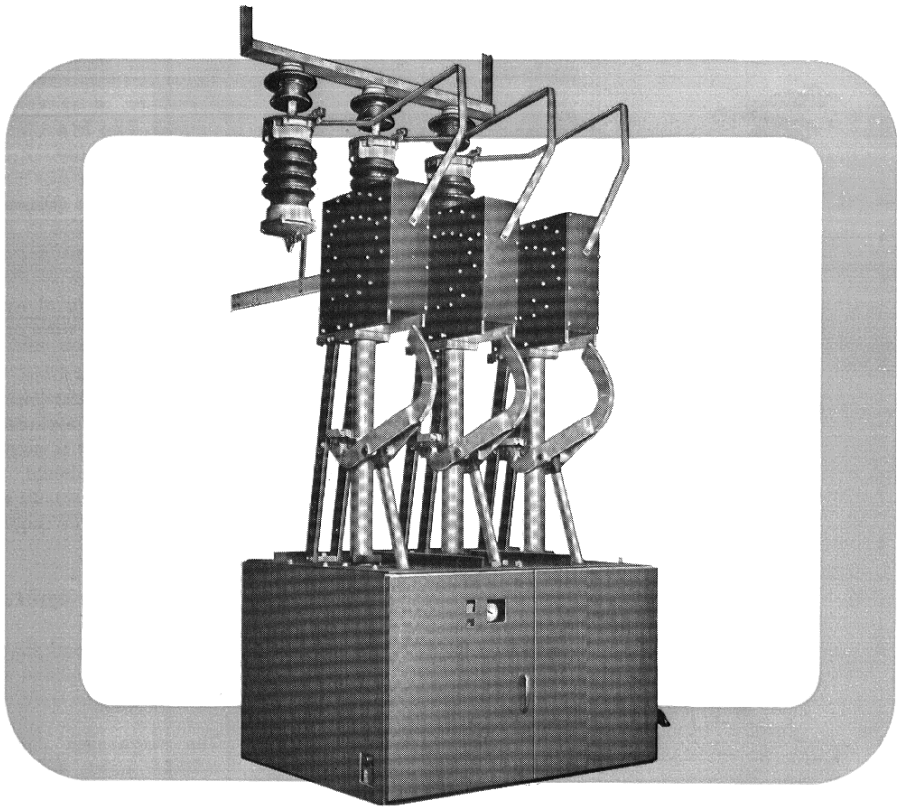
compressed air breakers
type CAF • indoor

for arc furnace switching • frame mounted
500 mva interr. capacity • 14.4 and 34.5 kv



ratings

	breaker type	
	150CAF500	345CAF500
voltage ratings		
rated kv	14.4	34.5
design kv	12-15.5	23-38
insulation levels: kv		
60 cy, 1 min pot. withstand	50	80
impulse crest	110	200
current ratings: amperes		
cont. 60 cy	2000	1200
momentary	40000	18000
4-second	24000	12600
maximum interrupting capacity: amperes	24000	12600

application

Type CAF compressed air circuit breakers are especially designed for the highly repetitive and severe overvoltage duty associated with arc furnace switching.

Although these breakers have a short-circuit interrupting capacity of 500 mva, they should be used only for furnace switching, and other breakers should be connected and relayed into the circuit to interrupt faults on the primary side of the furnace transformer.

advantages

continuity of service: Contacts, arc chutes, and all moving parts are designed for long operating life . . . 15,000 operations without major inspection.

reduction of overvoltages: During arc interruption, overvoltages are reduced by surge suppressors connected across the contacts.

electrically and pneumatically trip-free mechanism is designed for long life, easy accessibility, and minimum maintenance.

stand-by air supply: Because breakers can be operated at less than 100 psi air pressure, emergency operation from normal shop air system is possible.

