

Application Note

How to Connect Coil Control Cable to Circuit Breaker Coils

This application note describes the procedure of connecting CAT Coil control outputs and cables to the circuit breaker operating coils. Coil control cable set is shown in the Figure 1.

Figure 1. Coil control cable set (left) and coil supply cables (right)



Before the CAT instrument is connected to a circuit breaker under test, make sure that:

- the breaker is disconnected or separated from its circuit on both sides of the breaker in accordance with the national safety regulations; always comply with local safety regulations when using CAT,
- the breaker is properly grounded to a protective ground (PE),
- the CAT itself is properly grounded. To do so, connect the grounding screw of the CAT to the PE using originally provided grounding cable.



Note: Cables between CAT and other equipment shall be connected and removed ONLY when CAT is switched off.



Note: Before any connections are made to the circuit breaker control circuit, it is strongly recommended to turn off the control circuit power supply!

With the CAT turned off, connect it to the circuit breaker with appropriate cables.

In situations when the circuit breaker operating coils are controlled by the CAT instrument (external trigger is set to NO), the Coil control outputs act as switches.

Three-pole operated circuit breaker

When connecting to three-pole operated circuit breaker, where a substation power supply is used as a power source, presence of substation battery minus at both coils is commonly permanent. In this case, there is no need to connect black wire of Coil control cable to corresponding open and close coils.

Also, it is not necessary to connect black connector of Coil supply input to minus of substation voltage supply source (Figure 2). Coil supply inputs should be short-circuited for CAT devices having two isolated Coil supply inputs.

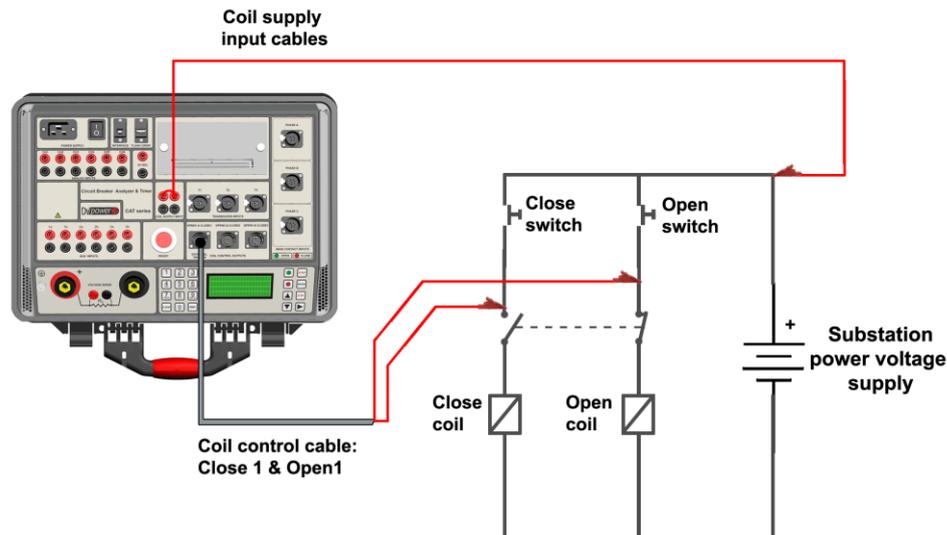


Figure 2. Connection diagram of the coil control cables for three-pole operated circuit breakers with substation power supply used as a power source

The connection is made in the following way:

- Connect Coil control cable to the Coil control output of the CAT instrument;
- Connect the red banana connector of the red lead labeled "CLOSE" to the positive pole (+) of the circuit breaker Close coil (including auxiliary contact "b" in the control circuit);
- Connect the red banana connector of the red lead labeled "OPEN" to the positive pole (+) of the circuit breaker Trip coil (including auxiliary contact "a" in the control circuit);
- Short circuit both red banana connectors of Coil supply input (for CAT devices having two isolated coil supply inputs)
- Connect the red banana connector of the CAT Coil supply input to the positive pole (+) of substation battery (as shown in the Figure 2).

