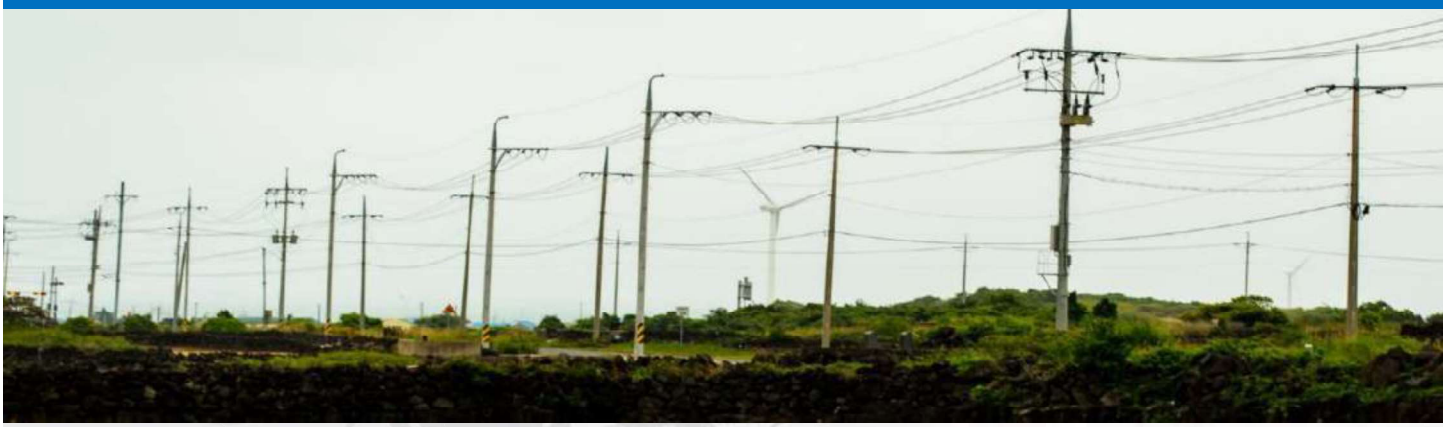
BR10-PS Series Switch for Distribution Automation and Protection



BR10-PS Series

Automatic Switch

Buheung BH SYSTEM Co., Ltd

Version 2.0

Your system more convenient , and more reliable

Introduction

The BR10-PS series automatic switches are a kind of automated load break switch installed on poles or in substations in low and medium voltage distribution networks with the dedicated controls.

These switches are used for making and breaking loads below rated current by remote and manual operations, and integrating system for operation of distribution automation system using various communications, site-centered auto-sectionalizing to isolate faulty sections from the system, and load shedding to improve power quality interfacing with dedicated controls.

The BR10-PS series switches are SF6 gas insulated load break switch adopting arc extinguishing method of puffer type and tungsten-copper contact to ensure adequate electrical durability during opening and closing.

The BR10-PS series switches use a spring toggle mechanism with single spring to guarantee a constant operating time of less than 1 second.

The BR10-PS series switches guarantee a constant operating time less than 1 second by adopting a spring toggle mechanism with single spring. It is possible to perform manual operations with a hook stick as well as electrical operations by motor drive. And manual operations on the ground is allowed through an optional operating mechanism, ground actuator.

The BR10-PS series switches have built-in contacts and sensors for line monitoring, fault detection, and automatic line protection. For those operations, voltage sensors are built into each bushing of each side in the switch, and current sensors are built into each bushing of the source side in the switch. In addition to main contact position information, gas pressure contact and status contact of the locking device are provided to the control.

The BR10-PS series switches are adopted high-quality polymeric bushing that has been proven in the field for years. Universal clamp or NEMA PAD type terminals are provided as bushing terminal. Wildlife protectors to prevent exposure of the terminal are provided as an option.

Various mounting bracket types can be provided for round poles, square poles, frame structure of substations, and gantry structures.

The control cable for connecting various signals between the switch and the control is made of high quality materials with ultraviolet resistance, and all connectors are watertight and all parts soldered in the connectors connected to the control cable are molded using moisture resistance material to prevent degradation of characteristics due to moisture.

The tank of the BR10-PS series switch is basically made of stainless steel, and has the operating handle to be operated with a hook stick from the ground, the bracket for surge arrester installation is provided either top or bottom part as an option, and the ground terminal is equipped on the switch for a reliable ground. In addition, the overpressure relief device is equipped to release pressure generated by an internal fault or arc on the back of the tank.

On the underside of the switch, there is main contact position indicator, gas status indicator, and motor box for electrical operation so that the status can be checked on the ground. The gas pressure gauge is provided as an option, and valve for gas filling is supplied by default.

Inside of the BR10-PS series switches, the circuit for CT open protection and voltage divider for the second voltage of voltage sensors are equipped. The BR10-PS series switches are provided voltage signals to the control through capacitive voltage sensors and have 1000:1 turn ratio CT by default.

