



II JORNADAS TÉCNICAS - ABB EN PERÚ, 6 ABRIL, 2017

Sectos Presentation

12-36kV SF6-insulated & interrupted, outdoor pole mounted load break switch for overhead lines

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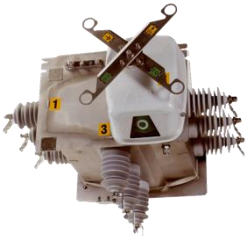
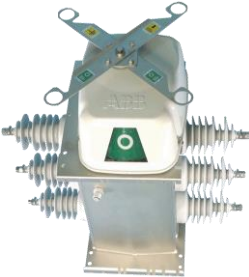
Sectos Load Break Switch

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- Main Components of Sectos
- Installation and Operation
- Feeder Automation
- Successful Story
- Quality Control
- Summary

Sectos Load Break Switch

Overview



Sectos load breaking switch offers the following features:

- Complete sealed stainless steel tank
- 2-position(ON - OFF) or 3-position(ON - OFF - EARTH)
- Reliable spiral spring operation mechanism with light reflecting and clear position indicator
- Stable gas density switch with a temperature compensated gauge
- Mechanical manual locking device or low gas locking device
- Multiple mounting modes
- Complete feeder automation ready solution
 - Easily upgraded from manual to motor operation
 - ABB controls with communication capabilities

Sectos Load Break Switch

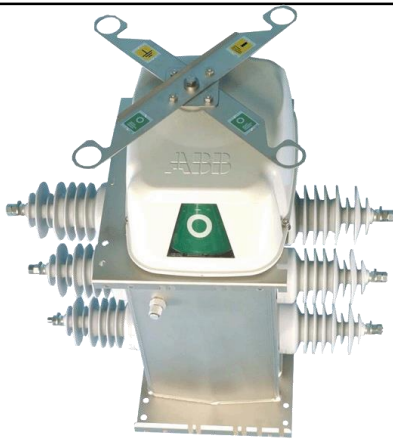
NXB and NXBD

Technical Parameter

	NXB	NXBD
Rated voltage	12-24 kV	12-24 kV
Rated current	630 A	630 A
Number of breaking operation C - O	400	400
Short time withstand current (4 sec)	20 kA	20 kA
Peak withstand current	50 kA	50 kA
Making current (kA / operations)	50kA / 5 31.5kA / 10	50kA / 5 31.5kA / 10
Mechanical endurance C-O		
Main switch	5000	5000
Earthing switch	2000	2000
Creepage distance	620/960 mm	620/960 mm
Two-way load break switch	Yes	-
Three-way load break switch	-	Yes

