ERMCO COMPONENTS

Made in USA

Internal, Oil-Immersed Secondary Circuit Breakers

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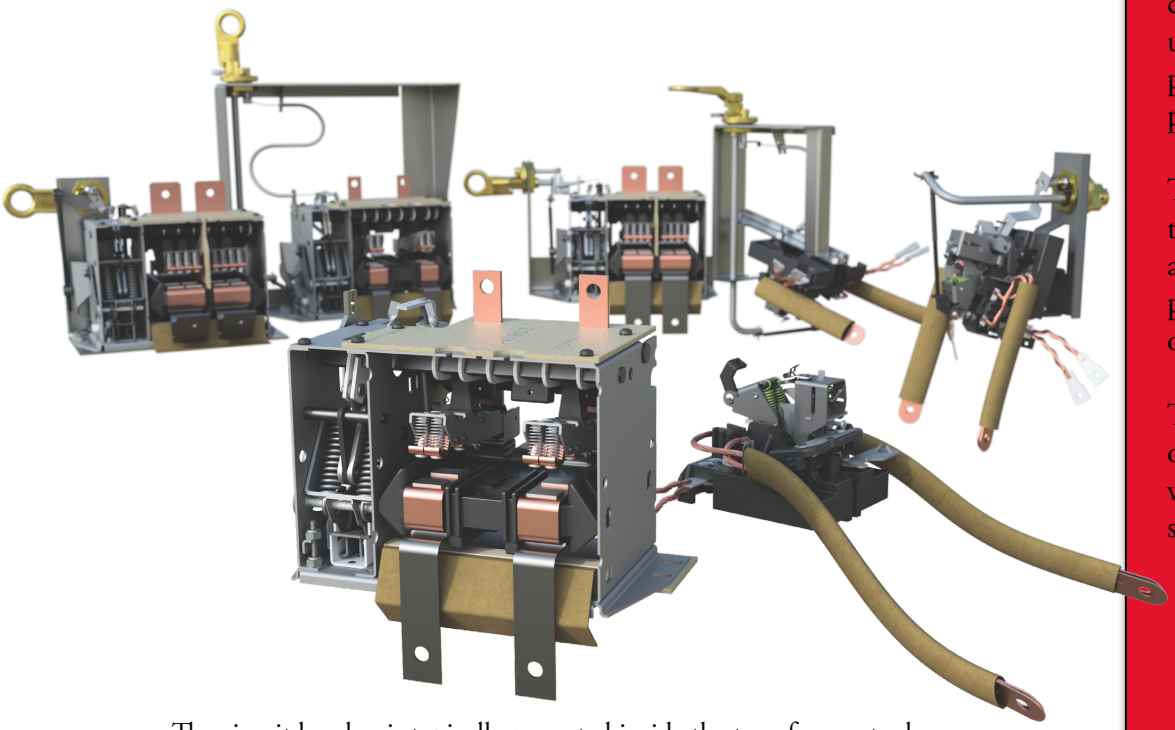
The Heart of Self-protected Transformers



The circuit breaker is typically mounted inside the transformer tank, directly above the coil-and-core assembly. Operating linkage for the circuit breaker is brought out through the tank and connected to an external operating handle. On pad-mounted transformers, the circuit breaker operating handle is typically mounted in the low-voltage compartment. The circuit breaker operating handle (Figure 11) is equipped with a metal loop for operation with standard hook stick.

The secondary circuit breaker is tripped by the deflection of bimetallic elements in series with the low-voltage leads (Figure 16) heated by the combination of current in the bimetals and the temperature of the oil. As maximum safe operating load is approached, the bimetals deflect and trip the operating mechanism. That opens the contacts and disconnects the secondary load from the transformer, protecting the transformer from burnout. Positive mechanical interlock between the circuit-breaker poles assures simultaneous opening of all poles. If the operator

General Information

Internal oil-immersed secondary circuit breakers are designed for use as part of a protection package for single and three phase distribution transformers.

The breaker is located between the transformers low voltage coil and the low voltage bushing to provide protection against overloads and secondary faults

Transformers subjected to overloading or applied on lines without overload protection should be self protected.

