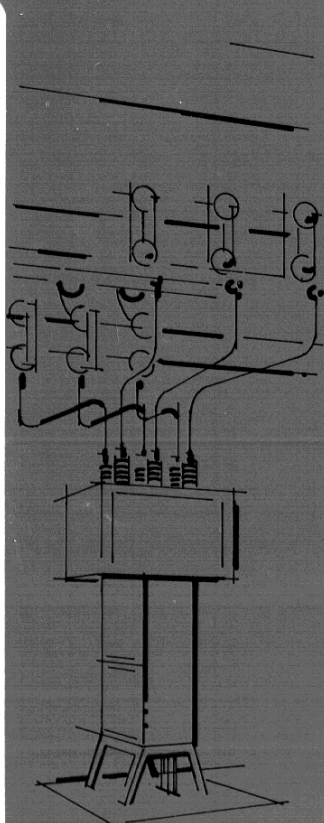


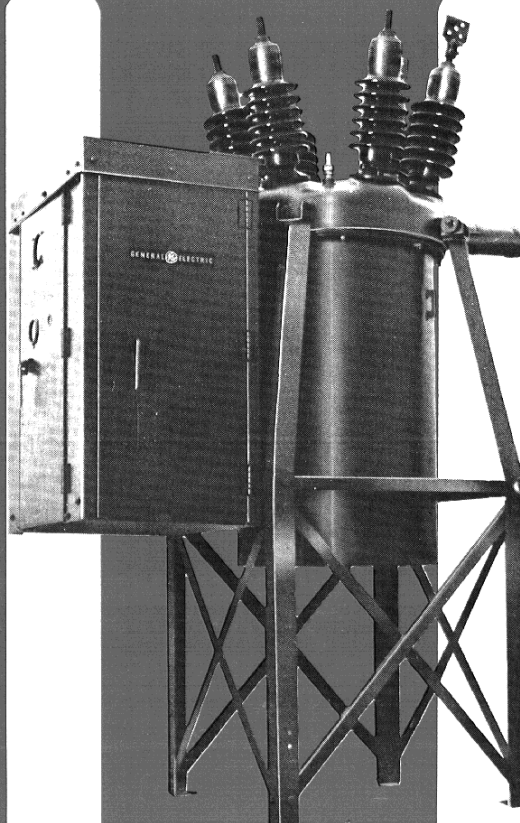
New 38-KV FKD Distribution Class Oil Circuit Breaker

38 kv – 750 mva – 1200 amperes

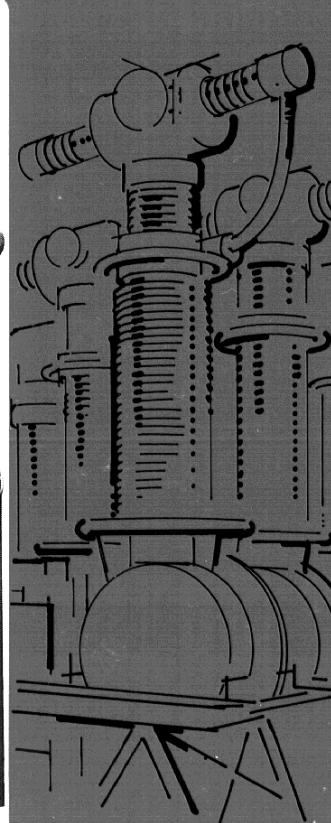
One of three General Electric technologies



Vacuum



Oil

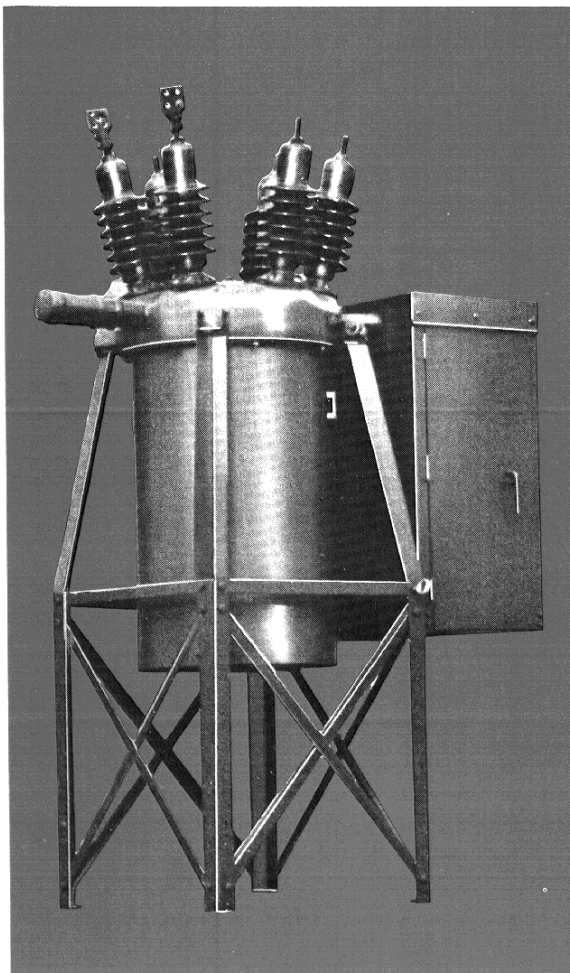


Air-Blast

GENERAL  ELECTRIC

DEPENDABILITY

built on 75 years' experience



Proven protection is provided by this new FGD 38 kv 750 mva power circuit breaker.