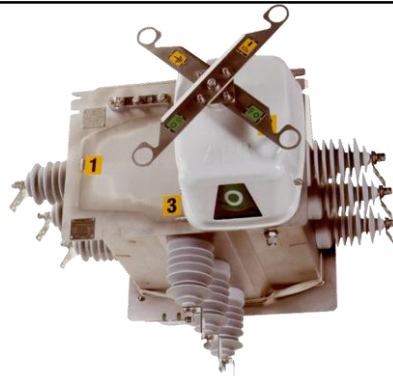
NXB

- Two-way load break switch
- Three-position: ON / OFF /EARTH



NXBD

- Three-way load break switch
- Three-position: ON / OFF /EARTH



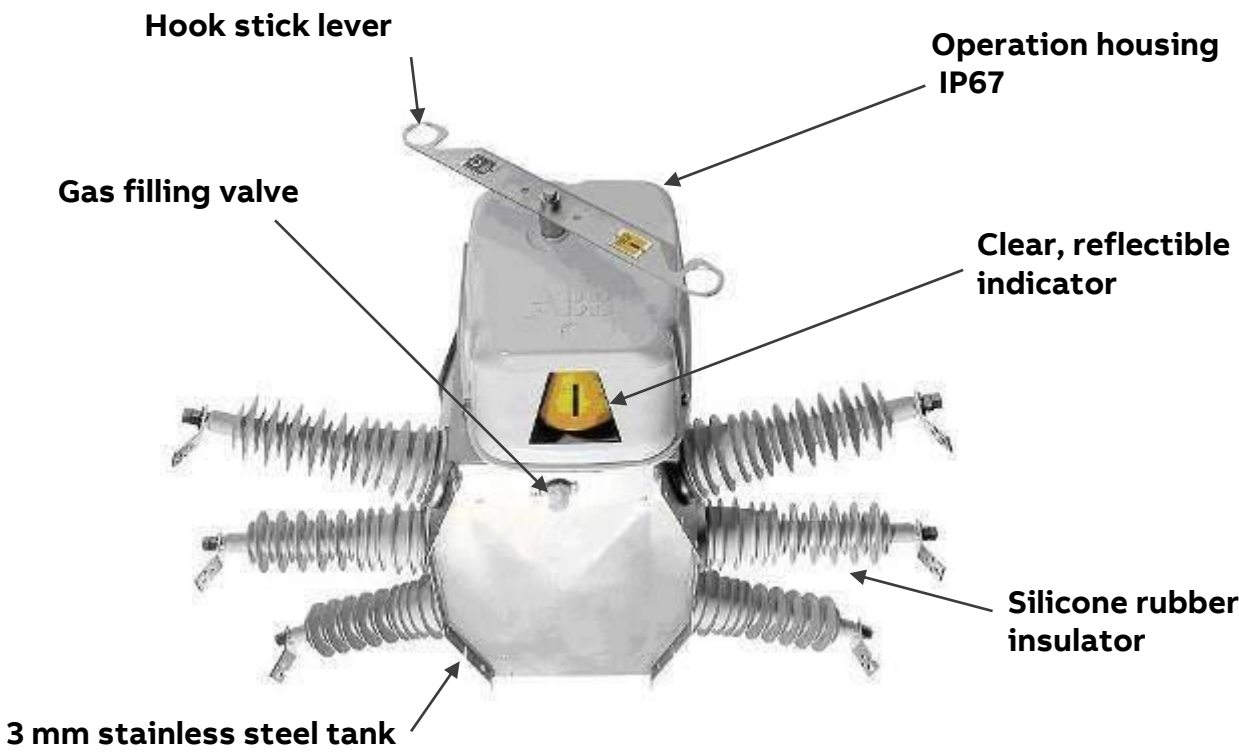
Sectos Load Break Switch

NXA

Technical Parameter

	NXA	NXA
Rated voltage	24 kV	36 kV
Rated current	630 A	400 A 630 A
Number of breaking operation C - O	400	400 50
Short time withstand current (3 sec)	16 kA	12.5 kA
Peak withstand current	40 kA	31.5 kA
Making current (kA / operations)	40kA / 5	31.5kA / 3
Mechanical endurance C- O	5000	5000
Creepage distance	960 mm	1440 mm
Two position switch – ON / OFF	Yes	Yes

NXA

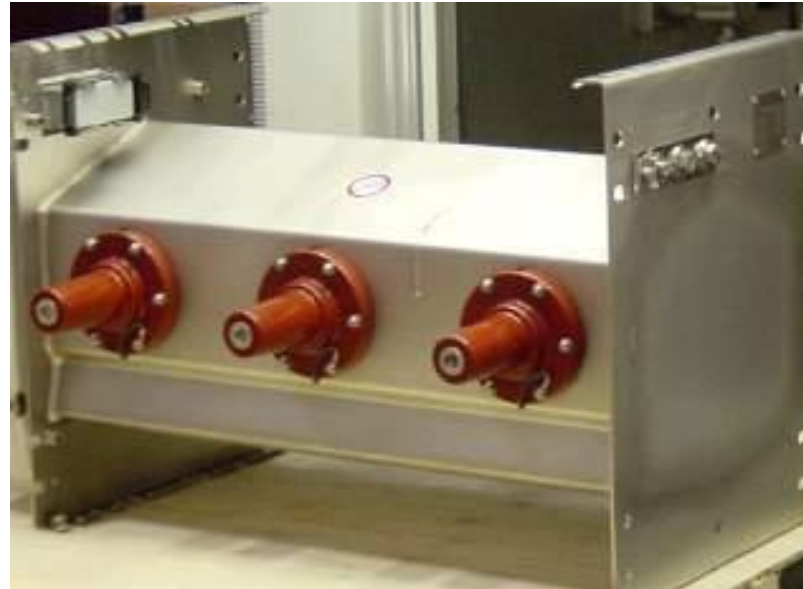


Sectos Load Break Switch

Main Components of Sectos

Tank

- 3mm stainless steel
- Laser cutting and robot welding
- Special fire-proof material at bottom
- Silicon rubber insulator



Sectos Load Break Switch

Main Components of Sectos

Contact system

- Contact material: copper with silver-plating.
- Short time withstand current: 20kA / 4 seconds.
- Making current: 50kA / 5 times
- Effective arc extinction by cooling plate
- Large clearance between open contact gaps



Sectos Load Break Switch

Main Components of Sectos

Earthing Switch

- Integrated earthing switch for NXB & NXBD type
- Earthing Switch for safety maintenance
- Close-open-earthing operations sequence, Only earthing the switch when Sectos is opened
- Mechanical endurance 2000 CO
- Earthing switch is only operated by manual operation



Value

Sectos

Cost Type	Formula	Cost
Material Cost	Earthing Switch type NXB_ES*	-
Labor Cost	No Installation Labor cost	\$0.00
Total =		-