For more information contact
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Internal oil-immersed, low-voltage secondary circuit breakers are available for distribution transformers rated

- Single phase 10-167 kVA with secondary voltages of 120/240 or 240/480 single-phase.

-Three-phase circuit breakers are available from 15-150 kVA below 480 volts and 45-300 kVA at 480 volts.

Magnetic trip circuit breakers offer improved performance in fuse coordination, fault-interrupting capability and, with the ECI T-12 circuit breaker, lower short-circuit forces in transformer windings. The magnetic trip circuit breaker follows the normal thermal time current characteristics (Figure 14) except when the secondary current exceeds 10-15 times rated load current. Under those circumstances, the magnetic trip takes over and bypasses the bimetal, causing immediate circuit-breaker trip by the activation of the magnetic trip plate. Figure 15 illustrates typical long-time operating characteristics of 15 and 25 kVA, 7,200-volt transformers, showing trip time for 75% initial load and 35°C ambient. Short-time, total-clearing, time-current characteristic curves are shown in (Figure 14).

Single Phase

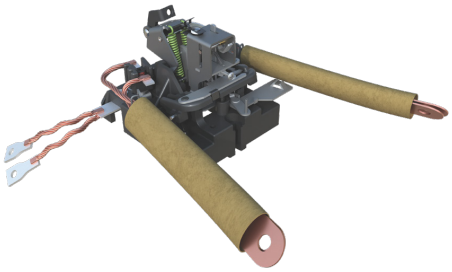


Figure 1 **Type T-1 circuit breaker, thermal trip, single-phase, 10-25 kVA, 120/240 volts; 10-50 kVA, 240/480 volts.**

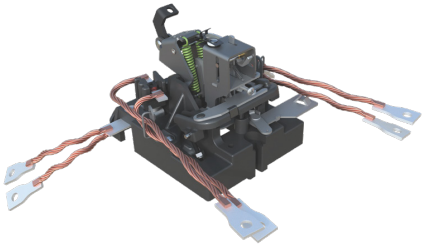


Figure 2 **Type T-12 circuit breaker, thermal and magnetic trip, single-phase, 37.5-50 kVA, 120/240 volts; 75-100 kVA, 240/480 volts.**

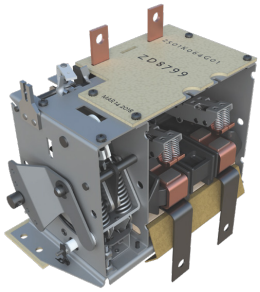


Figure 3 **Type T-13 circuit breaker, thermal and magnetic trip, single-phase, 75-100 kVA, 120/240 volts; 167 kVA, 248/480 volts. Maximum short-circuit capability: 25,000 amps for five operations.**

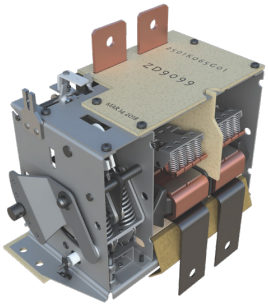


Figure 4 **Type T-14 circuit breaker, thermal and magnetic trip, single-phase, 167 kVA, 120/240 volts. Maximum short-circuit capability: 30,000 amps for five operations.**

Three Phase

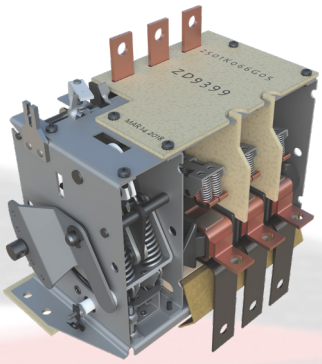


Figure 5 **Type T-15 circuit breaker, thermal trip without magnetic trip, three-phase, 15-150 kVA, 480 volts and below: 45-300 kVA, 480 volts delta, 460Y/225 volts, 480Y/227 volts.**

Breaker on Bracket

The breaker on bracket is a completely assembled breaker operating kit designed to provide the transformer manufacturer with simpler design and assembly as well as providing the utility customer a solution to the most common complaint associated with secondary breakers.

