



PARS SWITCH

NSA Center Break Disconnecter For Outdoor Installation

Rated voltage : 36-420kv Rated current : 1250-3150A Rated short time current :31.5-50KA



Disconnecter type NSA 245 / 3150 D, for 245 KV and 3150 A

Pars 230 / 63 Kv substation, the CB,s and DS,s delivered in 2010 by Pars Switch

Pars switch Co. Manufacturer of Medium & High
Voltage Circuit Breakers and Disconnectors



GENERAL

NSA is a center break type disconnecter and can be arranged for single pole operation or for the ranges of 36-245KV, linked together by operation rods to form 2 or 3 pole units.

The disconnecter can be delivered either by motor operating mechanism type BCM or hand operating mechanism type BCH.

Each pole of disconnecter consists of a base frame with bearings, two post insulators and terminals.

MAIN ADVANTAGES OF NSA D.S.

NSA D.S. which satisfies the highest demands is based on the international standards, IEC 129 and offers the following basic features:

- Easy installation due to simple construction.
- Low required force for operation.
- Self cleaning contacts.
- Erection can be done in several alternatives.
- Hot dip galvanized coating for steel parts.

Breaking capacity of NSA

When multi-pole disconnecter (for max 145 KV and horizontal erection) are to be used to break small load currents or the no-load current of a line, the breaking capacity, when the arc is able to develop freely, is:

- When disconnecting a capacitor or a no-load cable : 1A

- When disconnecting an overhead line on no-load : 2A
- When disconnecting transformers on no-load : 3A
- When disconnecting load current : 5A

