

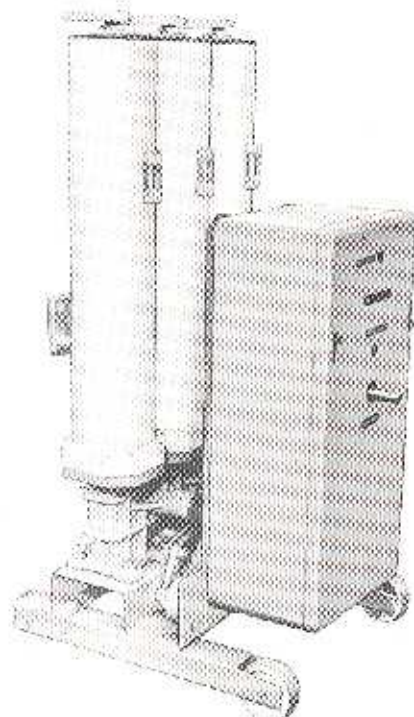
MINIMUM OIL CIRCUIT BREAKERS FOR INDOOR INSTALLATION

72-38 kV, 630-4000 A

Type HG

ACCORDING TO IEC RECOMMENDATIONS

9828 17 0519



DESCRIPTION

The circuit breakers, type HG are designed in a minimum oil technique intended for indoor installation. They are intended for installation in the metal clad cubicles manufactured by «Energinvest» or by some other manufacturers, as well as in the plants produced by the customers themselves. The circuit breakers, type HG are three pole devices composed of three identical poles mounted on the iron frame or on the truck, i. e. they can be installed as fixed or drawable part of the cubicle. All three poles have one common operating mechanism. The only single pole circuit breaker is 71101 which is made for railway electrification.

The drawing shows a cross-section of the circuit breaker pole, type HG 4a/8 which is, in principle, a unique solution for all circuit breakers of HG type. Each pole is composed of the insulating cylinder, filled with oil, which is fixed on the housing. The insulating cylinder is made of glass textile impregnated with epoxy resin of a high mechanical endurance. Upper and lower current terminals, as well as oil level indicator are installed at the outside of the cylinder. In the upper part of the cylinder above air «cushion» there is an expansion chamber with appropriate valves. Upper contact system as-

sembly is composed of the support, upper fixed contact mounted on the support, and spark gap. Upper current terminal is placed on the upper part of the support. Lower contact system assembly is composed of the support and lower fixed contact. Lower current terminal is placed on the opposite side of the support. Arc extinguishing chamber is placed below upper contact system. Movable contact is composed of the contact rod with specially designed tip, and which is at its lower end fixed on the insulating rod. The feature of this circuit breaker is a motion of the contact rod downwards during breaking operation. The contact rod and contact fingers of the fixed contacts are the main contacts made of silver coated copper. The spark gap and the contact rod tip are arcing contacts made as sinter-contacts on the copper tungsten basis. Such choice of materials provides a high thermal and electric conductivity, good mechanical properties and low wear caused by electric arc effects. The insulating cylinder is fixed on the housing in which is placed a system of levers which provides a connection between operating mechanism and the insulating rod.

OPERATING MECHANISM

The circuit breakers of HG type are equipped with motor-spring operating mechanisms. Closing operation of the circuit breaker is carried out by means of the energy accumulated in the closing springs. The energy is accumulated in the springs when they are charged by means of an universal electromotor (110, 220 V DC, AC) and necessary time for the charging is 12 sec. max. In case of failure of motor supply voltage, the closing springs can be charged manually. The energy accumulated in the charged closing springs enables following circuit breaker operations without recharging of the closing springs:

– starting from the «OFF» position

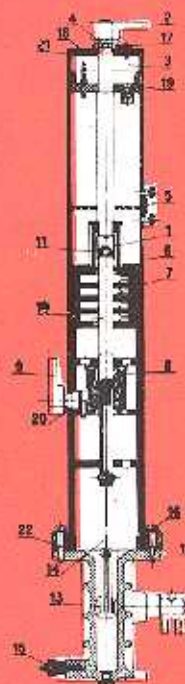
CLOSING – OPENING

– starting from the «ON» position

OPENING – CLOSING – OPENING

The operating mechanisms are capable for fast automatic reclosing operation. Because of that, breaking capacity of a great number of the circuit breakers has been tested on rated operating sequence 0-0, 3s-CO-3min. CO. The operating mechanisms designated with «I» (BNR-3LM, BLP) are capable for a «trip-free» operation, i. e. there is a possibility that movable contacts return and stay in the open position even in the case