The breaker on bracket consists of a breaker mounted to a rigid steel bracket together with the operating handle and linkage. The package comes completely assembled and adjusted from the factory. One catalog number covers everything, no other components required. When a signal light is used with any given breaker, it will need to be ordered separately. In addition, the light will require a separate hole in the transformer tank wall. Refer to the signal light bulletin for further details.

The breaker and bracket is secured to the tank interior by means of the operating handle that passes through the tank wall. The bracket is designed to rigidly mount the breaker in a fixed position relative to the operating handle. This ensures the breaker is properly positioned and eliminates the need for linkage adjustments

Features

- **Preadjusted** - No linkage adjustments are required by the transformer manufacturer.
- **Order as a complete kit** - One catalog number supplies the breaker, bracket, linkage and operating handle.
- **Rigid mounting brackets** - eliminates misalignment.

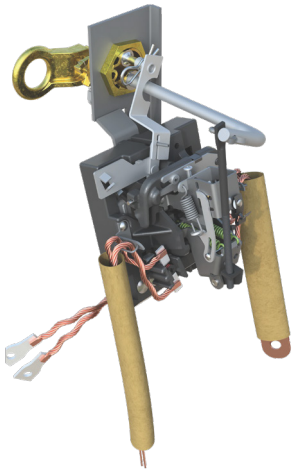


Figure 6

Type T-1 & T-12 circuit breaker on bracket for rigidly mounting on flat or curved surface.

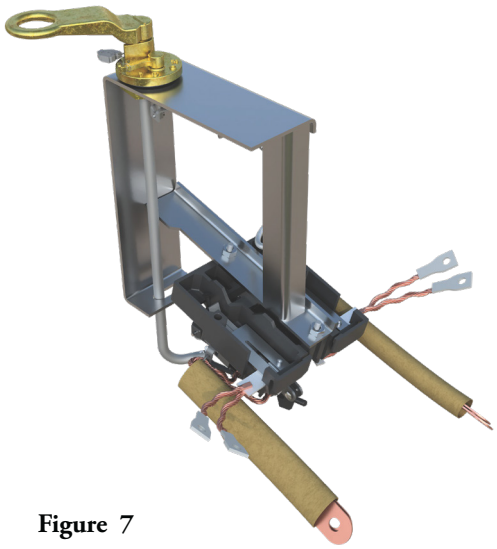


Figure 7

Type T-1 & T-12 circuit breaker on submersible bracket for rigidly mounting on transformer lid.

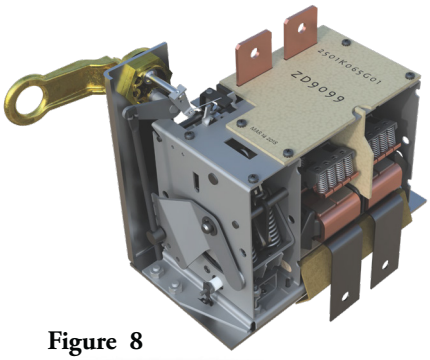


Figure 8

Type T-13 / T-14 / T-15 circuit breaker on bracket for rigidly mounting on flat surface.

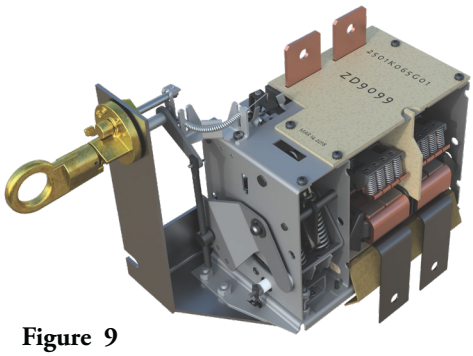


Figure 9

Type T-13 / T-14 / T-15 circuit breaker on bracket for rigidly mounting on curved surface.

