



BGS-40.5

SF6 Free Ring Main Unit up to 40.5kV 1250A 31.5kA

Catalogue
2024

 **Brunstock**

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BGS-40.5



BGS-40.5 in renewable application



Technical centre of Brunstock

BGS-40.5, a versatile switchboard

BGS-40.5 is a medium voltage gas insulated switchboard up to 40.5kV, 1250A, 31.5kA, 4s. It is used in secondary power distribution and is designed for customised application of switchgear in:

- Compact secondary substations
- Industrial zones
- Renewable power plants (BESS, wind, solar etc.)
- Hotels, shopping centres, office buildings, business centres etc.

Electrically insulated using SF6-free gas

Using dry air instead of SF6 (sulfur hexafluoride) in secondary switchgear offers several key benefits. Dry air is an environmentally friendly alternative because it is a natural and non-toxic gas with a significantly lower global warming potential compared to SF6.

Additionally, dry air is less expensive and more readily available than SF6, making it a cost-effective choice for many applications. It also avoids the challenges associated with handling and disposing of SF6, which requires special protocols due to its high potency as a greenhouse gas.

Compact

The design of BGS-40.5 makes it one of the most compact 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 BGS-40.5 guarantees simple and reliable use:

- Simplified maintenance of the functional units combined with continuity of service for the other units (LSC2 class)
- No gas 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 light
- Wide cable compartment to allow the installation of various types of cable

Safety and innovation

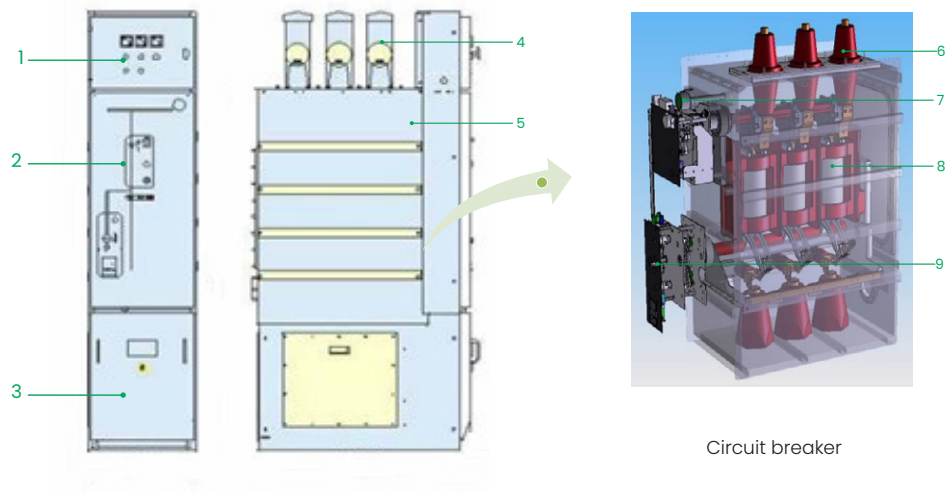
BGS-40.5 was designed for maximum safety of the operators and equipment. In case of internal arcing in the equipment it features:

- Safety valves at the rear yield, which will avoid gas overpressure;
- An exhaust duct that evacuates the gases towards the top (optional) and/ or a deflector at the rear channels that cools the hot gases; and
- Full protection for operators.

Resilient

BGS-40.5 is insensitive to the outside environment and is resilient to:

- Humidity
- Dust
- Pollution
- Dirt
- Pests, such as rodents

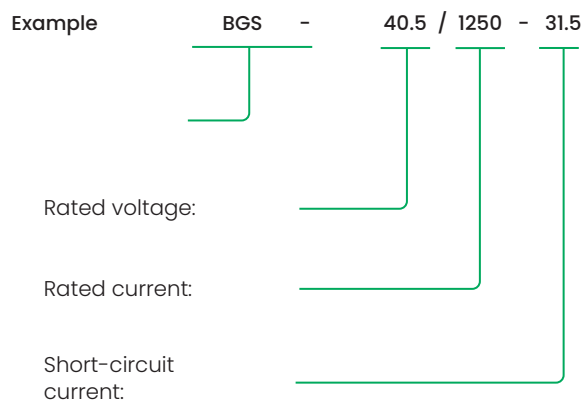


Circuit breaker

- 1 LV compartment
- 2 Operating mechanism compartment and mimic diagram
- 3 Cable compartment
- 4 Solid busbar connector
- 5 Hermetically-sealed stainless steel tank filled with gas to insulate the main circuit
- 6 Bushings for busbar connection
- 7 Tank pressure manometer
- 8 Vacuum circuit breaker
- 9 Operation mechanism

Identification plate

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



Operating conditions

- Altitude: ≤3000m
- Ambient temperature: -40°C ~ + 40°C
- Relative humidity: ≤95% (daily), ≤90% (monthly)
- Seismic intensity: ≤grade 8

Note: if deviation of normal service conditions occurs, the customer can negotiate with their Brunstock representative.