General Electric's new 38 kv FGD power circuit breaker is built with uncompromising quality for greatest possible all-around dependability. Utilizing the time-proven concepts of single-tank interruption introduced by General Electric in 1957, this modern breaker has been engineered to extend distribution-class capabilities with the benefits of General Electric's 70 plus years of power circuit breaker experience.

Laboratory testing and extensive field test experience have proven the General Electric FGD circuit breaker. The new 38 kv breaker is rated 1200 amperes with an interrupting capacity of 750 mva.

The basis of the FGD breaker is the multi-break interrupter, which provides fast interruption to keep arcs short. These shorter arc lengths mean less oil deterioration, less arcing waste products, and less contact erosion, resulting in longer intervals between service inspections.

The new MLD-14 spring charged mechanism is mechanically and electrically trip-free. This fast operating mechanism increases reliability of your breaker while reducing maintenance.

The Type U bushing, which has been proven for many years, is used in the FGD breaker. The simplified construction of these breakers keeps inspection and maintenance at a minimum . . . you can lower tanks and remove interrupters easily.

Factory assembled FGD breakers are shipped with all components in place. You need only position the breaker and make necessary service preparations.

The 38 kv oil circuit breaker combines all the time-tested features that General Electric's years of experience have provided. These quality features mean added safety for your electrical system.

TIME-PROVEN FEATURES

provide maximum system reliability

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

Compression 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.

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

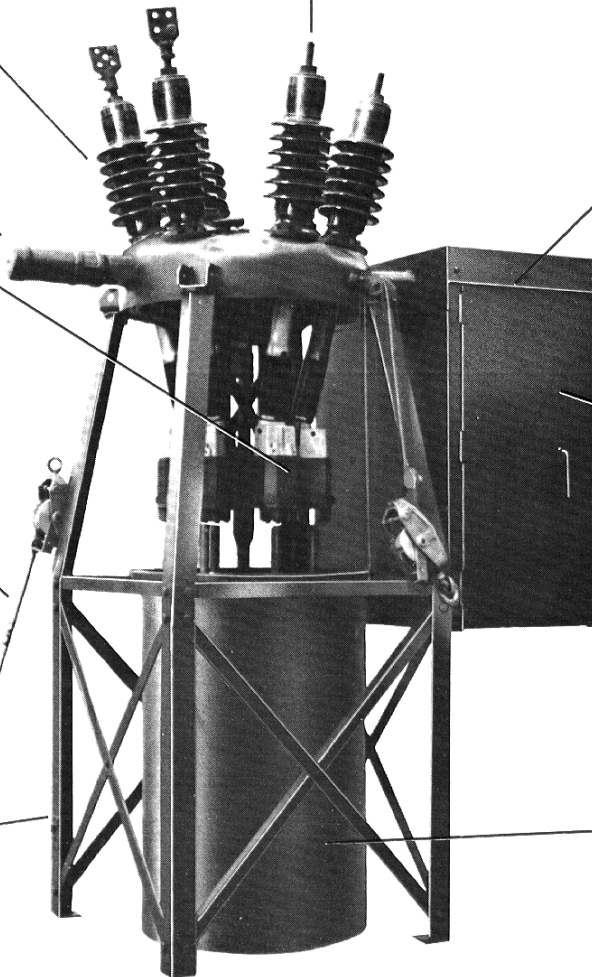
Rugged frame is specially designed to withstand repeated, severe mechanical stresses associated with heavy fault operation.

Bushing phase spacing is provided to mount bushing current transformers on all bushings.

Mechanism house is outdoor, weather resistant construction. 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.

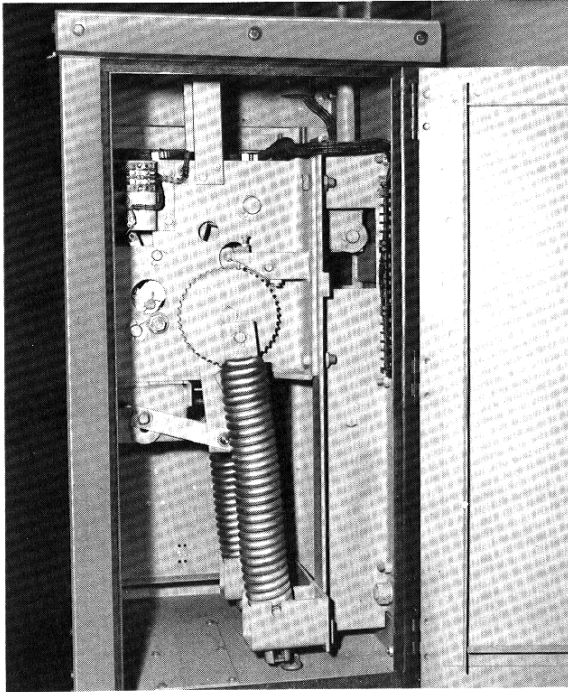
High-speed, stored-energy mechanism closes smoothly and rapidly time after time. It can close against rated fault current in less than 10 cycles even if closing control power is lost during the closing stroke, and it can be charged manually to close against a dead system. Mechanism is mechanically and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

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.