CIRCUIT BREAKER HG 4a/8



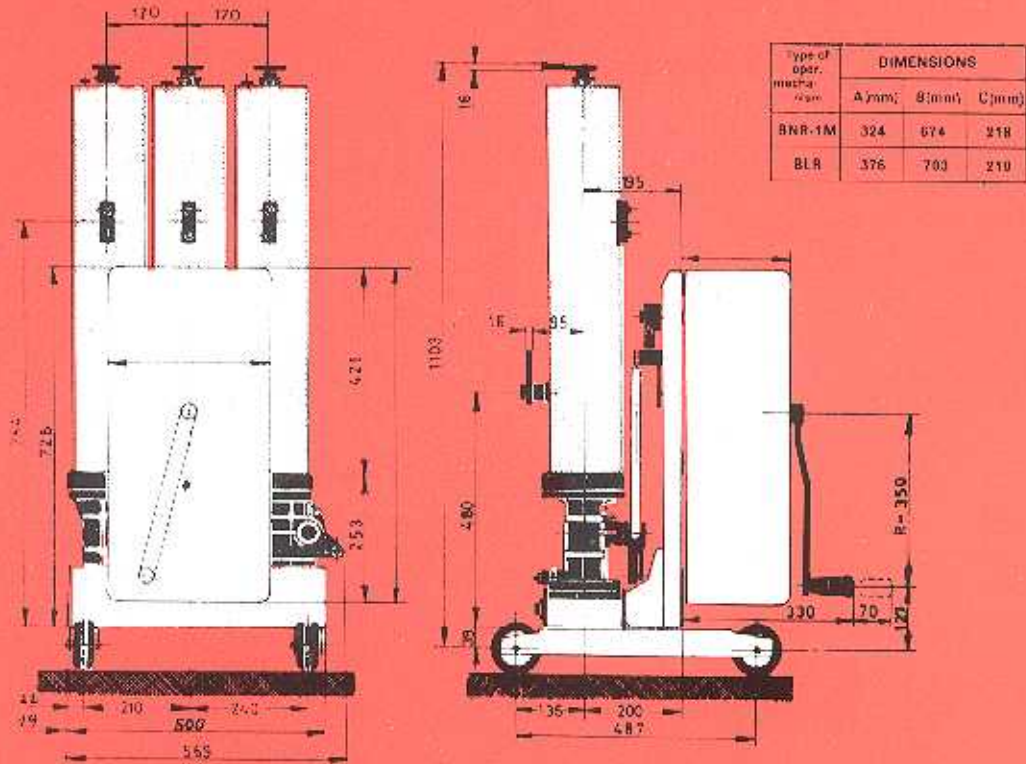
LEGEND:

1. Upper fixed contacts
2. Upper current connection
3. Expansion chamber
4. Oil filling plug
5. Oil level indicator
6. Insulating cylinder
7. Arc extinguishing chamber
8. Lower contacts
9. Lower current connections
10. Movable contact rod
11. Contact rod tip
12. Mechanism casing
13. Operating shaft
14. Linkage lever
15. Oil exhaust plug
16. Screw
17. Tightening piece
18. Insulating cover
19. Partition wall
20. Rubber gasket on lower current connection
21. Rubber gasket of phase cover
22. Insulating cylinder rubber gasket

