BGS-40.5

Dry air-insulated switchgear (GIS) up to 40.5kV

Catalogue | Substation portfolio

2026

Brunstock

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Example of BGS-40.5

BGS-40.5, a versatile switchboard

BGS-40.5 is a medium voltage dry air-insulated switchboard (GIS) up to 40.5kV, used in distribution applications. It can be fitted with the following protection devices:

- Transformer protection
- Line protection

Its compactness, wide range of functions and ease of installation and extensibility, make it a versatile switchboard to fit many distribution applications such as: public distribution, industry, infrastructure or renewables.

Electrically insulated using dry air

The high voltage conductive parts of the BGS-40.5 switchboard are placed in green insulating air (dry and clean air) .
The dry air is confined in a hermetically sealed stainless steel tank.
BGS-40.5 is insensitive to the outside environment and to any possible aggressions such as:

- Humidity
- Dust
- Pollution
- Dirt
- Harmful rodents

The use of dry air as an insulating gas, and the design of BGS-40.5, makes it one of the most compact environment friendly MV switchboards on the market.

BGS-40.5 in a MV substation

Simple operation and maintenance

With a service life of 30 years for the main circuit without maintenance, the overall design of the range of BGS-40.5 switchboards guarantees simple and reliable use:

- Simplified maintenance of the functional units
- No air filling is required on site at installation nor during the service life of BGS-40.5
- Under normal operating conditions
- Long service life
- Interlocking to ensure the correct sequences of operations
- Can be used in substations with or without walk-in operation corridors
- Voltage presence indicator
- Wide cable compartment to allow the installation of various types of cable, etc.

BGS-40.5 in renewable

Safety and innovation

BGS-40.5 has been designed for maximum safety of the operators and equipment in particular in case of internal arcing in the equipment:

- Safety valves at the rear bottom cable compartment and avoid gas overpressure
- Each functional compartment is independent completely
- The overall structure adopts a tank structure, with good sealing performance and strong compressive strength

Standards & certification

A major asset

Brunstock integrates with a manufacturing partner to produce BGS-40.5 and their role includes monitoring quality, environmental impact and employee safety to ensure compliance with standards. They utilise management systems to achieve this. As an extra layer of scrutiny, Brunstock's representatives apply local knowledge to verify design and quality manufacturing, and may use their own management systems.

The manufacture of BGS-40.5 is certified under the following management systems:

- ISO 9001: 2015 quality
- ISO 45001: 2018 workplace health and safety
- ISO 14001: 2015 environment

Quality system certified

During manufacture, each BGS-40.5 functional unit is subject to systematic routine testing with the aim of checking the quality and conformity of the following features:

- Measuring of opening and closing speeds
- Dielectric test
- Testing of safety systems and interlocks
- Testing of low voltage components
- Conformity with drawings and diagrams

The results obtained are recorded and approved by the quality control department on each device's test certificate. This therefore guarantees product traceability.

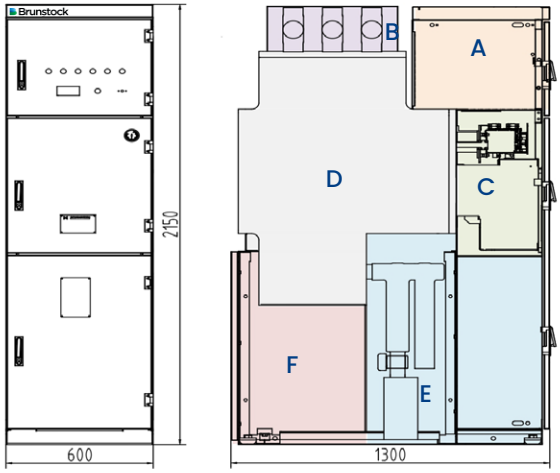
Environment system certified

As part of the manufacturer's environmental policy, Brunstock equipment is managed under an environmental management system. BGS-40.5 has been designed with environmental protection in mind:

- All materials used, for instance gas tank and conductors, are identified, and easily separable for recycling
- Our production sites are certified to ISO 14001

Health and safety system certified

Workplace Health and Safety (WHS) bears the highest importance at Brunstock. The manufacture of BGS-40.5 includes controlling risks and making improvements in performance in compliance to ISO 45001: 2018. Brunstock supports the system's focus on eliminating or minimising risks to personnel and other interested parties who could be exposed to WHS hazards associated with the manufacture of BGS-40.5.

