



# Co.S.Mo.S.

## Compact Substation Module Solutions A Highly Competitive Solution

Smarter, more compact, more reliable and more environmentally-friendly solutions, this is the trend. The energy transition to a more sustainable future is happening now.

### The Smart Revolution

The global community seems to have agreed on a smart choice, a common denominator: smarten up our worldwide grid assets rather than rebuilding these from scratch, simply by injecting the forces driving the smart revolution: knowledge, know-how and information/digital technology.

### Focus on Smart Grids

GE's expertise continuously drives the changes in the power grid. Our agility enables us to find solutions to any challenge for our grid customers. We are shaping the power grid to impulse the energy transition and bring clean and reliable energy to everyone, anywhere.

### The Simplicity Revolution

The success of free enterprise depends not only on what we decide to do, but especially on what we decide not to do. Enhance the value and cut the inefficiency. There's huge value to be added by just conquering costly complexity. During this process we rediscover Time (how to put things one after the other) and Space (how to put things side by side), with huge benefits for the whole value chain. The environment deserves special dedicated care, as it is no longer an object of conquest but a partner who appreciates integrity.

## Benefit from

- A unique supplier
- Perfectly integrated products
- Guaranteed quality
- Environmentally-friendly solutions
- Focused experts
- Exclusive know-how
- Next door presence



## Same Elements

## Different Results

### Simplify

There are many ways to go from problem to solution, but the simplest way makes the true difference.

A pure result of R&D activity, Co.S.Mo.S. combines the benefits of five separate elements already tested in hundreds of grids worldwide in conditions of severe climate and competition, thus unleashing enormous potential for our customers and partners in the form of highly competitive benefits.

- The value of the separate components
- The value of their combination
- The value of cutting the fat from the grid

The simplicity of this solution consists of cutting the unproductive time.

Ex Works.

We are aware that our customers come to the market searching for the value, for the benefits in what we offer. Our R&D started with the benefit in mind.



*Circuit breakers*



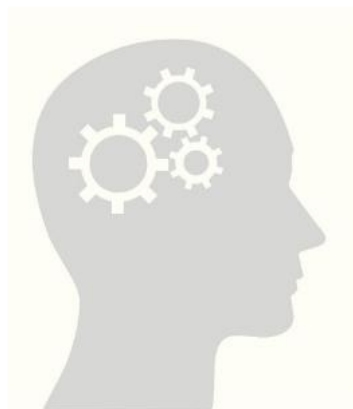
*Instrument transformers*



*Disconnectors*



*Earthing switches*



*Knowledge*

## Stand Alone or Stand Together?

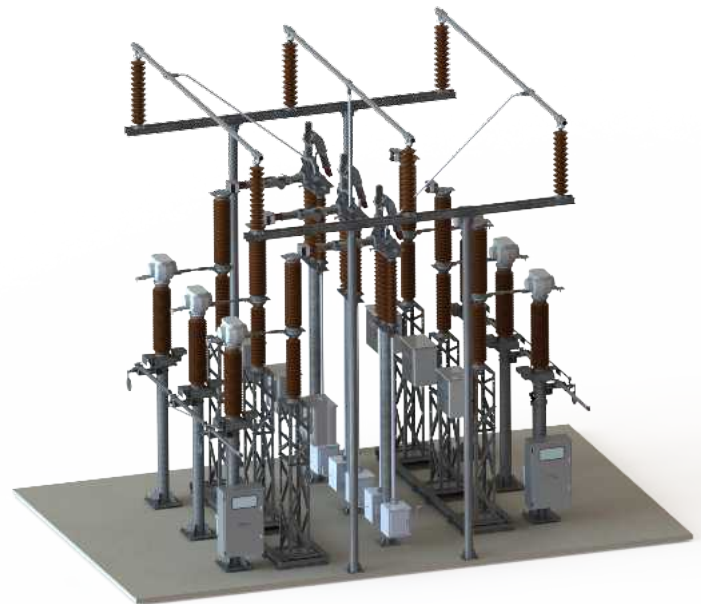
### Co.S.Mo.S - The Best Way to Make Them Fit Together

Thanks to the complete range of primary products for substations, GE is able to co-ordinate performance and dimensions that simplify the complete construction of the electrical substation guaranteeing reliability and easy maintenance.