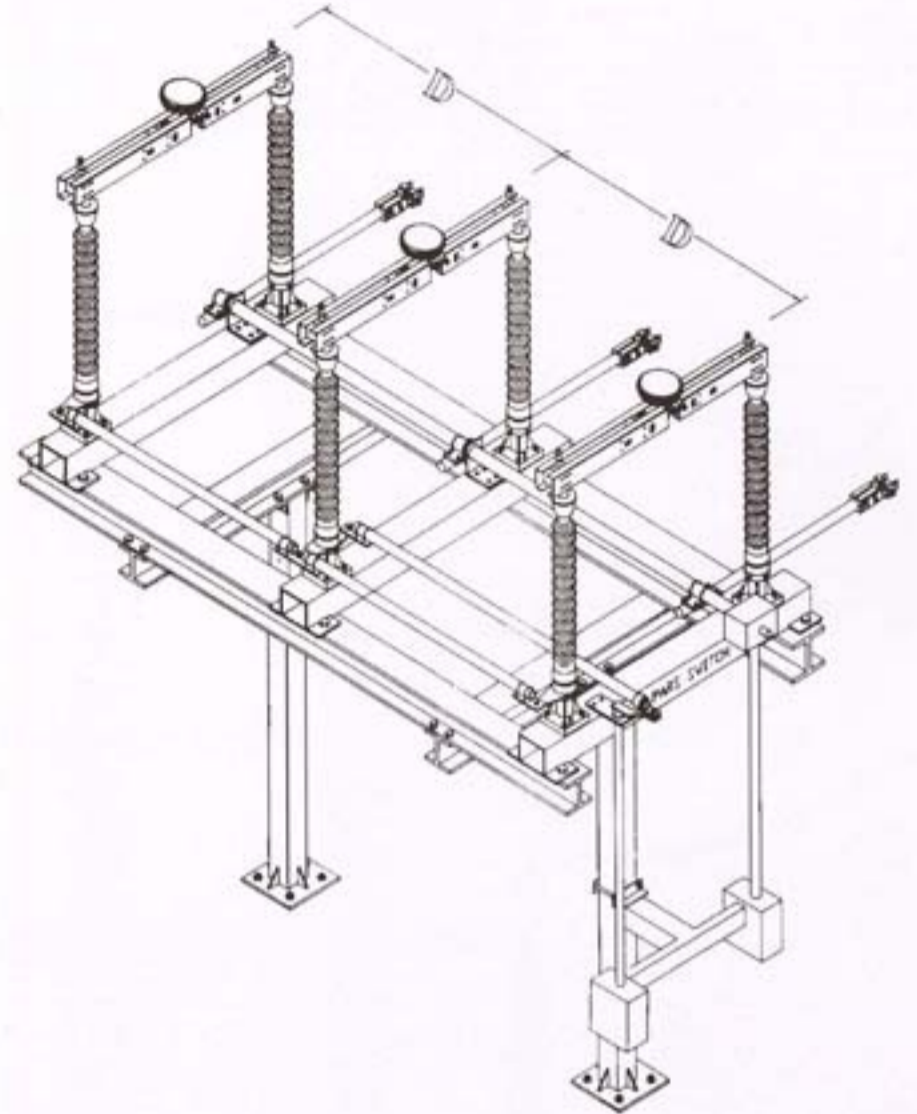


Fig.1-Parallel erection of NSA disconnecter

NSA DISCONNECTORS CHARACTERISTICS:

Type NSA	Rated voltage Kv	Rated normal current A	At the shortest permissible phase distance ("D", Figure 1)		Permissible tensile force at each terminal N
			Peak current KA	Short time current KA(sec)	
36/1250 C	36				1000
72.5/1250 C	72.5	1600	79	31.5 (3)	1000
145/1250 C	145				1000
72.5/1600 D	72.5				1000
145/1600 D	145	2000	100	40 (1)	1000
245/1600 D	245				1390
72.5/2500 D	72.5				1000
145/2500 D	145	2500	100	40 (1)	1000
245/2500 D	245				1390
72.5/3150 D	72.5				1000
145/3150 D	145	3150	125	50 (1)	1000
245/3150 D	245				1390
420/3150 D	420	3150	125	50 (1)	2200

The current-carrying parts are manufactured of copper (bars) for 1600 A and of aluminium for 2000-3150 A.

The connection between the rotatably mounted terminal bolt and the contact blade consists of spring-loaded copper contacts. (Sliding contacts for 1600 A and rolling contacts for 2000-3150 A). The main-contacts are made of silver-plated copper. When closing the disconnect, the contact pieces on one of the two blades are brought in between spring loaded contact bars on the other blade. The necessary contact pressure is built up during the final stage of the closing operation.