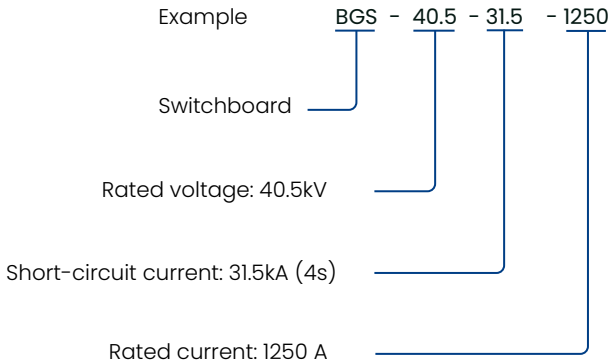


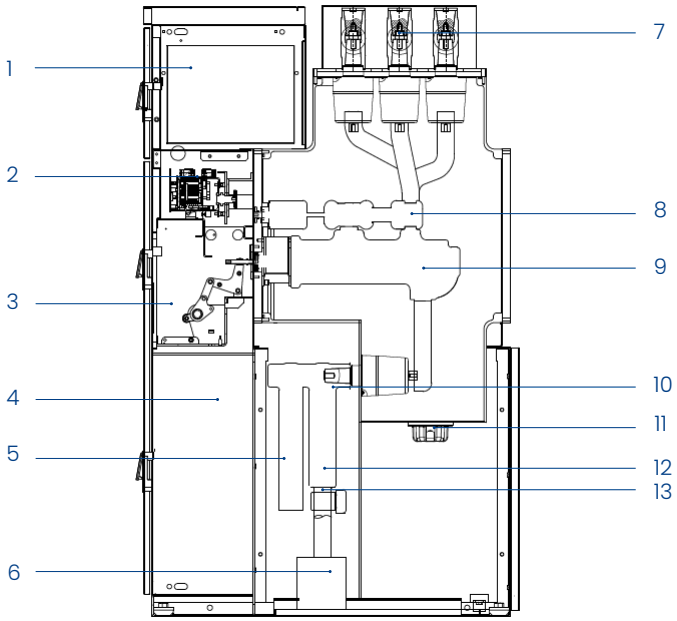
BGS-40.5 compartments

- A LV compartment
- B Top bus connection compartment
- C TPS and CB mechanism compartment
- D Gas tank
- E Cable compartment
- F Arc vent compartment

Identification plate

The rating plate supplies information on the version, rated voltage, short-circuit current, rated current and components.





BGS-40.5 structure

1 LV box
2 TPS mechanism
3 CB mechanism
4 LV compartment
5 Surger arrester (optional)
6 Ring CT (optional)
7 Top extension busbar
8 Three-position switch (TPS)
9 Circuit-breaker
10 Out-cone bushing
11 Arc release hole
12 Cable terminal
13 Cable clamp

Operating conditions

- Ambient temperature: from –40°C to +55°C (*)
- Typical maximum altitude for installation above sea level is 5,500 m
  However, much higher altitudes are possible on request
- Type of insulating gas: Dry clean air
- Rated absolute pressure at +20°C: 0.32 MPa

Protection index (IP)

- Main electrical circuits (gas tank): IP67
- Enclosure: IP4X
- Between compartments: IP2X
- Switchgear: IK10

Partition class and loss of service continuity category

- Partition Class: PM
- Loss of Service Continuity Category: LSC2A CLASS

IAC (internal arc classification):
The metal enclosed switchgear may have different types of accessibility on the various sides of its enclosure.
To identify the purpose of different sides of the enclosure, the following code shall be used (according to IEC 62271-200 standard).
A: restricted access to authorised personnel only
F: access to the front side
L: access to the lateral side
R: access to the rear side

Internal Arc Classification

BGS-40.5 is a pressurized sealed-unit system that complies with IEC 62271-1.
Its tank is filled with dry air that is used as an insulating and breaking medium.
BGS-40.5 internal arc classification as per IEC 62271-200 is detailed in the table below. In the unlikely event of air overpressure, the dry air is discharged via safety valves away from the operator.