Protection index (IP)

- Main electrical circuits: IP67
- Operating mechanisms: IP4X
- Cable connection compartment: IP2XC
- Switchgear: IK07

Partition class and loss of service continuity category

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

Internal arc classification

BGS-40.5 is a pressurised sealed-unit system that complies with IEC 62271-1. Internal arc classification as per IEC 62271-200 is detailed in the table below. In the unlikely event of gas overpressure, the gas 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, this RMU is classified as LSC2A.

The RMU switchboards comply with the standards

IAC (internal arc classification):
The metal enclosed switchgear may have different types of accessibility on the various sides of its enclosure.

To identify the different sides of the enclosure, the following codes will be used (according to IEC 62271-200 standard).

- A: restricted access to authorized 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 keeping other compartments energised when opening a main circuit compartment.

Description	IEC standard	IEC classes
Switchboard	IEC 62271-200 IEC 62271-1	
Behaviour in the event of internal faults	IEC 62271-200	
Earthing switch (in C, V, P, Pb)	IEC 62271-102	E2, E3
Disconnecter (in VL, P, Pb)	IEC 62271-102	
General use switch (C)	IEC 62271-103	M2, E3
Circuit breaker (in V, VL)	IEC 62271-100	M2, E2, C2
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	



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BGS-40.5 VVV

General introduction

BGS-40.5: Brunstock Gas-insulated Secondary switchgear rated to 40.5kV

This switchgear is a composite apparatus that has all the main circuit switches sealed in a metal enclosure. The insulation medium is dry air, making it an **SF6-free green GIS**. Suitable for Ring Main Units (RMUs) and dual power supplies in 40.5 kV networks, it allows for a transition from traditional single power supply systems.

BGS-40.5 is especially suitable for industrial and commercial zones or rural areas, which have high-density power supply loads and use a cable feed network. This switchgear has the advantages of safe operation in any weather, easy installation, little maintenance and space saving. It is often installed in substations and wind driven generators. The RMU can be flexibly combined by the extension of busbars.

BGS-40.5 is supplied with the following standard equipment

- Vacuum circuit breaker
- Earthing switch with single spring operating mechanism
- Switch position indication for circuit breaker, disconnector and earthing switch
- Single spring operating mechanism on cable switches
- Two-position mechanism with auto-reclosing duty for vacuum circuit breaker
- Cable bushings horizontal in front or vertical at the bottom, with integrated voltage divider for voltage indication
- Busbars, 630A/1250A
- Earthing bar
- Operating handle
- Lifting lugs for easy handling
- Adjustable cable support bars

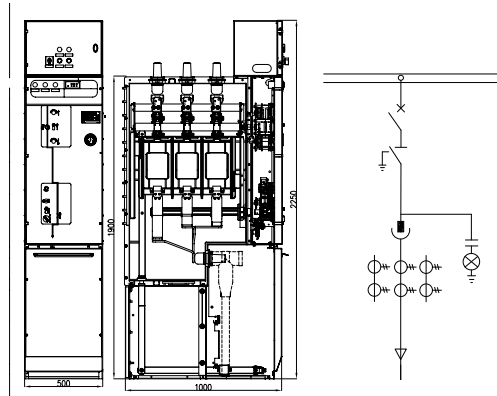
Service conditions

- Altitude: $\leq 3000\text{m}$
- Ambient temperature: $-40^{\circ}\text{C} \sim +40^{\circ}\text{C}$
- Relative humidity: $\leq 95\%$ (daily), $\leq 90\%$ (monthly)
- Seismic intensity: $\leq 8^{\circ}$

Note: if deviation of normal service conditions occurs, the customer can negotiate with their Brunstock representative.

Technical characteristics

- Equipped with circuit breaker function unit
- Small volume, light weight, the single minimum volume is $600*1000*1900(\text{mm})$, which is suitable for the use of renewable and energy storage systems
- Easy operation, safe use, convenient maintenance, the switchgear can be used for 30 years without maintenance
- This RMU is designed to be omniseal, without exposed live parts, and can run for a long time in an adverse environment
- If necessary, the gas tank can also reach to IP67, suitable for high salt fog areas, such as a maritime wind farm



Depth: 1000 mm
 Width: 600 mm
 Height: 1900 mm*

* Height with high LV-compartment: 2250

Technical data

Vacuum circuit breaker		
Rated voltage	kV	40.5
Rated power frequency withstand voltage	kV	95
Lightning impulse withstand voltage	kV	185
Rated current	A	630 / 1250
Breaking capacities		
Short circuit breaking current	kA	31.5
D.C. component	%	<52
Cable charging switching current	A	50
Making capacity	kA	80
Short time withstand current	kA	31.5
Internal arc classification IAC		AFLR-31.5kA-1s
Rated operating sequence		O-0.3s-CO-180s-
Number of mechanical operations		20,000 (Class M2)
Downstream disconnecter and earthing switch		
Rated voltage	kV	40.5
I _{min} power frequency withstand voltage (RMS) (phase to phase, to earth/across isolating)	kV	95/118
Lightning impulse withstand voltage (RMS) (phase to phase, to earth/across isolating)	kV	185/215
Making capacity	kA	80
Class (electrical endurance)		E2
Short time withstand current 4s	kA	31.5
Internal arc classification IAC		AFLR-31.5kA-1s
Number of mechanical operations		3,000

