BGP-40.5

Gas-insulated (dry air)
Primary switchgear rated up to 40.5kV

Catalogue

2025

Brunstock

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Introduction

Example of BGP-40.5

BGP-40.5, a versatile switchboard

BGP-40.5 is a medium voltage dry air insulated switchboard up to 40.5kV, used in primary 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 transmission and distribution applications such as: utilities, industry, infrastructure or renewables.

Electrically insulated using dry air

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

- Humidity
- Dust
- Pollution
- Dirt
- Harmful rodents

BGP-40.5 in a MV substation

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

Simple operation and maintenance

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

- Simplified maintenance of the functional units and with continuity of service for the other units (LSC2 class)
- No air filling is required on site at installation nor during the service life of BGP-40.5 under normal operating conditions
- It has a long service life
- It features interlocking to ensure the correct sequences of operations
- Can be used in substations with or without walk-in operation corridors
- Voltage presence indicator light
- Wide cable compartment to allow the installation of various types of cable, etc.

BGP-40.5 in renewables

Safety and innovation

BGP-40.5 has been designed for maximum safety of the operators and equipment, with special attention given to the remote possibility of internal arcing in the equipment:

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

Standards & certification

A major asset

Brunstock integrates with a manufacturing partner to produce BGP-40.5 and their role includes monitoring quality, environmental impact and employee safety to ensure compliance with standards. They utilise management systems to help 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 BGP-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 BGP-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.

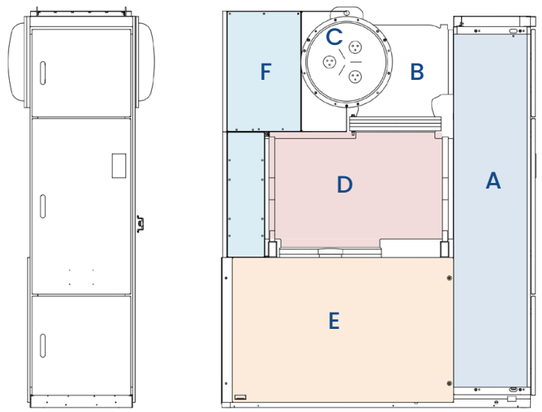
Environment system certified

As part of the manufacturer's environmental policy, Brunstock equipment is managed under an environmental management system. BGP-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 BGP-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 BGP-40.5.

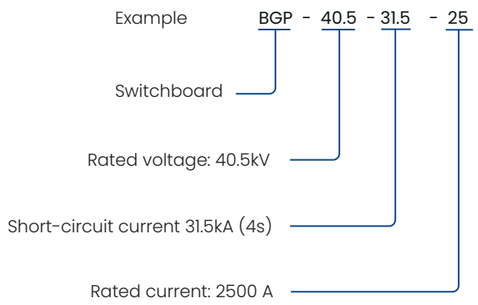


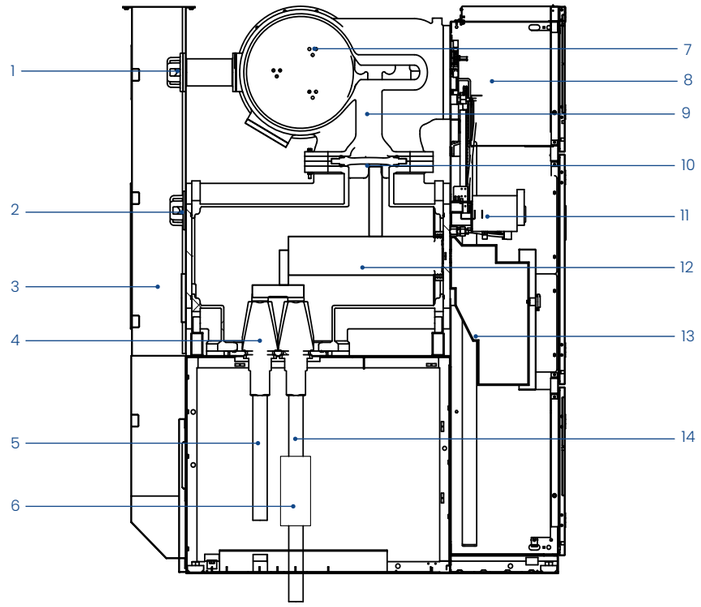
BGP-40.5 compartments

A LV and mechanism compartment
B DS and ES compartment
C Basin-type insulator and bus compartment
D Circuit breaker compartment
E Cable compartment
F Arc vent duct