IEC standards

Our BGS-40.5 switchboards comply with the standards shown below:

Description	IEC standard	IEC classes
Switchboard	IEC 62271-200 IEC 62271-1	
Behaviour in the event of internal faults	IEC 62271-200	
Earthing switch	IEC 62271-102	M1
Disconnector	IEC 62271-102	M1
Circuit-breaker	IEC 62271-100	C2, M2, E2
Current transformer	IEC 61869-2	
Voltage transformer	IEC 61869-3	
Voltage presence indicators	IEC 62271-206	
Voltage detection systems	IEC 61243-5	
Protection against accidental contact, foreign bodies and ingress of water	IEC 60529	

BGS-40.5

General introduction

- BGS-40.5 is a air-insulated, metal enclosed switchgear, mainly used in power distribution systems such as power plants, small and medium generators, substations, high-rise buildings, industrial and mining enterprises, subways and electrified railways, to implement the control, protection and detection of power supply systems and loads. It is especially suitable for underground, high altitude, frozen soil, coastal, humid and other environments, densely populated areas and places with expensive construction area.
- The key technologies of product development and design, such as insulation, temperature rise, mechanical strength, sealing, arcing, etc., are all calculated by computer simulation to ensure the quality and reliability of product development.
- In order to ensure the stability and reliability of product manufacturing quality, the company has introduced imported three-dimensional five-axis robot welding equipment, helium quality general leak detector, lightning impact, X-ray detection, partial discharge tester, temperature rise, high and low temperature testing and other equipment.
- The company strictly organizes production according to ISO9000 documents and 6S management to ensure that the quality of the entire cabinet is monitored throughout the process.
- The high-voltage primary components of the product are enclosed in aluminum alloy chamber, maintenance-free.
- The product adopts dry air insulation and vacuum arc extinguishing breaking technology, and the service life of the vacuum circuit breaker is up to 10,000 times.
- The product is designed with an independent arcing channel, and the internal arc classification of the switchgear: IAC-A FLR 31.5kA/1s.

Features

- Dry air insulation, vacuum interruption, environmentally friendly;
- No need to fill in dry air when on-site installation;
- Rated pressure for air filled is lower to 0.32MPA;
- With unique natural air cooling duct;
- Modular design, removeable gas tank and compartment;
- The main circuit is fully enclosed and insulated with IP67;
- The circuit-breaker is up to 1250A, main busbar up to 1250A and the rated breaking current 31.5kA;
- Main bus VT and arrester with isolation switch, easy for operation and maintenance;
- Compact size.

Advantages

Diversified solutions

- This SF6-free switchgear is an integral part of dry air
- Bus and line VT
- Disconnector
- Bus riser
- Metering

Capability of development

- Self-developed the core components (CB and TPS)

Compact size

- The height with LV box: 2200mm
- Width: 600mm/800mm
- Depth: 1300mm

Positioning

Technology

- 40.5kV dry air-insulated switchgear series

Market

- Utility, railway, renewable, oil & gas, mining, etc.
- Africa, Asia Pacific, Middle East, Europe

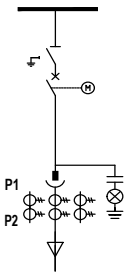
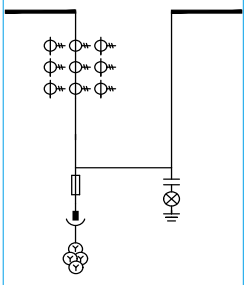
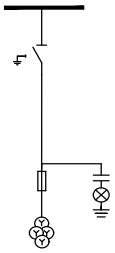
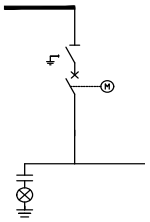
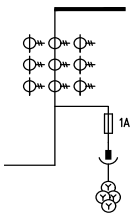
Quality & cost

