GREEN INITIATIVE

A new generation of MV Switchgears that help keep our planet green

SOLID TECHNOLOGY SOLID INNOVATION SOLID FUTURE



THE FUTURE IS SOLID

We are committed to help keep our planet green by reducing and/ or eliminating the production and use of toxic greenhouse gases such as SF-6 Gas in the Electrical Power Transmission and Distribution Industry.

OUR SOLUTION

Use of Bulox Advanced Solid Insulated Switchgears (BASIS) range

Solid Insulated Switchgear (SIS) Up to 40.5kV for Fixed Mounted Circuit Breaker Type, Up to 24kV for Removable Circuit Breaker Type

Medium-Voltage Switchgear

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OUR RESPONSIBILITIES TO OUR PLANET

Nowadays, with climate change and global warming coupled with many natural disasters and uncertainties associated with it, the environment becomes a very important issue. There is an urgent need for society to study and reassess what we do and how we can help to keep and protect the environment we live in. Without which, all lives on earth would be affected. Among others, it is discovered that greenhouse gases such as CO2 and SF6 are one of the main causes for climate change. Therefore, it is our duty and responsibility to reduce / eliminate the production and use of such greenhouse gases to help keep our planet green for the generation ahead of us now.

REDUCTION AND ELIMINATION OF SF6 GASES

Sulfur Hexafluoride (SF6) gas is a synthetic gas which does not occur naturally on earth. It is industrially produced and widely used as an insulation medium in high voltage equipment. While providing good insulation, SF6 gas is also very toxic when combusted – especially during electrical switching –and it is the most potent among all six greenhouse gases listed in the Kyoto Protocol. It is also estimated that the Global Warming Potential (GWP) for SF6 Gas is about 23,000 times greater than Carbon Dioxide (CO2). SF6 gas also has an atmospheric lifespan of about 3200 years as compared to CO2 which has about 250 years. Hence, it is very difficult to disintegrate or destroy them in our life time. As society progresses, the demand for world's energy and the production of SF6 gas for electrical equipment increase tremendously and at an absolute alarming rate. Recent study has shown that the percentage for the production rate of SF6 gas is the highest among all the greenhouse gases identified. The United Nation Panel of Inter -Governmental Climate Change (IPCC) has since then added SF6 Gas to the list of extremely harmful greenhouse gases and the Kyoto Treaty (1992) stipulated that it must be minimized and eliminated if needed.



THE FUTURE OF ELECTRICAL POWER TRANSMISSION & DISTRIBUTIONS

With the understanding and importance of Climate Change & Global Warming potential - as well as the implementation stiff regulatory measures and compliance as stipulated in the various Global agreements, many countries are now seeking for alternative solutions to help reduce and eliminate the production and use of greenhouse gases

As a major user of SF6 gas, it is envisaged that many high voltage electrical equipment manufacturers would have no choice but to switch to other forms of alternative solution to reduce their reliance on SF6 gas. One of the best prospects till date is the use of Solidly Insulated Switchgears (SIS) instead of Gas Insulated Switchgears for all MV electrical transmission and distribution. The use of Solid insulated products completely eliminated the use of SF6 gas and all additional monitoring and protection components associated with it. The newly developed Solid Insulated Switchgear is very compact, safe and reliable and no maintenance required.

It is envisaged that all HV & MV Switchgears shall be designed & manufactured using this solid medium from now on as there is no other alternative. Hence, the future for this technology is **SOLID**.

\ TYPE



\ TYPICAL USES

The **BASIS** range of Solid Insulated Switchgears designed and manufactured by Bulox Power Pte Ltd – in collaboration with its OEM Partner is very simple, modular, light, safe, reliable and almost maintenance-free. It can be used for the following industries:



Underground / Compact Substations



Solar / Renewable Energy



Telecommunication / Data Centre



Office & Commercial Building



Metro / Rail & Track



Industrial Plants



E-Bus/ Fleet Charging Centre



Marine & Offshore

\ PRODUCTS COMPARISON







The following are the main features / comparison among the different type of MV Switchgears:

Attributes	Solid Insulated Switchgear (SIS)	Gas Insulated Switchgear (GIS)	Air Insulated Switchgear (AIS)
Design & type tested according to IEC standard	Yes	Yes	Yes
Certificate/Approvals from major Institution	Yes	Yes	Yes
Safety / Reliability	Safe & Reliable	Safe	Moderate
Suitable for underground substation uses	Very suitable	Limited	No
Contribution to global warming (Greenhouse gases)	No	Yes	No
Potential green marks product	Yes	No	N/A
Dimensions / Compactness	Compact	Compact	Large
ISO-Phase protection / Segregation	Yes	No	No
Gas leakages / Monitoring	No	Yes	N/A
Potential for internal arc fault (HV)	Extremely low	Low	High
Panel extension	Yes	Depend on makes	Yes
Condensation / Humidity influence (HV)	No	Low	High
Potential hazard due to accidental touch	Safe	Limited	High
Fixed / Withdrawable type circuit breaker	Both types	Fixed type only	Withdrawable type only
VCB trolley requirements	No	No	Yes
Cable entry facilities	Top / Bottom	Normally bottom	Top / Bottom
Installation difficulties	Easy	Difficult	Difficult
Maintenance requirements	No/Negligible	Moderate	High

NOTE : The above technical comparison is based on Bulox **BASIS** range of **Solid Insulated Switchgears** compared with other general makes of Gas-Insulated Switchgears (GIS) and Air-Insulated Switchgears (AIS).

\ OEM PARTNERSHIP



While **Bulox Power** has its own factories and workshops, it will continue to source and partner with qualified OEM factories to carry out its production. Bulox Power believes that this is the best and most efficient way to provide good, quality and cost effective products and prompt services to its clients as it is not constraint by any single factory. The benefits of such OEM partnership include: **More Flexibility, Faster Response, Faster Delivery** and probably More **Cost Effective** as we have a wide range of OEM factories to choose from. The product quality is similar as each OEM Factory has to pass through a very stringent Engineering Check and Quality Audit before they can be selected by Bulox QC Department. **Bulox Power takes full responsibilities on all Warranties on behalf of its OEM factories to its clients.**

\ STANDARD COMPLIANCES

The **Bulox BASIS** range of Medium Voltage Solid Insulated Switchgears are designed and manufactured by our selected OEM partners with high quality materials and modern manufacturing processes. The products generally complies with the following main IEC Standards, Quality processes and Type-Test Certificates. Other types of Standards such as **ANSI/ NEMA** or equivalent are also applicable.

IEC 62271-100	HV Circuit Breakers
IEC 62271-200	Switchgear
IEC 62271-102	Isolating & Earthing Devices
IEC 60168	Insulators
IEC 60137	Bushings
IEC 60255	Protection Relay
IEC 60529	Enclosures



Pictures shown are for illustration only

\ TYPE TEST CERTIFICATES

Bulox BASIS range of MV Solid insulated Switchgears manufactured by our OEM partners have also been type tested by independent institutions and/ or internationally recognized testing laboratory such as KEMA/CESI, etc



Solid Insulated Switchgear (SIS) is a new class of Medium Voltage Switchgear with no exposed primary component as all HV components are solidly casted and grounded. It is ISO phase (No arc fault between bus), touchable by accident (Per IEC user safety standard) and being tested under IEC 62271-200:2003-11 standard.

BULOX BASIS Solid Insulated Switchgear KEMA Type

TestType Test Certificate of Complete Type Test

- Type Test Certificate of Dielectric Perfomance
 - Type Test Certificate of Temperature Rise
- Type Test Certificate of Switching and Short Circuit
 Performance
 - Type Test Certificate of Internal Arc Fault



\ QUALITY ASSURANCES

Bulox Power strives to provide the highest guarantee on Quality & Safety by adopting and implementing all the relevant international Quality Standards, Compliances, Approvals and best practices in the industry.