NEW SPRING CHARGED MECHANISM

increases operating reliability



New mechanically trip-free MLD-14 is simpler, easier to maintain.

Today's rapidly growing utility systems require breakers that are easier and faster to maintain, simple and dependable in operation. The new mechanically trip-free spring-charged MLD-14 operating mechanism satisfies these requirements, providing the user with these six major benefits:

- No code inspection or license is required.
- Increased reliability from high-speed closing.
- Reduced maintenance with no air-storage problems.
- Consistent closing operation.
- Hand charging for closing without power.
- Safer low temperature operation.

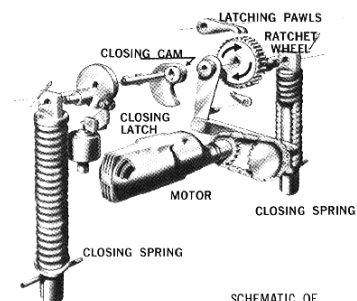
In addition, the charging motor of this less complex mechanism runs on either ac or dc, and thus as an option, the breaker can be equipped with emergency charging from the 125- or 250-volt d-c tripping source.

Here's how it works: The mechanism consists of a high-speed gear motor that compresses a set of closing springs through the action of a simple eccentric, ratchet, and pawl assembly.

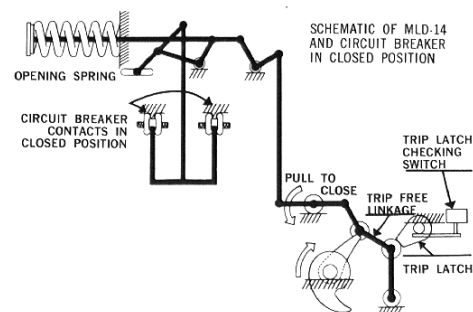
A closing operation causes the MLD-14 motor to be

energized. Rotary action of the motor is converted by an eccentric to reciprocating action moving a pawl which in turn pushes a ratchet wheel a few degrees each turn. A latching pawl keeps the wheel in position. When the reciprocating action has pushed the ratchet wheel approximately 180 degrees, the closing springs will be fully compressed. As the ratchet wheel continues to rotate, the spring load will shift over center and attempt to discharge. The compressed springs will be held in this position by the closing latch until a closing operation is required. After the initial open-close-open operation which requires about 19 cycles, the springs are recharged and ready for operation in less than five seconds. During the last few degrees the ratchet wheel rotates, the motor and interlock switches are released, and the driving pawl is raised from the ratchet surface. This allows the motor and driving mechanism to coast to a stop, expending all residual energy.

As the springs are being compressed, a relay locks the closing power circuits open. The relay will remain energized until the springs are fully charged and the control contacts are reset for subsequent operation.

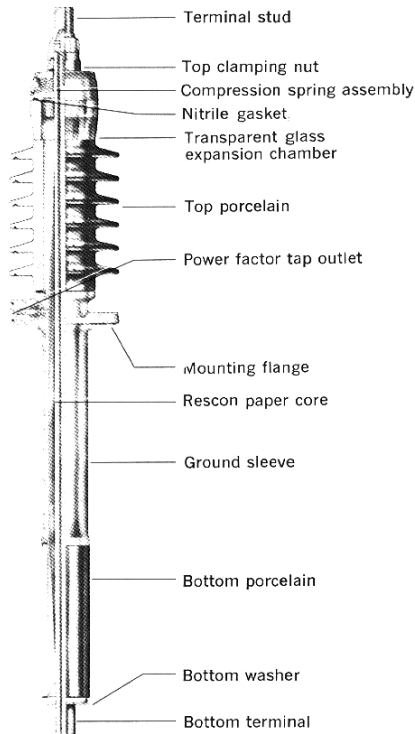


SCHEMATIC OF
MLD-14 STORED ENERGY
MECHANISM



SCHEMATIC OF MLD-14
AND CIRCUIT BREAKER
IN CLOSED POSITION

TYPE U BUSHINGS PERMIT EASY INSPECTION; provide high dielectric strength



Bushings used in the 1200 ampere FKD breaker allow space for current transformers on each bushing and have a tinted 360° glass gauge for easy check of oil level.

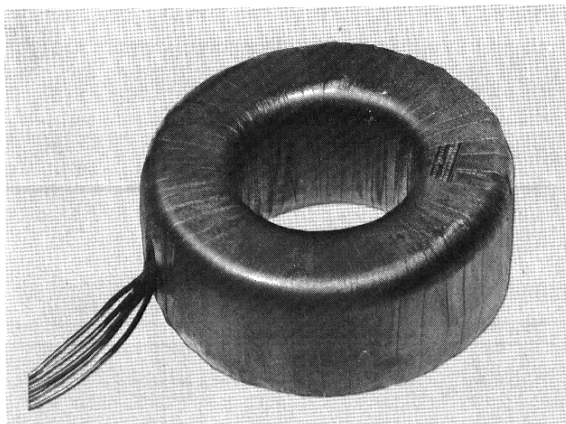
General Electric Type U Bushings have many distinctive features which help provide the FKD breaker with its outstanding maintenance and operating characteristics. Among these are:

- Visual oil level indication.
- Field servicing.
- Interchangeability.
- Corona-free.
- Uniform voltage gradient.
- Permanent high dielectric strength.
- Low power factor.
- Lighter weight and smaller diameter.