- IEC compliant and cost effective

High-end

- Safe and highly reliable, maintenance-free

Range of functions

Names	V	M	PT	Bus Section	Bus Riser
Size (W*D*H)	600*1300*2200	800*1300*2200	800*1300*2200	600*1300*2200	800*1300*2200
Functions	Circuit-breaker	Metering	Busbar VT	Bus section	Bus riser
					

BGS-40.5			
Rated voltage		kV	40.5
1min power frequency insulation		kV	95/118
Lightning impulse withstand voltage (peak)		kV	185/215
Rated frequency		Hz	50
Rated short-circuit breaking current (RMS)		kA	31.5
Rated peak withstand current		kA	80
Rated short-time withstand current (RMS)		kA	31.5
Duration of rated short-time withstand current		s	4
Rated current of main busbar		A	1250
Rated current of branch busbar		A	1250
Internal arc classification		kA/s	IAC A FLR 31.5/1
Mechanical endurance of VCB		times	10,000
Mechanical endurance of three-position disconnector		times	5,000
Rated ex-factory filling pressure (absolute at 20℃)		MPa	0.32
Minimum pressure(absolute at 20℃)		MPa	0.26
Type of insulating gas			Dry Air
Moisture content (20°C)		ppm	≤300
Annual leakage rate		%	≤0.01
Volume (WXDXH)		mm	600x1300x2200
IP class	Air tank (the primary circuit)		IP67
	Enclosure		IP4X
	Between compartments		IP2X

Notes:
1. The standard height of the LV box is 500mm. Other dimension on request.

BGS-40.5 Vacuum circuit-breaker		
Rated voltage	kV	40.5
1min power frequency insulation	kV	95/118
Lightning impulse withstand voltage (peak)	kV	185/215
Rated frequency	Hz	50
Rated short-circuit breaking current (RMS)	kA	31.5
Rated peak withstand current	kA	80
Rated short-time withstand current (RMS)	kA	31.5
Duration of rated short-time withstand current	s	4
CB electrical endurance	/	E2
100% short-circuit breaking times	times	30
Rated cable-charging current	A	50
CB mechanical endurance	times	M2
Closing time	ms	30-70 @ Rated voltage
Opening time	ms	18-45 @ Rated voltage
Contact opening distance	mm	23±2
Rated operating sequence	/	O-0.3s-CO-180s-CO

BGS-40.5 Three-position switch		
Rated voltage	kV	40.5
1min power frequency insulation	kV	95/118
Lightning impulse withstand voltage (peak)	kV	185/215
Rated frequency	Hz	50
Rated short-time withstand current (RMS)	kA	31.5
Rated peak withstand current	kA	80
Duration of rated short-time withstand current	s	4
Distance between dynamic and static contacts of DS	mm	60±2
Distance between dynamic and static contacts of ES	mm	60±2
Three-phase closing asynchrony	mm	≤3
Three-phase opening asynchrony	mm	≤3
The circuit resistance between the dynamic and static contacts of the main circuit	μΩ	≤30
Manual operating torque	N. M	≤60(within 90% travel)/≤120(last 10% travel)
Mechanical endurance	times	5,000

Vacuum circuit breaker

Vacuum breaking technology is adopted for the circuit breaker on BGS-40.5, including features:

- Maximum rated current: 1250A
- Rated short-time withstand current: 31.5kA/4s
- Rated short-circuit breaking current: 31.5kA
- Electrical endurance: E2
- Mechanical endurance: M2 (10,000 times)

Function

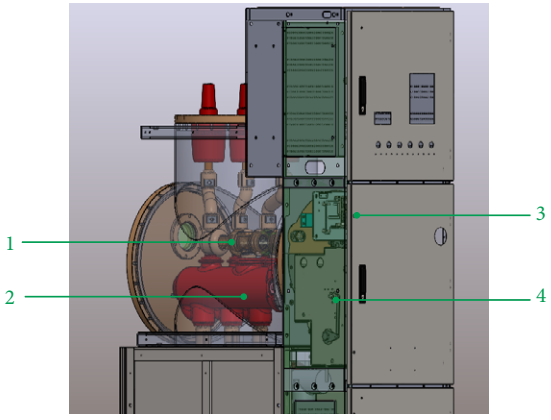
- open and close
- Short-circuit breaking and making operations;
- Corporate with three-position switch to achieve earthing function.