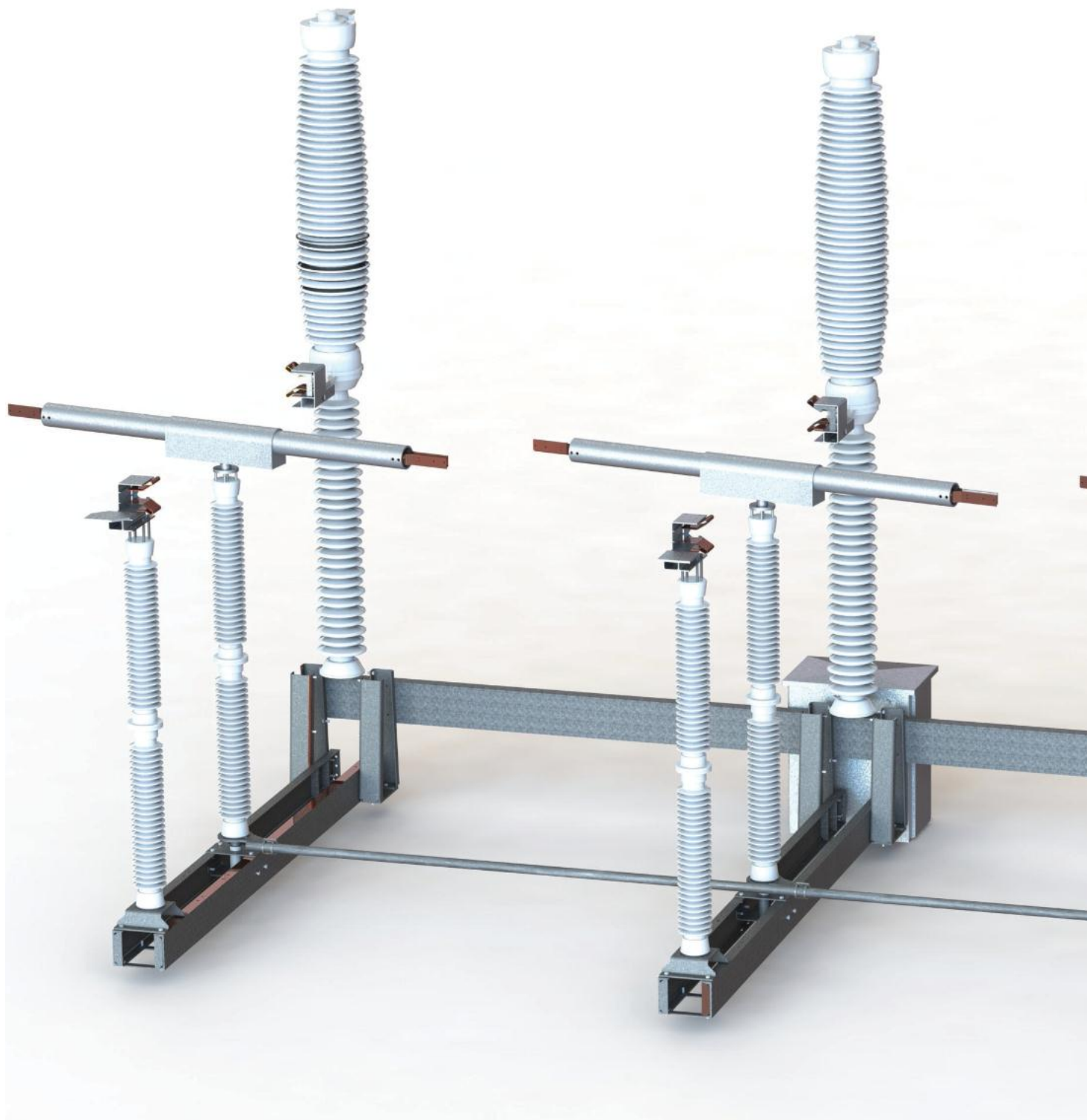
#### Co.S.Mo.S. - Why?

The compact module is a complete substation and includes all necessary functions:

- Trolley mounted circuit breaker with spring operating mechanism (single or three pole operation)
- Integrated disconnecter
- Multi-core current transformers
- Multi-secondary voltage transformers (if required)
- Integrated earthing switch
- Surge arrester (if required)
- Pre-wired and pre-tested control and protection system
- Bushings (if required)



## Co.S.Mo.S. - A Complete Substation





The module, composed of top range products tested and installed on the main electrical networks, has been specifically developed for air insulated high voltage substations and combines the circuit breaker, instrument transformer, disconnector and earthing switch functions.