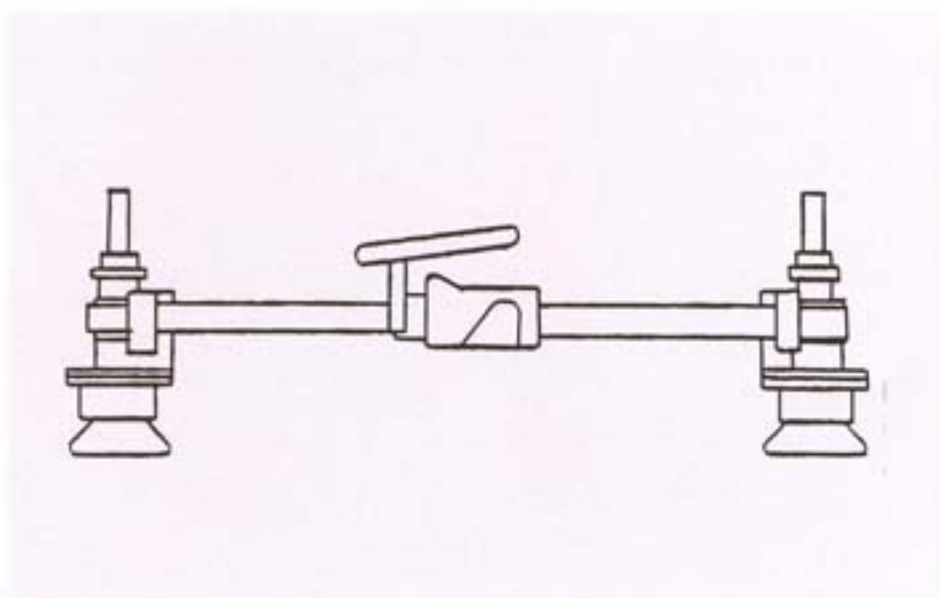


Fig. 2- Current-carrying parts for 1600 A

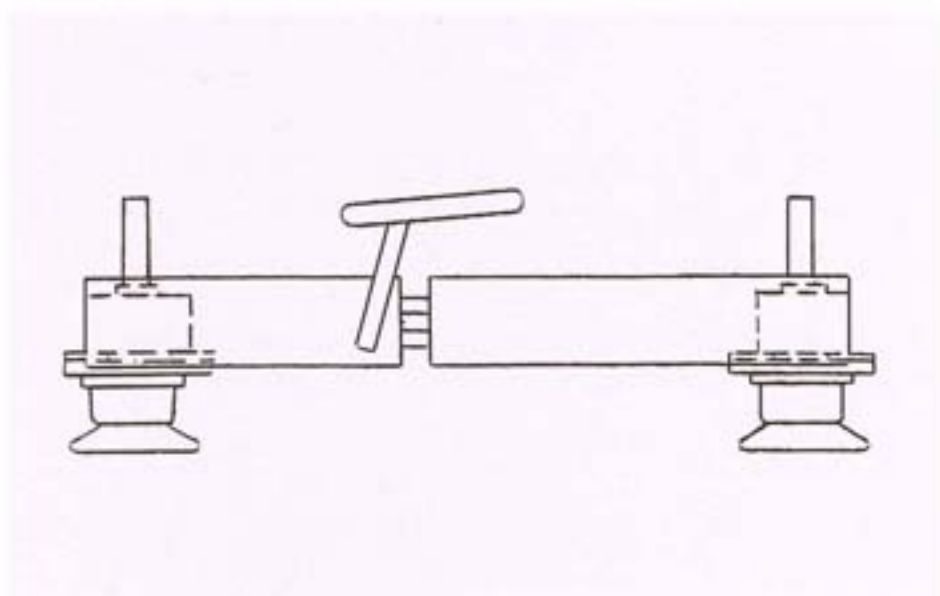


Fig. 3- Current-carrying parts for 2000-3150 A

For 1600 A, a single spring loaded bar is sufficient whilst for higher currents three or more parallel bars (or fingers) are needed.

The terminal for 1600-2000 A consists of a vertical, silverplated copper bolt with a diameter of 30 mm. For 2500-3150 A, the terminal consists of an aluminium bolt with a diameter of 60 mm. The length remaining for clamping is 125 mm for both. NSA disconnectors are operated by rotating the vertical operating shaft 190 degrees by means of a suitable operating mechanism.

Two kinds of operating mechanisms are available:

- BCH Manual operating mechanism.
 - BCM-F Motor operating mechanism.
- Both kinds of operating mechanisms are designed and tested according to IEC 62271-102 & SEN 281200 standards with the following basic characteristics:
- The operating shaft is turned 190 degrees and thereby effectively locking the disconnect in the end position.
 - Simple design.
 - Easy installation.
 - Removable cover.
 - Lockable hand operating lever.
 - All iron parts are with hot dip galvanized coating.

BCH manual operating mechanism.

The manual operating mechanism consists of a plastic insulated steel lever mounted in a bearing bracket and fitted with a splined shaft end.



Fig.4-BCH manual operating mechanism

General characteristics of BCM-F operating mechanism:

BCM-F is characterized by a specially robust, simple, and thereby functionally reliable design and application. The motor operating mechanism BCM-F consists of a reversible universal motor turning the operating shaft via a gear-set.

The size of the transmission torque is determined by a torque limitation device.