The three-phase pole of the circuit breaker is horizontally placed in the circuit breaker air tank, the operating mechanism is located outside for easy maintenance. The mechanism and the pole are connected by movable sealing bellows.

Three-position switch

The three-position switch on the BGS-40.5 combines the functions of an disconnector switch and earthing switch. It does not have the ability to make and break, and the maximum rated circuit is 1250A. It can only perform "close and open" operations when there is no current.

The three-position switch can only be operated the earthing switch when there is no current in the circuit, the earthing switch can only be closed once circuit breaker opened.

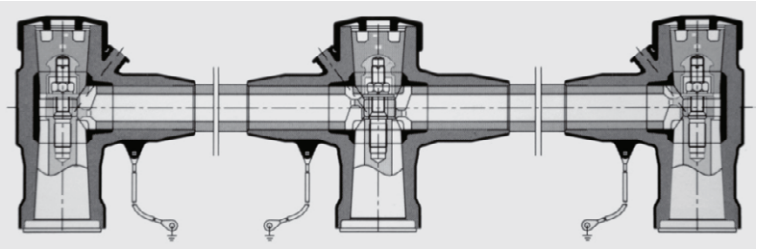


Structure of BGS-40.5 V function

1 Three-position switch mechanism
2 Vaccum interrupter
3 Three-position switch
4 Vaccum circuit-breaker

Bus connector

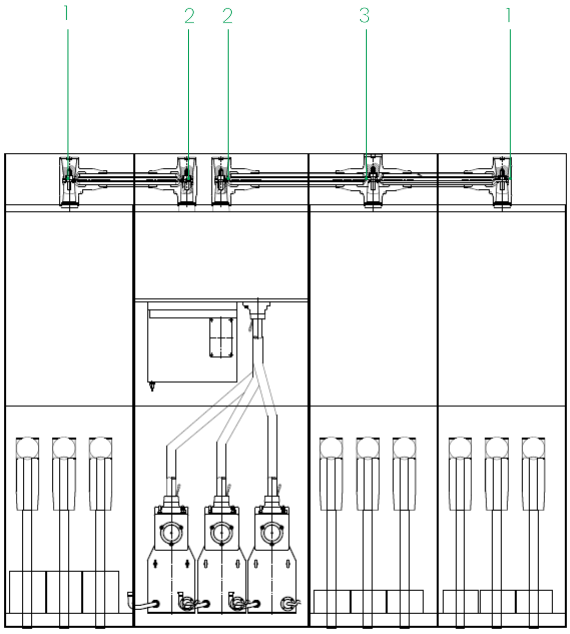
Top extension busbar is used between the cabinet of BGS-40.5 with the maximm rated current of 1250A. The installation is convenient, and it has low requirement on foundation flatness.The partial discharge of each solid bus can be achieved within the range of 5pC at 45kV voltage.



Example of busbar connection

There are two main types of busbar connection:

- Three-way busbar connector is applied to the end of switchboard and bus section panel.
- Four-way busbar connector is applied to the middle switchgear.



1. Three-way busbar connector at end of swithboard

2.Three-way busbar connector at bus section panel

3. Four-way busbar connector

Operating mechanism (three-position switch and circuit-breaker)

The operation buttons and position indication of circuit-breaker, three-position switch and air pressure manometer involved in BGS-40.5 are all embodied on the panel of front cover. The operation and indication are user friendly. The specific structure is shown as below:

Interface of V

1. Disconnector switch position indication
2. Disconnector switch manual operation hole
3. Earthing switch manual operation hole
4. Earthing switch position indication
5. Circuit breaker close button
6. Circuit breaker position indication
7. Circuit breaker operation counter
8. Spring status indication
9. TPS unlock button
10. TPS selection knob
11. Mannometer
12. Circuit breaker open button
13. Spring manual charge

Three-phase integrated CT

Current instrument transformer

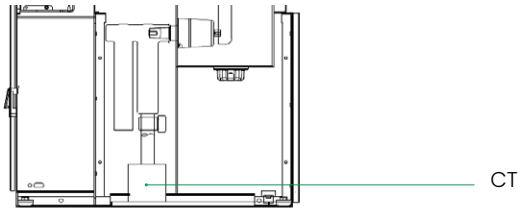
BGS-40.5 adopts ring-type CTs, which can fit incoming/outgoing single or multiple cables and the main busbar. The primary current of current transformer ranges from 100A to 1250A, and the secondary current is rated as 1A or 5A. The specific core quantity, accuracy and capacity of CT shall be determined when ordering.