\ CLASS APPROVAL

If needed, we can also comply or meet the following Class / Society requirements - **ABS, DNV, BV, Lloyd or GL.**



BULOX POWER WILL HELP REDUCE THE CARBON FOOTPRINT BY INTRODUCING BULOX ADVANCE SOLID INSULATED SWITCHGEAR - BASIS

ADVANTAGES OF SOLID INSULATED SWITCHGEAR (SIS)

SAFETY

- All BASIS switchgears design complies fully to the latest IEC Standards and Requirements
- No SF6 gas required. Hence no risks of faults due to gas leakage or regular check and top-up.
- All live/ active fully encapsulated & grounded no accidental electric shock or earth fault occurrence.
- Each live phase is encapsulated separately (ISO-Phase) no possibility of Phase-to-Phase fault.
- Full "idiot-proof" mechanical interlock system for all key components such as panel covers, disconnector switch and earth switches with the circuit breaker operation.
- The whole **BASIS** Switchgear is very simple & solidly constructed reducing all inter-connection and minimizing potential fault drastically.

RELIABILITY

- The implementation of **Permanent Magnet Actuator (PMA)** instead of using conventional spring-charged mechanism reduces the number of mechanical parts drastically. Hence, make the **BASIS** switchgears very simple and reliable to operate. Our factory guarantee minimum 10,000 times of fault-free operation.
- For SIS, the whole switchgear is constructed modularly and there are practically very little interconnection parts and all live parts are fully encapsulated. Hence, the whole **BASIS** Switchgear is very safe and reliable
- Unlike GIS, there is practically no gas involved. Hence, saving a lot complicated gas monitoring and protection devices which may also provide false alarm during operation.
- There is minimum requirement to maintain the **BASIS** range of MV Switchgears due to its fully encapsulated design for all live/ active parts and use of **PMA**. Hence, it is very reliable for long term use in all appropriate environmental condition.

MAINTENANCE FREE

- The **BASIS** range of Solid Insulated Switchgear is one of the most simplified, modular, compact and fully encapsulated ever designed and is almost maintenance free.
- The use of **PMA** device reduces the mechanism drastically and there is no requirement for regular servicing or lubrication.
- All active parts of the switchgears including the CB, DS, ES and main bus-bars are fully encapsulated and maintenance free.
- The whole switchgears can be fully and easily accessible from all sides for inspection or maintenance when needed.







ECO FRIENDLY

- One of the main reasons for the development of the **BASIS** range of Solid Insulated Switchgears is our responsibility to help keep the planet green for future generation.
- The current production and use of ozone depleting gases such as Hexaflourine Sulfide (SF6) gas is alarming as this
 gas is not only very toxic when combusted but also very harmful to the environment. It takes a very long period (>
 3500 years) to dissipate on earth and SF6 gas has 23,900 times warming potential greater than CO2. Hence, it
 is our duty and responsibilities to help reduce or completely eliminate the reliance of SF6 gas in the Electrical power
 Distribution and Transmission industry.
- The majority of the materials used in the BASIS Switchgears are from sustainable sources and recyclable.

CONVENIENCE

- Modular and solid design with minimum interconnecting and interfacing parts make the **BASIS** easy to handle and assembly at site. The **BASIS** Switchgear is also lighter than GIS type.
- No gas involved hence, no cumbersome gas works at site.
- Withdrawable **VCB** has its own integrated wheels with ram access and interlocks this allow it to move around easily on its own unit without additional truck.
- Panel-to-Panel assembly and cable connection are very easy to implement.
- While designed and manufactured as a Standard, the **Bulox BASIS** can also be easily customized to suit your specific needs.