The operating shaft on the top of the BCM-F will be clamped to the operating rod of the disconnecter.

The torque for BCM-F is adjustable for different types of disconnectors. During operation, the operating shaft is rotated 190 degrees. Thereby, the disconnecter is effectively locked in both end positions. A motor-operation takes 3-5 seconds. The BCM-F is protected by a splash proof, lockable stainless steel or Aluminium cover.

Degree of protection according to IEC 62271-102 is IP 55. The cover is supplied with vents for percolation and drain valve.

The BCM-F is also supplied with a heating element for further protection of the humidity.

This shall be continuously connected.

With removed cover the inside of the BCM-F is open for inspection and for local electrical operation. The selector switch for local or remote operation and the operating switch are placed on the front of the control board. The operating mechanism is linked to the vertical operating shaft of the disconnecter by means of a universal joint. The bracket has fixing holes for securing to a frame. The operating lever can be locked by means of a padlock in both end positions.



Fig.5-BCM-F operating mechanism

Legend plates for marking of CLOSED and OPEN positions are affixed. The operating mechanism can be supplemented with auxiliary contacts, and/or electrical interlocking.

Assembly line of high voltage circuit breakers



Motor operation of BCM-F

Electrical operations can be initiated either by a remote or a local impulse.
 A started close or opening operation is continued to the end position. (The length of the impulse should not be less than 0.15 seconds).
 If the voltage supply is interrupted during an operation, the operation stops.
 When the voltage returns, the disconnecter can be operated in either direction by a new opening or closing impulse.

Hand operation of BCM-F

Hand operation can be done by using the hand-operating lever, normally hanging in a lockable position in front of the BCM-F.
 When the lever is removed from the operating mechanism, an interlocking contact is disconnecting the motor during hand-operation, and a part of the gear-set is disconnected for easier hand-operation.
 During hand operation, the vertical operating shaft will be turned the necessary 190 degrees by the hand-lever.
 Before electrical operation is possible, the lever must be returned to the normal position in front of the BCM-F.

Interlocking coil and key operated interlocks of BCM-F

The BCM-F can also be supplied with:

- Interlocking coil.
- Key operated interlocks of castell or Lowe & Fletcher type.
- The three combinations mentioned are adapted to motor and manually operated mechanisms of the types described above.



Fig. 6-Two types of interlocks & auxiliary switch

Technical data of BCM-F motor operated mechanism

Rotary movements of the operating shaft	190 degrees	
Connecting device for the vertical operating shaft	60 mm (2 ")	
Output shaft moment (adjustable)	500-800 Nm	
Operating time	3-5 seconds	
Motor current consumption at max.load:	<u>110 V DC</u>	<u>220 V DC</u>
500 Nm	4.7 A	2.6 A
800 Nm	5.8 A	3.6 A
Starting current (depending on the network) approx.	12-16 A	6-10 A
Auxiliary contacts:	breaking current	5 A
	rated load current	25 A
Operating coils:	Power consumption	approx.
		approx.
		approx.
		10 W (opening-closing)
		2 W (under-voltage relay)
		7 W (interlocking magnet)
Heater :	Power consumption	approx.
		50 W

Design and internal view of BCM-F

1. Frame with gear and moment-limiter between the motor and the operating shaft.
2. Cable entrance, FL 21.
3. Removable, lockable and drained cover.
4. Lockable hand-operating lever.
5. Vents for percolation.
6. Support for the hand-operating lever.
7. Earthing clamp.
8. Cavity for interlocking-cassette.
9. Limit switches (BG1 and BG3)
10. Auxiliary switches (BG2) three types (6+6, 12+12 or 18+18) are available.
11. Direct-on-line motor starter (with thermal overcurrent protection and instantaneous release).
12. Contactors for operation (Q1 and Q3).
13. Under-voltage relay (K1).
14. Heater (constantly connected) (E1).
15. Reversible universal-motor for 110-125V or 220-250V, 50-60 Hz or DC (M).
16. Interlocking contact for disconnecting the motor during hand-operation (S5).
17. Rotary switch for operation (opening-closing) (S1).
18. Rotary switch for re-connection (remote-local-disconnected) (S4).
19. Terminal blocks:
 Motor circuits:
 Through terminal (6 mm²).
 Signal circuits:
 Through terminal (4 mm²).

