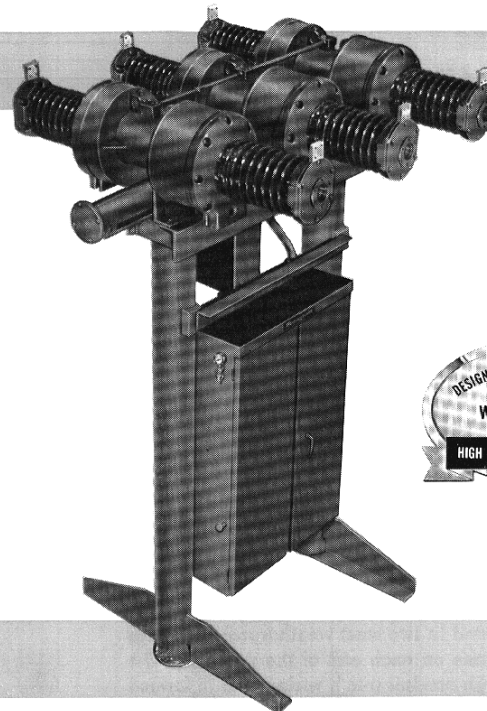




dead tank construction

Type SF₆, low capacity, gas filled breakers are designed for use on 23 through 46 kv power transmission circuits, and may be installed in existing substations.

This horizontal puffer design meets ASA, AEIC, AIEE and NEMA Standards for power circuit breaker ratings. The low capacity unit provides excellent capacitor switching performance up to 50,000 kvar on either single or multiple banks.



advantages

- **dead tank construction:** Complete safety provided, with all three pole units mounted on common frame. Mechanism housing recessed under frame for saving space and better station layout.
- **reduced weight:** SF₆ breakers are approximately 30-45% lighter in weight than comparably rated oil circuit breakers.
- **minimum foundation stress and cost:** Negligible energy transfer takes place during interruption; this combined with the lighter unit allows simplified, less costly, foundation construction.
- **quiet operation:** Closed gas system keeps noise level, even at full rated interruption, at a minimum.
- **sealed construction:** Eliminates contamination due to moisture and atmospheric conditions.
- **no fire hazard:** Inert SF₆ gas eliminates filtering or reconditioning of gas.
- **single low pressure:** 60 psi eliminates need for gas compressor. Low volume eliminates need for gas handling equipment.
- **simplified maintenance:** Use of stable SF₆ gas with its characteristic of negligible decomposition assures long life of this insulating and interrupting medium. By swinging down the porcelain assembly, the interrupter becomes accessible for inspection and maintenance. Mechanically tied contacts afford simple adjustment, synchronization of contacts and positive contact indication. The contacts are designed for long life and less frequent maintenance.
- **compact dimensions:** These self contained units can replace existing oil breakers with a minimum of labor and time.

October, 1961

new information

mailed to: E/279, 280/DB; C/331, 332/DB



design features

1 tanks

The three tanks are mounted horizontally on the common frame at ground potential, and afford easy access to the interrupters. A crank shaft for the operating linkage enters the tank through a Teflon V ring gland seal. The V rings are spring loaded to prevent leakage over a wide temperature range. The tanks are connected with a common header pipe which is brought down side of frame to filling valve and pressure gauge. Since the filling valve is located at ground potential and at eye level, gas may be added without removing breaker from service. Although 60 psi is the normal operating pressure, the breaker will meet all its ratings down to 45 psi; however, gas leakage is negligible over long periods of time.

2 current transformer

The transformers are mounted in two steel weatherproof housings outside the gas chamber, one on each end of the pole unit. The taps are brought out through conduit into a wiring trough formed by the horizontal member of the frame. Leads are terminated at blocks in the housing. Conventional 10L200 accuracy is obtained with the multi-ratio transformers. Space is provided for total of 3 standard accuracy transformers per pole.