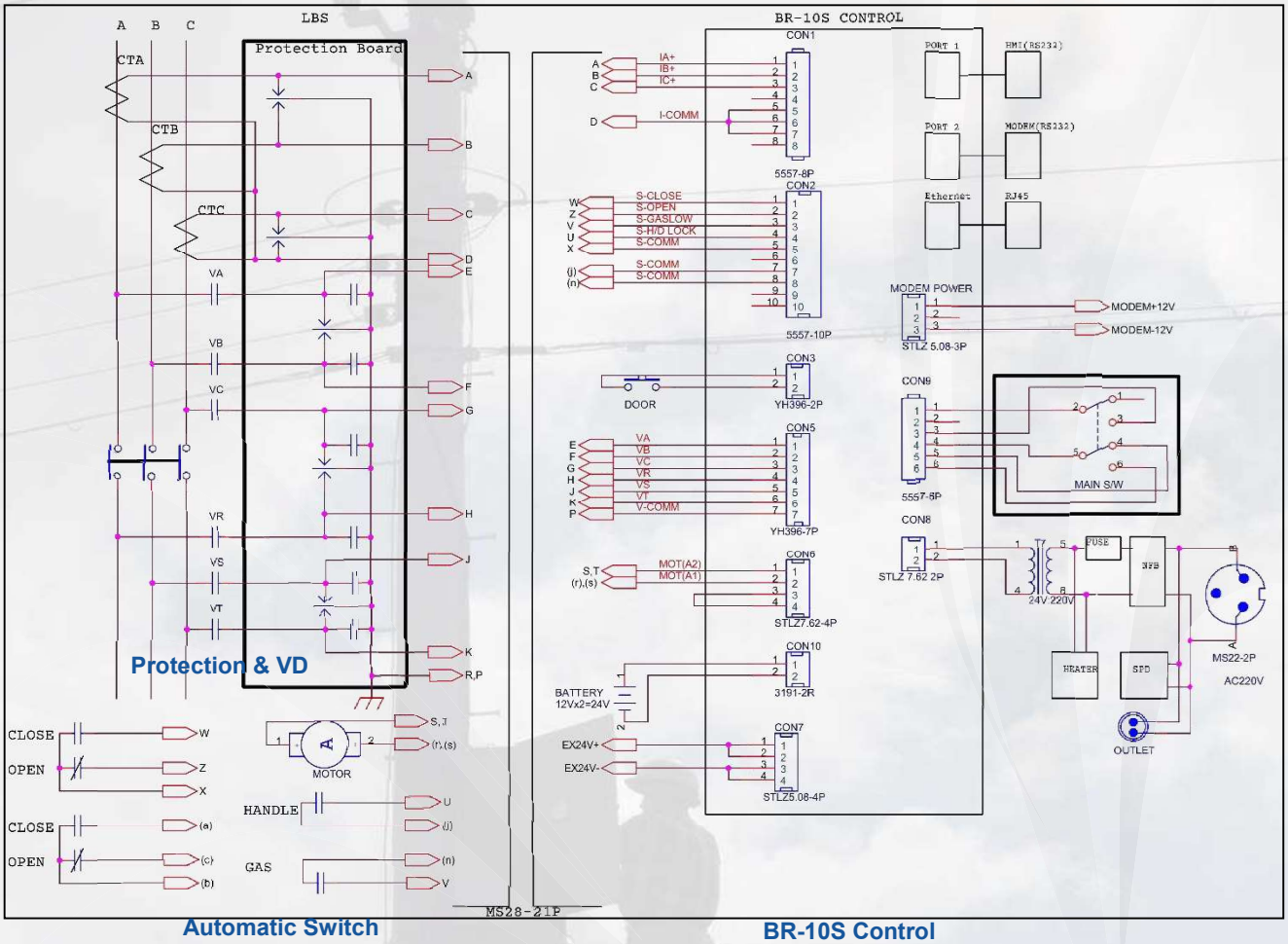
Available Options and Accessories

- Ground actuator set for manual operation to the switch on the ground
- Control cable of more than standard length
- Surge arrester and mounting bracket
- External PT for auxiliary supply and mounting bracket
- Gas pressure gauge
- Brackets other than standard mounting brackets
- Universal clamp, and operation counter
- BR-10S or BR-10SN control
- Electrical control for LBS

Interface between the BR10-PS Switch and the Control

The BR10-PS series switches are connected to the BR-10S/SN control via control cables as shown below.