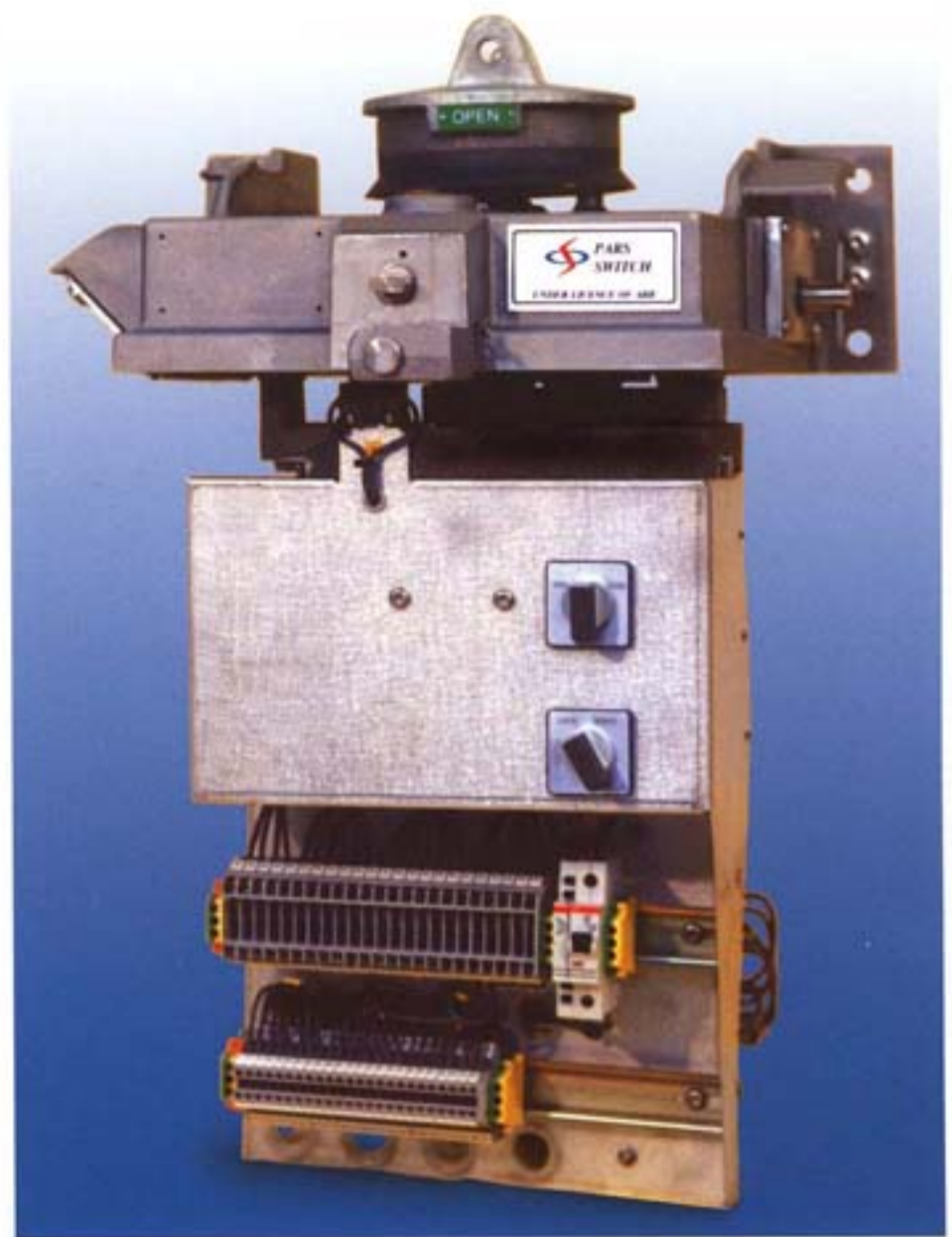


Fig.7- Internal view of BCM-F

20. Internal cables, PVC-insulated:
 Motor circuits: 2.5 mm²
