TYPE FKD OIL CIRCUIT BREAKERS

DISTRIBUTION CLASS RATINGS

The oil filled circuit breakers for the protection of distribution feeders are designated Type FKD. The maximum circuit voltages are rated 15.5 and 25.8 KV with 250 and 500 MVA interrupting ratings.

The 3 phase oil recloser, which has substantially the same construction as the FKD-15.5-8900 breaker, is designated Type OR. The recloser is rated for a maximum of 560 amperes and is furnished with the same recloser control as is used with the vacuum recloser. The distribution breakers are ordinarily purchased with automatic reclosing relay equipment. These are designed to make the distribution breaker completely operative from a 230 volt AC control power source. In the section devoted to relays, some features of the relay panels for these breakers will be included.

INSTALLATION

Specific instructions are issued which cover the installation, inspection and maintenance of the Type FKD-15.5 oil circuit breakers. As explained in these instructions, the breakers are shipped with the breaker secured in the open positions and with the tanks empty. These instructions, along with the prints and associated data furnished for the job, should be followed in performing installation and maintenance work on the units. For reason of emphasis two or three details are being brought to your attention. Most of these breakers utilize a capacitor trip device so that the trip circuit can be supplied with energy from the normal AC control power source. This device will fail immediately if the control power is applied to the breaker in the condition in which it is received. To avoid this problem, the blocking should be removed and the breaker opened and the trip coil circuit opened by separating relay contacts before applying control power to the breaker.

BREAKER OIL

The filling of the breaker tanks with oil is an important consideration. The tanks should be carefully cleaned and the oil transferred from the shipping containers to the breaker tanks through a filter press. It should be noted that the oil should be tested before the breaker is placed in service. It is quite difficult to get an oil test above the minimum limits if the handling of the oil is by means other than a filter press.

EMERGENCY OPERATION

The ML-10 mechanism on this breaker with the normally charged torsion spring allows for one emergency manual closing of the breaker, provided the spring is fully charged. In common with the full circuit breaker line, it is important that the maintenance operating device not be used to close the breaker contacts on an energized circuit.

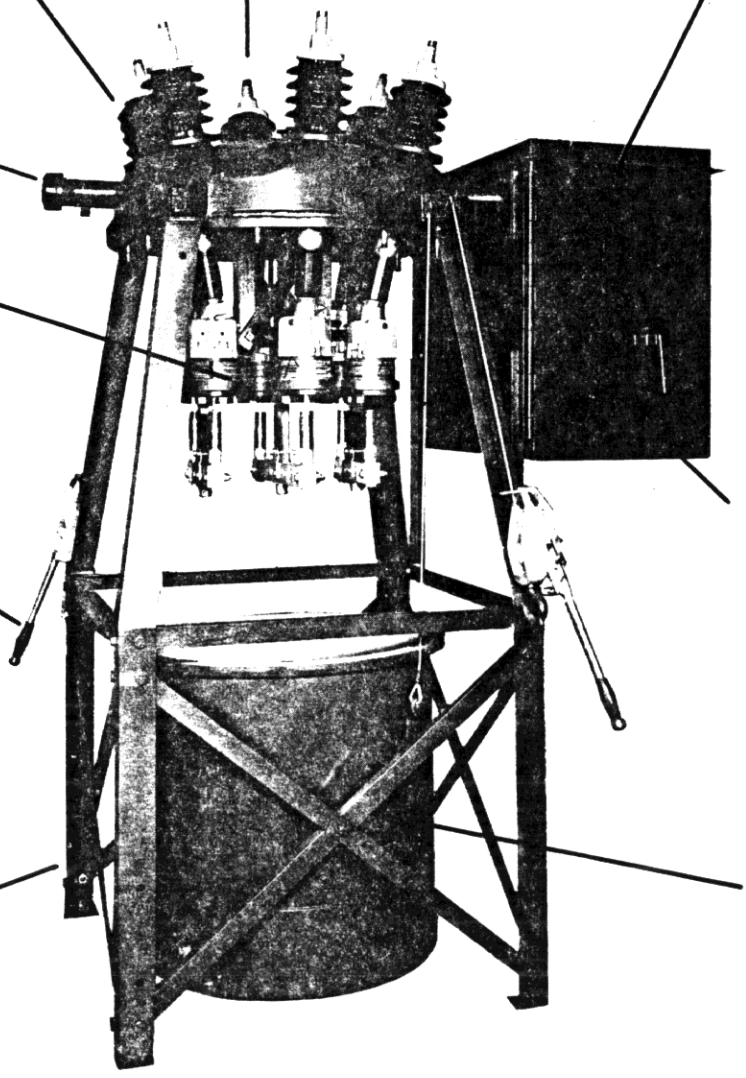
Type FKD power circuit breakers provide low maintenance costs and operating reliability.

Bushing phase spacing is extra wide, ample for 25.8 kV—space for one bushing current transformer on all bushings. Positive oil seal prevents siphoning of oil into mechanism house.

Bushings are oil-filled and center-clamped, with equalizer construction.

Mechanism house is outdoor, weatherproof construction. Front plate easily removable for maintenance overhaul. Space heaters are provided to prevent condensation. Door handle has provision for padlocking. Push-button for emergency manual trip is located on front panel. Contact position indicator and operation counter are also located on front panel.

Bias spring assures fast, constant opening speed.