\ TECHNICAL DATA - FIXED TYPE



TECHNICAL DETAILS OF FIXED TYPE SIS

TYPE/MODEL	UNIT	BASIS1-12F	BASIS1-24F	BASIS1-36F	BASIS2-24F (Double Busbar)
Maximum rated voltage	kV	6.6/7.2	22/25.8	33/40.5	22/25.8
Number of phase	Phase	Three (3)	Three (3)	Three (3)	Three (3)
Rated frequency	Hertz (Hz)	50/60	50/60	50/60	50/60
Maximum rated current	Ampere (A)	630	630/1250/2000	630/2000	600/2000
Power frequency withstand voltage	kV	20/30	50/55	95/118	70/77
Impulse withstand voltage	kV	60/70	125/140	200/220	150/165
Duty cycle	-	CO-15s-CO	0-0.3s-CO-15s-CO	0-0.3s-CO-180s- CO	0-0.3s-CO-15s-CO
Rated short time current (Peak/rms)	kAp/kA@sec	32.5/12.5@3.0s	65/25.1@3.0s	82/31.5@3.0s	65/25.1@3.0s
Rated making capacity	kAp	32.5	65	82	65
Rated breaking capacity	kA	12.5	25	31.5	25
Operating temperature	Deg-C	-5.0 ~ 45	-5.0 ~ 45	-5.0 ~ 45	-5.0 ~ 45
Enclosure protections (Active parts/panels)	IP	IP65/3X	IP65/3X	IP65/3X	IP65/3X
Circuit breaker type	-	Vacuum	Vacuum	Vacuum	Vacuum
Insulation medium	-	Solid Cast	Solid Cast	Solid Cast	Solid Cast
VCB operating system	-	PMA	PMA	PMA	PMA
Control voltage	Volts(V)	DC24/110DC/ AC220V	DC24/110DC/ AC220V	DC24/110DC/ AC220V	DC24/110DC/ AC220V
Approximate dimensions (W x D x H)	mm	500 x 1350 x 1950	600 x 1500 x 2250	800 x 1800 x 2250	600 x 2000 x 2250
Approximate weight	Kg	500 ~ 750 kg	650 ~ 850 kg	750 ~ 900 kg	950 ~ 1150 kg

Note:

- The above technical information is based on the current design and information provided at this time of publication.

- The Manufacturer reserves the rights to improve/ change the design without official notification.

\ TECHNICAL DATA - WITHDRAWAL TYPE





TECHNICAL DETAILS OF WITHDRAWAL TYPE SIS

TYPE/MODEL	UNIT	BASIS1-17W	BASIS1-24W
Maximum rated voltage	kV	22/17.5	24/25.8
Number of phase	Phase	Three (3)	Three (3)
Rated frequency	Hertz (Hz)	50/60	50/60
Maximum rated current	Ampere (A)	630/1250	630/1250
Power frequency withstand voltage	kV	38/45	50/60
Impulse withstand voltage	kV	95/110	125/150
Duty cycle	-	0-0.3s-CO-15s-CO	0-0.3s-CO-15s-CO
Rated short time current (Peak/rms)	kAp/kA@sec	65/25.3@3.0s	65/25.1@3.0s
Rated making capacity	kAp	65	65
Rated breaking capacity	kA	25	25
Operating temperature	Deg-C	-5.0 ~ 45	-5.0 ~ 45
Enclosure protections (Active parts/ panels)	IP	IP65/3X	IP65/3X
Circuit breaker type	-	Vacuum	Vacuum
Insulation medium	-	Solid Cast	Solid Cast
VCB operating system	-	PMA	PMA
Control voltage	Volts(V)	DC24/110DC/AC220V	DC24/110DC/AC220V
Approximate dimensions (W x D x H)	mm	540 x 1500 x 1950	600 x 1500 x 2250
Approximate weight	Kg	600 ~ 850 kg	750 ~ 950 kg

Note:

The above technical information is based on the current design and information provided at this time of publication.
The Manufacturer reserves the rights to improve/ change the design without official notification.

\ BASIC PANEL LAYOUT



SINGLE BUS-BAR PANEL CONFIGURATION





Legend

- 1. Permanent Magnetic Actuator, circuit breaker operation mechanism
- 2. Earthing mechanism
- Disconnecting Function of three-Position Switch
 Vacuum Circuit Breaker
- Vacuum Circuit Breake
- 5. Low-voltage control compartment
- 6. Cable Compartment
- 7. Solid Insulated Busbar
- 8. Cable Connection
- 9. Feeder Current transformer
- 10. Surge Arrester
- 11. Cable connection with outside-cone T-plug
- 12. Earthing function of three-position Switch
- 13. Disconnector mechanism
- 14. Low-voltage connection compartment
- 15. Feeder Name Tap
- 16. Vacuum Circuit Breaker
- 17. Disconnecting Function of three-Position Switch
- Disconnecting Function of three-Position Switch
- 19. Multi function protection relay
- 20. Three-Position indicator & Circuit breaker Indicator
- 21. Three-Position indicator & Circuit breaker Indicator
- 22. Protection Relay interface panel LCD
- 23. Protection Relay function status LED indicator
- 24. Protection Relay interface panel Reset button
- 25. Protection Relay interface panel ON/ OFF button
- 26. USB Port