Identification plate

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





BGP-40.5 standard structure

1 Pressure relief device of TPS tank
2 Pressure relief device of CB tank
3 Rear arc duct
4 Innercone socket
5 Surge arrester (optional)
6 Ring CT (optional)
7 Basin-type insulator for lateral extension
8 LV cubicle
9 Three-position switch (TPS)
10 Insulated bushing
11 TPS mechanism
12 Vacuum circuit breaker (VCB)
13 VCB mechanism
14 Cable in/out

Presentation

Operating conditions

- Ambient temperature: from –5ºC to +40ºC (*)
- Average value over 24 hours (max.): +35ºC
- Typical maximum altitude for installation above sea level is 1,000 m
  However, much higher altitudes are possible on request
- Type of insulating gas: Clean dry air
- Rated pressure at +20ºC: 0.32 MPa

(*) Lower/higher ambient temperature on request.

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 (1)
- Loss of Service Continuity Category: LSC2B for single functional unit (2)

Internal Arc Classification

BGP-40.5 is a pressurised 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.
BGP-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.

(1) PM class according to IEC 62271-200 edition 2: metallic partitioning between compartments;
(2) Based on IEC62271-200 edition 2, BGP-40.5 is classified as LSC2B.

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

LSC2A (Loss of service continuity):
This category defines the possibility to keep other compartments energised when opening a main circuit compartment.

LSC2B: switchgear and controlgear of category LSC2 where the cable compartment is also intended to remain energised when any other accessible compartment of the corresponding functional unit is open.

IEC standards

Our BGP-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	E2
Disconnector	IEC 62271-102	M2
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	

BGP-40.5 specifications

BGP-40.5

General introduction

- BGP-40.5 is a dry air insulated, metal shell, fixed switchgear, and is an indoor complete set of three-phase AC 50Hz single bus and bus segments. 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 challenging environments. It is equally delightful at fitting into densely populated areas as it is at saving construction costs in rural and remote locations.
- The key technologies of product development and design, such as insulation, temperature rise, mechanical strength, sealing and arcing 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, our manufacturing partners use three-dimensional five-axis robot welding equipment, a helium quality general leak detector, lightning impact, X-ray detection, partial discharge tester, temperature rise, high and low temperature testing and other equipment.
- The high-voltage primary components of BGP-40.5 are enclosed in aluminum alloy gas chamber, and the main circuit is fully enclosed, fully insulated and maintenance-free.
- BGP-40.5 uses 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 arcing capacity of the whole cabinet: IAC-AFLR 31.5kA/1s.

Features

- Dry air insulation, vacuum interruption, environmentally friendly
- No need to fill with dry air when on-site installation takes place
- 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 2500A, main busbar up to 2500A and the rated breaking current is 31.5kA
- Independent centralised pressure relief channel
- Main bus VT and arrester with isolation switch is easy for operation and maintenance
- Compact size

Range of functions

Advantages

Diversified solutions

- This SF6-free switchgear is an integral part of a green GIS solution
- Bus and line VT solution
- Disconnector solution
- Bus riser

Capability of development

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

Compact size

- The height with standard LV box: 2350mm
- Width: 600mm/800mm
- Depth: 1840mm/1980mm

Positioning

Technically

- 40.5kV dry air gas insulated switchgear series

Market

- Utility, railway, photovoltaics, oil & gas, mining, etc.
- Africa, Asia Pacific, Middle East, Switzerland