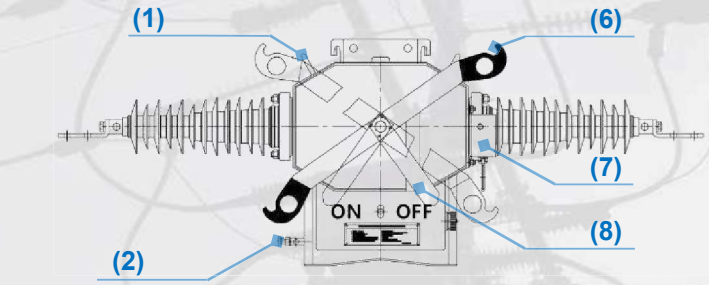
Three-phase voltages on the source and load side, three phase currents, main contact position information and its auxiliary contact, gas pressure and locking device status contact are provided to the control through the control cable. In addition, the motor drive signal to operate the switch from the control is connected to the switch.

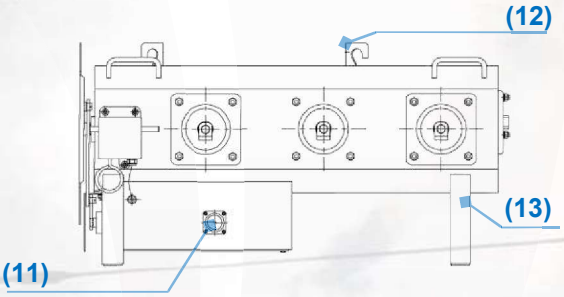


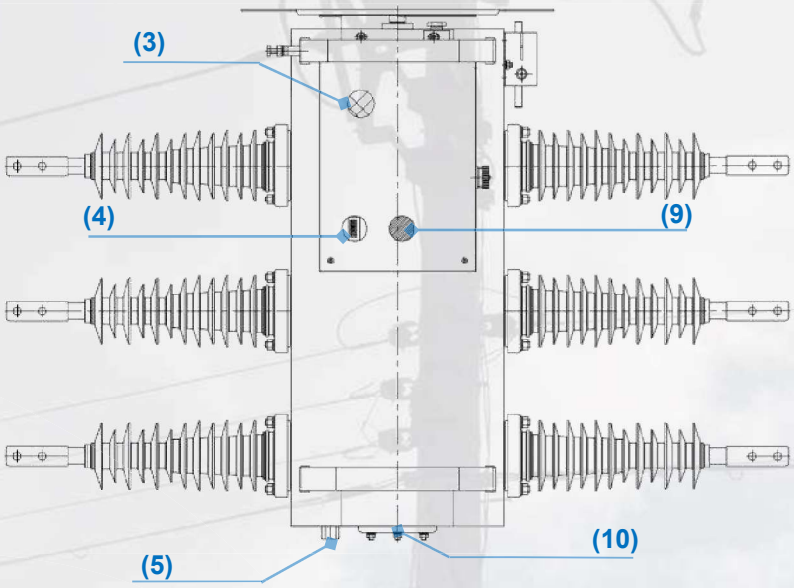
Block diagram of the BR10-PS Switch and the control

Note : The connection between the control and the switch may vary depending on the control used.

External Appearance

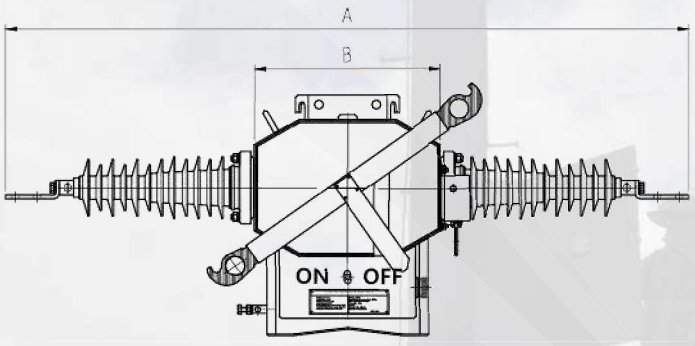


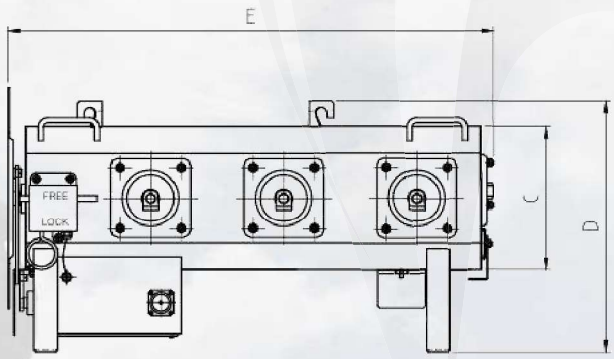




(1) : Carrying Handle
(2) : Ground terminal
(3) : Low Gas Target
(4) : Operations Counter
(5) : Filling Valve
(6) : Operating Handle
(7) : Locking Device
(8) : Front Position Indicator
(9) : Bottom Position Indicator
(10): Overpressure relief device
(11): Receptacle for Control Cable
(12): Hanger Bracket Fixing Part
(13): Stabilizer