Others

Cost Type	Formula	Cost
Material Cost	Earthing Switch	-
Labor Cost	2 workers x 4 hrs x \$80 / hour	\$640.00
Total =		-

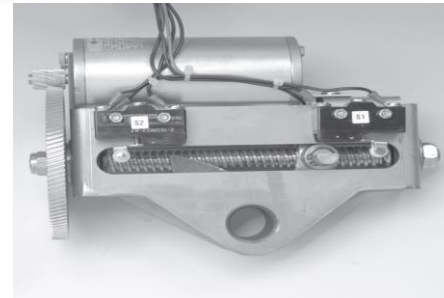
*Sectos NXB and NXBD available with integrated earthing switch, no need external earthing switch

Sectos Load Break Switch

Main Components of Sectos

Operation Mechanism

- Reliable manual and motor operation mechanism.
- Independent spiral spring operation mechanism
- Easy to be upgraded from manual operation to motor operation at site



Sectos Load Break Switch

Main Components of Sectos

Position Indicator

- Large position indicator symbols
- Reflective colours
- The reliable indication of the device meets the design and testing of IEC 129 A2



Sectos Load Break Switch

Main Components of Sectos

Gas Pressure Indicators

- Temperature compensated gas density switch and gauge
- Gas density switch: gas-low alarm will be active and sent by the relay when the gas pressure is below 1.2bar(NXB)/1.6(NXA)
- Gas gauge: under the tank, with large indication symbols.



Sectos Load Break Switch

Main Components of Sectos

Gas Pressure Locking Devices

- Optional gas-low locking device and manual locking device.
- Gas-low locking device will lockout the switch when gas pressure is below 1.1bar for the safety consideration
- The switch will be completely lockout when manual locking device is active. Both remote control and local control will be blocked to prevent the unauthorized operation



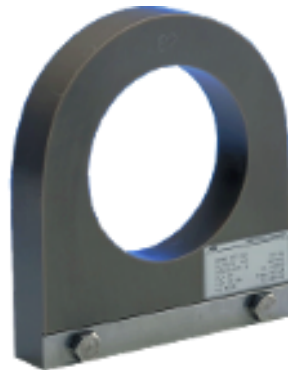
Sectos Load Break Switch

Main Components of Sectos

Measurement Input Signals-CT

Ring type current transformer

- Installed around the bushings for protection and monitoring
- Easily to be installed and replaced.
- Service conditions: -40...+40 °C.
- I_{th}/I_{dyn} : 20/50 kA.
- Accuracy: IEC Class 0.5 and 10P25.



Measurement Input Signals-VT

Traditional VT

- 12, 24 and 36 kV outdoor
- 75, 110 and 200 kV BIL
- Material: HCEP



Sectos Load Break Switch

Main Components of Sectos

Measurement Input Signals

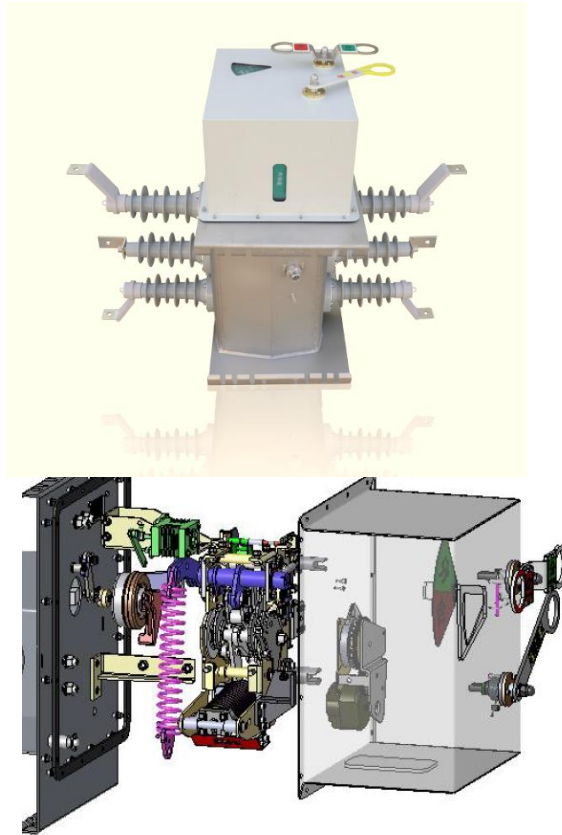
- Voltage sensor and Combi sensor
- Safe, compact design and wide dynamic range.
- With 3 voltage sensors and 3 Combi sensors, we provide 6 voltage inputs and 3 current inputs.