DOUBLE BUS-BAR PANEL CONFIGURATION



\ TYPICAL CONFIGURATION

Bulox **BASIS1 & BASIS2** range of **Solid Insulated Switchgears (SIS)** can be configured with the following components:



\ PRIMARY DIMENSIONS & INSTALLATION SCHEME

550 600 600 600 1250~1500 550 ₽.Ŧ ₽.£ \$ Г 권 2100 --- 8 Floor Level 4 4 4 **▲1000** 4 4 4 4 4 4 . 4 -4 4 4 4

SINGLE BUS-BAR INSTALLATION (BOTTOM CABLE ENTRY)

SINGLE BUS-BAR INSTALLATION (TOP CABLE ENTRY)







(16)

\ TYPICAL INSTALLATION SCHEME

(FOR SINGLE BUS-BAR - BASIS 1)



EXAMPLE 1





EXAMPLE 2

EXAMPLE 3

\ TYPICAL INSTALLATION SCHEME

(FOR DOUBLE BUS-BAR - BASIS 2)





EXAMPLE 1

EXAMPLE 2

ONE OF THE MAIN REASONS FOR THE DEVELOPMENT OF THE BASIS RANGE OF SOLID INSULATED SWITCHGEARS IS OUR RESPONSIBILITY TO HELP KEEP THE PLANET GREEN FOR FUTURE GENERATION.

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\ MAIN COMPONENTS & FEATURES

The following are the main features / component for Bulox's **BASIS1** & **BASIS2** range of **MV Solid Insulated Switchgears (SIS)**:





CIRCUIT BREAKER DRAW-OUT POSITION

PERMANENT MAGNETIC ACTUATOR (PMA)



The **PMA** is probably one of the most significant innovation for switchgears operations in recent history used in all Bulox **BASIS** MV Switchgears Range. It virtually reduces thousands of mechanical parts normally found in a conventional spring charged mechanisms to less than 20-parts only, thereby, not only avoiding a lot of potential malfunction but also saving on requirements for regular maintenances. The operation of the **PMA** is also very simple, safe and reliable as well as the respond for any activation is almost instantaneous and powerful. The **PMA** guarantees a minimum operation cycles >10,000 times compared with conventional spring charged mechanism which has < 2000 cycles times.

VACUUM CIRCUIT BREAKER (VCB) - FULLY ENCAPSULATED FIXED TYPE



The VCB is one of the main component used in Bulox BASIS MV Switchgears. It is used for switching and/ or isolating the HV circuitry. The VCB consists of a set of 3 x Vacuum Interrupters and they are fully vacuum casted in high grade epoxy – thereby providing full isolation and protection from each other as well as the external environment. They are very compact, safe and reliable to operate.

VACUUM CIRCUIT BREAKER (VCB) - FULLY ENCAPSULATED WITHDRAWABLE TYPE



The Withdrawable **VCB** is similar in constructions as the Fixed Type **VCB** excepts that it can be isolated and withdrawn from the switchgears, thereby, providing an additional level of safety.

There are many interlocking electro-mechanical safety features incorporated into the Withdrawable **VCB**, hence making it very safe and reliable to operate. Unlike conventional MV Switchgears, the Bulox **BASIS** range of Withdrawable **VCB** does not requires additional **VCB** Trucks. It operated at floor level and the **VCB** can be easily pushed around on its own integrated trolley system.

DISCONNECTING/ EARTHING SWITCHES (DS/ ES) - FULLY ENCAPSULATED



The Disconnecting and Earthing Switches (DS/ ES) are used for isolation and grounding the MV switchgears. Both the DS and ES are also fully vacuum casted in high grade epoxy castresin materials and fully insulated from each other as well as protected from the environment, hence they are very safe and reliable to operate.

MAIN BUSBAR SYSTEM (**MBS**) – FULLY SEGREGATED AND ENCAPSULATED, ISO-PHASE



The Main Busbar System of Bulox **BASIS** Range of MV Switchgears are constructed with high quality cylindrical coppers and individually vacuum casted with high grade epoxy cast-resin materials. This not only provide equal potential around the Busbar but also provide a high level of safety and reliability as the busbar are totally isolated from each other (Iso-Phase) and fully protected from the environment. The Busbar are modularly and solidly constructed and they can be easily and safely connected with each adjacent panels. All the surfaces of the busbars are also coated with special conductive materials and fully grounded, hence, they are safe and protected from accidental touch.