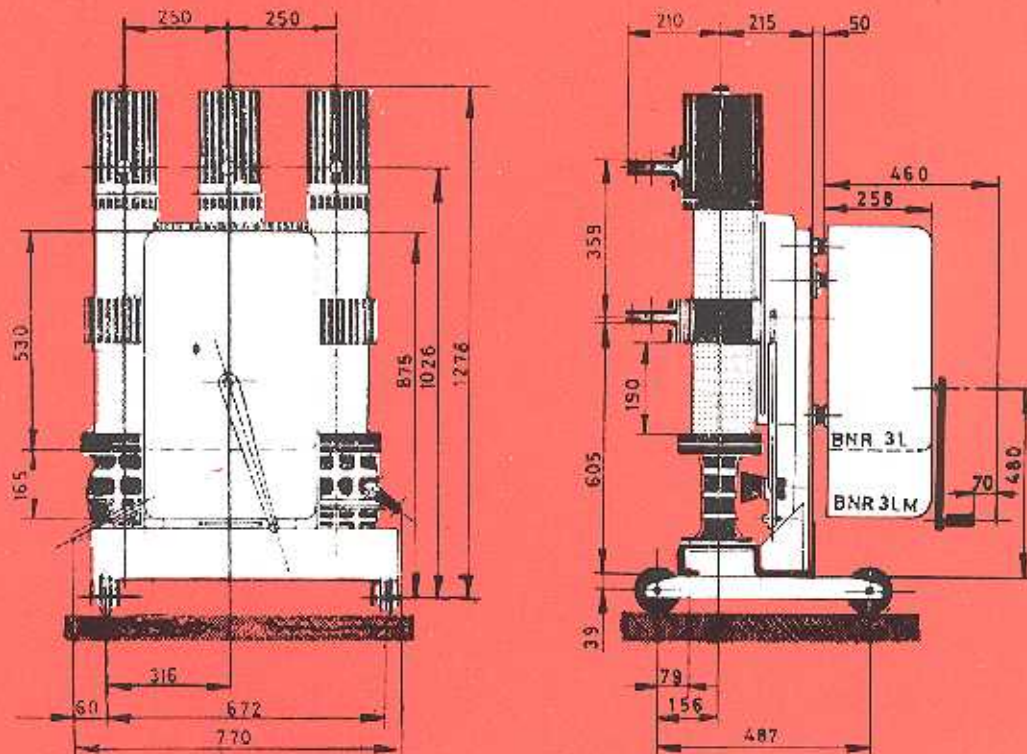
MEASURING DRAWING

The manufacturer reserves the right for further improvement of the apparatus. The measuring drawing is delivered by the manufacturer at purchaser's request before placing the order.

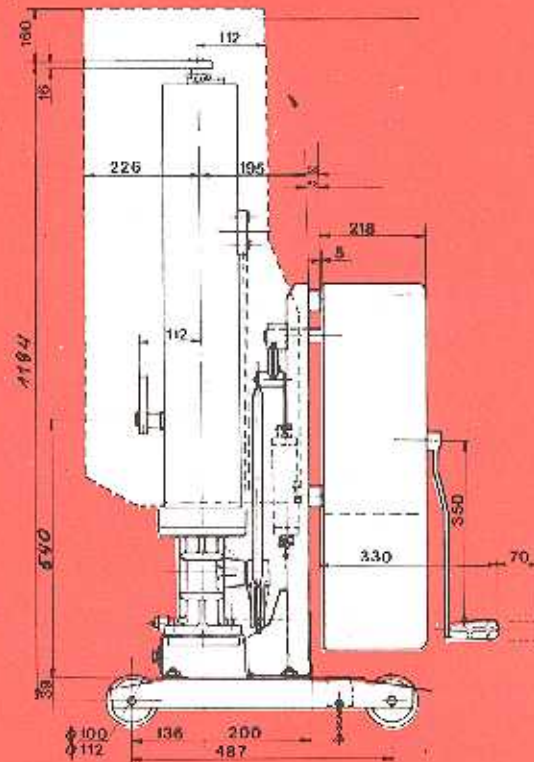
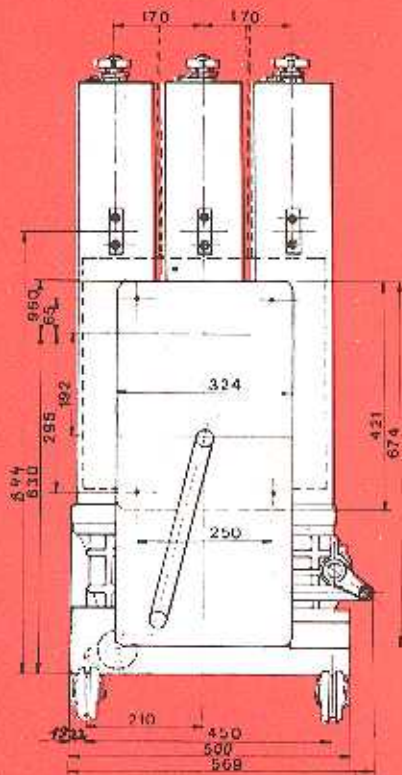
CROSS-SECTION OF THE CIRCUIT BREAKER POLE HG 4a/8