 Signal circuits: 1.5 mm²

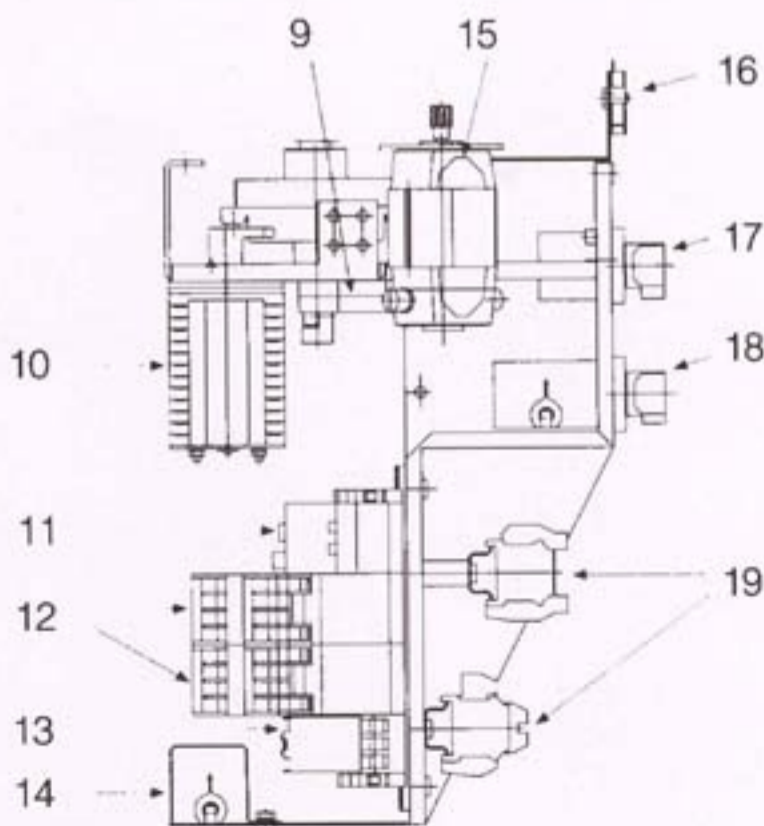


Fig.9 - BCM-F, side-view of the control panel.