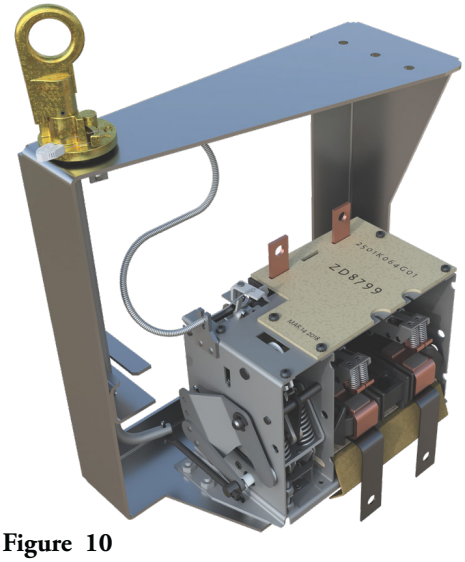
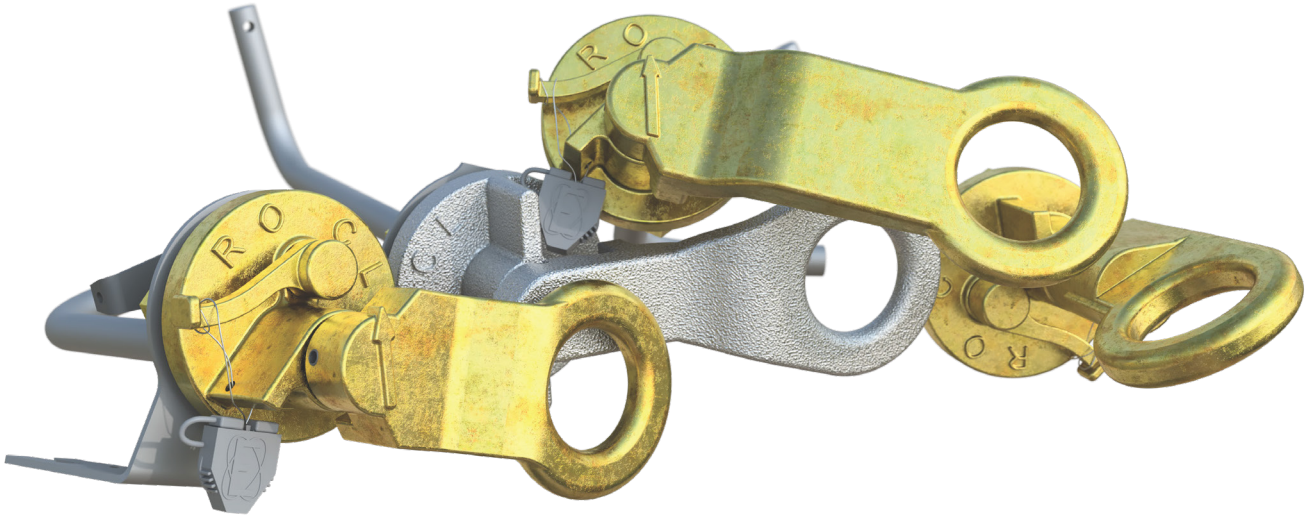


Figure 10

Type T-13 / T-14 / T-15 circuit breaker on submersible bracket for rigidly mounting on transformer lid.

Circuit-Breaker Operating Handles

Figure 11



To open the low-voltage circuit manually, move the handle so the pointer moves from “C” (Closed) to “O” (Open). When the pointer coincides with the “O” position, the low-voltage circuit is open. To close the breaker, move the handle to the position “C” (Closed). If the breaker has tripped thermally or magnetically, move the handle to position “R” (Reset) to engage the latch mechanism, then to “C” (Closed). The “L” (Light) position is not used on a pad-mounted transformer. If desired, the breaker operating handle can be operated with a switch hook.