Standard features

- Up to 1250A vacuum circuit breaker and main busbar
- Two position operating mechanisms for the downstream disconnecter and earthing switch
- Interlocking between vacuum circuit breaker and disconnecter
- Switch position indication for vacuum circuit breaker, disconnecter and earthing switch
- Self-powered electronic protection relay with ring core CTs on cables
- Trip coil (for relay tripping)
- Cable bushings horizontal in front or vertical at bottom, with integrated capacitor for voltage indication
- Cable compartment cover allowing double cable connection
- Earthing bar



BGS-40.5 applied in BESS

Factory assembled options

- Cable bushings
- Bushings for connection of external busbars or cable on
- Key interlocking
- Cable compartment front cover electromagnetic interlocked with earthing switch
- Signal (INO) from internal pressure indicator wired to terminals

Additional equipment also available as retrofit

- Manometer
- Motor operation for vacuum circuit breaker and disconnecter
- Top LV-compartment with hinged door
- Short circuit indicator
- Auxiliary contacts
 - Vacuum circuit breaker position 2NO+2NC
 - Disconnecter position 2NO+2NC
 - Earthing switch position 2NO+2NC
 - Vacuum circuit breaker tripped signal INO
- Capacitive voltage indicating systems
 - VPIS acc. to IEC 61958 with integrated indicator lamps (LED)
 - VDS acc. to IEC 61243-5
- Indicator lamp
- Trip coil
- Closing coil
- Undervoltage release (optional electronic time delay device)
- Cable compartment cover
 - With extra depth (surge arrestor)
 - Arc proof (if existing modules have interlocked covers)
- Cable support bracket
- Aluminum cable gland plate for power and control cable
- Internal arc duct

Relays with auxiliary voltage

Located in LV-compartment with hinged door.

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Circuit breaker unit

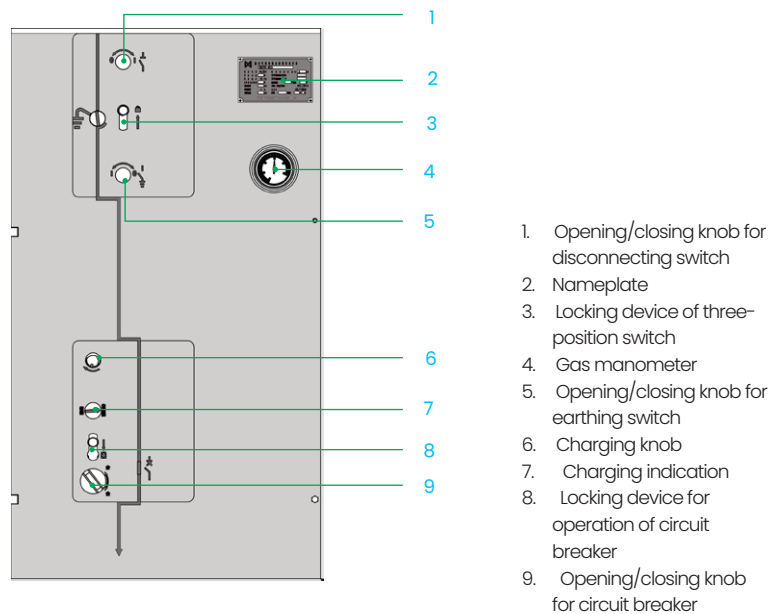
Power-on operation:

- Close cable room door. The taper of the barrier should be set on position 3. Insert the operating handle into the earth handle hole, and turn it in a clockwise direction to open the earthing switch.
- The taper of the barrier should be set on position 1. Insert operating handle into isolating handle hole, and turn it in a clockwise direction to close the disconnecter.
- The taper of the barrier should be set on position 2. Insert operating handle into the charging hole of the circuit breaker. Turn handle in a clockwise direction to close the circuit breaker and charge the spring.
- Turn the opening-closing knob in a clockwise direction to close the circuit breaker.

Power-off operation:

- Turn the opening-closing knob in an anticlockwise direction to open the circuit breaker.
- The taper of the barrier should be set on position 1. Insert the operating handle into the isolating handle hole, and turn it in an anticlockwise direction to open the disconnecter.
- Make sure that the cable side is neutral, and ensure the lock pin of the electromagnetic lock is in the unlock position.
- The taper of the barrier should be set on position 3. Insert operating handle into the earth handle hole, and turn it in an anticlockwise direction to close the earthing switch. Then the cable room door can be opened.

The taper of the barrier can be installed with padlock to lock positions 2 and 3, which is designed to prevent accidental closing of the disconnecter and earthing switches.