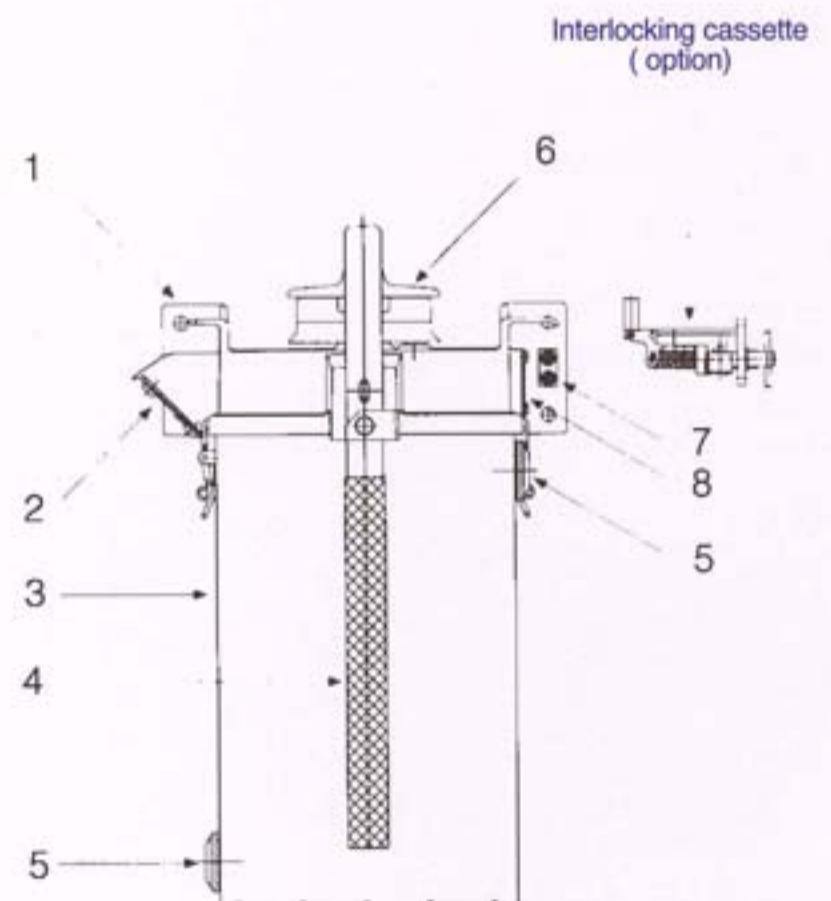
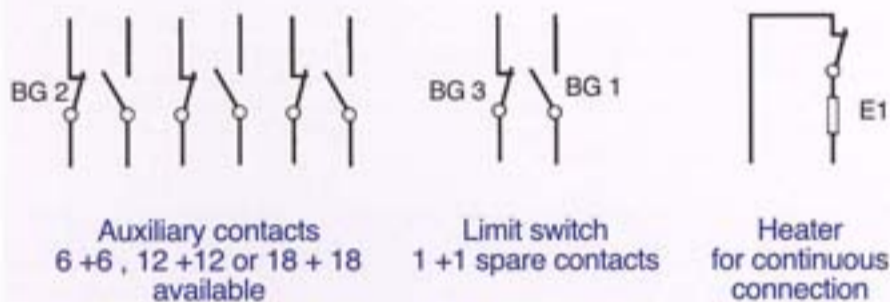
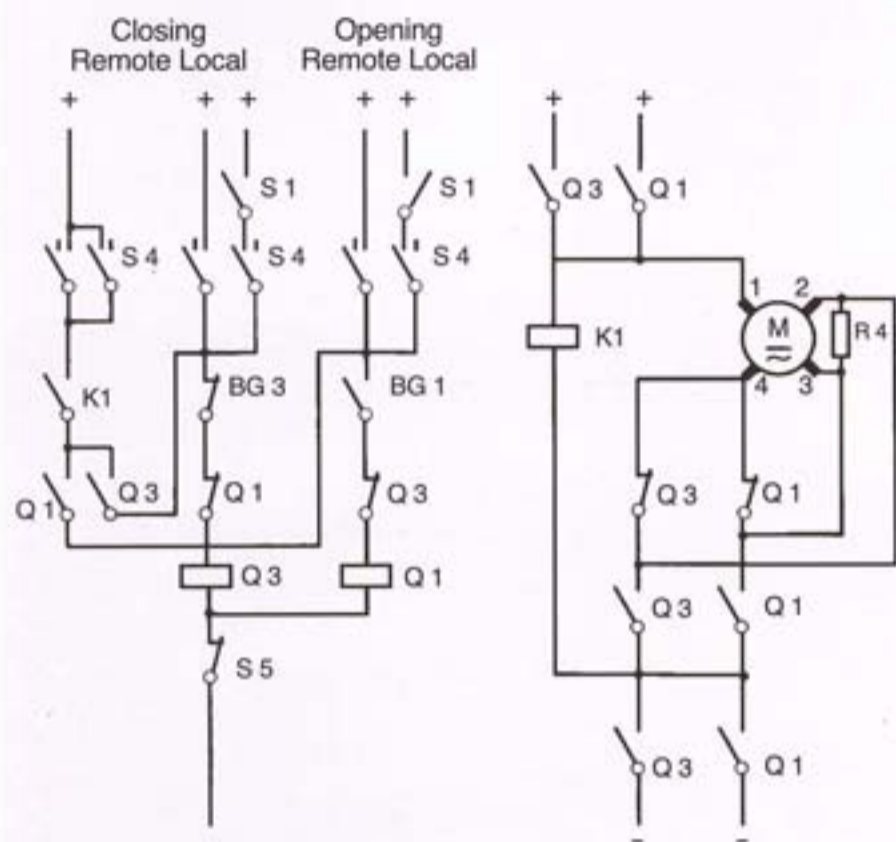