Thousands of equalizers in the form of Rescon® lines printed on the wound paper core provide a smooth voltage distribution from conductor to ground. Complete oil impregnation of the paper structure minimizes radio or television interference.

This combination of voltage stress equalizers and an oil-impregnated paper core produces high dielectric strength and makes a smaller and lighter weight bushing possible.

Bushings are center-clamped to assure tightness and to reduce chance of porcelain breakage. The oil expansion changer is constructed of a thick-walled, tinted-glass shell which affords visibility in every direction.



BR bushing current transformers reduce flux leakage and increase accuracy.

Current Transformers

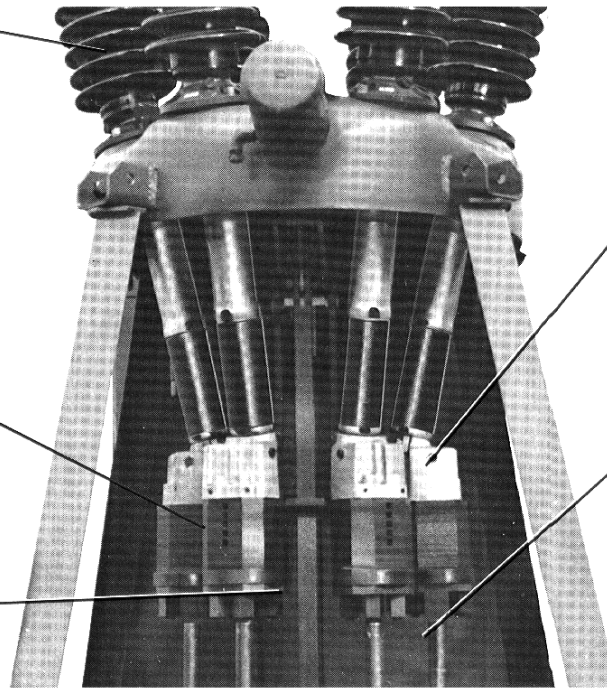
As a source of current supply for operating protective devices. Type BR current transformers are supplied. These transformers have distributed windings—on complete winding encircling the core between each tap—to reduce flux leakage—and thereby increase accuracy. Interior insulation is polyvinyl-chloride tape, and the final outside layer is fiberglass-base tape, providing excellent dielectric strength and moisture resistance. The secondary winding of each multi-ratio transformer has three taps and a total of five leads, all of which are exposed for external connections. The leads run in a conduit into the operating mechanism compartment where they are terminated at suitably marked terminal boards.

TWO CROSS-BLAST INTERRUPTERS PER PHASE give extra reliability

Type U Bushings. These are designed to combine voltage stress equalizers and an oil-impregnated paper core. This produces a core of high dielectric strength and makes possible a smaller diameter and lighter weight bushing with the same electrical characteristics used successfully for years.

Interrupters — Cross-blast interrupters with baffle stacking — high-efficient interruption gives lower carbonization.

Lift rod and lift-rod guides fabricated from extra-strong, high-insulating material.



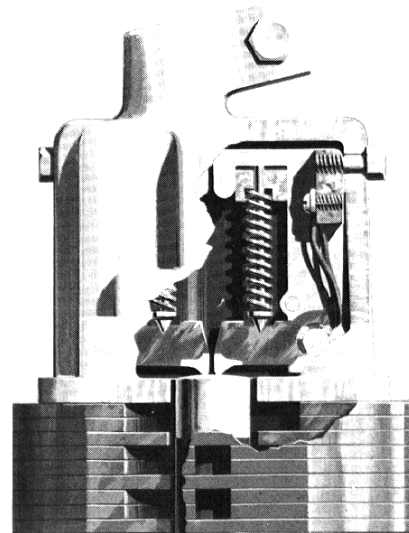
Interrupter-adapters — contain finger-type stationary contacts — self-wiping across the moving contact for lower resistance.

Moving contact rods — more than ample cross-section — easily adjustable in the cross arm — silver-molybdenum tipped.

The 38 kv FKD circuit breaker employs two interrupters per phase to assure fast, dependable interruption. These are based on the established "cross-blast" design that General Electric has found best through years of experience on high-voltage breakers.

Springs affixed to the rocker finger contacts apply a downward force to six contact fingers and at the same time provide a wiping action when the fingers and the movable bayonet contact part or join.

Interrupter contacts are designed to withstand repeated severe short-circuit currents. Erosion-resisting silver-molybdenum is used on the stationary and the moving contact tips. Contacts have endured integrated short-circuit current many times their rated duty in full-scale tests at the General Electric High Power Laboratory.



Self-wiping, self-cleaning finger contacts withstand severe short-circuit conditions, yielding added life and dependability to the breaker.