Operation board on circuit breaker unit (V module)

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:

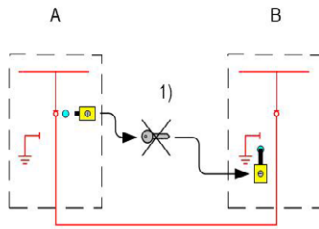
Functional unit with vacuum circuit breaker, disconnector and earthing switch

Interrupting mechanism	Position	Interlock status...						
		DS		ES		CB		Cable compartment panel
		Open	Closed	Open	Closed	Open	Closed	
Disconnecter (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	<ul style="list-style-type: none"> ■ Unlocked if ES open ■ Locked if ES closed 	Unlocked	<ul style="list-style-type: none"> ■ Unlocked if DS open ■ Locked if DS closed 	Unlocked	–	–	–
	Closed	Locked	Locked	Locked	Locked	–	–	–

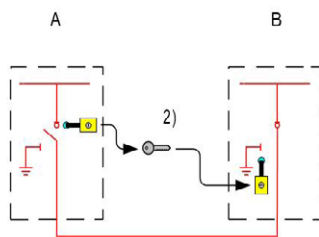
Key interlock

As an option all load break switches and earthing switches may be equipped with key interlock. Key interlock may be mounted according to the customer's specification; either to prevent closing or opening of the switch.

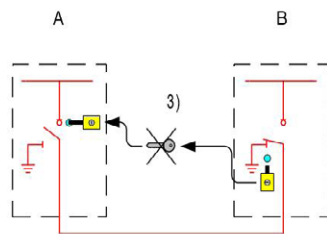
Key interlocks can be used as follows: two switchgears, A and B, are connected to each other by cables. The purpose of interlocks is to prevent closing of the earthing switch unless the load break switch on the other switchgear is locked in open position.



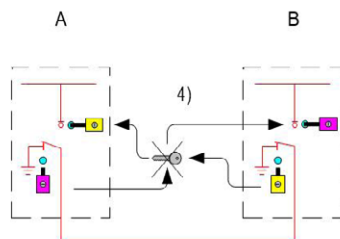
1) One key interlock will be mounted close to the operating shaft of the load break switch in switchgear A. An identical key interlock will be mounted close to the operating shaft of the earthing switch in switchgear B. As long as the load break switch in switchgear A is in the closed position, it will be impossible to remove or operate the key in the key interlock.



2) First you have to operate this load break switch in switchgear A to open position. Then it will be possible to operate this key interlock and turn the key which extends the locking bolt. This will prevent the access to the operating shaft of this load break switch. The next thing to do is to withdraw the key and insert it into the identical key interlock on the earthing switch of switchgear B.



3) When the key is inserted, you will be able to operate the key interlock and turn the key which will withdraw the extended locking bolt. Then you will have access to operate this earthing switch to closed position. As long as this earthing switch is in closed position, the key will be captured and makes it impossible to close the load break switch in switchgear A.



4) If the load break switch in switchgear B and the earthing switch in switchgear A are equipped with another identical key interlock, which has a different key combination than described above, it will be impossible to make an earth connection of an incoming energised cable from neither switchgear A nor B.

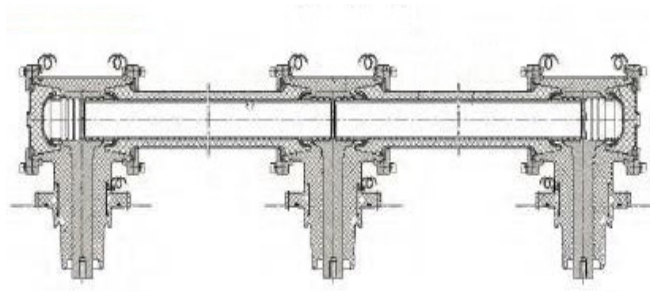
Another example for use of key interlocks is to prevent access to the distribution transformer before the primary side of the transformer is connected to earth. This can be solved by means of two identical key interlocks; one mounted on the earthing switch for the distribution transformer feeder and the other one on the door in front of the transformer.

Extensibility of BGS-40.5

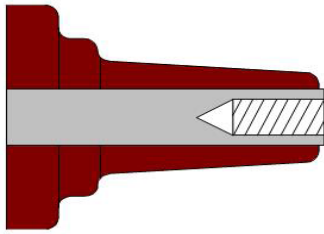
- The RMU offers extensible configurations for secondary distribution applications
- The connection of each functional unit allows for multiple combinations depending on the installation requirements
- The RMU extensible permits the connection of additional units on the left or right-hand side, thereby offering greater flexibility in the choice and positioning of the medium voltage switchboard functions
- The installation and in-line connection of RMU extensible does not require any handling of gas
- Maximum current: 630/1250A.

Erection and assembly

The extension bus can choose following types:



Cable bushing



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

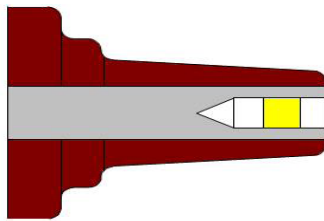
Interface B with plug 400 series, In = 400 A
Optional for all modules.

The yellow area indicates the silver coated contact spring.