Two interrupters per phase provide fast, positive interruption with a minimum of oil carbonization and contact wear. Interrupters are based on established "Cross-blast" principle used for high-voltage breakers.

High-speed, torsion-spring cam-operated mechanism closes smoothly and rapidly time after time. It can close against rated fault current in less than 10 Hertz even if closing control power is lost during the closing stroke, and it can be charged manually to close against a dead system. Mechanism is mechanically and electrically trip-free and is non-pumping. Spring interlock prevents closing unless spring is wound.

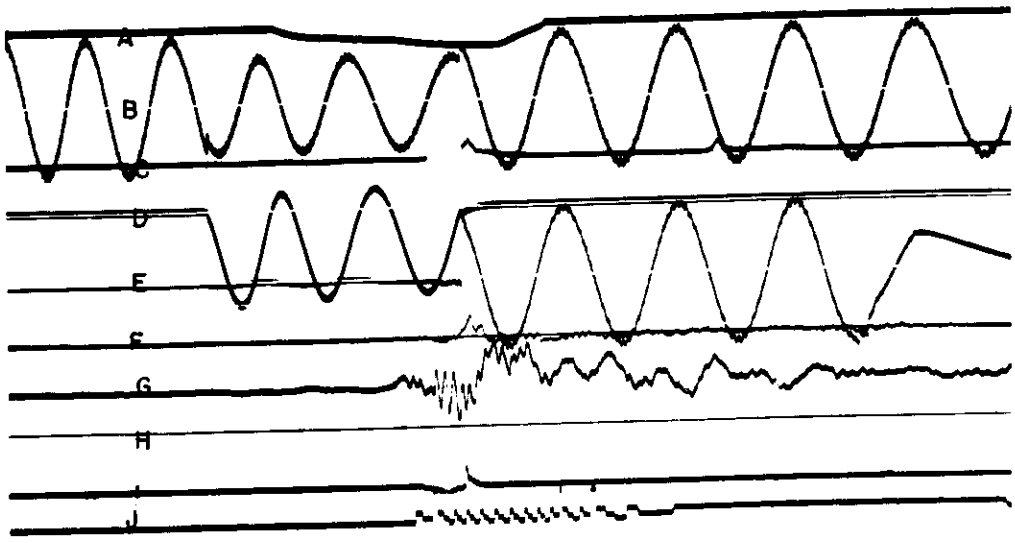
Tank lifter is commercially available, provides maximum flexibility and portability.

Rugged frame is specially designed to withstand repeated, severe mechanical stresses associated with heavy fault operation.

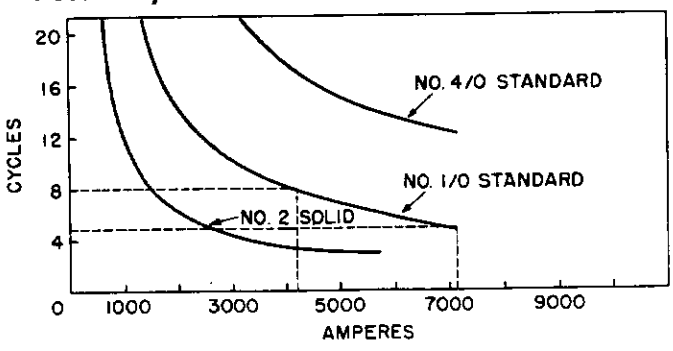
Single-tank construction speeds maintenance operations. Tank and one-piece dome are specially fabricated for extra strength. The dished bottom on the tank also increases its strength and makes draining and cleaning easier.

Field tests and full-capacity tests at The High Power Laboratory in Philadelphia demonstrate the fast clearing time of the Type FKD distribution breaker. Extra fast interruption provides a safety margin against line equipment damage as system loads continue to grow. Such fast interruption also permits application of lower rated fuses for better protection of the system. And, with fast reclosing, loads are picked up more quickly and easily following an outage.

Better than 5-Hertz interruption, 15- to 20-Hertz reclosing

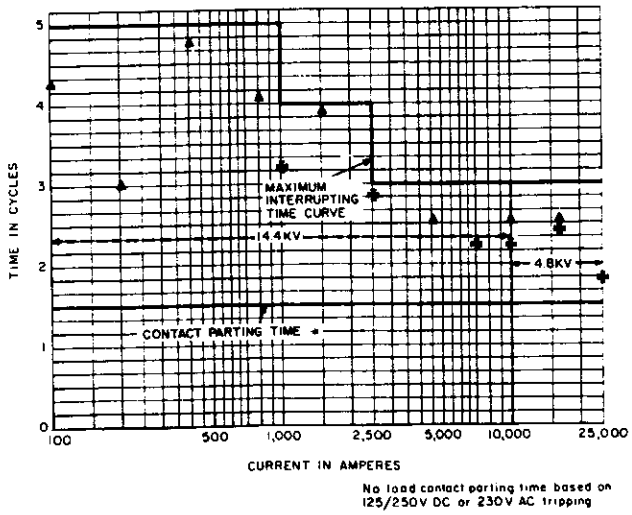


Possibility of line burn-down reduced



High-speed breaker reduces chance of line burn-down. Chart shows typical burn-down characteristics of covered copper wire at different interruption speeds.

Performance characteristics



Performance of 15.5 kV breaker based on more than 200 interrupting tests. ▲ representative single-phase tests; ✣ representative three-phase tests.