Ring CT (for single cable)

Ring CT (for double cable)

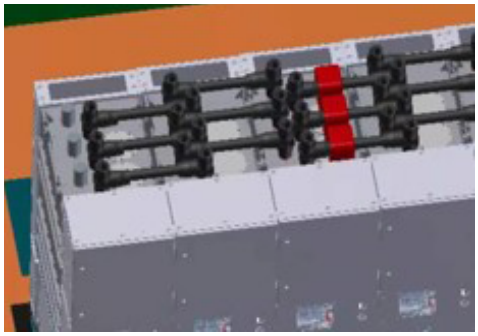
CT installation in the cable compartment

The ring-type CT can fit the incoming/outgoing cable and is fixed on the beam on the cable compartment, as shown as below.



CT installation on main busbar

The current transformer on main bus of BGS-40.5 can fit the main bus and is fixed on the top of the cubicle



Voltage transformer

The voltage transformer (VT) in BGS-40.5 is designed with an insulated medium voltage terminal with a plug-in connector, and the VT is directly plugged into the special socket on the bottom side of the air tank. The VT core and the winding are integrated, and can be protected by a fuse (optional). The fuse is installed inside the VT and its current matches the short-circuit current withstand capacity. This effectively protects the VT when the power grid has problems, such as harmonics. Please see the figure below for VT with or without a fuse.

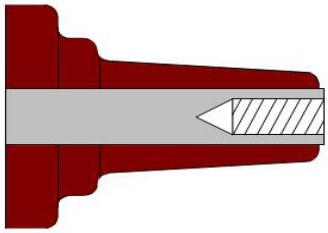
The VT secondary voltage is 100V, and the secondary core provides measurement and protection function. For example: 35/√3/0.1/√3/0.1√3/0.1/3kV. VT specific secondary core quantity, accuracy, capacity and other characteristics are determined when ordering.

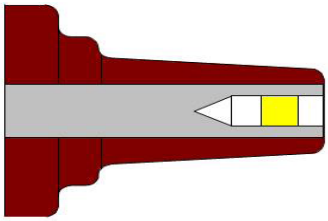
VT with fuse

VT without fuse

LV box

It is modular and withdrawable design, the standard height is 500mm (can be customized), The low-voltage components and accessories are designed according to customer requirements.





BGS-40.5 is equipped with cable bushings which comply with EN 50181 and IEC 60137 for termination of cables. The bushings fulfil the requirements of DIN47636T1. The following cable bushings are used:

Interface C with M16 x 2 metric threads 400 series, In = 630 A
Standard on all modules and for side connection

Interface B with plug 400 series, In = 400 A
Optional for all modules.
The yellow area indicates the silver coated contact spring.

The installation instruction from the manufacturer of cable terminations must be followed. Be sure to lubricate the bushings thoroughly with silicone supplied

Important:

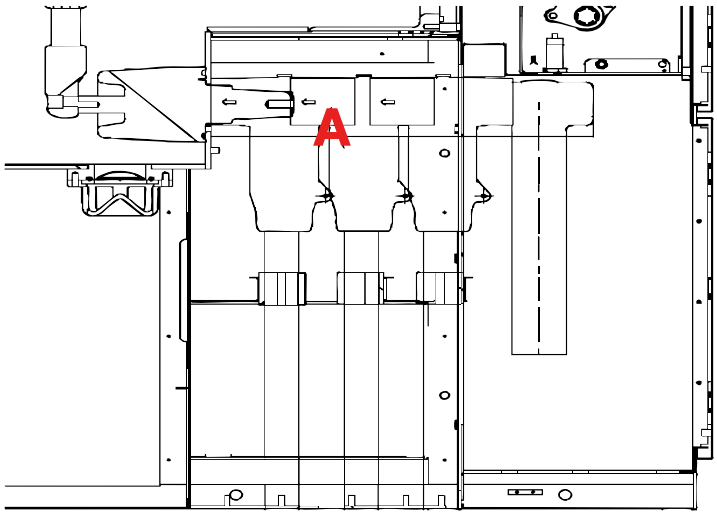
Where cables are not connected, the earthing switch must be locked in closed position or the bushings must be fitted with dead end receptacles before the unit is energised.