Dimensions(mm)



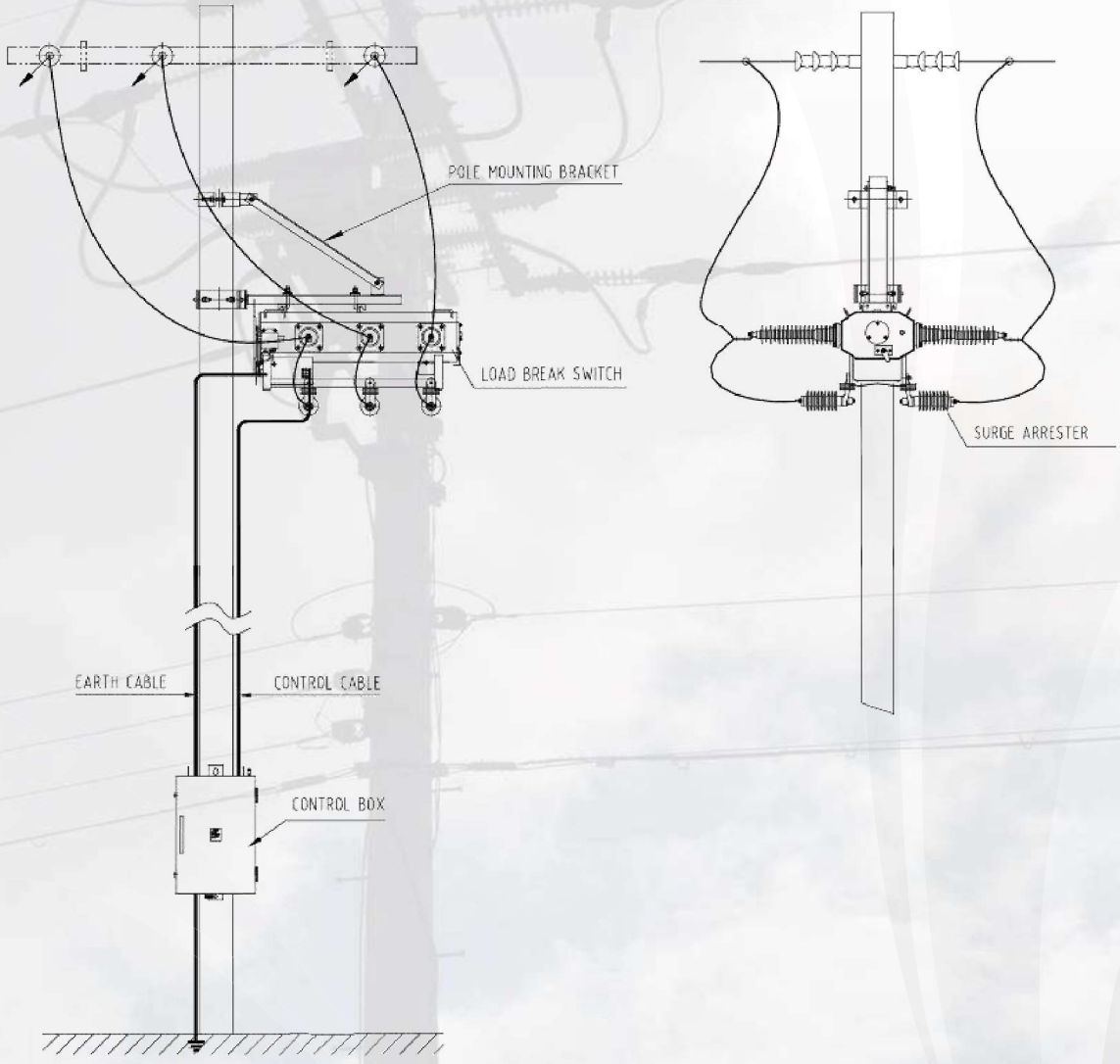


	A	B	C	D	E	P to P
15.5kV	1400	380	280	490	949	260
25.8kV	1400	380	280	490	949	260
36kV	1700	430	280	507	1189	350