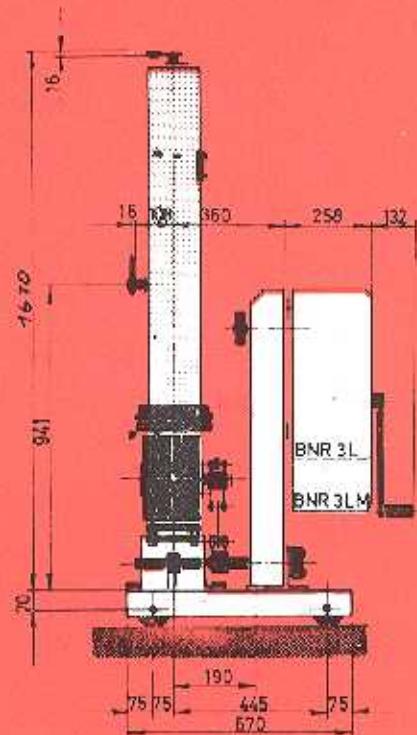
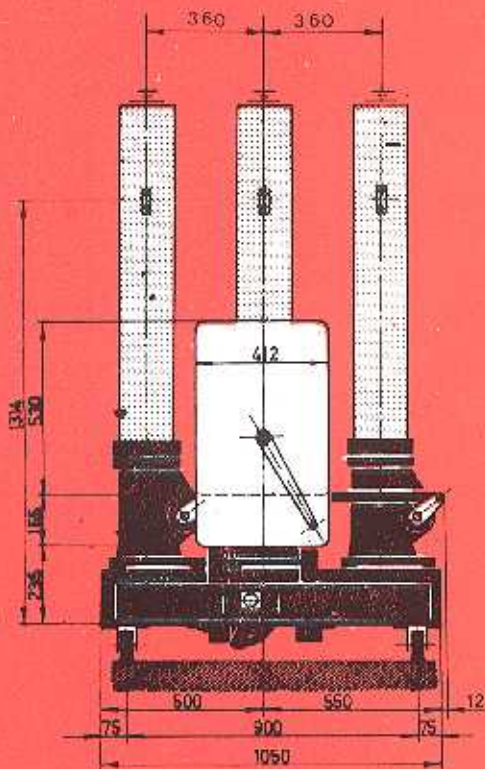
HG 4/9 H