Emergency Overload Lever

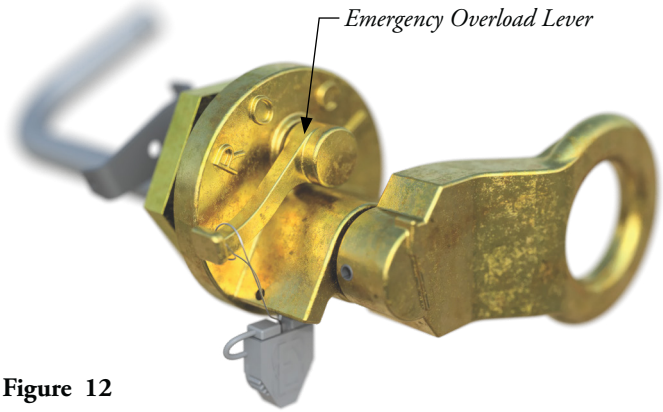


Figure 12

Through the use of the emergency overload lever, self-protected transformers are able to carry overloads in excess of those normally permitted by the circuit breakers (Figure 15). The lever, mounted on the circuit-breaker operating handle, can be moved to permit change from normal to emergency overload setting. If a transformer circuit-breaker has tripped and the bimetals are still at trip temperature, the use of the emergency overload lever may allow the operator to close the circuit-breaker to restore service.

Signal Light

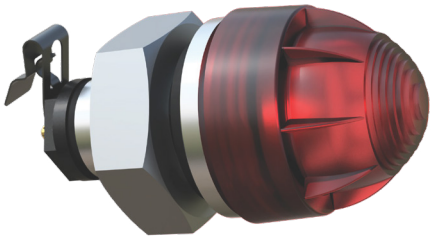


Figure 13

One of the features of the self-protected pole-type transformers is the signal light (Figure 13). The switch in the signal-light circuit is an integral part of the circuit breaker. The switch reacts to the degree of loading in precisely the same manner as the circuit-breaker. When the transformer is thermally overloaded, the signal light will light, serving as visual evidence that an unusual overload has occurred on the transformer. In this way, the signal light serves as a continuous load-survey device on each individual transformer. Light characteristics for 15 and 25 kVA units are shown in (Figure 15). This light will remain on until reset by the circuit-breaker operating handle. Provision is also made to check the signal light bulb when the transformer is in service. Rotating the circuit-breaker operating handle to beyond the closed position should cause the signal light to come on. If it does not, the bulb should be replaced.