AUTOMATIC RECLOSING RELAYING

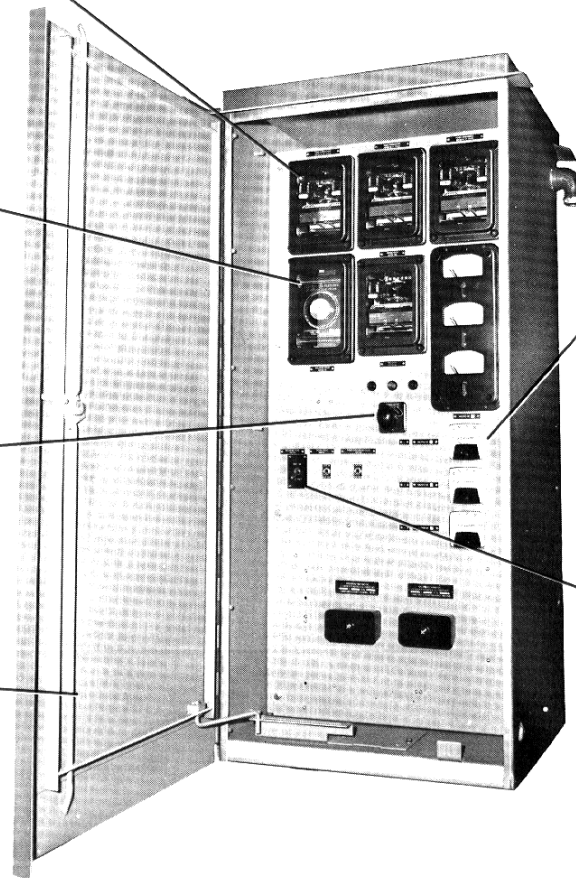
assures high-speed return to service

All necessary small wiring is complete to terminal boards. Terminal boards are equipped with designation strips for incoming and outgoing leads.

Reclosing relay — motor-operated, with three reclosures. Provides reclosures at adjustable time intervals. First reclosure may be immediate or adjustable time-delay. Subsequent reclosures are time-delay with lockout after the final reclosure in case the fault is not cleared in a predetermined time.

Circuit breaker control switch, with red and green indicating lamps. Switch has silver-to-silver contacts, and an indicating target that shows the last operation of the switch.

Weather proof relay housing constructed of heavy sheet steel with front and rear doors permitting easy access to all devices and wiring.



Miniature indicating ammeters with 5-ampere scale.

Toggle switch — includes or cuts out reclosing feature.

The automatic reclosing relay equipment of the FKD circuit breaker is designed for fast overcurrent tripping and speedy automatic reclosing. From a normal closed position, the breaker can complete one high-speed reclosing operation in 20 cycles. The fully charged reclosing spring stores enough energy for this

single reclosing operation. Subsequent reclosing operations depend upon the spring winding time of three to five seconds.

Each installation is completely engineered, assembled and tested as a unit to assure consistent and coordinated operation.

LOW INSTALLATION COSTS AND EASE OF MAINTENANCE yield added value

General Electric FKD breakers are designed for extra strength, and long, efficient service. Oil tanks are constructed of durable, heavy gauge steel to withstand high arc-interrupting pressures. Welded seams and a gasket joint between the tank and the top frame make the breaker oil- and water-tight.

Consistently high manufacturing standards are behind every General Electric power circuit breaker—from the use of quality materials to extensive factory testing. Quality materials such as the high-strength interrupter chamber are used on all General Electric FKD breakers. Every breaker is subjected to a wide variety of tests before shipment to assure fast, trouble-free start-up.

Maintenance is easy. Portable, windlass-type lifters facilitate raising and lowering the tanks for inspection without removal of the oil. The operating mechanism is mounted on the breaker frame at convenient shoulder height, and hinged doors allow arm's reach of all

Loosening four bolts exposes contacts. Reassembly is quick and easy with no time required for realignment of contacts.



parts. The structural steel framework is of simple, open design, permitting ready access to all working parts of the breaker when the tanks are lowered.

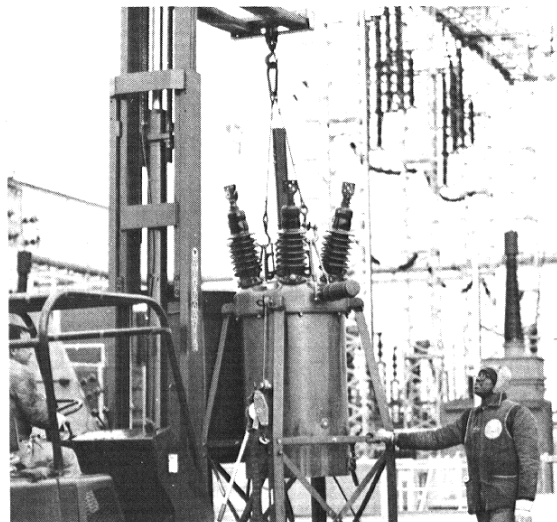
Factory-assembled Construction

General Electric FKD breakers are completely pre-assembled at the factory and shipped as self-contained units.