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



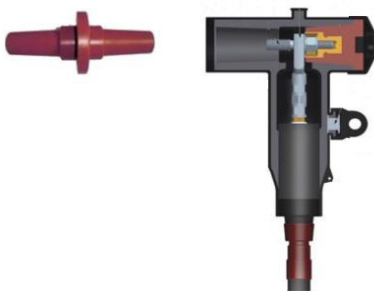
Cable terminations

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

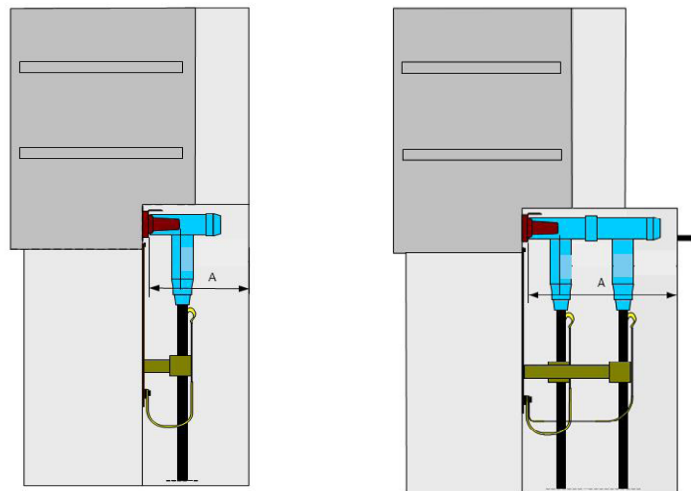
The table below the drawings shows the distance A in millimetre from cable bushing to the inner part of cable compartment cover.



Inner cone cable connector



Outer cone cable connector



	Distance A
Standard	350 mm
Double cables	570 mm
Arc proof cable covers	331 mm

40.5kV: Separable connectors interface B with earthing shield, I=400A						Cable compartment with														
Manufacturer	Designation	Conductor (mm ²)	XLPE / EPR Ø [mm]	Additional equipment for dual cable arrangement	Surge Arrester with	Single cable + SA				Dual cables				Dual cables + SA						
						Standard Dis. A = 361 mm	Arc proof Dis. A = 344 mm	Double cables Dis. A = 581 mm	Direct connection Dis. A = 316 mm	Standard Dis. A = 361 mm	Arc proof Dis. A = 344 mm	Double cables Dis. A = 581 mm	Direct connection Dis. A = 316 mm	Standard Dis. A = 361 mm	Arc proof Dis. A = 344 mm	Double cables Dis. A = 581 mm	Direct connection Dis. A = 316 mm			
3M	94-EE 605-4	35-300	22.8-39.6	KU 33+94-EE 605-4	MUT 23															
Euromold	M400LR/G	35-185	12.0-37-5	None	None															
Euromold	M400TE/G	35-185	12.0-37-5	M400CP-SC+M400TE/G	None						X									
nkt cables	CB 36-400	25-300	17.0-40.0	CC 36-630	CSA 36	X	X	X	X	X	X	X	X					X		
Prysmian	FMCE-400	25-240	21.4-38.8	None	None															
Prysmian	FMCT-400	25-240	21.4-38.8	None	None															
Südkabel	SEHDT 32	35-300	22.8-39.6	None	None															
Tyco Electronics	RSTP	50-300	22.4-40.0	None	None															

40.5kV: Separable connectors interface C with earthing shield, I=630A						Cable compartment with														
Manufacturer	Designation	Conductor (mm ²)	XLPE / EPR Ø [mm]	Additional equipment for dual cable arrangement	Surge Arrester with	Single cable + SA				Dual cables				Dual cables + SA						
						Standard Dis. A = 360 mm	Arc proof Dis. A = 343 mm	Double cables Dis. A = 580 mm	Direct connection Dis. A = 315 mm	Standard Dis. A = 360 mm	Arc proof Dis. A = 343 mm	Double cables Dis. A = 580 mm	Direct connection Dis. A = 315 mm	Standard Dis. A = 360 mm	Arc proof Dis. A = 343 mm	Double cables Dis. A = 580 mm	Direct connection Dis. A = 315 mm			
3M	94-EE 705-6	70-400	25.1-42.8	KU 33+94-EE 705-6	MUT 23			X				X								
Euromold	M400TB/G	35-240	12.0-37.5	M400CP-SC+M400TB/G	400PB-XSA			X				X								
Euromold	P400TB/GI)	35-240	12.0-37.5	M400CP-SC+P400TB/G	400PB-XSA			X				X								
Euromold	M440TB/G	185-630	23.5-56.0	M440CP+M440TB/G	400PB-XSA			X				X								
nkt cables	CB 36-630	25-300	17.0-34.6	CC 36-630	CSA 36	X	X	X	X	X	X	X	X					X		
nkt cables	CB 36-630 (1250)	400-630	34.0-51.0	CC 36-630(1250) or CC 36-630	CSA 36	X	X	X	X	X	X	X	X					X		
nkt cables	CB 36-630I)	50-185	28.9-40.0	None	None															X
nkt cables	CB 36-630	50-300	22.4-40.0	None	None															
Prysmian	FMCTs-400	25-240	21.4-38.3	FMPCS-400-36+	Yes2)			X				X								
Südkabel	SEHDT 33	35-500	22.8-45.6	KU 33+SEHDT 33	KU 33+MUT33			X				X								
Tyco Electronics	RSTI-66xxI)	50-300	22.4-40.0	None	None															
Tyco Electronics	RSTI- 66LxxI)	400-630	34.0-51.0	RSTI-66CP-MI6+RSTI-66LXX	None							X								