Ratings

Model Number	BR10-PS-25	BR10-PS-25	BR10-PS-36
Rated current(I_r)	630A		
Rated lightning impulse withstand voltage(U_p) - common value / across the isolating distance	110/121kV	150kV	175/195kV
Rated power-frequency withstand voltage(U_d) - common value / across the isolating distance	50/55kV	60/66kV	70/80kV
Rated frequency(F_r)	50/60Hz		
Rated short-time withstand current(I_k) / duration(T_k)	16kA/3sec,	20kA/3sec,	25kA/1sec
Rated short circuit making making current(I_{ma})	40kA		
Rated cable-charging breaking current(I_{cc})	25A		25A
Rated line-charging breaking current(I_{lc})	1.5A		2A
Rated earth fault breaking current(I_{ef1})	48A		75A
Rated cable- and line-charging breaking current under earth-fault conditions(I_{ef2})	27.7A		43.3A
No load transformer breaking current	25A		
Rated filling pressure for operation(P_{rm})	0.07Mpa		0.1Mpa
Minimum functional pressure for operation(P_{mm})	0.01Mpa		0.03Mpa
Rated auxiliary and control voltage(U_a)	DC 24V		
Creepage distance	900mm	900mm	1350mm
Phase to phase distance Phase to phase clearance	260mm 225mm		350mm 315mm
Mechanical endurance class	M2(5000)		
Electrical endurance class	E3		
Weight	100kg		124kg
Degrees of protection – Mechanism / Control Part	IP65		
Ambient temperature	-25 to +55℃		
Altitude	Up to 1,000m		
Operating mechanism	Manual or motorized operation		
Applied Standard	IEC 62271-103		

General Arrangement



Note : The ratings and diagrams in this document may be changed arbitrarily for better performance or user specification.

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BR-10 Series Controls for Distribution Automation

BR-10S

Automatic Switch Control

Buheung BH SYSTEM Co., Ltd

Your system more convenient , and more reliable

Introduction

The BR-10S control is a micro-processor-based automatic switch control which includes the automatic sectionalizing functionality, and can interface with the automatic switch such as pole mounted load break switch or sectionalizer installed on low and medium voltage overhead distribution networks.

The BR-10S control is connected to the automatic switch to measure the voltage and current in the distribution line using the voltage and current sensor built in the switch to detect faults on the distribution network. The BR-10S control perfectly interacts with the substation's circuit breaker (Reclosing Relay), or a recloser on the distribution networks to perform highly reliable fault detection.

The BR-10S control is an integrated device that measures the voltage and current of the distribution line and generates various information based on these measured values, and performs functionalities such as fault detection, auto-sectionalizing, communication, status monitoring and control of the automatic Switch, etc.

The BR-10S control provides space and brackets for installation of modem within the enclosure. It includes an auxiliary power supply of appropriate capacity to supply power to the modem and auxiliary devices.

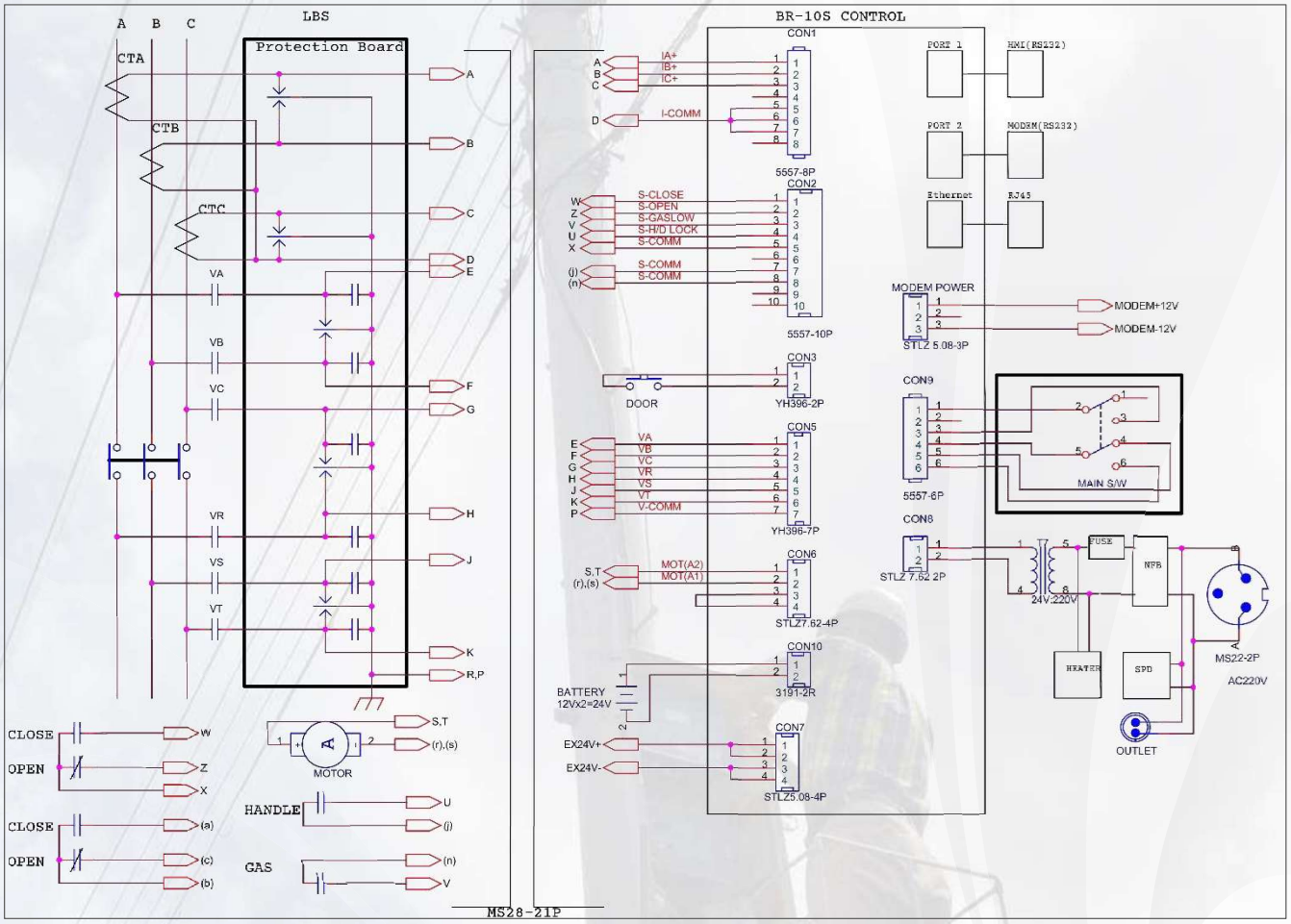
The BR-10S control consists of the following modules.