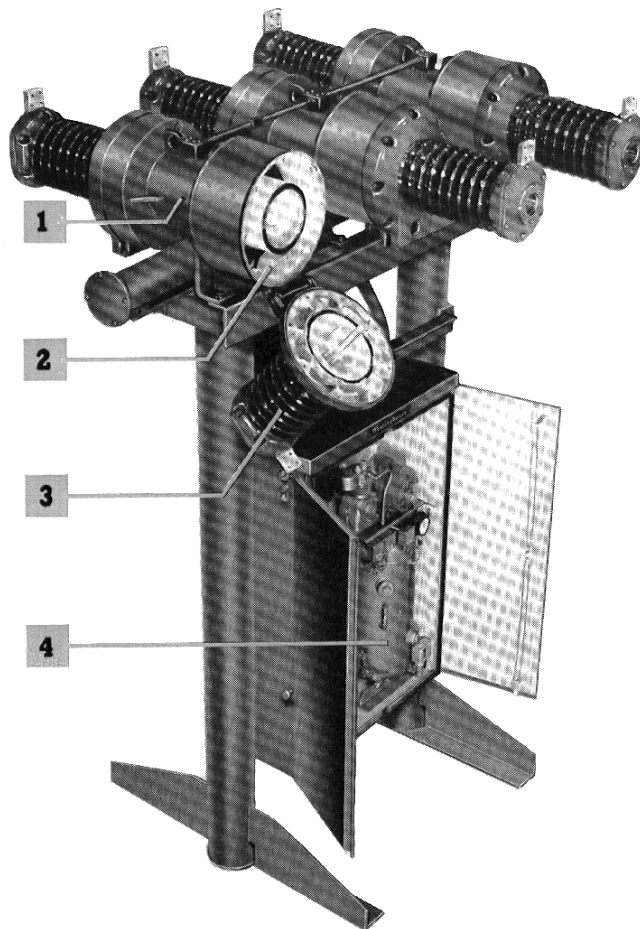
3 porcelain

Conventional bushings are not required on this breaker. A simple porcelain weather casing on each end of the breaker filled with gas performs this function. Since the only organic insulation inside the breaker is the puffer tubes, there is no need for the usual bushing power factor measurements. Each porcelain is hinged at the tank to facilitate inspection and maintenance, and also provide access to current transformers. Terminal connections are made to the cap on the outer end of the porcelain.

4 pneumatic mechanism

A standard AA-7 pneumatic mechanism electrically and mechanically trip free, closes contacts and compresses the spring required for opening the breaker. Contacts are mechanically tied together to insure synchronous operation of the pole units. The housing is tucked under the frame to provide a saving feature.

A temperature compensated pressure switch located inside AA-7 cabinet provides pressure alarm and cutout for low gas pressure. Customer has choice of either tripping or to prevent tripping breaker on low gas pressure. Cutout also opens closing circuit on AA-7 mechanism to prevent closing or reclosing on low gas pressure.



operation

A single break puffer type interrupter is used with these breakers, mounted inside a grounded steel tank. The current path is brought out of each end through porcelain weather casings. The entire unit, including porcelains, is filled with gas at 60 psig. This provides insulation to ground and interrupting medium.

The puffer consists of a stationary insulating piston fastened to the grounded tank at the left end, over which slides a moving insulating cylinder.

Attached to the right end of the moving tube are a set of contact fingers and a Teflon orifice. When the breaker opens, an accelerating spring on the operating linkage drives the puffer cylinder and contact fingers to the left. The arc is transferred rapidly to the arc resistant tip, which projects beyond the fingers. The movement of the puffer picks up gas pressure rapidly in the interrupting chamber as the orifice is pulled away from the end of the stationary contact. Now the gas is forced through the orifice mixing with the arc to De-ionize and extinguish it at an early current zero. During closing, the puffer reverses and pulls gas back into the cylinder. Since the puffer interrupter uses gas at a low pressure, a gas compressor is not required.

SF₆ gas filled breakers
type SF • low capacity

descriptive
bulletin

33-551

dead tank construction

page 3

selector guide

standard ASA ratings	rated voltage	34.5 kv	46 kv
	type	34SF500	46SF500

ratings: Ratings based on recommendations of EEl-AEIC-NEMA joint committee on power circuit breakers. For definitions see technical data 33-060

voltage ratings	rated kv	34.5	46
	maximum design kv	38	48.3
	min. for rated mva kv	23	40
current ratings	continuous, 60 cycle amp	1200	1200
	momentary amp	20000	12000
	4-second amp	12600	7200
interrupting ratings	3-phase mva	500	500
	rated voltage amp	8400	6300
	maximum amp	12600	7200
	opening cycles	5	5
insulation level	60-cycle test kv	80	105
	impulse withstand kv	200	250

components

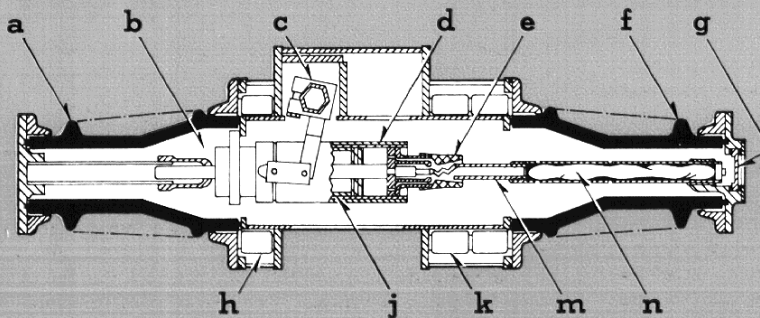
bushing current transformers	relaying accuracy	10L200	10L200
	maximum ratio	1200/5	1200/5
transformers	additional available ratios	100 600	100 600
		200 800	200 800
		300 900	300 900
		400 1000	400 1000
		500 1200	500 1200

weight and gas requirements

net weight lb	4500	4550
shipping weight lb	4900	4950
gas required lb	12.0	12.5
normal gas pressure psig	60	60

operating currents

pneumatic mechanism	closing (125 v, d-c) amp	9	9
	tripping (125 v, d-c) amp	7	7
	motor (230 v, a-c, 1 ph) amp	4.2	4.2