	Current Sensor	Voltage Sensor
Principle	Rogowski-coil	Capacitive voltage divider
Rated primary value	80 A	20: $\sqrt{3}$ kV
Rated primary current factor	10	
Accuracy limit factor	60	
Rated continuous thermal current	630 A	
Rated secondary value	0,150 V (0,180 V at 60 Hz)	2,0: $\sqrt{3}$ V
Accuracy - using calibration factor	Class 5 Class 3 / 10P60	Class 6P

Sectos Load Break Switch

NXB17R with EL mechanism for 12kV application



- EL mechanism is proposed, which can realize more rapid close and open operations, meet the specific requirements of the various kinds of distribution network automation:

Closing time ≤ 100 ms

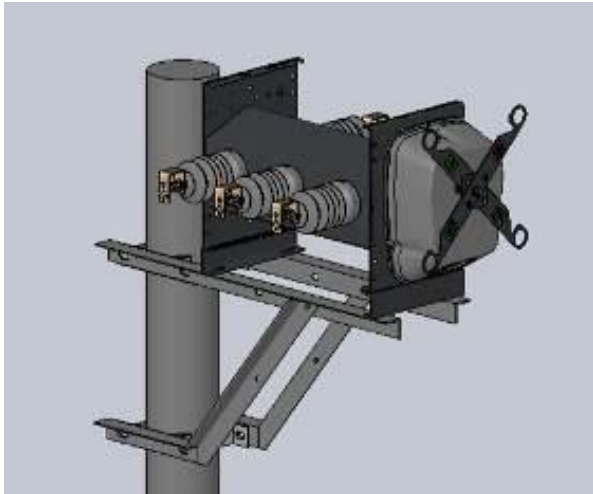
Opening time ≤ 50 ms

- Rated voltage 12kV
- Rated current 630A
- Short time withstand current (4s) 20kA
- Peak withstand current 50kA
- Making current (kA / operations) 50kA/10
- Mechanical endurance 5000
- Rated voltage of motor 24/48VDC 220VAC
- Power frequency withstand voltage: 42/48kV
- Lighting impulse withstand voltage: 95/110kV
- Creepage distance (epoxy): 372mm