Fig.8 - BCM-F , the front from outside.

WIRING DIAGRAM OF BCM-F

control and operating circuits



The circuit diagram shows operating mechanism when the belonging disconnector is in open position

- BG1 Limit switch (open).
- BG2 Auxiliary switch.
- BG3 Limit switch (closed).
- E1 Heater.
- K1 Undervoltage relay.
- M Motor.
- Q1 Contactor (opening).
- Q3 Contactor (closing).
- R4 Parallel resistor.
- S1 Operating switch (closing/operating).
- S4 Selector switch.
(remote/local/disconnected).
- S5 Blocking contact (blocking motor operation during hand-operation).



Assembly line of BCM-F & BCH.

Erection alternatives of NSA

The disconnector can be installed in various erection alternatives, i.e. horizontal parallel erection, horizontal row erection and for 1600 A, vertical parallel erection.

Disconnectors larger than NSA 145/ 1250 (1600A) should not be erected vertically.

Suspended horizontal erection on request.



Assembly line of NSA disconnector.

Ice condition of NSA

A special version of NSA for the 20 mm ice requirement according to IEC 62271-100 can be selected as an alternative.



Insulation strength & creepage distance of NSA disconnectors

Rated voltage KV	Minimum permissible phase to phase distance ("D", Figure 1) mm	Impulse test voltage 1.2 / 50 μ s		Power frequency withstand voltage		Creepage distance	
		to earth and between poles KV	across open pole KV	to earth and between poles KV	across open pole KV	insulators with "normal" creepage distance mm	insulators with "long" creepage distance mm
36	1250	170	195	70	80	1116	1116
72.5	1500	325	375	140	160	1850	2250
145	2500	650	750	275	315	3750	4500
245	4500	1050	1200	460	530	6125	7500
420	5500	1425	1425 (+240)	520	610	10700	13000

Base frame of NSA

For all sizes up to and including 145KV, the base frame is of welded design and has four fixing holes.

The base frame of the 245-420KV disconnectors consist of a channel section, UNP 300 & UNP 160. The post insulators are mounted on bearings fixed on the base frame.

A rod situated under the base frame connects the bearings, allowing the insulators to be rotated together.

Earthing switches of NSA

The disconnectors can, if so desired, be fitted with earthing switches, operated by either a manual or a motor operating mechanism.

Disconnectors with earthing switches are always fitted with a mechanical interlock which prevents operation of the earthing switches when the disconnector is in the " ON " position and vice versa.

Delivery tests on NSA

Prior to delivery, the disconnectors are assembled (without insulators) and the following tests are made:

1. Resistance test
2. Voltage test on:
 - Auxiliary contacts
 - Operating mechanism
3. Functional test on:
 - Main circuit and movable mechanical parts
 - Earthing switch
 - Operating mechanism
 - Accessories

Available standard accessories of NSA

Auxiliary switches :

Number of poles : 6 + 6 or 12 + 12.

Other number of poles on request.

Hot-dip galvanized pipes for the operating shaft and rods.

Other creepage distances on request.

مَبسان

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