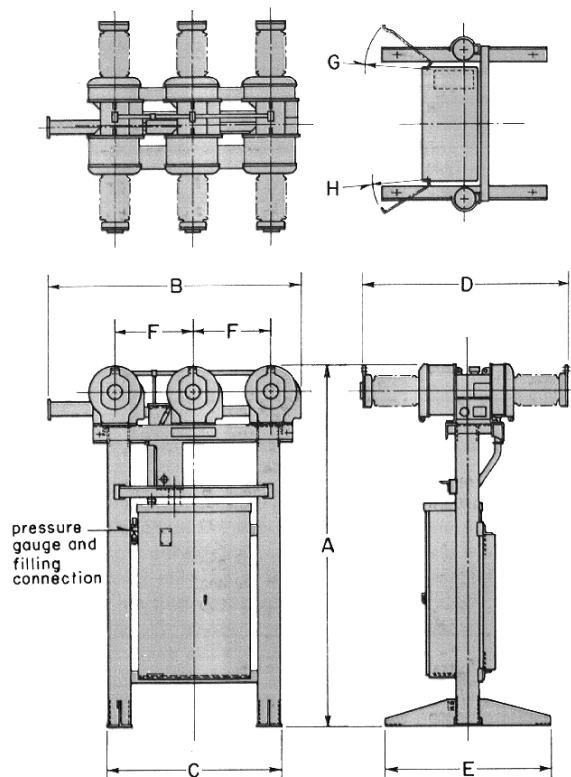


- a — porcelain weather casing
- b — SF₆ gas
- c — pole unit drive lever
- d — moving tube
- e — Teflon orifice
- f — porcelain weather casing
- g — pressure relief diaphragm
- h — current transformer
- j — stationary tube
- k — current transformers
- m — stationary contact
- n — activated alumina



SF₆ gas filled breaker
type SF • low capacity

dimensions in inches



	345SF500	460SF500
A	133 $\frac{1}{16}$	133 $\frac{1}{16}$
B	93 $\frac{3}{8}$	93 $\frac{3}{8}$
C	65 $\frac{5}{8}$	65 $\frac{5}{8}$
D	67 $\frac{7}{16}$	75 $\frac{9}{16}$
E	62	62
F	29 $\frac{1}{4}$	29 $\frac{1}{4}$
G	23 $\frac{1}{8}$	23 $\frac{1}{8}$
H	20 $\frac{3}{8}$	20 $\frac{3}{8}$

further information

description: descriptive bulletin 33-553
prices: price list 33-520

specifications

included with type SF breaker:

necessary SF₆ gas

- 1—welded structural steel frame
- 1—set of terminals
- 1—set of weatherproof cases and supports for bushing transformers
- 1—set of weatherproof metal conduit for transformer leads
- 6—type BYM multi-ratio bushing current transformers
- 1—mechanical "open" and "closed" indicator
- 1—set of accelerating springs
- 1—ground pad on frame
 - provision for installation of a time travel device
- 1—gas pressure gauge
- 1—gas filling valve
- 3—activated alumina bags (1 per pole)
- 1—weatherproof mechanism and gas system housing within which is mounted:
 - 1—type AA-7 d-c controlled pneumatic closing mechanism
 - 1—d-c shunt trip coil
 - 1—control relay panel upon which will be mounted electrically trip free control relay and three 2-pole fused knife switches; one for control circuit, one for compressor motor, and one for heaters
 - 1—air compressor and reservoir with automatic controls for 230 volt single phase operation
 - 1—set of terminal blocks
 - 1—type W rotary auxiliary switch, 11 pole
 - 1—type W cutoff switch, 2 pole
 - 1—latch checking switch
 - 1—operation counter
 - 1—set of heaters with thermostat
 - 1—temperature compensated pressure switch for low gas pressure alarm and cutout

recommended spare parts:

- 1—set of stationary contacts ▲
- 1—set of arcing horns ▲
- 1—set of moving contacts ▲
- 1—set of Teflon orifices ▲
- 1—set of gaskets complete for 3 pole breaker
- 1—set of shaft seal Teflon V rings
- 1—set of activated alumina bags
- 1—porcelain
- 1—trip coil
- 1—set of control relay coils
- 1—pilot valve
- 1—set of control relay contacts
- 1—set of heaters

▲ sufficient for 3 pole breaker