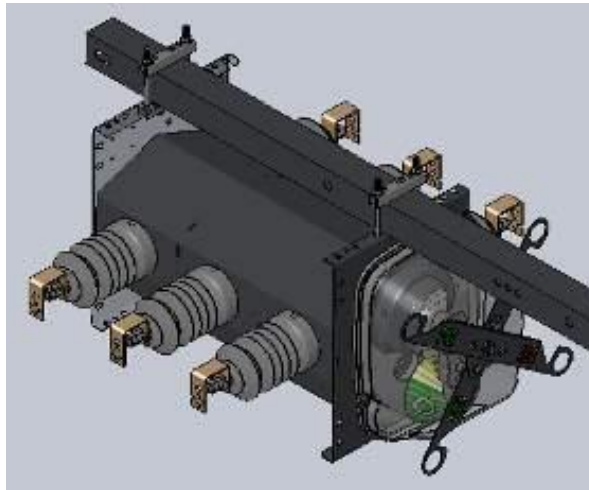
Sectos Load Break Switch

Installation and Operation

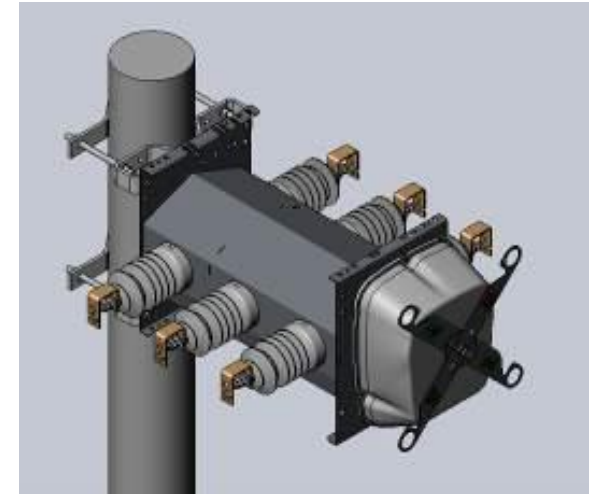
Above crossarm



Below crossarm



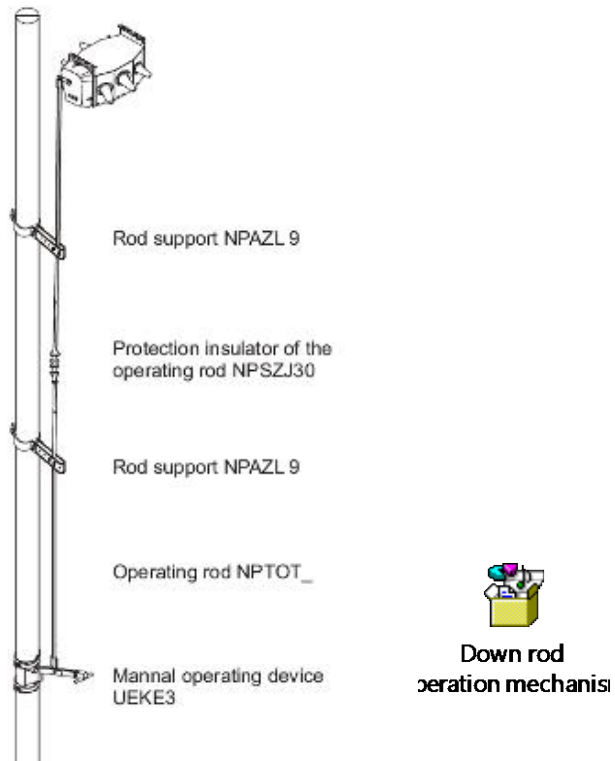
Mounted on pole directly



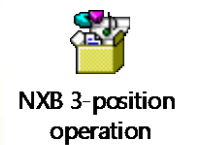
Sectos Load Break Switch

Installation and Operation

Manual Operation-Operate by down rod



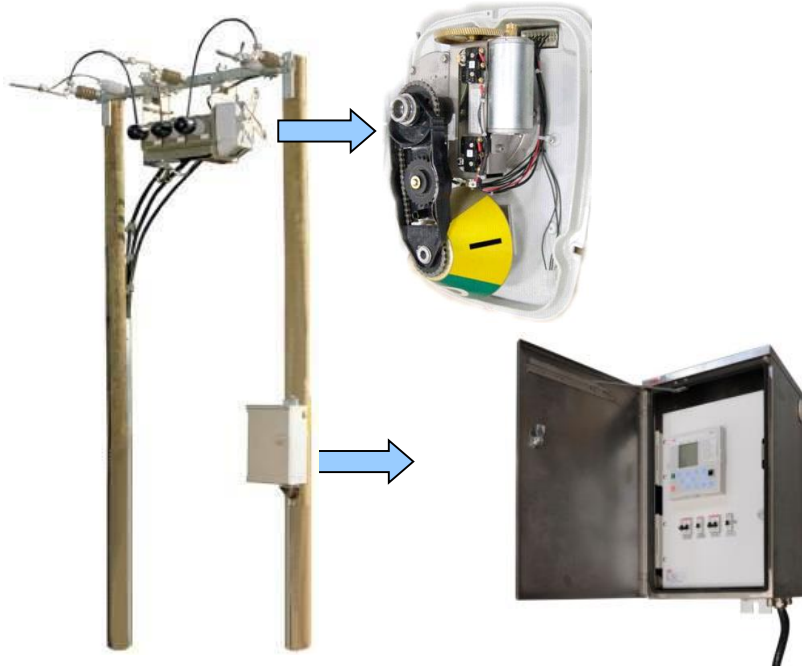
Manual Operation-Operate by hook stick



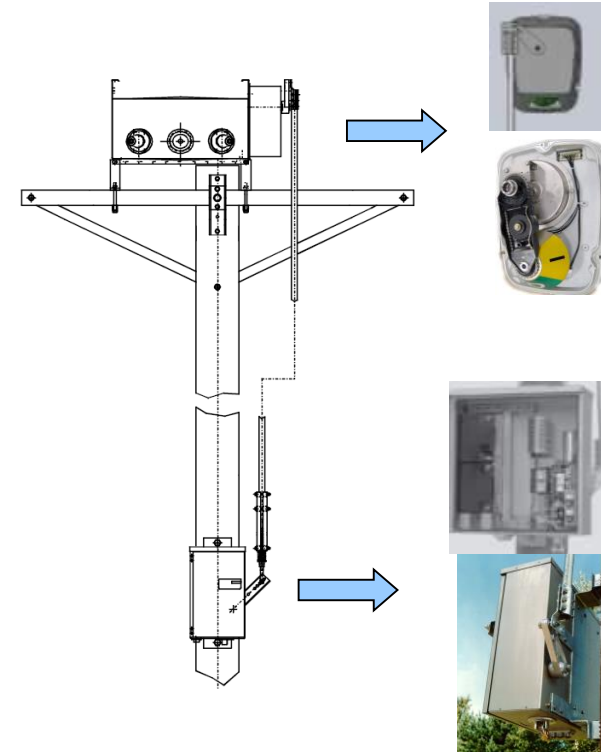
Sectos Load Break Switch

Installation and Operation

Motor Operation-Motor Up



Motor Operation-Motor Down



Sectos Load Break Switch

Feeder Automation

Drivers

Request for improvement of the quality of the power supply

- less and shorter outages and improved voltage quality

Need to improve the operational efficiency through

- improved tools for the network operators and the field crews

Need to utilize the distribution network / improve the economy

- utilize the network more efficiently (transfer of active power)/
minimize the network losses
- minimize the amount of energy not supplied

Provide improved safety for the utility personnel

- less need to travel to places difficult to reach
- less need to work in dangerous environments