Co.S.Mo.S.  
- A Highly Competitive Substation

## Compact Module with Withdrawable Circuit Breaker

With the disconnecter in the open position, the circuit breaker can be isolated from the main circuit. If required, the poles can be trolley mounted and the circuit breaker easily removed through disconnectable contacts between poles and current transformers.

### Module Structure

The circuit breaker (single or three pole operation) is of the GL type with trolley mounted spring mechanism which allows easy and quick disconnection and extraction as and when required for the scheduled maintenance or replacement of the poles. The disconnect operation takes place via an integrated Horizontal Semi-Pantograph Disconnector (SPO model) which is operated by a motor operating mechanism.

The multi-core current transformer is connected to the circuit breaker via disconnectable contacts. An integrated earthing switch operated by a manual or motor operating mechanism allows the module to be earthed thus allowing the voltage of the main busbar to be maintained.

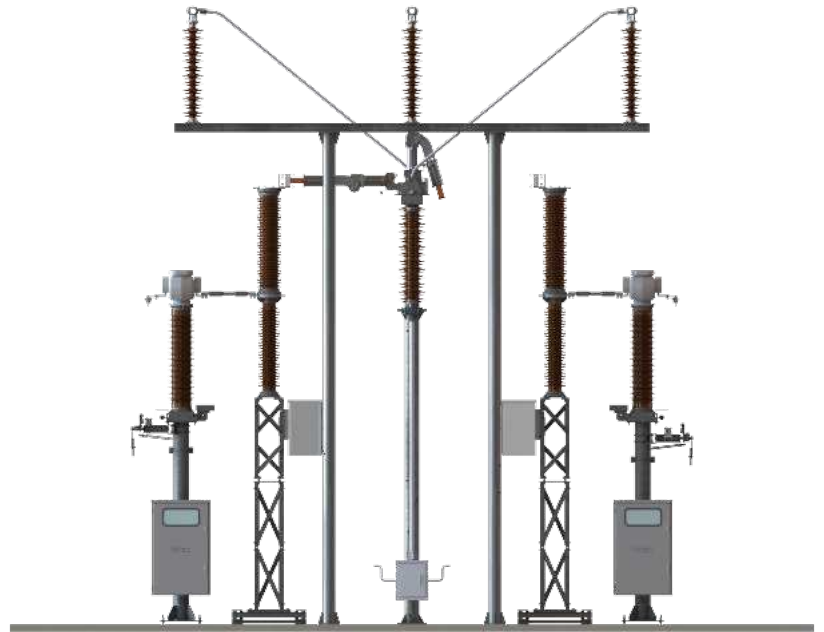
### Key Features / Benefits

- Cost effective: overall cost reduction
- Easy maintenance and inspection
- Minimum environmental impact (50% less compared with a conventional outdoor installation)
- Only one contract (project management is not necessary)
- Fully type tested as a whole
- Less land required for the switchgear yard
- Short cable-ways
- Reduced erection time
- High flexibility in terms of circuit diagram as well as layout
- Control and protection system pre-wired and pre-tested in factory before shipment
- Minimize the duration of possible outages
- Appropriate earthing system for the whole bay
- Integrated control and protection system



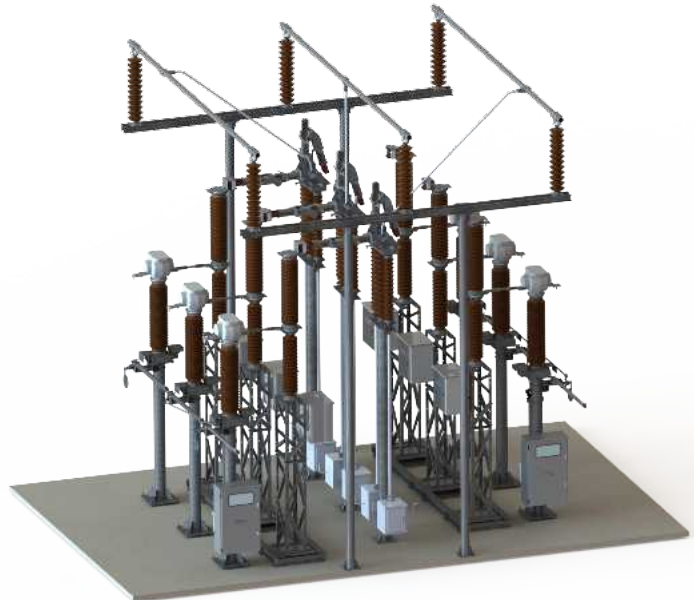
#### Insert Module

Busbars are energised by both sides for normal functioning conditions.