Outer cone cable connector

Cable terminations

All bushings are protected by cable compartment cover. The drawings below show typical arrangements with cable connectors.

The table below the drawings shows the distance A in millimetre from cable bushing to the inner part of cable compartment cover.



	Distance A
Standard	225mm
Double cables	332mm
Three cables	450mm
Three cables with surge arrestors	569mm
Double cables	570 mm

Surge arrester

BGS-40.5 surge arresters use plug-in connection with the cubicle and can be categoriezd by two types cable bushings:

- Outer-cone bushing

Surge arresters should be located in the cable compartment.

The specific technical parameters of arresters shall be determined when ordering.

Item	Outer-cone
Type	
Rated voltage (kV)	41/42/51/52.7/54
Applicable cubicle	

Interlock

Electrical interlock

- Electrical interlock can be achieved by intelligent control and protection unit's contact detection and logic programming for position state of TPS and CB, and it can be achieved by microswitch as well;
- The electrical interlock can be worked only when secondary power supply is powered;
- Electromagetic lock is optional for ES.

Mechanical interlock

- Mechanical interlock can only be achieved by operating the main shaft with TPS manually under certain conditions;
- When circuit breaker is closing, the manual operation cover of DS is interlocked. Only after the CB is opened, the cover can be freely opened, then the handle can be inserted into the hole for DS operation. whenever opened the cover manually, the CB cannot be operated electrically or mechanically;
- Key lock and padlock is optional for CB/DS/ES upon request.

Interlocking of the functional units

During the development of BGS-40.5, emphasis was placed on personnel safety and the reliability of the switchgear in operation. An interlocking system prevents any incorrect use. Thus, the operating levers can only be inserted if the service status permits it. Access to the cables compartment is only possible if the appropriate outgoing feeder is connected to earth.

These ring main units are equipped with the following interlocks:

Functional unit with vacuum circuit breaker, disconnector and earthing switch

Interrupting mechanism	Position	Interlock status…						
		DS		ES		CB		Cable compartment
		Open	Closed	Open	Closed	Open	Closed	panel
Disconnector (DS)	Open	–	–	Unlocked	Unlocked	Unlocked	Unlocked	–
	Closed	–	–	Locked	–	Unlocked	Unlocked	–
Earthing switch (ES)	Open	Unlocked	Unlocked	–	–	Unlocked	Unlocked	Locked
	Closed	Locked	–	–	–	Locked	–	Unlocked
Circuit breaker (CB)	Open	■ Unlocked if ES open ■ Locked if ES closed	Unlocked	■ Unlocked if DS open ■ Locked if DS closed	Unlocked	–	–	–
	Closed	Locked	Locked	Locked	Locked	–	–	–

Packaging

For road and rail transport:
BGS-40.5 switchboard is packaged under protective sheeting. It is delivered fixed on to a wooden pallet by two plastic tapes.

- For maritime transport:

BGS-40.5 is packaged in a heat-sealed cover with bags of desiccant, then enclosed in a wooden case with a solid leak tight bottom (including transport by container).

- For air transport:

BGS-40.5 switchboard is packaged in a wooden boxes (crates) with solid walls and a protective cover (dust cover).

Handling

The BGS-40.5 must be transported vertically:

- When moving using a forklift:

Only move the device on a pallet.