- Controller performing user interface, communication and major logic functionalities
- Power module for supplying stable power to the controller
- Battery charger and Battery for operation of controller and Switch during with no AC power

Exterior view

Interior view

Wiring Diagram between LBS and Control



Connection Diagram between LBS and Control

Benefits

- BR-10S control is an integrated device including not only fault detection, isolation, measurement, communication, remote and site control, and monitoring for switch and distribution lines but also auxiliary power, battery and charger. It provides a high price-performance ratio and connectivity when it is integrated to distribution automatic system
- It is compatible with most load break switches and sectionalizers.
- It provides user-friendly operations through control front panel and operating program. It does not ask users for complicated settings.
- It has a high connectivity supporting a variety of networks and protocols for automation.
- When crews patrol, they can easily check the device conditions through external indicator.

Applications

- Distribution lines requiring protective coordination in conjunction with reclosers
- Distribution lines requiring real-time monitoring and control
- To prevent faults that have occurred in customer districts from spreading to the distribution lines
- Low and medium voltage overhead and underground distribution networks

Operation mode of BR-10S

- LBS Mode

  It detect faults on lines in cooperation with reclosers on distribution lines or protective devices of substations.
  It is appropriate for centralized automatic system based on communication.

- Sectionalizer Mode

  When a fault happen to the distribution line, it is used for securing maximum healthy sections in cooperation with reclosers without communication networks.
  It could be applied to the localized control system without communication networks and utilities can also obtain more effective system operation by combining with centralized automatic system based on communication.

Key Features

Fault Detection & Protection

- Phase and ground fault detection
- Directional SEF detection
- Inrush restraint
- Auto-sectionalizing
- Voltage and current unbalance
- Loss of phase, overload
- Power flow direction
- Loss of synchronism

Metering

- Current for three phase, neutral or sensitive ground
- Phase voltage for three phases of both sides
- Single and 3 phase kW, kVar, and kVA
- Sequence components
- Single and 3 phase power factor
- Phasor of voltage and current
- Phase sequence
- Energies(4 quadrant Metering)
- Voltage and current unbalance factor
- THD of voltage/current for each phase
- Loaded battery and charging voltage
- Internal temperature

Status Monitoring

- Switch contact position(Closed/Open)
- Manual operating handle
- Gas pressure , battery and charger
- AC power, remote control
- Control inhibit, outer door
- Self-diagnostic

Control Outputs

- Switch contact(Close/Open)
- Battery test, reset fault targets
- Control Inhibit, enable remote
- Reset alarm, demand, energy, operation count, trip count, fault count and outage count
- Optional 2 outputs for displaying line status

Counter

- Permanent and temporary fault count
- Interruption count and duration
- Energies, operation count

Recording

- Total 1,024 functional and system events
- Switching and fault events
- Self-diagnostics events
- Demand current and power
- Each of 8 fault and inrush waveforms

Communication and Protocol

- IEC 60870-5-101/104
- Optional unsolicited Message transmission to multiple user and operation for LBS via SMS
- 10/100 Base-T Ethernet Port

Interlocking

- Possible of inhibiting close control for the switch over live load or synchronism failed
- Inhibiting all controls for the switch over gas low and handle locked

Security

- Required 4 digits password when accessed to Control through control front panel or operating program

External Indicator

- Turning on external indicator when fault detection, battery low, self alarm or sectionalizer trip happened

Technical Specifications

Environmental

- Operating temperatures : -30℃ ~ 70 ℃
- Humidity : up to 95%
- Altitude : Max. 2,000m
- Overvoltage category III
- Pollution degree : 4