#### Partially Isolated Module

Busbars are energised by one side to permit maintenance or replacement of the disconnected pole.



## Compact Design

The Greatest Solution for the Smallest Places

## Compact Module with Rotating and Withdrawable Circuit Breaker

The circuit breaker can rotate so that it can be isolated from the main circuit. If required, the poles can be trolley-mounted to permit the easy removal of the circuit breaker.

### Module Structure

The circuit breaker is of the live tank type incorporating the latest interrupter chamber technology equipped with the double motion principle up to 145 kV and high interrupting ratings, allowing application on a wide variety of systems. The disconnect operation takes place via the rotation of the centre insulator or double side break disconnect switch. In this way the circuit breaker remains isolated from the main circuit.



### Key Features/Benefits

- Pre-fabricated bays
- Pre-fabricated and self-supporting busbars
- Mobility
- Minimum environmental impact
- Fully type tested as a whole
- Flexibility in terms of circuit diagramme as well as layout
- Available up to 170 kV rated voltage
- Suitable for both indoor and outdoor applications
- Control and protection system pre-wired and pre-tested in factory before shipment
- Appropriate design of the earthing grid in order to obtain global consistency of the substation as a whole



## Technical Specifications

Rated voltage	kV	145/170
Rated power frequency withstand voltage	<ul style="list-style-type: none"> <li>• Common value</li> <li>• Across insulating distance</li> </ul>	kV 275/325 kV 315/375
Rated lightning impulse withstand voltage	<ul style="list-style-type: none"> <li>• Common value kV 650/750</li> <li>• Across insulating distance kV 750/860</li> </ul>	kV 650/750 kV 750/860
Rated frequency	Hz	50 - 60
Rated normal current	A	3,150
Rated short time withstand current	kA	40
Rated peak withstand current	kA	100
Rated duration of short circuit	s	3
Ambient temperature	°C	-30 - +40
Altitude	m	1,000
Rated DC supply voltage	V	48-110-125-220
Rated AC supply voltage	V	230
Standard		IEC 62271-205

### Live-Tank circuit breaker - Technical Data

Rated voltage	kV	145/170
Rated power frequency withstand voltage	kV	275/325
Rated lightning impulse withstand voltage	kV	650/750
Rated frequency	Hz	50 - 60
Rated normal current	A	3,150
Rated short time withstand current	kA	40
Rated peak withstand current	kA	100
Rated duration of short circuit	s	3
Rated short-circuit breaking current kA 40	kA	40
First-pole-to-clear factor		1,3 - 1,5
Rated short-circuit making current	kA	40
Type of operation		Single or three phase
Spring operating mechanism type		FK3
Rated operating sequence		O-0,3s-CO 3min CO

### Three-phase Disconnecter - Technical Data

Rated voltage	kV	145/170
Rated power frequency withstand voltage	<ul style="list-style-type: none"> <li>• Common value and across insulating distance</li> </ul>	kV 275-325
Rated lightning impulse withstand voltage	<ul style="list-style-type: none"> <li>• Common value and across insulating distance</li> </ul>	kV 650-750
Rated normal current A 3150	A	3,150
Rated short time withstand current kA 40	kA	40
Rated peak withstand current	kA	100
Rated duration of short circuit	s	3
Operating mechanism		Motor/Manual

### Earthing Switch

Rated short time withstand current kA 40	kA	40
Rated duration of short circuit s 3	s	3
Operating mechanism		Motor/Manual

### Current Transformer

Rated transformer ratio (I <sub>p</sub> n/I <sub>s</sub> n)	A	200-400-800-1200/5
Rated continuous thermal current		1,2I <sub>p</sub> n
Metering cores		30 VA cl 0,2
Protection cores		5P30

## CABA: Compact Air-insulated Breaker Assembly

This customised and smart solution is based on the combination of a live tank circuit breaker and a double side break disconnect, both of which are mounted on a common frame, meaning a simple design with lower purchase cost, lower operating costs and less space requirement..