HV CABLE TERMINATIONS (HCT) – FULLY SHROUDED TYPE

VOLTAGE TRANSFORMERS (VT) – INTEGRATED TYPE



The HV Cable Terminations found inside the Bulox **BASIS** range of MV switchgears can accept both Bottom or Top Entry HV Cables. The terminations points for these HV cables fully complies to IEC standards and requirements for each voltage level. The recommended HV Cable Terminations onto the switchgears are by standard fully shrouded elbow type of cable terminations.



VTs are used for transforming HV to LV in the Switchgears - so that they can be monitored and measured safely for protection purposes. All the VTs used in the Bulox **BASIS** range of HV switchgears are fully vacuum casted in solid modular form so that they can be easily integrated inside the Switchgear panels. They are very safe and reliable and can also include protection fuses.

CURRENT TRANSFORMERS (CT) – VACUUM CASTED

SURGE ARRESTER (OPTIONAL)



High Voltage CTs are used to help measure current in the HV Switchgears safely – either for measurements and protections purposes or for revenue requirements. All the CTs used in the Bulox **BASIS** range of MV switchgears are fully vacuum casted in solid modular form - so that they can be easily integrated inside the Switchgear panels – in a very safe and reliable operation.



The Surge Arrester is an optional item which can be incorporated into the **BASIS1** & **BASIS2** range of MV Solid Insulated Switchgears (SIS). It is use to protect the switchgears from unnecessary voltage spikes due to short-circuit or lightning strikes in the electrical distribution network.

INTEGRATED CONTROL PANEL (ICP) – HMI BASED C/W OPTIONAL BULOX'S CONDITIONAL MONITORING SYSTEM (CMS)



The ICP is the "brain" for the panel as well as the switchgears as a whole. It is where all the various monitoring inputs from the different CTs and VTs are received and the decisions are made to whether to provide alarms and/ or to trip a circuit - through the use of various and appropriate monitoring and protection relays. Bulox range of **BASIS** MV Switchgears uses both standard inhouse designed integrated HMI/ PLC based Multifunction full screen control panel or they can be customized to suit each customer requirements. The **BASIS** standard HMI/ PLC based **ICP** is probably one of the most comprehensive, flexible, reliable and safe control panel ever developed for MV Switchgear operations. It is fully type-tested and has been used in many installations Worldwide.

The Bulox's HMI/ PLC Based Integrated Control Panel can also easily incorporate a Bulox Advanced Remote Monitoring (ARM)System for each switchgears as an option.

\ INTEGRATED HMI PROTECTION RELAY (ETR500)

ETR500 THE PROTECTION RELAY

Equipped with advanced micro processor, ETR500 is an IED (Intelligent Electronic Device) designed to protect, monitor and control power line, transformers, motors and so on. ENTEC's SIS and D-SIS often come with this protection relay to ensure maximal safety and stability.



MAIN FEATURES 7" LCD Touch Screen • MODBUS, DNP 3.0, IEC60870-5-101, IEC60870-5-104, IEC61850(optional) • Duel communication method • Operating Software • Measurement and Power Quality Monitoring

PROTECTION

- Phase to phase fault/phase to earth fault/sensitive earth fault/negative sequence fault/Neutral time delay
- Overcurrent protection (51P,51N,51G,51SG,51Q) x2
- Phase to phase fault/phase to earth fault/sensitive earth fault/ negative sequence fault/Neutral instantaneous Overcurrent protection (50P,50N,50G,50SG,50Q) x3
- Isolated Ground instantaneous overcurrent protection (50IG)
- Phase to phase fault/phase to earth fault/sensitive earth fault/negative sequence fault/Neutral directional protection (67P,67N,67G,67SG,67Q)
- Demand(49D)
- Open phase(46BC)
- Bus/Line under voltage protection(27,27S) x2
- Auto reset upon under voltage clearing (27R)
 Bus/Line over voltage protection (59 59S)
- Bus/Line over voltage protection (59,59S) x2

CONTROL

- Reclosing (79)
- Cold load pickup (CLPU)
- Synchronizing or Synchronism-Check Device(25)