Quality & cost

- IEC compliant and cost effective

High-end

- Safe and highly reliable, maintenance-free

Technical data

Brunstock

BGP-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	50/60
Rated short-circuit breaking current (RMS)		kA	25/31.5
Rated peak withstand current		kA	63/80
Rated short-time withstand current (RMS)		kA	25/31.5
Duration of rated short-time withstand current		s	4
Rated current of main busbar		A	1250/2500
Rated current of branch busbar		A	630/1250/1600/2000/2500
Internal arc classification		kA/s	IACA 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 (relative)		MPa	0.32
Alarm pressure (relative)		MPa	0.29
Blasting pressure of explosion-proof membrane (relative)		MPa	0.26
Type of insulating gas			Dry Air
Moisture content (20°C)		ppm	≤300
Annual leakage rate		%	≤0.05
1min power frequency insulation at zero gauge pressure		kV	85
Volume (WXDXH)		mm	1250A: 600X1840X2350 2500A: 800X1980X2350
IP class	Gas tank (the primary circuit)		IP67
	Enclosure		IP4X
	Between compartments		IP2X

Notes:
1. The standard height of the LV box is 600mm. If more instruments, the height of the secondary room can be increased appropriately through technical clarification.

BGP-40.5 specifications

Technical data

BGP-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	25/31.5
Rated peak withstand current	kA	63/80
Rated short-time withstand current (RMS)	kA	25/31.5
Duration of rated short-time withstand current	s	3
CB electrical endurance	/	E2
100% short-circuit breaking times	times	30
Rated cable-charging current	A	50
CB mechanical endurance	times	10,000
Closing time	ms	30-70 @ Rated voltage
Opening time	ms	18-45 @ Rated voltage
Contact opening distance	mm	19±1
Over travel	mm	4±1
Rated operating sequence	/	O-0.3s-CO-180s-CO

BGP-40.5 specifications

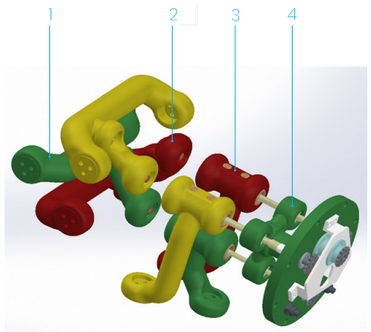
BGP-40.5 Three position switch		
Rated voltage	kV	40.5
1min power frequency insulation	kV	95/118
Lightning impulse withstand voltage (peak)	kV	185/215
Rated frequency	Hz	50
Rated short-time withstand current (RMS)	kA	DS/ES: 31.5 ES circuit: 27.4
Rated peak withstand current	kA	DS/ES: 80 ES circuit: 69.6
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	≤200
Mechanical endurance	times	5,000

LV cubicle

It is modular and withdrawable. The standard height is 600mm, but it can be expanded. It contains plug-in control busbars (through 6-10 pin plug-in terminals) and is equipped with traditional and digital relays. The secondary equipment will be designed according to customer requirements.

Three-position switch

The three-position disconnector on the BGP-40.5 combines the functions of an isolating switch and a grounding switch. It does not have the ability to make and break, and the maximum rated circuit is 2500A. It can only perform 'close and open' operations when there is no current. The specific structure can be shown as below.

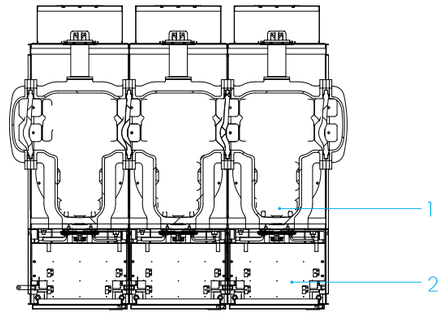


Three-position switch

1 Main busbar
2 Disconnector closed position
3 Disconnector open position
4 Earthed position

Bus connector

A basin-insulated bus connector is used between the cabinet of BGP-40.5 and the main busbar inside a dry air tank. Its operation is not involved in the assembly of the switch cabinet, so it is not affected by dust and condensation. This makes the installation of BGP-40.5 more convenient and it has less of a requirement for flat foundations. The partial discharge of each solid bus can be controlled within the range of 5pC under 45kV experimental voltage. The maximum rated current of the bus of BGP-40.5kV is 2500A, however, we do have an optional solution for 3150A. Please discuss with your Brunstock rep.