### Module Structure

The circuit breaker is of the live tank type incorporating the latest interrupter chamber technology equipped with the double motion principle up to 145 kV and high interrupting ratings, allowing applications on a wide variety of systems. The disconnect operation takes place via the rotation of the centre insulator or double side break disconnect switch. In this way the circuit breaker remains isolated from the main circuit.



### Key Features/Benefits

- Complete factory-assembly and control: the structure can easily replace existing equipment ensuring a high quality solution and a drastically reduced delivery time
- Maintenance-free interrupters: hermetically sealed to eliminate the hassle and expense of field filling SF<sub>6</sub>, ensuring long and trouble-free life
- Reliable operating mechanisms: the circuit breakers are powered by spring-operated mechanisms from GE's FK3 series. The drive mechanism uses the most reliable helical compression springs (thousands already in service worldwide are equipped with this state-of-the-art drive technology)
- Testing: CABA meets the requirements of IEC and ANSI standards
- Optional features available including key interlocks and earthing switches

## Technical Specifications

<b>Live-Tank Circuit Breaker</b>					
Rated voltage	kV	72.5	145	245	245
Circuit-breaker type		GL 309	GL 312	GL 314	GL 314X
Circuit-breaker operating mechanism		FK3	FK3	FK3	FK3
Rated continuous current	A	3,150	3,150	3,150	3,150
Rated frequency	Hz	50/60	50/60	50/60	50/60
Rated dielectric withstand					
• Power frequency 1 minute dry	kV	160	310	460	460
• BIL (1.2/50s impulse wave)	kVpeak	350	650	1,050	1,050
• 2s chopped wave kVpeak	kVpeak	452	838	1,160	1,160
Rated short-circuit breaking capacity					
• Periodic component	kArms	40	40	40	63
• Percentage DC component	%	53	53	53	68
• First pole to clear		1,5	1,5	1,5	1,5
• Interrupting time cycles		3	3	3	3
• Rated short-circuit making current	kApeak	108	108	108	170
• Rate out-of-phase breaking capacity kA 10 10 10 16	kA	10	10	10	16
Rated line-charger breaking capacity (C2 Class)	A	100	160	400	400
Rated capacitor bank breaking capacity (C2 Class)	A	630	400	N/A	1,200
Rated operating sequence		CO-15s-CO	CO-15s-CO	CO-15s-CO	CO-15s-CO
Ambient temperature (without blanket heaters)	°C	-30-+40	-30-+40	-25-+40	-30-+40
<b>Three-Phase Disconnect Switch - S3CD Double Side Break</b>					
Rated voltage	kV	72.5	145	245	
Disconnect switch type		S3CD	S3CD	S3CD	
Disconnect switch operating mechanism		Manual handcrank	Manual handcrank	Manual handcrank	
Rated Frequency	Hz	50/60	50/60	50/60	
Rated continuous current	A	3,150	3,150	3,150	
Rated continuous current 30 minutes emergency	A	4,100	4,100	4,100	
Rated dielectric withstand (IEEE/ANSI Standard)					
• Power frequency 1 minute dry	kV	175	335	465	
• Power frequency 10 second wet	kV	146	275	385	
• BIL (1.2x50 per second rated withstand)	kVpeak	350	650	900	
Rated short time current					
• Three (3) second	kArms	63	63	63	
• Momentary current	kA	100	100	100	
• Peak current	kApeak	164	164	164	
• Capacitance current switching capability	A	1	1	1	
• Transformer magnetising current switching capability	A	3	3	3	
Open gap length (IEEE/ANSI standard)	Inches	22x2	38x2	50x2	
Open rotation gap	Degrees	80	80	80	
Rated ice breaking capability	Inches	0.75	0.75	0.75	
Number of operations before service is required		1,000	1,000	1,000	
Ambient temperature -50-+50 -50-+50	°C	-50-+50	-50-+50	-50-+50	

CABA: The Best Solution for the Smallest Places

A partner you can rely on



#### GE delivers on promise.

GE considers the final result as the only way to build a partnership.

GE's on-site installations are solid proof of our performance.

GE and its customers,  
Partners in the smart revolution



For more information please contact  
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Imagination at work