Power Supply

- Range :
  - Transformer type : rated voltage ±10%, 50/60Hz
  - Optional SMPS type : 85~265Vac, 50/60Hz
- Auxiliary power
  - 12Vdc/1A
  - 24Vdc/1A

Enclosure

- Dimensions : 450(W) * 562(H) * 260(D)
- Weight : 46kg
- Material : Stainless steel, 2t
- Pole mounting
- Ingress protection : IP 65
- Controller case
  - Dimensions : 230(W) * 310(H) * 115(D)
  - Material : Aluminum

Battery and Charger

- Type : 12V*2, 12AH, SLA battery
- Life span : Max. 7 years
- Periodically automatic battery test
- Battery low and deep discharge alarm

AC Voltage Inputs

- Inputs : 3 voltages(ABC Side)
- Range : 0 ~ 10Vp-p
- Accuracy : ±1%

AC Current Inputs

- Inputs : Three phases and neutral
- Range : up to 20 times rated
- Accuracy : ±1% + 1A
- Optional 3Io(CBCT) Input

Status Input

- Wetting voltage : 24Vdc
- Fully optically isolated inputs
- Scan rate : every 1ms
- Configurable debouncing time
- Aux. Input : 1 point

Control Outputs

- Contact rating : 30Vdc/10A
- Support Select Before Operate(SBO) and Check Back Before Operate(CBO)
- Configurable relay on time
- Aux. Output : 1 point. 30Vdc/5A

SCADA Port

- RS 232 Port
  - Configurable up to 38,400bps
  - Connector : EIA 232, DB9, Male
  - 2kV Optical isolated protection
  - Location : Side panel
- Ethernet Port
  - 10/100 Base-T
  - Supports Static and Dynamic IP

Maintenance Port

- 57,600bps
- Location : Front panel
- Connector : EIA 232, DB9, Male

Control Front Panel

- LCD 4*20 with backlit and 4 Menu Keys
- 25 Status LEDs
- 6 Setting and control buttons
- Maintenance port

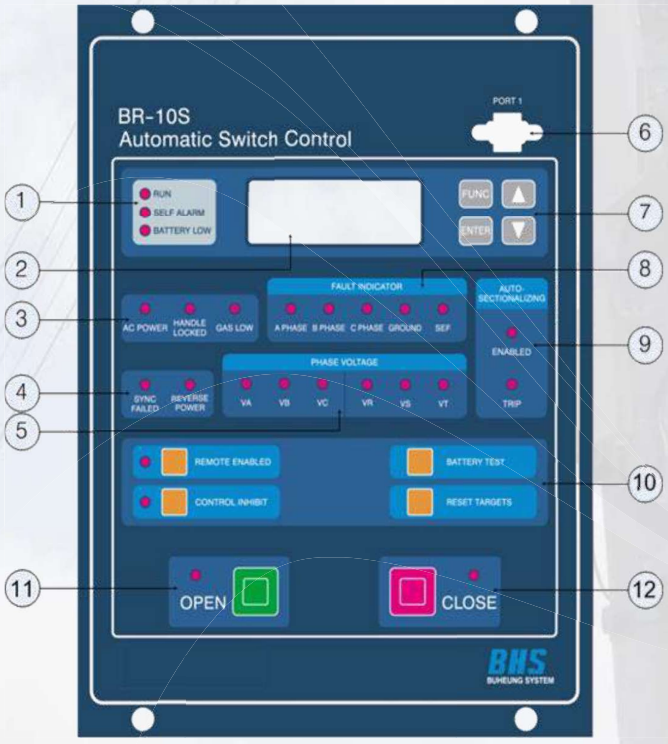
Standards

- IEC 60255-5 : Insulation/Dielectric
- IEEE C37.90.1 : 1MHz burst disturbance
- IEEE C37.90.1 : EFT/Burst test
- IEC 61000-4-5 : Surge immunity
- IEC 60068-2-1 : Environmental
- IEC 60068-2-2 : Environmental
- IEC 60255-21-2 : Vibration, shock, bump
- IEC 60529 : Dust/Water

Operating Program

The Win-OP Operating Program enables local and remote communication between a Windows computer and the BR-10S Automatic Switch Control for verifying settings and status, edit settings, display of measured values and verification of various history data.
The Win-OP provides easy graphical interface and monitor the BR-10S Control.