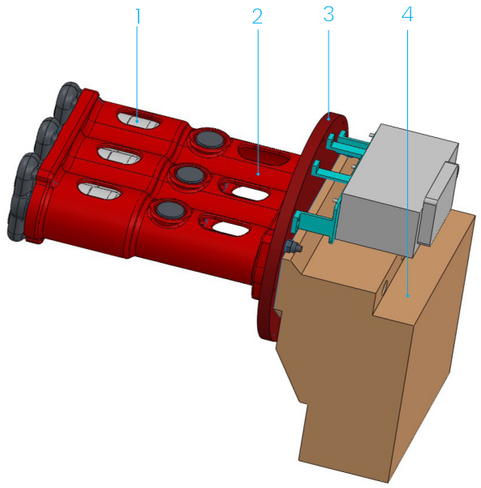
Top Busbar extension

1 Basin-type insulator
2 Solid busbar

Vacuum circuit breaker

Our circuit breaker uses vacuum breaking technology in BGP-40.5. The maximum rated current is 2500A. The rated short-time withstand current is 31.5kA (3s). The electrical life is E2 (30 times) and the mechanical life is M2 (10,000 times). The three phases of A/B/C are horizontally arranged from left to right.

After the installation and commissioning of the cabinet, it is fixed in the cabinet. The specific structure is shown below.



The structure of our vacuum circuit breaker

1 Vacuum interrupter
2 Circuit breaker pole
3 Sealing plate
4 Operating mechanism

Function

- Rated opening and closing current
- Short-circuit breaking and making operations
- Incorporates a three-position switch to achieve the grounding function

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

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

Operating mechanism (three-position switch and circuit breaker)

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

Interface of operating mechanism

1 Opened/Closed indication for ES
2 Opened/Closed indication of DS
3 CB operation counter
4 CB opening button
5 CB opened indication
6 CB energy charging
7 Unlock button for DS manual operating
8 Selection knob for DS/ES operation hole
9 Gas manometer of TPS tank
10 Handle insertion aperture for manual operation of ES
11 Handle insertion aperture for manual operation of DS
12 Gas manometer of CB tank
13 CB closing button
14 CB energy storage indication

Three-phase integrated CT

Current transformer

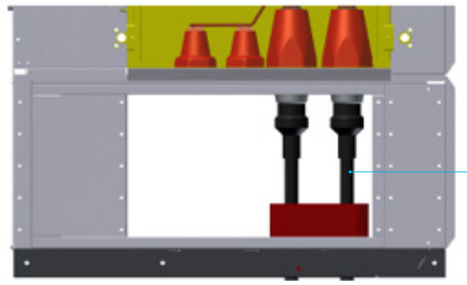
BGP-40.5 has straight-through type CTs, which can go through incoming/outgoing single or multiple cables and the main busbar. The external cone cable is used to connect the CT on BGP-40.5. The three-phase integrated CT can be directly fixed on the outer cone sleeve. The primary current of the current transformer is 100 to 2500A, and the secondary current is 1A or 5A. The specific secondary coil quantity, accuracy and capacity of the CT is determined when ordering.

Ring CT (for single cable)

Ring CT (for double cable)

CT installation in the cable side

The cable-side circuit transformer passes through the incoming/outgoing cable and is fixed on the beam on the cable compartment, as shown as below.



Voltage transformer

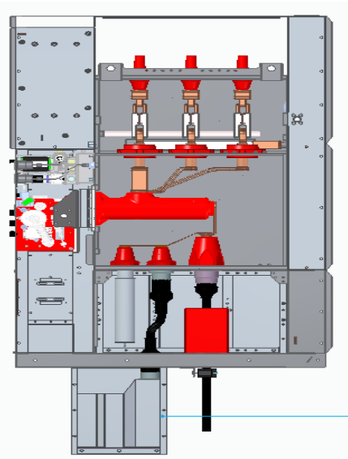
The voltage transformer (VT) in BGP-40.5 is designed with an insulated medium voltage terminal with a plug-in connector, and the VT is directly plugged into the special socket on the bottom side of the product's gas tank. The VT core and the winding are integrated, and can be protected by a fuse. The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

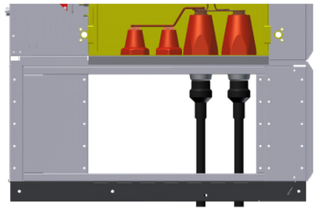
The VT secondary voltage is 100V, and the secondary coil can provide a measurement level and a protection level. For example: 35/√3/0.1/√3/0.1√3/0.1/3. VT specific secondary coil quantity, accuracy, capacity and other characteristics are determined when ordering.