- When moving without a pallet:

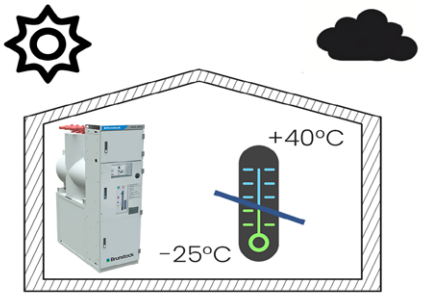
A lifting sling must be hooked on to the switchgear's lifting rings. The angle with the lifting sling must be at least 45°.

- When transporting on pallet:

Don't tilt the switchgear. Respect the centre of gravity markings.

- When transporting with slings:

Use the two lifting rings.



Storage

BGS-40.5 must be packaged depending on the requirements for its planned storage duration. BGS-40.5 must be preserved intact in its factory origin packaging.

The storage area must not have any sharp and important changes in temperature. Consult with your Brunstock representative for any particular storage conditions you wish to use that are not mentioned here.

Plan

Brunstock representatives help you to plan the full design and execution of your solution, to secure your process and optimise your time. With training provided by Brunstock, our reps usually offer the following:

- **Technical feasibility studies:** Accompany you to design a solution specifically for the given environment
- **Preliminary design:** Accelerate turn-around time to come to a final solution design

Install

Brunstock representatives will help you to install efficient, reliable and safe solutions based on your plans.

- **Project Management:** Designed to help you complete your projects on time and within budget
- **Commissioning:** Ensures your actual performance versus design, through on-site testing, commissioning tools and procedures.

Operate

Brunstock reps help you maximise your installation uptime and control your capital expenditure through their services. Please ask them for specific details about their:

- **Advantage service plans:** Customised services plans which cover preventive, predictive and corrective maintenance
- **On-site maintenance services:** Extensive knowledge and experience in electrical distribution maintenance
- **Spare parts management:** Brunstock reps are able to ensure spare parts availability and can help you optimise the maintenance budget for your spare parts
- **Technical training:** To build up necessary skills and competencies. In order to properly operate your installations in safety.

Optimise

Brunstock reps propose recommendations for improved safety, availability, reliability and quality.

- **Electrical Assessment:** Define improvement and risk management program.

When it comes to your electrical distribution installation, Brunstock representatives can help you:

- Increase productivity, reliability and safety
- Mitigate risk and limit downtime
- Keep equipment up to date and extend lifespan
- Cut cost and increase savings
- Improve your return on investment

Frequency of maintenance intervention

BGS-40.5 switchgear is relatively maintenance-free. Depending on the exact configuration of the solution, we may recommend a schedule for maintenance activities to extend the life of your electrical distribution equipment and improve performance over time. Further information is available in the BGS-40.5 manual and can be discussed with your Brunstock representative.

Contact us for more information

sales@brunstock.com

At the end of the BGS-40.5 service life

The dismantling and disassembly of BGS-40.5 is possible at the end of its service life. The separation of the elements making up the switchgear will be made:

- By disconnecting the mechanical connections
- By dismantling, breaking or shearing the connections.

To guarantee efficient and ecological sorting and destruction of the materials, all plastic components have been identified. Your Brunstock representative will provide a description of the materials to you, their customer, along with information on the best valorisation process that recylcing companies in your local area may need.

End of service life processing

Brunstock can support you in your BGS-40.5 end of service life processing approach.

Eliminate hazardous gas recovery

Due to the use of dry air, BGS-40.5 has no need for a process of any hazardous gas.

Composition of materials and valorisation at end of service life

After disassembly or dismantling, the recovered elements must be forwarded for treatment in the following manner:

Waste processing

Type of waste	Destination	Recommended processing
Steel & stainless steel	Local recovery agent	Shredding, sorting and recycling
Alluminum alloy	Local recovery agent	Shredding, sorting and recycling
Non-ferrous metals	Local recovery agent	Shredding, sorting and recycling
Epoxy resin	Cement plant	Revalorisation at a lower added value
Thermoplastics	Local recovery agent	Incineration
Molecular sieve	Authorised network	Elimination
Soiled protective equipment	Authorised network	Incineration
Cables	Local recovery agent	Separation of sheathing and conductors

Brunstock
sales@brunstock.com
brunstock.com

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