MONITORING

- Breaker failure(50BF)
- 2nd harmonic interruption(2STH)
- 5th harmonic interruption(5STH)
- Fault detection upon line energization (SOTF)
- Fault Locator(FL)
- Manual closing block
- Trip/Close Coil Monitoring
- Circuit Breaker trip count, contact wear monitoring, PQM (power quality monitoring)
- System Power

METERING

- Current and current phase
- Voltage and voltage phase
- Frequency and IED REF
- Power Dower quality and imbalance factor
- Energy
- Demand current and TD
- Harmonic
- True R.M.S

- Phase to earth over voltage protection (59N(64)) x2
- Neutral over voltage protection(64N) x2
- Negative sequence over voltage protection(47P)
- Ratio differential protection(87T-P/G)
- Stator ratio differential protection (87S)
- Under frequency protection(81U), over frequency protection (81O), frequency changing rate protection (df/dt, 81D) auto reset of frequency protections (81R)
- Forward power(32FP)/Direction power(32)
- Power quality protection (55)
- Over excitation protection(24)
- Under current protection (37C)
- Under power protection (37P)
- Rotator lock protection (48(51LR))

EVENT LOGGING

- Operation event maximum 256 records
- Fault event maximum 256 records
- Fault wave maximum 32 records
- System event maximum 8192 records
- Load history maximum 3072 records
- Diagnose event maximum 256 records
- Rebooting/self-diagnose abnormality/operation/fault count
- PQM event maximum 256 records

PROGRAMMABLE LOGIC

- More than 500 logical operators
- AND, OR, NOT operator
- Input debounce timer, output pulse timer, pulser timer, logic timer logic timer, counter, oneshot logic, latch etc.

COMMUNICATION

- Current and current phase(each phase and symmetric Operation software
 - Editable user's communication map
- DNP3
- MODBUS
- IEC60870-5-101/104
- IEC61850 (option)

\ BULOX ADVANCED REMOTE MONITORING (ARM) SYSTEM

The Bulox Advanced Remote Monitoring (ARM) System is an optional Condition Monitoring System which can be incorporated into every major equipment that **Bulox Power** has supplied and installed – including the whole range of **Bulox BASIS** range of MV Switchgears. Depending on the type of equipment and the level of monitoring required, appropriate type of technological device shall be installed onto the equipment and internally connected to a PLC and router system. It will automatically monitor the condition of all the critical assets 24/7 and provides warning and/ or data logging services through wireless cloud services. Please consult **Bulox Power's** Sales for more information on this **ARM system**.



COMMUNICATION

PROTOCOL	- DNP 3.0, MODBUS, IEC60870-5-101/104
BPS	- RS23 and RS485: 1200-19200 bps - RJ45 (TCP/IP): 10M/100< bps
PORTs	 PORT1 (RS232 for interface Software) PORT2 (RS484 for HMI) PORT3 (TCP/IP for SCADA) Protocol: DNP3.0 or IEC60870 PORT4 (RS232 for SCADA) Protocol: DNP3.0 or IEC60870 PORT5 (RS422/485 for SCADA) Protocol: MODBUS or DNP3.0 or IEC60870

Bulox Power reserves the right to modify or amend the technical specification, design and information to this brochure without prior notice.



The Bulox BASIS range of MV Solid- Insulated-Switchgears (SIS) is Solid, Safe and Reliable that we are prepared to provide a 15-Years Warranty subjected to the following terms and conditions:

1) The equipment must be properly installed and operated as per Manufacturer recommendation.

2) The equipment must be installed, tested and commissioned by the Manufacturer or any of its license Installation Contractors.

3) Regular Annual Maintenance must be carried out by the Manufacturer or any of its officially appointed Service Contractors.

(Note: Annual Maintenance Costs quoted separately - with some compulsory standby consumer spares)

4) End-users need to install the Bulox Advanced Remote Monitoring (ARM) System. The Bulox ARM System is a Cloud- based Condition Monitoring System that helps to monitor and ensure the installed equipment are working well 24/7 so as not to incur any costly downtime. It also stores and provides all critical information as well as manages all the maintenance schedules.

5) Warranty is only based on Manufacturer defects - excluding all consumer and/or electronics parts - which is understood to have limited normal life span of typically 5-8 years.

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