VT with fuse

VT without fuse

The VTs are physically arranged at the bottom of the cabinet, and can be directly plugged in and fixed on the base of the cubicle's cable room or outside through a cable connection.





Bushings

The primary main circuit of BGP-40.5 is fully enclosed and fully insulated. All incoming and outgoing cables are equipped with plug-in cable terminals. The connection between the connector and the product cabinet is coordinated and fixed by bushings. There are two catogories of bushings in BGP-40.5: inner cone bushings and outer cone bushings. Refer to the below table for relevant information of cable types, rated current and applicable BGP-40.5 cubicle types.

Item	Inner cone bushing	
	2#	3#
Type		
Rated current	1000A	1250A
Applicable cubicle	BGP-40.5	BGP-40.5
Applicable position	VT/SA	Power cable

Connectors

The connection between the cable and cabinet of BGP-40.5 is fully enclosed and fully insulated, which is mainly realised by cable terminal. According to the structure, the connectors are divided into inner cone connectors and outer cone connectors. The connectors' structure and applicable cabinet type involved in BGP-40.5 are shown below.

Item	Inne cone connector
Type	
Applicable cable	50mm^2~630mm^2
Applicable cubicle	BGP-40.5

Surge arrester

The BGP-40.5 surge arrester can be divided into two types according to the cable sockets: one with an outer cone sleeve and the other with an inner cone cable socket. These have a plug-in connection with the cubicle and match with the 2# inner cone sockets. The surge arresters of the main busbar and the line side are placed on the bottom of the cubicle.

The specific technical parameters of arresters is determined when ordering.

Item	Inner con	erminal
Type		
Rated voltage (kV)	41/42/51/52.7/54	
Applicable cubicle	BGP-40.5	

Interlock

Electrical interlock

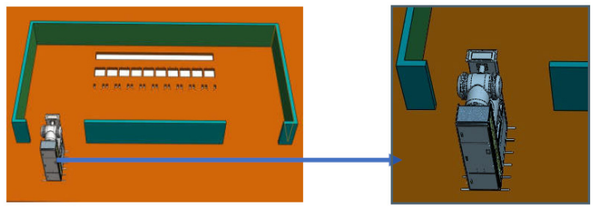
- Electrical interlock can be achieved by the intelligent control and protection unit's contact detection and logic programming for the position state of the TPS and CB, and it can be achieved by microswitch as well
- The electrical interlock works only when the secondary power supply is energised
-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

Mechanical interlock

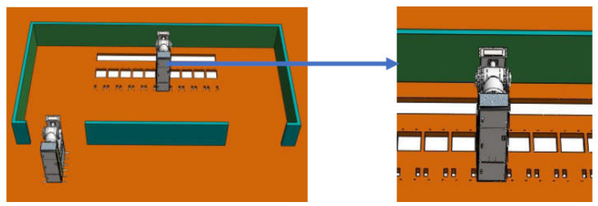
- Mechanical interlock can only be achieved by operating the main shaft with TPS manually under certain conditions
- When circuit breaker is closing, the manual operation cover of DS is interlocked. Only after the CB is opened, can the cover be freely opened. Then the handle can be inserted into the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

Installation

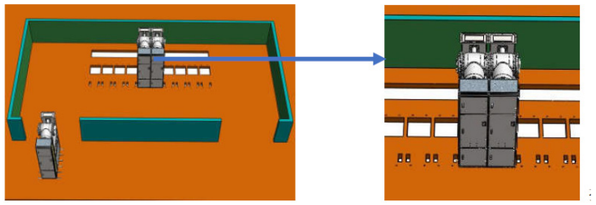
Engineered with outer cone solid busbar connectors, the system streamlines on-site installation by removing the need for vacuum-filling, dry-air testing, and other complex procedures — ensuring faster, more efficient deployment.