Normally a combination of the above

Sectos Load Break Switch

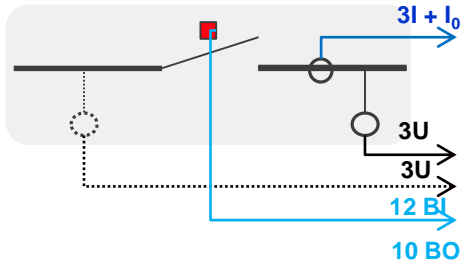
Feeder Automation

Controller

LBS

IED Type

Input /Output Interface



REC615 Configuration A

(3 current transformer)

REC615 Configuration B

(3 current transformer+ 6
capacitive voltage dividers)

REC615 Configuration C

(3 Current & 3Voltage
sensor)

Analogs/Inputs/Outputs

Conf A: 4 CT (Io 0.2/1A) + 3 VT 8 BI + 10 BO

Conf B: 4 CT (Io 0.2/1A) + 6 VD 12 BI + 10
BO3

Conf C: 3 Current sensor + 3 Voltage sensor
+ Io (0.2/1A) 8 BI + 10 BO

Optional I/Os 6 BI + 3 BO

Communication Serial

RS 232/485 (including IRIG-B)

Glass fibre ST

RS 232/485 + RS485 (including IRIG-B)

Communication Ethernet

Ethernet 100Base FX (LC)

Ethernet 100Base TX (RJ45)

Ethernet 100Base TX (3xRJ45)

Ethernet 100Base FX (2xLC, 1xRJ45)

Communication Protocol

IEC 61850

IEC 61850 + IEC 101 (Slave) + IEC 104
(Slave)

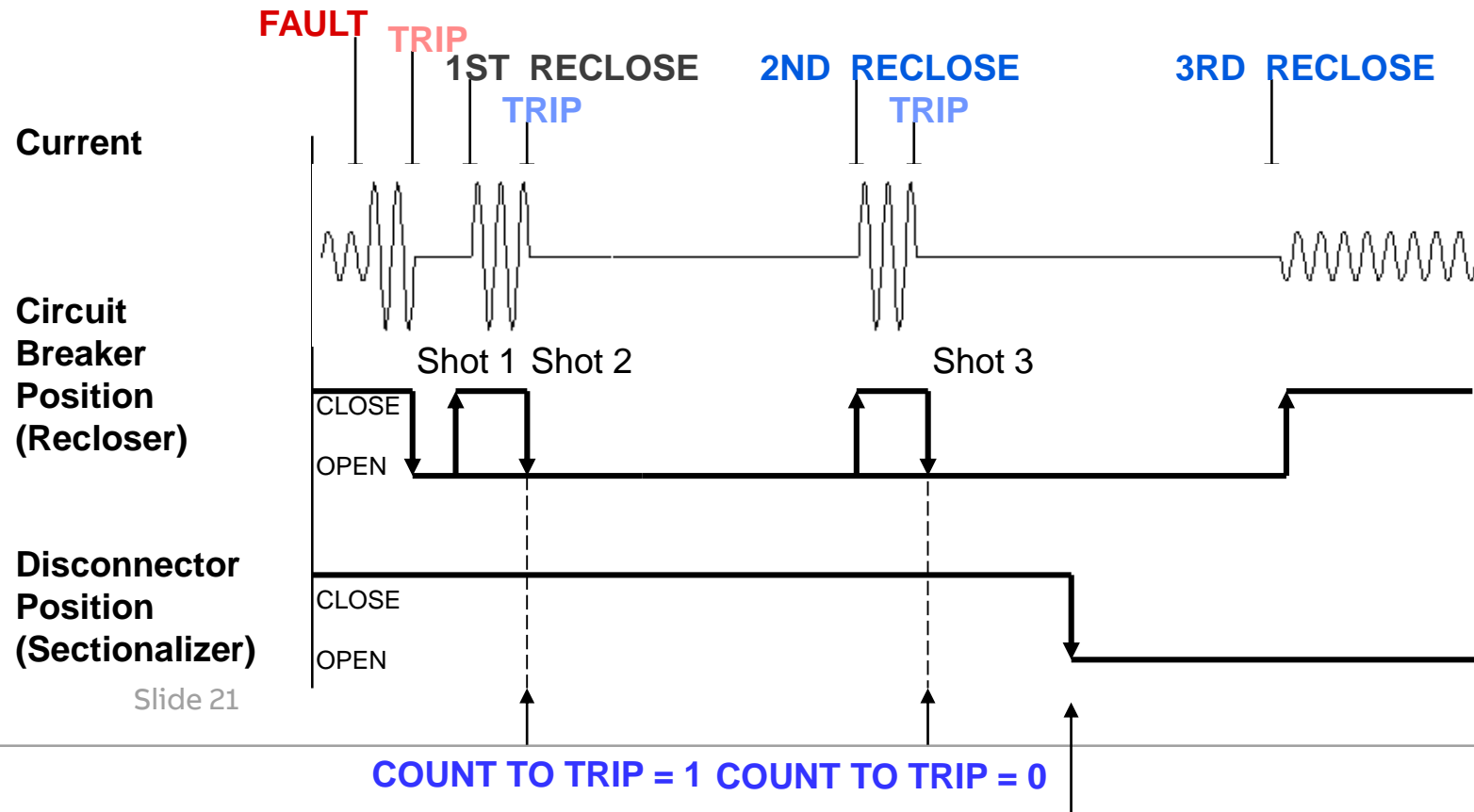
IEC 61850 + DNP 3.0 (Slave) + Modbus
(Slave)