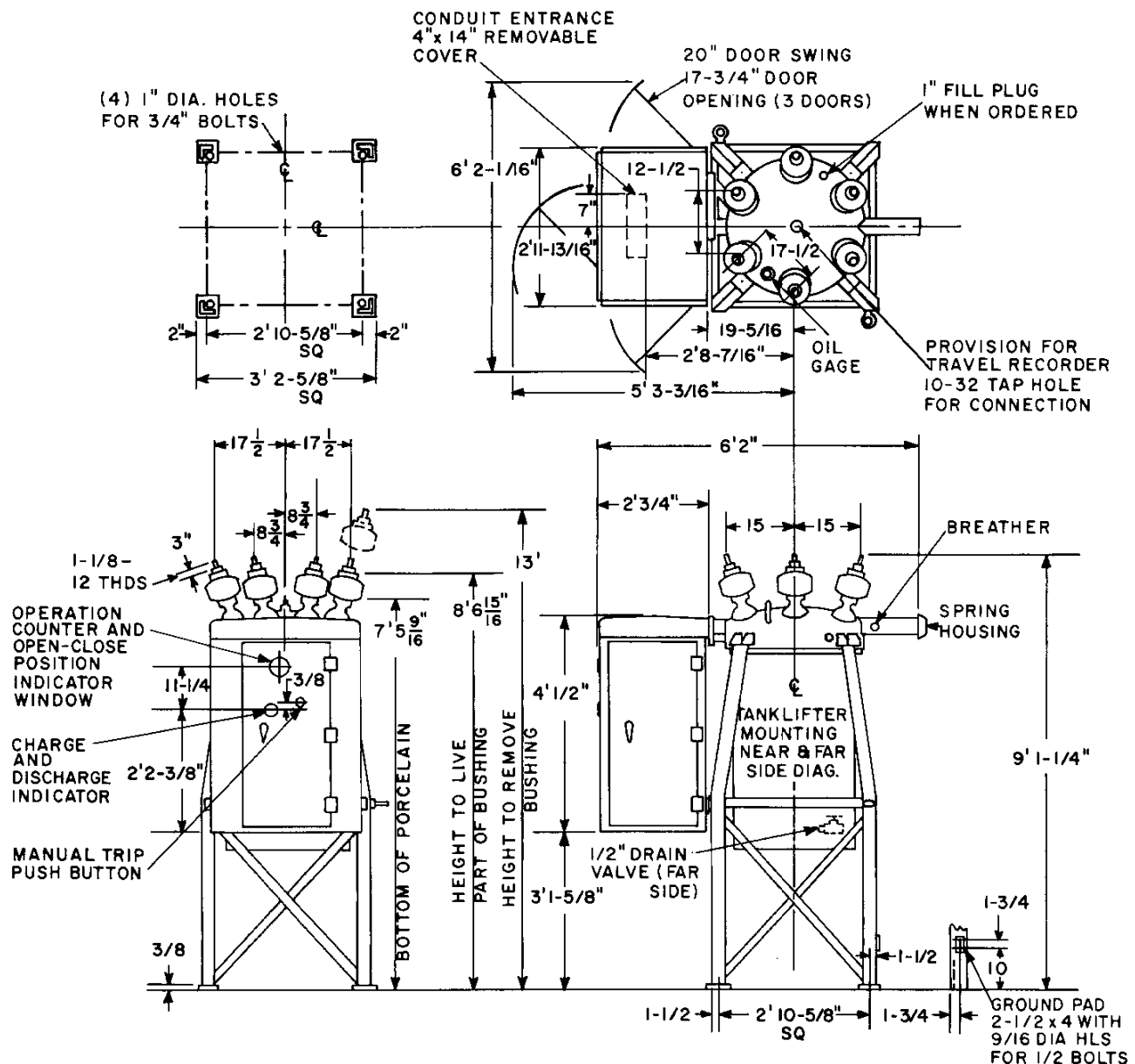
All bushings, bushing current transformers, interrupters, moving contact members, and the breaker linkage are in place. The operating mechanism and its housing are shipped assembled and mounted to the breaker frame. Unit-constructed breaker installation cost is low because the breakers are shipped completely assembled.

Breakers can be set up quickly on preconstructed pads. It's merely a matter of positioning and securing the breaker to the foundation, filling with oil, and making the necessary operation connections.

Compact design of single-tank breaker cuts excavation costs and foundation materials expense, and less space is needed for installation.



LOW-PROFILE DIMENSIONS help maintain attractive sites



RATED TO FIT THE APPLICATION

APPLICATION

These oil circuit breakers are suitable for medium-duty applications on distribution circuits within their voltage and continuous-current ratings. The rated interrupting current of the breaker must be as great as, or greater than, the maximum short-circuit current of the system it may be called upon to interrupt.

DESCRIPTION

The Type FKD outdoor power circuit breaker with single-tank design provides reduced length of breaker, reduced maintenance time and less oil.

Sealed, oil-filled bushings, Type U.

New improved oil-blast interrupters.

Easily renewable contact fingers.

Mechanically and electrically trip-free motor-operated spring charged mechanism and all necessary controls.

Five-cycle interrupting time.

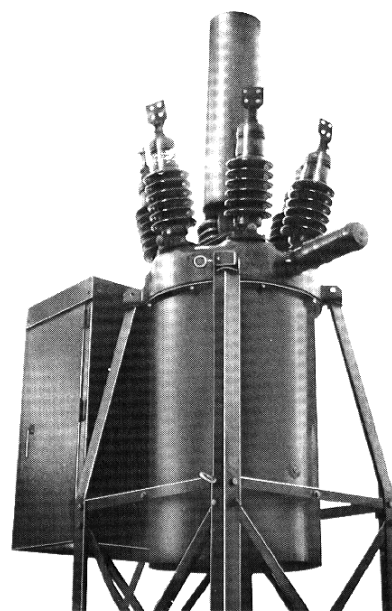
Breakers are shipped completely assembled ready for installation (except oil, which is shipped separately).