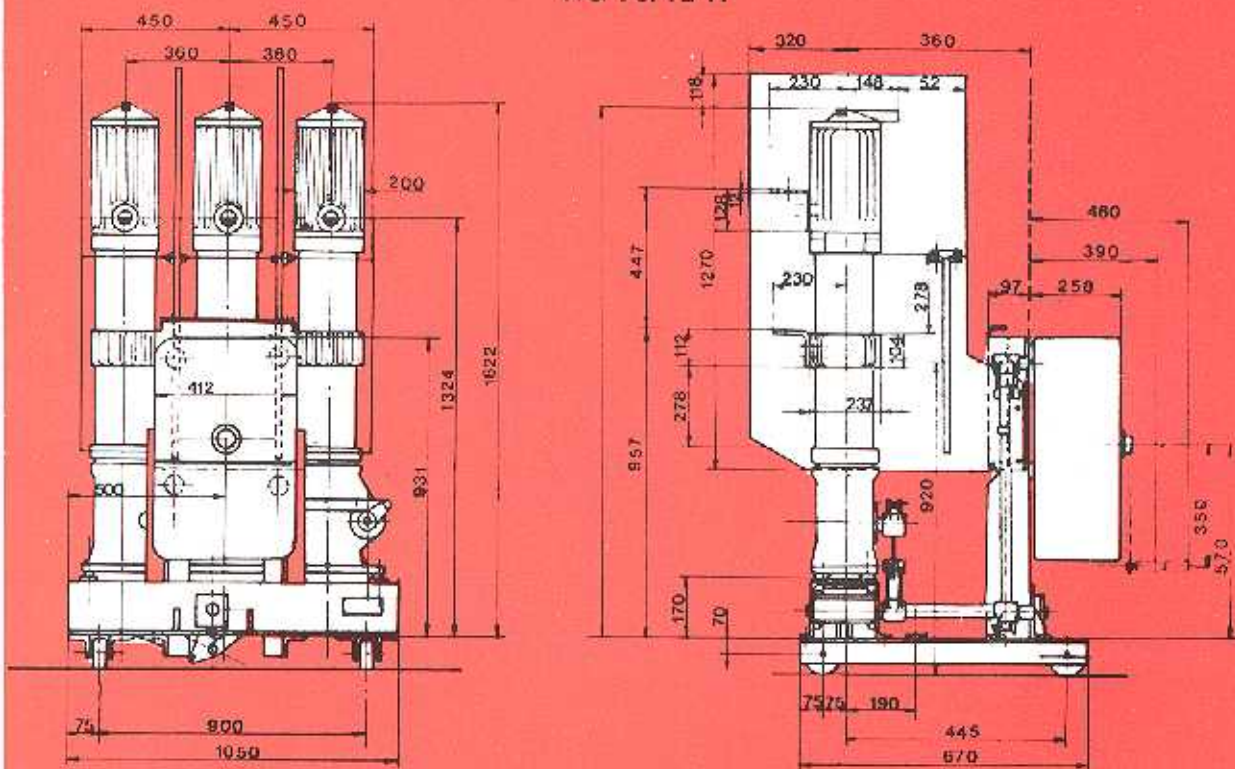
HG 6a/8 C; HG 6a/8 F



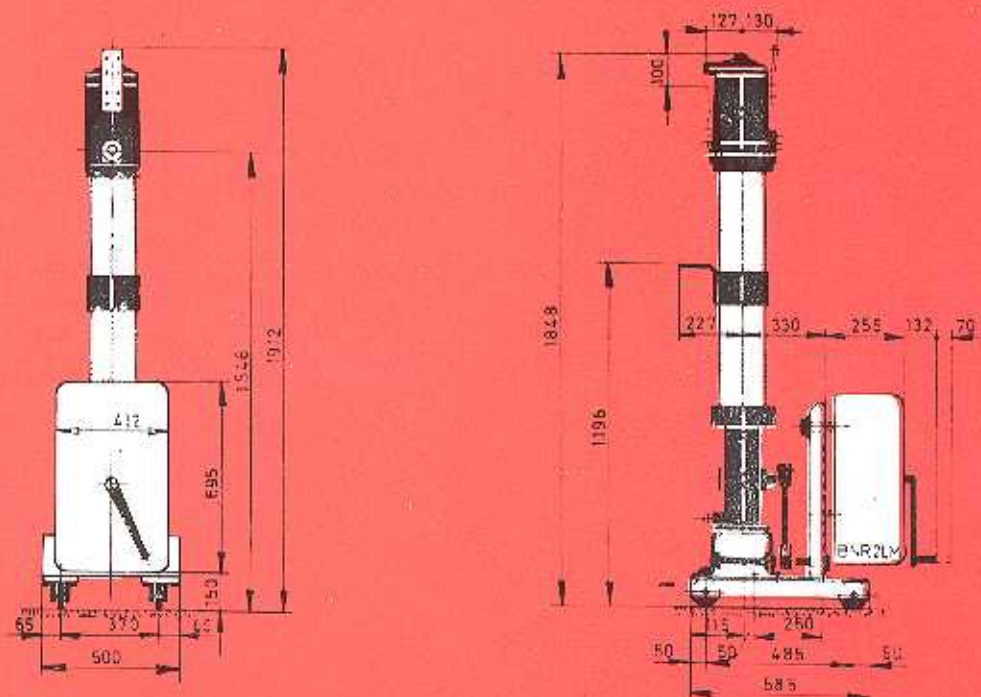
HG 7/9 C; HG 7/9 F; HG 7s/10 F; HG 7a/12 F



HG 7c/12 H



HG 7/10 I



Factory of Medium Voltage Circuit Breakers produced approximately 30.000 of the circuit breakers, type HG to 1981 inclusive. These circuit breakers have been exploiting in Yugoslavia, Rumania, Poland, USSR, CSSR, Libya, Ethiopia, Egypt, Sudan, Ghana, Zaire, Iran, Iraq, Pakistan, Bangladesh, India, Sri Lanka, Indonesia, Burma, Kuwait, Afghanistan, Mexico, Cuba, etc.

when a command for opening operation comes during closing operation even if a command for a closing operation is maintained. Such operating mechanisms have some advantages concerning reducing of thermal and dynamical stresses on the circuit breaker itself and on the plant's components. The circuit breaker can be operated remotely or directly on the circuit breaker by pushing the appropriate levers on the operating mechanism.

Motor-spring operating mechanism is equipped with:

- signalling switch with 4a - 4b of signalling contacts

shunt releases for closing and opening (12, 24, 32, 48, 60, 110, 220, V DC AC)

On purchaser's request it is possible to install additionally: 4a + 4b of signalling contacts, shunt opening release, undervoltage release, operations counter, permanent heater, lock for for a mechanical locking of closing operation in the «OFF» position, anti-pumping relay and primary over-current release.