Sectos Load Break Switch

Feeder Automation

Automatic sectionalizer - example



Permanent fault, needs 3 reclosing shots

Sectionalizer settings:
Counts to trip = 2
(can be up to 5)



Operation logic

Sectos Load Break Switch

Feeder Automation

Sectos Solution

- Solution: current-count
- Location: Blida - Algeria
- Product: NXA36
- Order: 355 units
- Commissioning: April 2002



- Solution: current-count
- Location: Indonesia
- Product: NXB23
- Order: 209 units
- Commissioning: July 2012



Sectos Load Break Switch

Successful Story

Project name	STEG LBS Tender
Scope	20kV NXB LBS
End-user	STEG (Societe Tunisienne de l'electricitee du Gaz)
Country	Tunisia
Installation Date	2005

Significance of this Project

- 1. Most demanding inland climatic condition such as salt-laden atmosphere, corrosion, high humidity and extreme temperature
- 2. Tailor-made mounting & operation mode
- 3. Excellent performance record for about 10 years
- 4. Zero after-service complaint



Sectos Load Break Switch

Quality Control

Partial Discharges Test



Robot Welding



Sandblasting



Sectos Load Break Switch

Quality Control

Gas Leakage Detection



- Helium gas leakage detection (the molecular weight of Helium is 1/36.5 of SF₆).
- SF₆ leakage rate: <0.15% per year.