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supersedes descriptive bulletin 33-451 dated July, 1957
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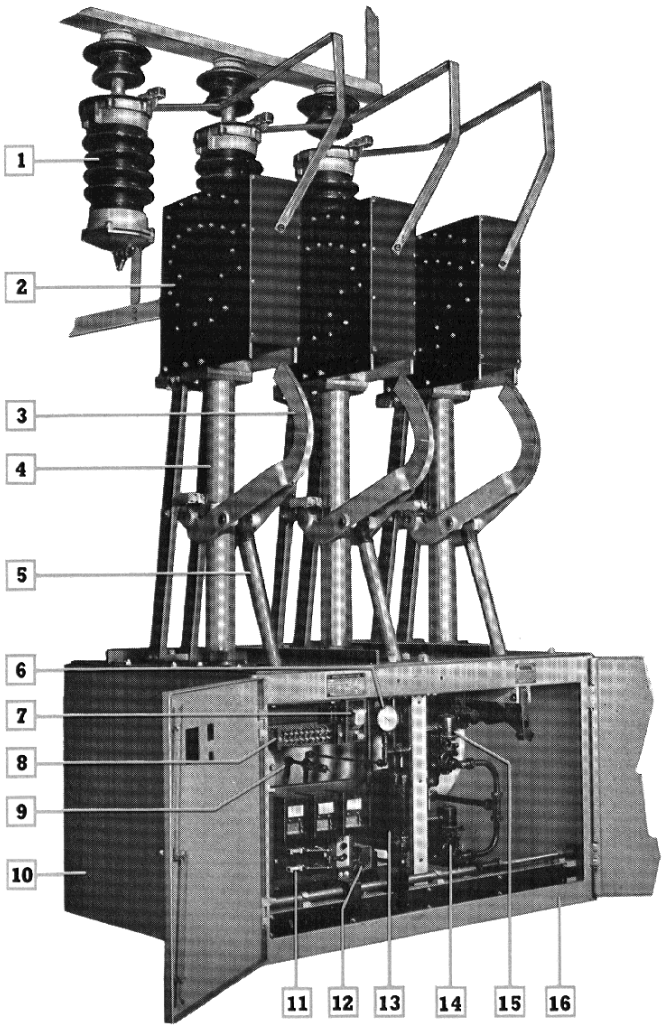
design features



1 surge suppressor
2 arc chute
3 moving contacts
4 blast tube
5 operating rod
6 air pressure gauge
7 position indicator and operation counter
8 auxiliary switch
9 air storage reservoir
10 operating mechanism enclosure
11 control panel
12 pneumatic operating mechanism
13 pressure switches
14 mechanism close valve
15 mechanism open valve
16 wiring trough

To insure reliable service of the breaker, a practical limit of 15,000 operations, or six months, has been set for reconditioning of the breaker. This is not intended to imply that a complete change of contacts, interrupters, and other moving parts will be required. Rather, it is intended that a careful examination be made, replacing only those parts showing deterioration, so as to prevent unscheduled outages, and to point the way for preventive maintenance under conditions peculiar to the application. Since the upper limit on furnace switching is about 3000 operations per month, this should give at least five months of service during which replacement of worn or damaged parts is not required.

At 15,000 operations, or six months, all hardware should be retightened, cotter pins and hinge pins checked for wear, contacts filed smooth or replaced, and arc splitters checked and replaced if obvious wear is noted at the splitter slots. In addition, normal maintenance should include periodic inspection, including lubrication of contacts and moving parts, every 2000 operations or oftener as may be required.

pneumatic operating mechanism

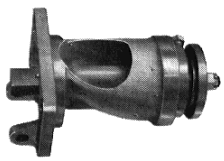
The lower compartment contains the operating mechanism and its auxiliaries. Grounded steel barriers isolate the compartment from the high voltage section above.

The mechanism consists of electrically-operated air valves, cylinder, piston, and connecting rod. The connecting rod connects the mechanism to the jack shaft, which operates the blast valves, contact operating rods, and the shock absorbers.

All parts in contact with air flow are made of corrosion-resisting materials. The air piping is made of copper tubing with threadless-type pressure fittings having Neoprene seals which provide flexibility and eliminate soldering.

The breaker contacts are held in the closed position by an over-toggle. Two magnet valves control the open and close operations through functional dump valves which permit the breaker tripping impulse to have preference over the closing impulse.

The following devices assure correct and safe operation: breaker operation counter, check valve, over-pressure air safety valve, air pressure gauge, low pressure alarm switch, low pressure cutoff switch, and control circuit knife switch.



blast valves are operated on the opening operation only, by the movement of a cam on the jack shaft. Each valve is partially opened before the contacts separate, and then moves quickly to the full open position. Cam action allows the spring and air pressure to close the valve before the contacts reach the full open position. An easily replaceable Neoprene valve seat produces a tight seal with long life.

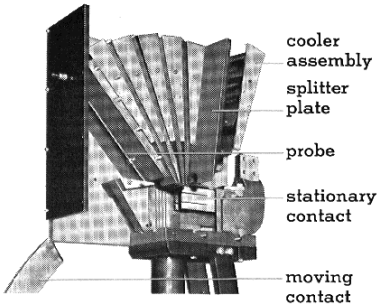
shock absorbers: Double-acting, tubular-type, oil-filled shock absorbers in conjunction with compression springs operate off the jack shaft to cushion the motion of the contacts.

surge suppressor

Surge suppressors for separate mounting are supplied with the breakers as a means of reducing the high surge voltages associated with furnace switching. Connected between the front of the arc chute and the stationary contacts, the suppressors actually are non-linear resistors which are introduced in parallel with the arc during the interrupting period. The resistance is lowered sharply when the applied voltage exceeds a predetermined value, permitting the resistors to carry a high current. For normal crest line voltage, however, the resistance rises, and the current is limited to a value easily interrupted when the moving contact is withdrawn from the arc chute.