HOW TO ORDER

Specify the following when ordering:

1. Breaker type and rating — voltage, current, and mva
2. Closing control voltage — 48, 125, or 250 V d-c; 115 or 230 V a-c
3. Type of trip — 24, 48, 125 or 250 V d-c; 230 V a-c or 230 V a-c capacitor, a-c current (3A instantaneous, 5A* instantaneous or time-delay)
4. BCT's-type, number, rating, and location (max. 2/bushing)
5. Heater voltage — (230 V a-c unless otherwise specified)
6. Motor voltage — (same as closing control unless specified)
7. Terminals — specify if required
8. For reclosing breakers—relay information, duty cycle and ammeter scale if other than standard specified on page 2. Ground relay details if required.
9. Tanklifter if desired
10. Customer specifications or special requirements or accessories as applicable

*For direct tripping from bushing current transformers.



Type FKD-38—750 mva breaker showing non-reclosing type mechanism housing

RATING AND TECHNICAL INFORMATION—Reclosing-time Rating—20 Cycles

Symmetrical Bias of Rating															
Breaker Type	Rated Values								Related Required Capabilities				Total Oil Gallons Required	Net Wt Incl Oil in Lb \$	Net Wt Less Oil in Lb \$
	Voltage		Insulation Level		Current		Inter-rupting Time Cycles	Nomi-nal 3-phase mva	Max Kv Divided by K Kv, Rms	Current Values					
	Max Kv, Rms	Range Factor K	Withstand Test Voltage		Cont. Current at 60 Hz Amp, Rm	Short Circuit Current (At Rated Max Kv) Ka Rms				Max Symmet-rical Inter-rupting Capability Ka, Rms	3-Sec. Short-Time Current Carrying Capability Ka, Rms	Closing and Latching Capability 1.6K Times Rated Short-Circuit Current Ka, Rms			
			Low Fre-quency Kv, Rms	Impulse Kv, Crest											
FKD-38-12000	38.0	1.21	80	200	1200	12	5	750	31.4	14.5	14.5	23	96	2750	2050

§ Net weight of oil is 7.45 lb per gallon; shipping weight in drums is 9 lb per gallon.

PRICING INFORMATION

Power Circuit Breaker-P(071)

Breaker Type	Rating			Interrupting Time Cycles	List Price, Each GO-190		
	Max. Kv	Nominal Mva	Cont. Amp		Nonreclosing Nonrelayed Basic Breaker Item 1	Nonreclosing Relayed Feeder Breaker Item 2	Reclosing Feeder Breaker Item 3
FKD-38.0-12,000	38.0	750	1200	5	Refer to the nearest General Electric office.		

PRICES INCLUDE

Item 1 — Non-reclosing Basic Breaker

(No reduction in price for omission of any of the following):

- Triple-pole breaker, electrically and manually operated
- Framework, painted
- Six bushings, standard creepage
- Three relay-type BCT's on bushings 1-3-5; 600 or 1200 amperes, all wired to terminal boards in mechanism house
- Trip-free, motor-operated MLD-14 spring mechanism; available with 115 or 230 volt a-c motors and 48, 125, or 250 volt d-c controls
- Closing release coil: 48, 125, 250 volts d-c; 115 and 230 volts a-c
- Shunt coil: 24, 48, 125, 250 volts d-c; 115 and 230 volts a-c
- Auxiliary switch, latch checking switch
- Operation counter
- Control power device; fused pull-out type
- Space heater, 125 or 250 volts d-c; 115 or 230 volts a-c, all rated 160 watts
- Necessary terminal boards and wiring
- Oil (10C**) and float-type oil gage
- Drain valve
- Mechanism wrench and maintenance closing device
- Ground terminal connector, 2/0 to 250 mcm
- Bolted-type terminal connectors (only when specified on order)

Item 2 — Non-reclosing Relayed Feeder Breaker

(No reduction in price for omission of any of the following):

- Item 1, plus:
 - 1 - Relay and meter cabinet
 - 3 - Miniature ammeters ¶
 - 3 - IAC relays §
 - 1 - Control switch and indicating lights
 - Necessary control boards and wiring

Item 3 — Reclosing Feeder Breaker

(No reduction in price for omission of any of the following):

- Item 1, plus:
 - 1 - Relay and meter cabinet
 - 3 - Miniature ammeters ¶
 - 3 - IAC relays §

1 - Control switch and indicating lights

1 - 3 shot reclosing relay, Type ACR † and cut-off switch

Necessary control boards & wiring

Optional Modifications

- Capacitor trip
- Extra creepage bushings
- Skid mounting
- Hi-potential test
- 1 - Instantaneous current trip (direct acting) Δ
- 1 - Time delay, current trip (direct acting)
- Additional bushing current transformers above basic 3 included
- 3 - Relaying, Type BR, 600 or 1200/5A standard accuracy (multi-ratio)
- 3 - Relaying, Type BR, 2000, 3000 or 4000/5A standard accuracy (multi-ratio)
- 3 - Metering, Type BM 300, 400, 600 or 800/5A (single-ratio)
- 1 - Tanklifter
- Optional Additional Relay and Metering Modifications
- (Items 2 or 3 only)
 - Add 1-shot recloser (Item 2 only)
 - 1 - Triplex thermal demand ammeter in place of 3 miniature ammeters -
 - 1 - Overcurrent relay Type IAC
 - 1 - Voltmeter, indicating with transfer switch
 - 1 - Voltmeter, indicating (no transfer switch)
 - 1 - Substitute ammeter and switch for 3 miniature ammeters
 - 1 - Watthour meter, 2-element
 - 1 - Watthour meter, 2 1/2- or 3-element
 - 1 - Demand register for watthour meter
 - 1 - Varmeter, indicating
 - 1 - Test block or test switch, (6-pole max.)
 - 1 - Toggle switch

¶ Standard scales for ammeters are 5 ampere; card holder is furnished for CT multiplier data.