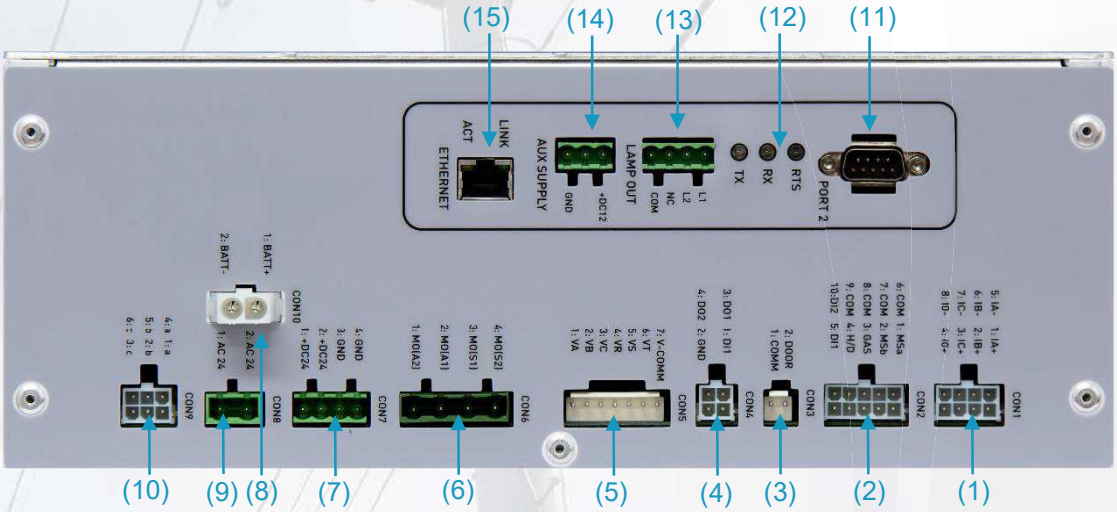
Control Front Panel



Control Front Panel

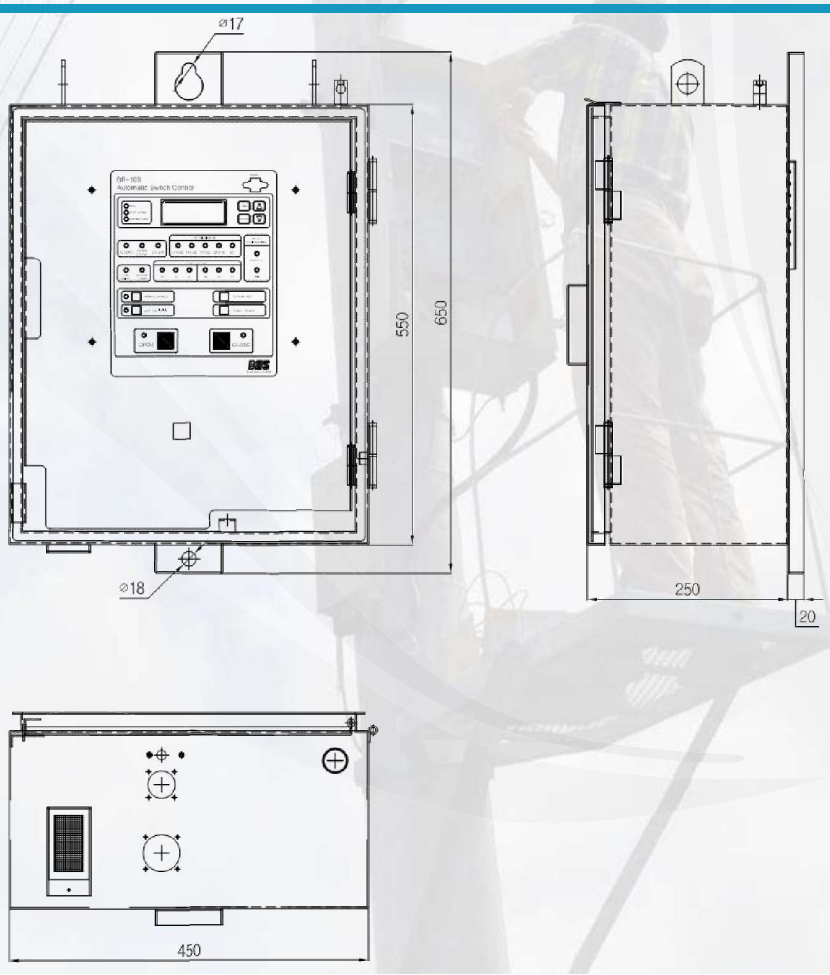
① System Status LED
② Display 4*20 LCD
③ External Input Status LED
④ Synchronism and Power Flow Status LED
⑤ Phase Voltage Status LED
⑥ Maintenance Port
⑦ LCD Menu Key
⑧ Fault Indicator
⑨ Auto-sectionalizing Status LED
⑩ Operating and Setting Buttons
⑪ Open Button and LED
⑫ Close Button and LED

External Connections



(1)Current Input (2)Switch status Input (3)Door (4)Auxiliary in/output (5)Voltage Input (6)Control Output (7)Auxiliary Power Supply (8)Battery (9)AC Power Input (10)DC Power Switch (11)RS232 Port2 (12)Indicator of Port2 (13)Lamp Outputs (14)Aux. Supply (15) Ethernet Port

Enclosure Dimensions



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