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Overall operation

The digital multi-functional protection relay is equipped with a high-performance microprocessor. This provides fully numerical processing of all functions in the device, from the acquisition of the measured values up to the output of commands to the circuit breakers.

Application scope

Microcomputer comprehensive protection and monitoring devices are versatile devices designed for protection, control and monitoring of bus-bar feeders. For line protection, the device can be used in networks with grounded, low resistance grounded, isolated or compensated neutral point. It is suited for radial systems with single end infeed, for open or closed ring systems and for networks that are radial or looped, and for lines with double-end infeed. The device is equipped with motor protection for asynchronous machines of all sizes.

The device includes the functions that are necessary to protect and monitor circuit breaker positions and control the switchgear elements in single or double bus-bars providing universally applicable protection schemes. The devices also provide excellent backup facilities of differential protective schemes of lines, transformers, generators, motors and bus-bars of all voltage levels.

Functions overview

The relay features protective functions and additional functions. The hardware and firmware is tailored to these functions. Moreover, the command functions can be adjusted to the system conditions. The user can also enable or disable individual functions during configuration or modify how the functions interact.

- Protective functions
- Control functions
- Messages and measured values; recording of event and fault data
- Communication



Protection relay: STROM, ST260E



Protection relay: Kries, IKI-35

An intelligent, self-powered relay

Brunstock has adopted an intelligent protection relay with a microprocessor that integrates easily with other systems. It has a bus in the chip to process signals from the current transformers, and then output them through digital logical operations. This protection relay has a compact structure, an airproof chassis and a maintenance-free design that does not suffer from sound interference. It is well-suited for ring network systems, even those running in challenging environments with limited installation options.

Features

- Lower power consumption: Low power consumption technology is adopted for the whole machine, to ensure the protection functions can start quickly and are reliable at any condition
- Easy installation: The structure of the device is simple and smart, easy and flexible to install, making it suitable for the compact installation conditions of ring network systems
- Backup power supply: The protection relay comes with a power self-supply function that is powered by the current transformer. This prevents extra costs associated with installation of a DC screen or UPS
- Flexible configuration: The protection configuration is flexible and complete, and all protection functions can be switched on and off freely, through control figures
- Inverse time curves: Numerous types of inverse time curves, conforming to IEC standards, are readily accessible
- High-current latch-up protection: This can be used in conjunction with various fuse protectors, addressing common issues observed in power distribution systems
- LED display and multi-layer menu Interface: The device features an LED display interface and a multi-layer menu display, creating a user-friendly human-machine interface
- Large non-volatile memory capacity: The protection relay's non-volatile memory can record at least 200 instances of historical events, capturing complete content. Even if the power is interrupted, no data will be lost
- Dynamic and static self-inspection function: The device includes both dynamic and static self-inspection functions. These features continuously monitor the working conditions of various parts, ensuring the device's reliability
- Precision and reliability: High-precision components and optimised workflows contribute to the protection relay's accuracy, reliability, and extended service life
- Communication interfaces for SCADA: The device provides an RS-232 communication bus interface (with the option for a back-side terminal RS-485 communication bus interface). Additionally, it supports open communication protocols, enabling SCADA (Supervisory Control and Data Acquisition) functionality.



Fault passage indicator

Fault passage indicators

To improve your power availability and manage your network load, BGS-40.5 can be fitted with a variety of fault passage indicators integrated in the low voltage front panel.

Main characteristics of fault passage indicators:

It provides a high visibility flashing LED and gives detailed information via the digital display. An optional outdoor lamp can be added that will indicate the fault passage to personnel outside the substation.

Overcurrent detection

- Automatic mode for automatic adjustment-free calibration of detection thresholds
- Manual mode possible to perform special override settings
- Fault acknowledged time

Earth fault detection

Principle: the detector checks the 3 phases of current variation (di/dt). A time delay of 70s is applied for fault confirmation by the upstream protective device.

- Automatic mode for automatic, adjustment-free calibration of detection thresholds
- Manual mode possible to perform special override settings
- Inrush function: to prevent unwanted detection in the event of load switch-on
- Incorporates a 3 s time delay for fault filtering at network power up



Fault indicator: Kries, IKI-20

Fault indication

- Signalling
 - As soon as a fault is confirmed, the indication device is activated
 - Fault indication via a red LED on the front panel
 - Indication of the faulty phase (earth fault) on LCD display
 - Optional remoting of indication to external flashing lamp
 - Activation of a contact for retransmission to the SCADA system
- Indication reset
 - Automatic reset upon load current recovery
 - Manual reset via front panel button
 - Reset via external reset input
 - Reset by time delay
- Communication
 - Provides Modbus communication while also acting as a voltage detector

To accompany the rise of distributed power generation on distribution networks, Brunstock switchgear can be equipped with directional fault indicators.