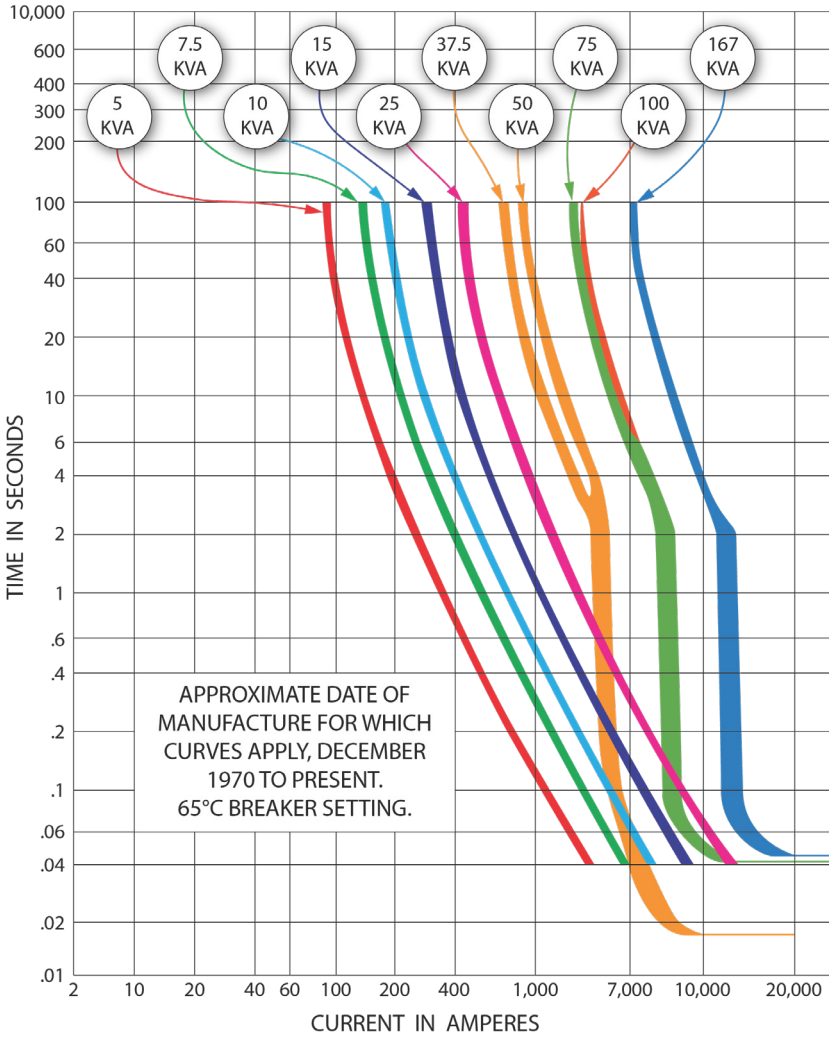


Figure 14

Typical short-time, total clearing, time-current characteristics (25°C, no initial load) for circuit breakers in single-phase transformers at 240 volts.

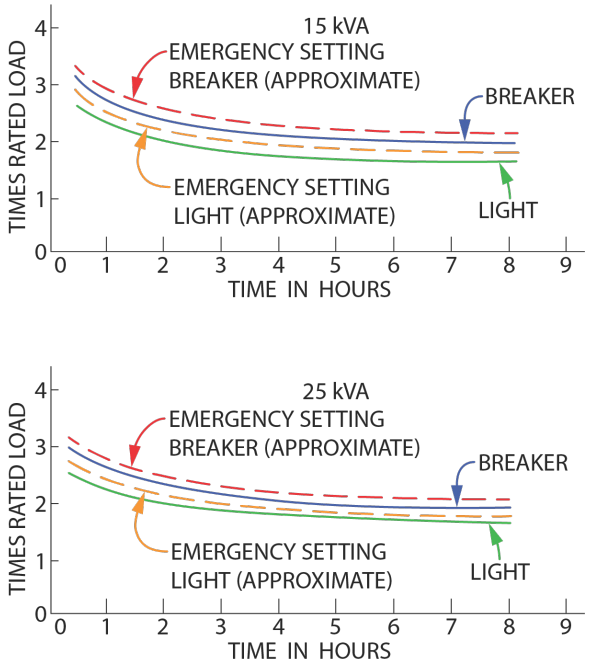


Figure 15

Typical performance curves for 12470 GRDY/7200 transformer. Circuit-breaker trip timeis for 75% initial load and 35° ambient.

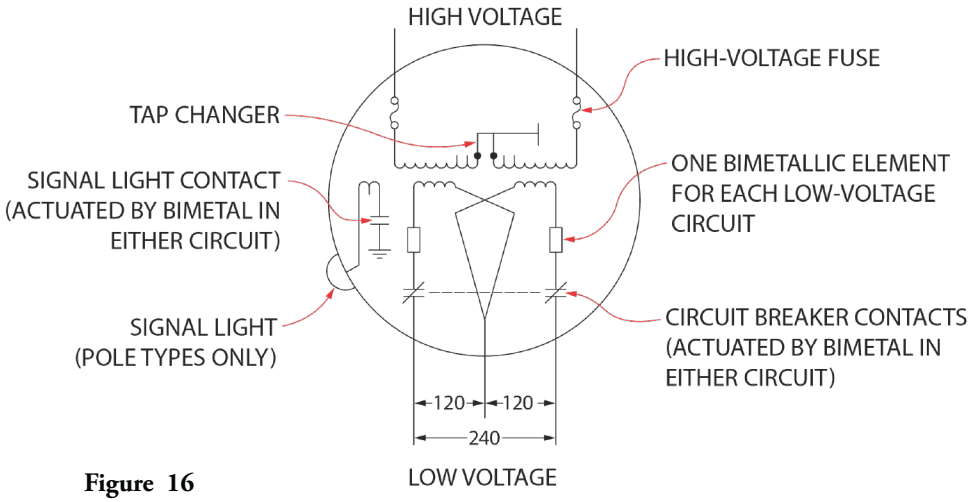


Figure 16

10-100 kVA connection diagram.

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