The use of surge suppressors reduces the overvoltages to less than 50 percent of the normal undamped value over the most active current range of 10 to 100 amperes.

arc chute



The arc chute is a fibre-lined Micarta box of fixed width containing several fibre arc splitter plates and cooler assemblies. Each cooler assembly contains a series of metal screens to cool the arc gases, and is V-shaped to permit free expansion of the arc gases as they pass upward.

breaker contacts

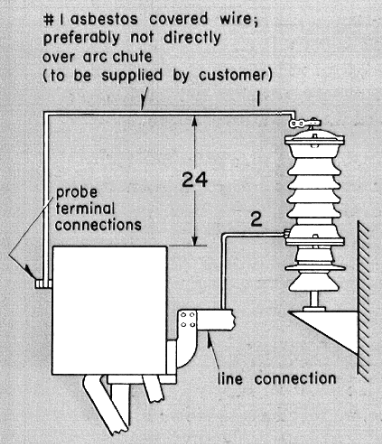
stationary contacts, bolted to the main stationary terminal casting, consist of Cupaloy fingers machined to give proper deflection when the contact is closed. These contacts are quickly and easily replaced, and are realigned by simply tightening the two holding bolts with the breaker in the closed position.

moving contacts are curved blades hinged at their base to the lower terminals. The 15-kv contacts are Cupaloy castings with silver-plated contact surfaces and special arc-resisting metal inserts at points of arcing. The 34.5-kv contacts are aluminum castings with silver-plated copper contact blocks and special arc-resisting metal inserts at points of arcing.

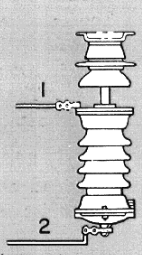
bridging members, each spring biased to maintain correct contact pressure, conduct the current across the hinge joint. Wiping action maintains silver-to-silver contacts, and the assembly is easily removable for inspection or maintenance.

dimensions in inches

preferred surge suppressor mounting

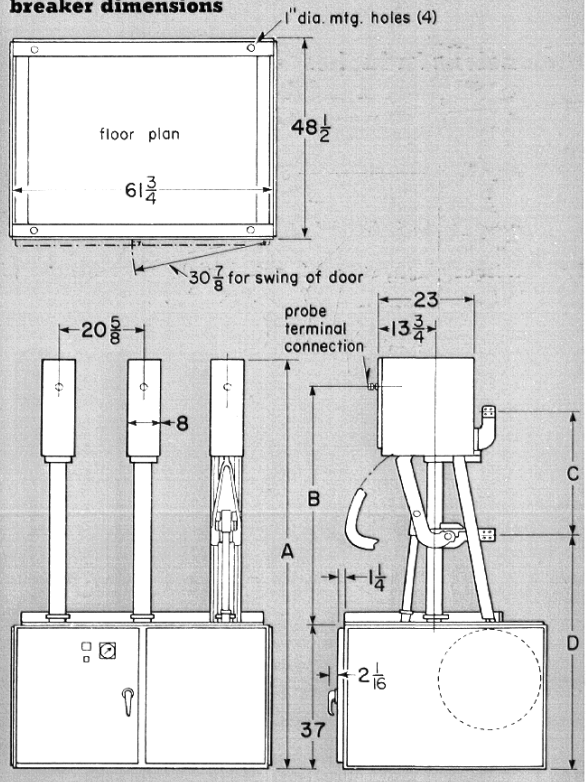


alternate surge suppressor mounting



(alternate surge suppressor mounting, shown suspended from ceiling.)

breaker dimensions



breaker type	approximate dimensions: inches			
	A	B	C	D
150CAF500	86½	42½	22½	50¼
345CAF500	104⅜	60⅜	31¼	59⅜

compressed air supply

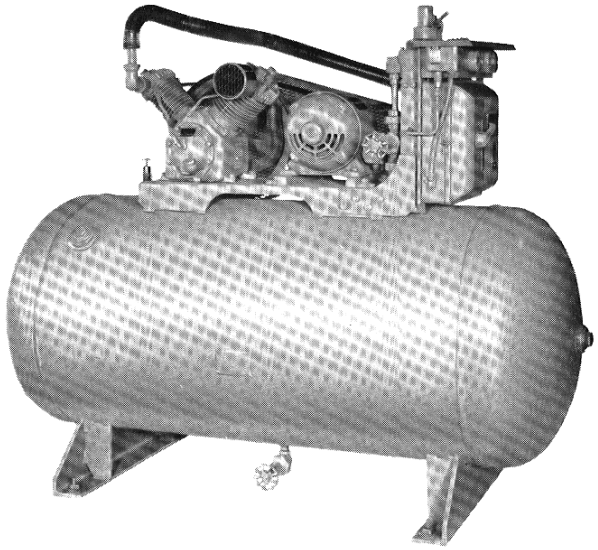
Since a compressor is not furnished with the breaker, an independent source of dry compressed air must be provided.