Before installation



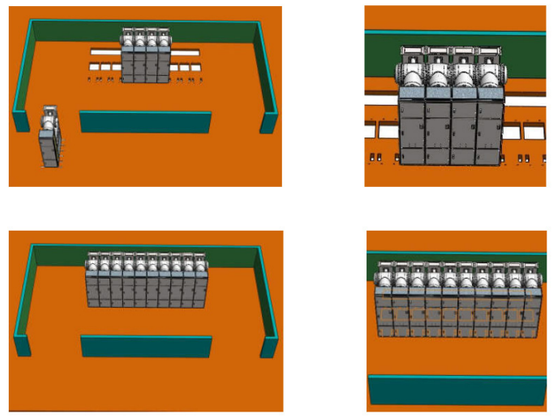
Installed in the substation



Extension

Extension

Easy extension: Low requirements on the foundation flatness (2mm/m).

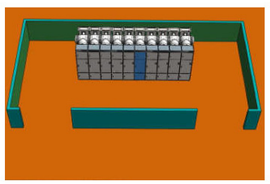


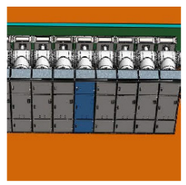
Install bus

Complete extension

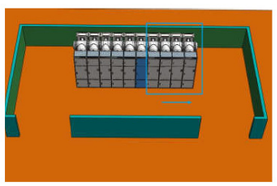
Maintenance

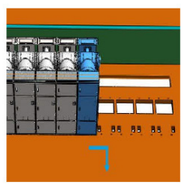
Efficient maintenance: When an 'unrecoverable fault' occurs in any compartment, the switchgear can be replaced. Please refer to BGP-40.5 maintenance manual for details. The process of replacement is shown below.



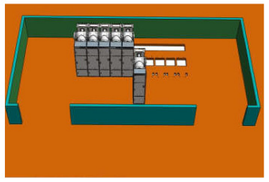


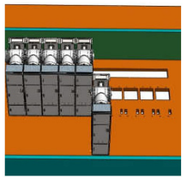
When a fault occurs, power off



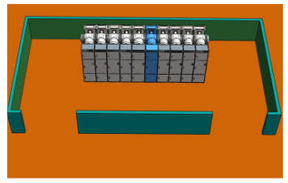


Remove the faulty switchgear





The faulty switchgear has been taken out



Replace the switchgear

Packaging and transport

Packaging

For road and rail transport:

BGP-40.5 switchboards are packaged under protective sheeting. It will be delivered fixed onto a wooden pallet by two plastic tapes.

For maritime transport:

BGP-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:

BGP-40.5 switchboards are packaged in wooden boxes (crates) with solid walls and protective covers (dust covers).

Handling

The BGP-40.5 must be transported vertically.

When moving using a forklift:

Only move the device on a pallet.

When moving without a pallet:

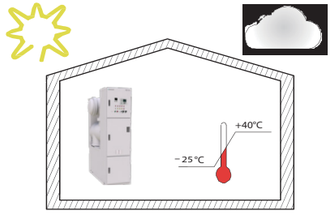
A lifting sling must be hooked onto the switchgear's lifting rings. The angle with the lifting sling must be at least 45°.

When transporting on a pallet:

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

When transporting with slings:

Use the two lifting rings.



Storage

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

The storage area must not have any sharp significant changes in temperature. Consult your Brunstock representative about the particular storage conditions you are planning to use.

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.

Frequency of maintenance intervention

Brunstock equipment manufacturers recommend a schedule for maintenance activities to extend Electrical Distribution equipment performance over time. Further information is available in the product manual and can be discussed with your Brunstock representative.

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

Contact us for more information

sales@brunstock.com

At the end of the BGP-40.5 service life

The dismantling and disassembly of BGP-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 BGP-40.5 end of service life processing approach.

Eliminate hazardous gas recovery

Due to the use of dry air, BGP-40.5 has no need for a process of SF6 gas recovery.

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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