§ The three phase-connected overcurrent relays shall be extremely inverse type with the 4-16 ampere standard operating range, with 10-40 ampere instantaneous attachments.

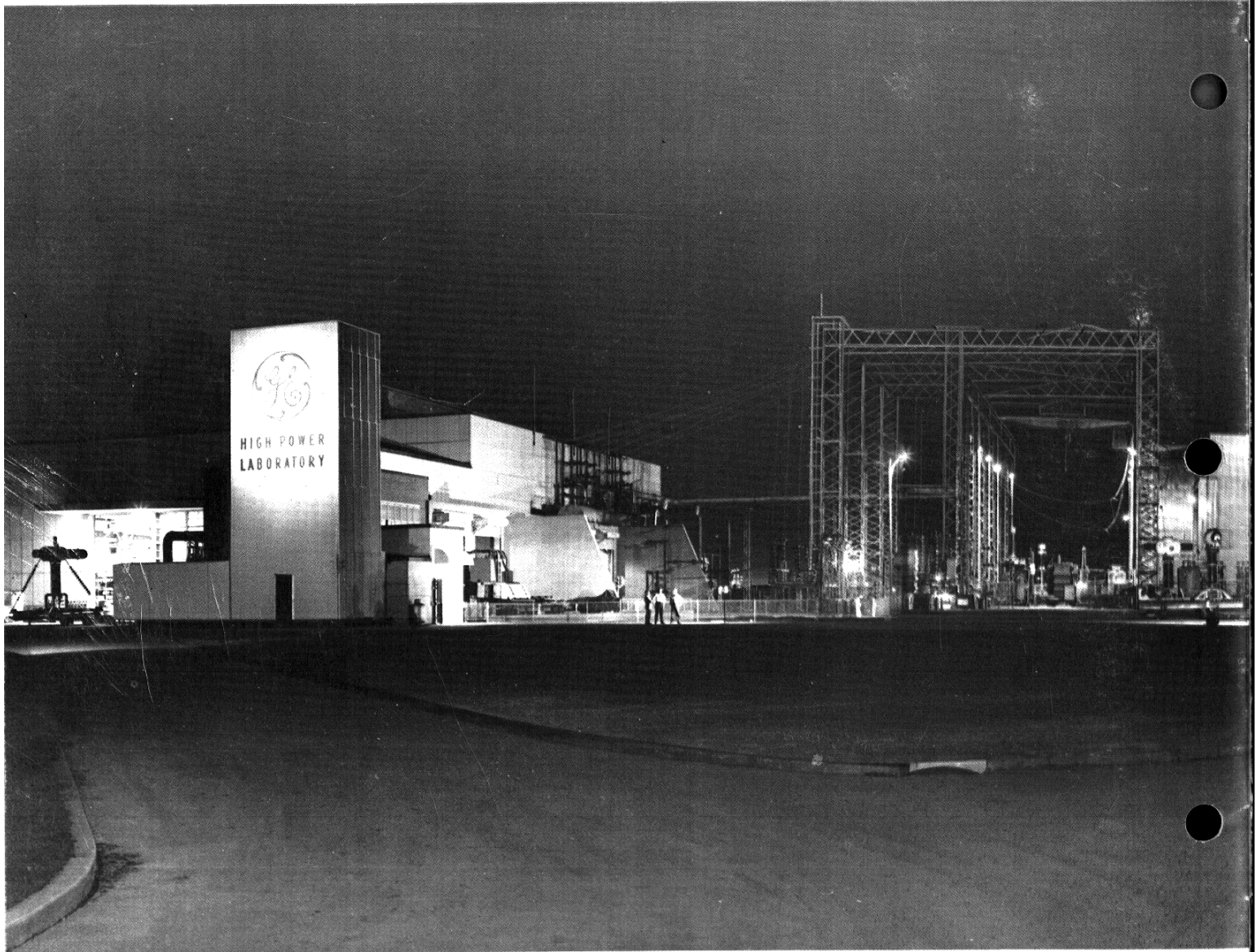
† Reclosing relay shall be set for reclosures at 0-15-45 second intervals.

Δ Whenever a-c current trip coils are furnished, a potential trip coil rated 230V a-c is also included.

**Trade-mark of General Electric Co.

Continuing a tradition of supplying full-line capabilities in all **III** technologies

General Electric High Power Laboratory, situated at Philadelphia on a 27-acre site, provides multiple testing and development facilities — the most comprehensive testing service available anywhere.



POWER CIRCUIT BREAKER PRODUCTS DEPARTMENT PHILADELPHIA, PENNSYLVANIA 19142

GENERAL  ELECTRIC