The air supply unit consists of a motor-driven compressor, complete with automatic control and one 30 cubic foot storage reservoir, together with cooling coils, pipe connections, valves, and pressure switches. The 9 cfm two-stage compressor stores air in the reservoir at 300 psi. The 300 psi air is cooled and expanded to the operating pressure of 90 to 105 psi, thus reducing the relative humidity and drying the air. The moisture precipitated in the air storage reservoir can be removed through a drain valve.

This air supply unit has sufficient capacity for one to two type CAF breakers provided any one does not operate in excess of the following schedule:

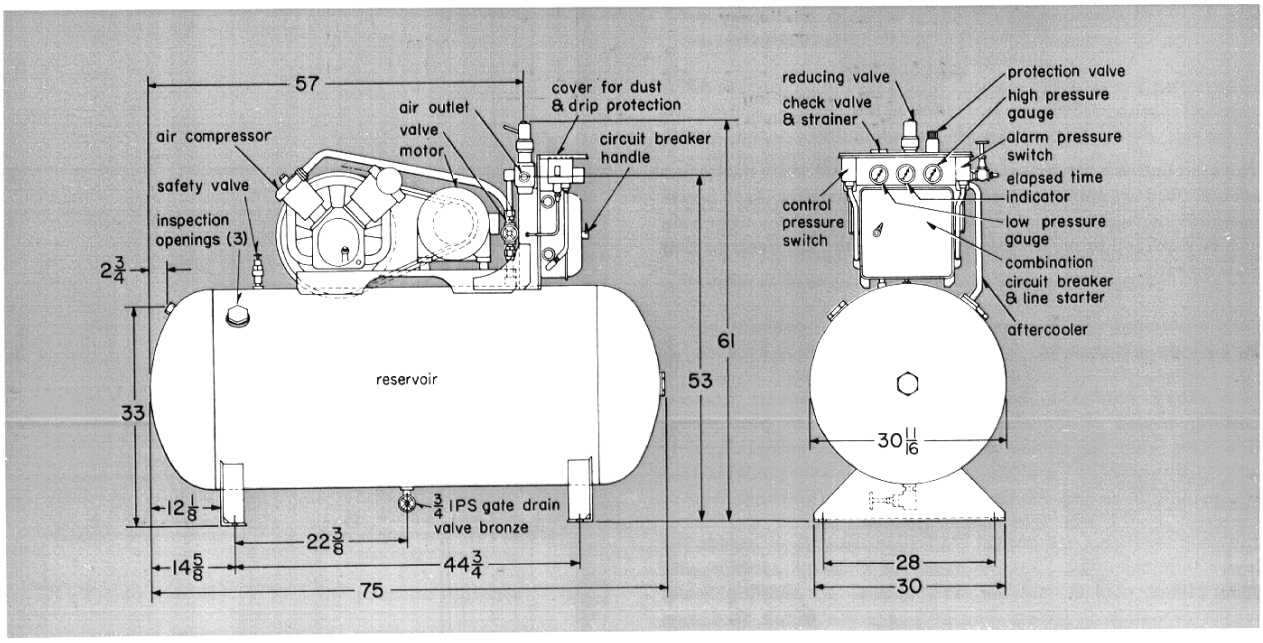
time	close—open operations
1 minute	1
10 minutes	4
60 minutes	10

It is recommended that the plant air supply system (80-100 psi) be used for stand-by service, provided a suitable air filter and moisture trap are furnished. Provision is made for connecting this system to the breaker reservoir.



Two-stage compressor and storage reservoir (9 cfm). The compressor is driven by a 3-hp, 230-volt, 60-cycle, 3-phase squirrel-cage motor.

dimensions in inches • approximate only. Do not use for construction purposes



further information: **prices and inquiries**: refer to nearest Westinghouse Sales Office
CA compressed air breaker: db 33-450

Westinghouse Electric Corporation
Power Circuit Breaker Dept.: East Pittsburgh Division • Trafford, Pa.
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