, 66kA C&L
		2														7.2kV - 500MVA, 78kA C&L
			E													7.2kV - 785MVA
			F													13.8kV - 500MVA, 37kA C&L
		3														13.8kV - 500MVA, 58kA C&L
			G													13.8kV - 750MVA, 58kA C&L
		4														13.8kV - 750MVA, 77kA C&L
			H													13.8kV - 1000MVA
			J													13.8kV - 1500MVA
			K													4.76kV - 31.5kA
			L													4.76kV - 40kA
			M													4.76kV - 50kA
			N													4.76kV - 63kA
			P													8.25kV - 40kA
			Q													8.25kV - 50kA
			R													8.25kV - 63kA
			S													15.0kV - 20kA
			T													15.0kV - 25kA
			W													15.0kV - 31.5kA
			Y													15.0kV - 40kA
			Z													15.0kV - 50kA
		5														15.0kV - 63kA
							0		0	0	0	0	0	0	0	None
							1									Yes
				1	1	1		1	1	1	1					DC48V
				2	2	2		2	2	2	2	A				AC/DC120-125V
				3	3	3		3	3	3	3	B				AC/DC240V-250V
				9							9					DC340
												1				AC/DC110V
												2				AC/DC220V
													1			Seismic
													2			UL Label
													3			Certified Test Reports
													4			Seismic & UL Label
													5			Seismic & Test Reports
													6			Seismic & UL Label & Test Reports
													7			UL Label & Test Reports
												*		*		Consult Factory

Information Required for PowerVac Retrofill Application

Complete information required for quotation/order entry. Information required to order a replacement breaker is found on the breaker and equipment nameplates. The below information should be filled out to match the breaker and equipment nameplates and attached for quotation. A copy of the in-field original breaker connection drawing should be reviewed by the customer to note any field modifications to the wiring. Connection and/or wiring changes should be forwarded with the breaker and equipment information.

Customer Name: _____ Fax: _____ Email: _____
Site Address: Street: _____ GE Shop Order Number (in known) _____
City: _____ State: _____ Zip: _____ GE Requisition Number (in known) _____
Contact: Name: _____ Phone: _____

Breaker Nameplate Info (fill out below or attach picture) for each different rating to be replaced:

Type: _____ Set. No. _____
Rated Max Voltage _____ kV Rated Amp _____ A
HZ _____ Impulse withstand _____ kV Int Time _____ CYC
Rated Short Circuit Amps _____ kA Rated Voltage Range Factor _____ Close & Latch Cap. Amp _____ kA
Close Coil _____ Volts _____ Closing Amps _____ Volt Range _____
Trip Coil-1 _____ Volts _____ Closing Amps _____ Volt Range _____
Trip Coil-2 _____ Volts _____ Closing Amps _____ Volt Range _____
Charging Motor _____ Volts _____ HZ _____
Connection Diagram _____ WT _____ Mech Type _____ Date MFG _____
Vacuum Interrupter _____
Additional Details: _____

Actual System Voltage _____ kV

Have any electrical or mechanical modifications been performed on this equipment since installation? Yes No
If yes, please detail.

Are all breakers or only specific breakers to be replaced? Please identify.

To View the Entire Medium Voltage Seco Product Offering Please Visit: www.geindustrial.com

Middle East

United Arab Emirates

Injaz Building, 3rd Floor
Dubai Internet City, PO Box 11549, Dubai
T: +971 4 4546912



Seco Cube

Latin America

Latin America Headquarters

790 N.W. 107th Avenue, Suite 200,
Miami, FL 33172 USA
T: +1 305 551 5155

Chile

Vespucio Norte, Avenida Presidente Eduardo Frei
Montalva 6001, Edificio N° 66
Comuna: Conchalí, Sector el Cortijo, Santiago
T: (56 2) 928-4700

Mexico

Av. Churubusco 3900 Nte, Col. Industrial Benito Juárez
Monterrey, N.L. 64517
T: (01-800) 800-1968



Seco RMU

North America

USA

41 Woodford Avenue
Plainville, CT 06062
T: +1 800-431-7867

Canada

2300 Meadowvale Blvd.
Mississauga, ON L5N 5P9
T: 1-800-GE1-STOP



Seco Gear



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Imagination at work

GE
41 Woodford Avenue
Plainville, CT 06062
www.geindustrial.com

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