APPLICATION

The circuit breakers, type HG are intended for installation in normal climatic conditions and for the altitudes up to 1000 m. It is possible to install the circuit breakers different from the normal ones and at the altitudes above 1000 m. In that case the Factory should be consulted. The circuit breakers are intended for breaking of short-circuit current, cable-charging breaking current, capacitor bank current and small inductive currents.

The circuit breakers have been tested in CESI Laboratory - Italy and in «Energoinvest» own high power laboratories at Dobrinja and Sarajevo, according to the standards and recommendations of IEC and JUS.

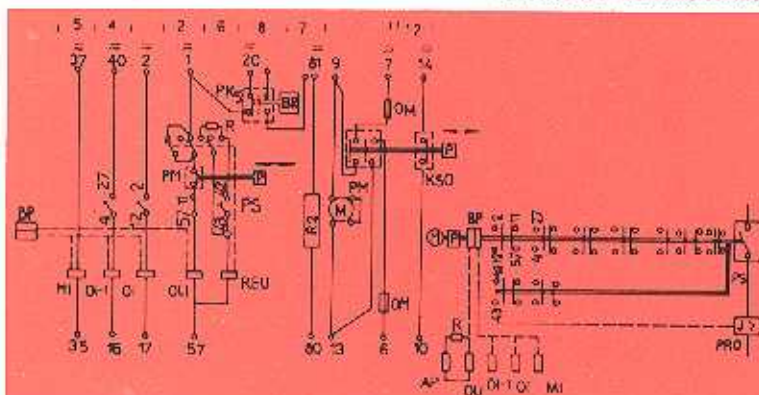
TABLE OF TECHNICAL CHARACTERISTICS

Type of C.B.	Rated voltage (KV)	Rated current (A)	Breaking capacity (KA)	RATED OPERATING CYCLE	Type of operating mechanism	Mass of complete C. B. (Kg)	Quantity of oil in the complete C.B. (l)	Short time withal and current/3 sec (KA)		
HG 4a/8c	7,2	630	31,5	0-3min-CO-3min-CO	BNR-1M	195	15	36		
HG 4a/8f		1250								
HG 4a/8c		630								
HG 4a/8F		1250	25		0-0,3sec-CO-3min-CO					
HG 4a/8F		1250	40		0-3min-CO-3min-CO	BLR-2M	215		15	38
HG 72/50-3150	7,2	3150	50	0-3min-CO-3min-CO	BNR-4M	620	48	50		
HG 72/50-4000		4000				630	50			
HG 4a/8C	12	630	25	0-0,3sec-CO-3min-CO	BNR-1M	195	15	36		
HG 4a/8F		1250								
HG4/9H		2000	40		0-3min-CO-3min-CO	BNR-3LM	322		20	42
		2500	25		0-0,3sec-CO-3min-CO					
HG 4a/10K		2500	50		0-3min-CO-3min-CO	BLR	530			50
HG 12/50-3150	12	3150	50	0-3min-CO-3min-CO	BLR-3M	620	48	50		
HG 12/50-4000		4000				630	50			
HG 6a/8C	24	630	12,5	0-0,3sec-CO-3min-CO	BNR-1M	210	16,5	36		
HG 6a/8F		1250								
HG 6a/10K		2500							25	0-3min-CO-CO-3min-CO
	2500	20	0-0,3sec-CO-3min-CO							
HG 7/10I	27,5	630	18	0-3min-CO-3min-CO	BNR-1LM	252	20	1,8		
			9,5	0-0,3sec-CO-3min-CO						
HG 7/9C	36/38	630	12,5	0-0,3sec-CO-3min-CO	BNR-3LM	467	50	25		
HG 7/9F		1250								
HG 7a/10F		1250							16	0-0,3sec-CO-3min-CO
HG 7a/12F		1250							25	0-0,3sec-CO-3min-CO
HG 7c/12H		2000							25	0-0,3sec-CO-3min-CO

NOTE

When ordering please specify: C. B. type, rated voltage, rated current, breaking capacity at operating sequence, type of operating mechanism, motor voltage, number and type of signalling contacts, voltage of closing and opening releases.

CIRCUIT DIAGRAM:



- P - closing spring.
- BP - closing and opening lock.
- PS - auxiliary contacts.
- OU - Shunt closing release.
- REU - anti-pumping relay.
- R - pre-resistor.
- BR - «Boure» or «Castell» lock.
- OI - shunt opening release.
- MI - undervoltage release.
- PRO - over-current release.
- OI-1 - supplementary opening release.
- OM - motor protection.
- PK - switch for local-remote control selection.
- PM - motor limit switch.
- KSO - contact for springs state signalling.