VDS HR and its removable luminous indicator

Voltage detection systems

The absence, or presence, of voltage at the outgoing feeder level can be checked using 3 types of device:

- VDS-HR
- VDS-LR
- VPIS

Voltage indicators and any connectors for warning lights can be found on the top of the switchgear front panel.



VPIS, Voltage Presence Indicating System

VPIS: voltage presence indicating system

Description:

- The VPIS is a self-powered voltage presence indicating system, in compliance with the IEC 62271-206 standard
- Connectors on the front panel allow the use of a phase comparator
- Extended lifetime of LEDs on the front panel
- Compatibility with existing MV network devices for replacement. VPIS-V0
- VPIS can be fitted with a voltage output cable to interface with passage indicator range or VD23 voltage detection relay, and in particular for power source changeover.



VPIS-V0

IVIS : voltage detection system

BGS-40.5 can be fitted with the VDS-LR IVIS device:

- The integrated IVIS system (Integrated Voltage Detection System) checks for the absence of voltage
- Flashing arrow symbols light up on the indicators in case of the presence of a voltage within defined threshold response limits
- The IVIS is equipped with a self-test in order to avoid any electrical tests.
- The IVIS system also provides a phase comparison function.

It is equipped with integrated electronics, protected against bad weather conditions and requires no maintenance. It is auto-supplied. An auxiliary contact is available for remote monitoring (optional).



VDS: Kries, CAPDIS-S1/2+R4.5

CAPDIS-S1/2+R4.5: fail-safe integrated voltage detecting system

Kries VDS provides integrated continuous three-phase voltage indication in high voltage equipment according to IEC61243-5.

Features:

- **Inherent safety:** it includes a self test which offers inherent safety; no external test device is required.
- **No battery & maintenance free:** for voltage detecting and self test, no external power supply or battery is required.
- **Relay and LED outputs:** for remote monitoring of voltage condition, two relay contacts are integrated. The relays are driven by auxiliary voltage. Two LEDs show the actual relay state.

LPVT options

BGS-40.5 can be specified with compact high accuracy Low Power Voltage Transformers (LPVT). These innovative sensors are ideal for the new generation of electronic protection devices and are the only way to measure energy in secondary MV loops.

- Up to Class 0.5 accuracy levels for metering
- Linear wide spectrum voltage range with no ferro resonance characteristics
- Low power consumption and reduced size—ideal for new or retrofit solutions
- Excellent harmonic performance for **power quality monitoring**
- Increased quality and safety under over-voltage, open circuit, or short circuit conditions
- Easy to install, operate and test—no need to disconnect for cable testing
- Comply to international standard : IEC 60044-7



Remote control & monitoring

BGS-40.5 can be motorised by functional units allowing for the remote control and monitoring of the components. Complete automation of the network is therefore possible and avoids costly human interventions on the site. To enable communication with the network control centres, the switchgear integrates communication systems such as:

- Modem solutions for telephone lines
- Radio
- The GSM network

Possible equipment levels for remote control and monitoring are detailed in the upcoming table. The levels correspond to the basic variants. Level 3 includes the control relays, local/remote selector switches and microswitches. Other documents covering the level of equipment for monitoring and integrated remote control & monitoring are available on request.

Remote terminal unit

The switchgear is suitable to equip a remote terminal unit that integrates all the functional units necessary for remote supervision and control:

- Acquisition of the different types of information: switch position, fault detectors, current values
- Transmission of switch open/close orders
- Exchanges with the control centre

Required particularly during outages in the network, the RTU is of proven reliability and availability, being able to ensure switchgear operation at any moment. It is simple to set up and to operate.

Functional unit designed for the medium voltage network

- It is designed to be connected directly to the MV switchgear, without requiring a special converter
- It has an integrated MV network fault current detection system (overcurrent and zero sequence) with detection set points that can be configured channel by channel (current value and fault current duration)
- Open communications thanks to appropriate protocols (IEC101/104, DNP3 or Modbus) and large choice of media (GSM/GPRS, radio, telephone, etc.)
- Automation function with an optional Auto-transfer-switch capability for power source permutation

Medium Voltage switchgear operating guarantee

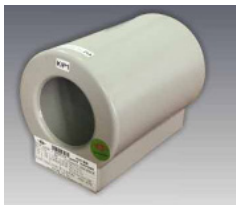
It is a backed up power supply which guarantees continuity of service for several hours in case of loss of the auxiliary source, and supplies power to the RTU and the MV switchgear motor mechanisms

Characteristics of the current and voltage transformers

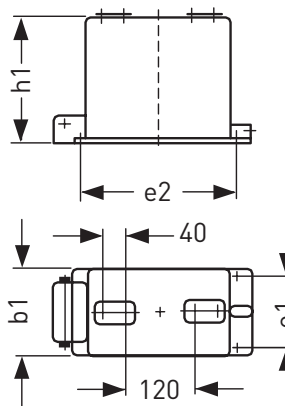
Current and voltage transformers in compliance with the DIN 42600 standard (narrow version) must be used in metering cubicles.