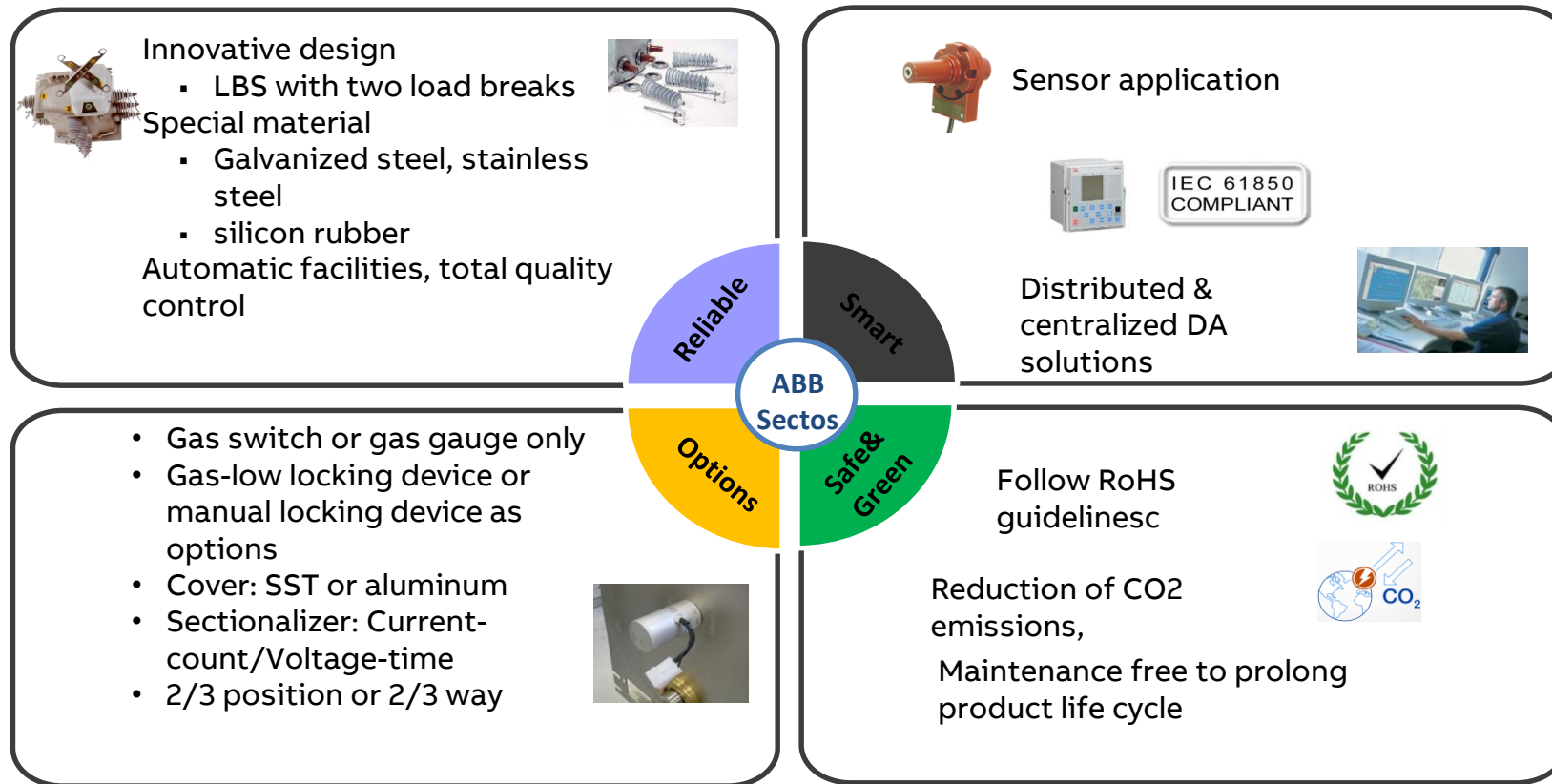
Final Test



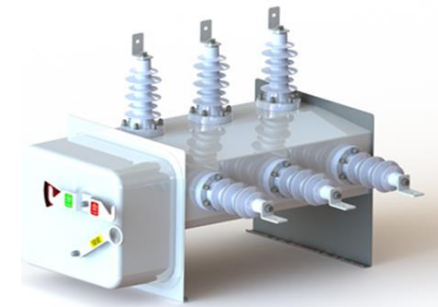
Sectos Load Break Switch

Summary

Technology & Innovation



PVB-S Pole Mounted Vacuum Circuit Breaker



In General

PVB-S is outdoor vacuum circuit breaker (hereinafter referred to PVB-S) is pole mounted switch equipment of ABB vacuum circuit breaker series, Rated voltage is 12 kV, applied to the overhead lines.

PVB-S is one of the most flexible devices for smart grid application, and also provides maximum functionality and mounting flexibility suitable for a variety of applications. This is especially true of our feeder automation product, where years of knowledge and modular manufacturing technique allow PVB-S outdoor circuit breaker to meet any need and schedule.

Features

- ABB leading Vacuum interruption technology
- Modular design spring mechanism EL for easy service ability in field
- Dead tank with phase CT and zero CT mounted inside of the tank
- Suitable for different climatic conditions
- Low operating force
- “0” gas pressure to reduce leakage risk
- Parts and components are recyclable
- SST tank to avoid of corrosion
- Smart CB, different controller and DA solution is available

Technical Data

Parameter	Value
Rated voltage	12 kV
Rated frequency	50/60 Hz
Power frequency withstand voltage (to earth and between phase)	48/54 kV
Lighting impulse withstand voltage (to earth and between phase)	85/96 kV
Rated normal current	630 A
Short-circuit breaking current/Operations	25kA/30CO
Rated short-circuit making current	63 kA
Rated short-time withstand current/duration	25 kA/4s
Number of breaking operations (Rated normal current)	10,000 CO
Mechanical endurance	10,000 CO
Degree of protection	IP 67
Interrupting medium	Vacuum
Insulation medium	SF6
Phase clearance	240mm
Pollution Level	IV

PVB-L Pole Mounted Vacuum Load Break Switch



In General

PVB-L is outdoor pole mounted switch equipment of ABB vacuum load break switch, rated voltage is 12 kV, applied to the overhead lines.

Features

- ABB leading Vacuum interruption technology
- Modular design spring mechanism EL for easy service ability in field
- Dead tank with phase CT and zero CT mounted inside of the tank
- Suitable for different climatic conditions
- Low operating force
- “0” gas pressure to reduce leakage risk
- Parts and components are recyclable
- SST tank to avoid of corrosion
- Smart CB, different controller and DA solution is available

Technical Data

Parameter	Value
Rated voltage	12 kV
Rated frequency	50/60 Hz
Power frequency withstand voltage (to earth and between phase)	48/55 kV
Lighting impulse withstand voltage (to earth and between phase)	85/96 kV
Rated normal current	630 A
Number of breaking operation C - O	630A/100CO
Making current(Operations)	63 kA/5
Rated short-time withstand current/duration	25 kA/4s
Number of breaking operations (Rated normal current)	10,000 CO
Mechanical endurance	10,000 CO
Degree of protection	IP 67
Interrupting medium	Vacuum
Insulation medium	SF6
Phase clearance	240mm
Pollution Level	IV



ABB