Remarks:

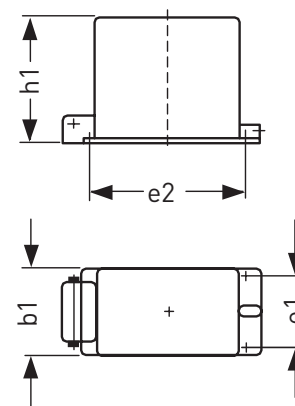
- Installation of current and voltage metering devices is possible with or without a selector
- Option: a voltage indicator can be added
- Pre-assembled cable connections can be purchased as an option.



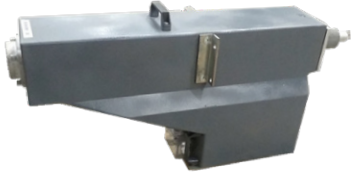
Electrical parameters of current transformers								
Type	Rated primary current	Rated secondary current	CSRI-40.5					
			Accuracy class and rated secondary output (VA)			Accuracy class and rated secondary output (VA)		
			0.2S	0.2	0.5	10P20	10P15	10P10
High-precision current transformer	75	5			2.5			
	100				5			
	200		2.5	7.5	10	2.5	3.75	5
	400		5	12.5	15	5	7.5	12.5
	600		10	20	25	7.5	12.5	12.5
Type	Rated primary current	Rated secondary current	CBC-40.5					
			Accuracy class and rated secondary output (VA)			Accuracy class and rated secondary output (VA)		
			0.2	0.5	1	10P15	10P10	10P5
Open-type current transformer	75	5		2	2.5			2.5
	100			3.75	5			2.5
	200			7.5		2.5	5	
	400		5	12.5		7.5	10	
	600		10	20		10	15	



Current transformer (C)
(DIN 42600, Section 8)



Single phase voltage transformer (V)
(DIN 42600, Section 9)



VT: VSSIF4-40.5/195 (only as reference, real product could

VT solution

Brunstock provides VT solution:

- A block VT (36/40.5 kV)
- Plug for VT

Electrical parameters of voltage transformer

Type	VSSIF4-40.5/195
Rated voltage ratio	33/ $\sqrt{3}$ /0.1/ $\sqrt{3}$ /0.1/3
Accuracy class combination	0.2/3P, 0.5/3P, 1/3P, 3/3P
Rated secondary output (VA)	15/15, 25/100
Limit (VA)	300



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Motor operation and coils

Closing and opening operations of load-break switches and charging of the springs of the mechanism for the circuit breaker can be performed with a motor operation. Earthing switches do not have this possibility.

All motor devices require DC voltage. If control voltage is either 110 or 220 VAC, a rectifier is integrated in the control unit.

Operating cycle for motor operation for C module is CO - 3 min (i.e. it can be operated with a frequency of up to one close and one open operation every third minute). Operating sequence for V-module is O-0,3s-CO-180s-CO.

Test voltage for tables below is +10/-15% for motor operations and closing coils and +10/-30% for trip coils and opening coils. Motor and coils can easily be mounted on the mechanisms after delivery (retrofit).

Characteristics of motor operation for V-module

Rated voltage (V)	Power consumption (W)	Closing time (s)	Current (A)	Peak start current (A)	Fuse current (A)
24	70	13±2	6.5	6.8	10
48	70	13±2	3.2	3.6	6
60	70	13±2	2.5	2.8	4
110	70	13±2	1.4	1.6	4
220	70	13±2	0.7	1	2

Characteristics of shunt trip coil, closing coils and opening coils V-module

Rated voltage (V)	Power consumption (W)	Operating times		Current (A)	Fuse current (A)
		Closing time (ms)	Opening time (ms)		
24 DC	200	40±10	30±10	8	10
48 DC	200	40±10	30±10	4	6
60 DC	200	40±10	30±10	3	4
110 DC	200	40±10	30±10	2	4
220 DC	200	40±10	30±10	1	2
110 AC	200	40±10	30±10	2	4



Relative pressure gauge



Operating lever



Halogen qualitative leak detector

Manometer

- The interrupting mechanisms are installed in stainless steel tanks filled with SF₆-free gas. During the service life of the switchboard, the addition of gas is not necessary
- The gas pressure in the hermetically sealed tank is indicated, as an option, by a relative or absolute pressure manometer for uses at high altitude
- An auxiliary contact can be fitted to the manometers (optional)

Accessories

Standard accessories supplied with the switchboard are:

- A set of operating levers (longer lever is optional)
- A hardcopy of operation manual

Ask for details of other supplies. Only Brunstock accessories are authorised for use.

Halogen Qualitative Leak Detector

XP-1A detector is as an optional accessory for detecting the leakage.

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