In case when some independent external power source (e.g. SAT or POB) is used as voltage supply for coils or when there is no permanent minus of voltage supply at coils (e.g. since there is control switches at both sides of coil) in case of substation battery supply, the connection diagram is as shown in the Figure 3. Coil supply inputs should also be short-circuited for CAT devices having two isolated Coil supply inputs.

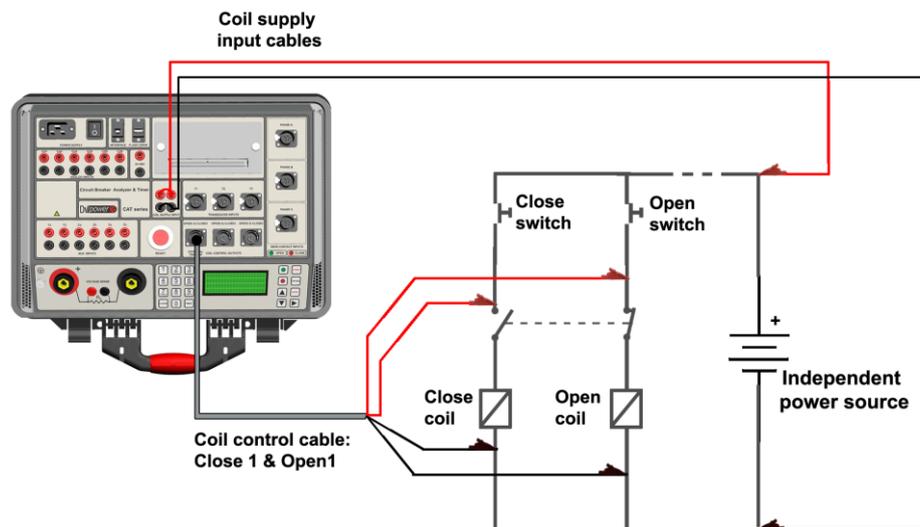


Figure 3. Connection diagram of the coil control cables for three-pole operated circuit breakers with independent power supply used as a power source for coils

The connection is made in the following way:

- Connect Coil control cable to the Coil control output of the CAT instrument;
- Connect the black banana connector of the black lead labeled "CLOSE" to the negative pole (-) of the circuit breaker Close coil;
- Connect the black banana connector of the black lead labeled "OPEN" to the negative pole (-) of the circuit breaker Trip coil;
- Connect the red banana connector of the red lead labeled "CLOSE" to the positive pole (+) of the circuit breaker Close coil (including auxiliary contact "b" in the control circuit);
- Connect the red banana connector of the red lead labeled "Open" to the positive pole (+) of the circuit breaker Trip coil (including auxiliary contact "a" in the control circuit);
- Short circuit Coil supply input (for CAT devices having two isolated coil supply inputs);
- Connect the Coil supply input of the CAT device to power supply intended for the control circuit supply (as shown in the Figure 3).

Procedure stated above is for the three-pole controlled circuit breakers tested with the CAT instrument which has two Coil control channels (CAT Standard series – models: CAT31,

CAT34, CAT61, CAT64) or six Coil control channels (CAT Advanced series – models: CAT35, CAT36, CAT64A, CAT65, CAT66, CAT124A, CAT125, CAT126).

Independent-pole operated circuit breaker

When connecting to independent-pole operated circuit breaker, where a substation power supply is used as a power source, presence of substation battery minus at both coils is commonly permanent. Also, in this case, there is no need to connect black wire of Coil control cable to corresponding open and close coils. Also, it is not necessary to connect black (minus) coil supply input from substation supply source (Figure 4). To provide single-pole control for this type of the circuit breaker please use CAT Advanced series instrument which has six control outputs intended for the independent control of each of the three trip and three close coils. In case that open and close coils have different values of voltage supply, both Coil supply inputs should be connected to appropriate coils' power sources. Otherwise, if there is one power source for both close and open coils, Coil supply inputs should be short-circuited and connected to power source.

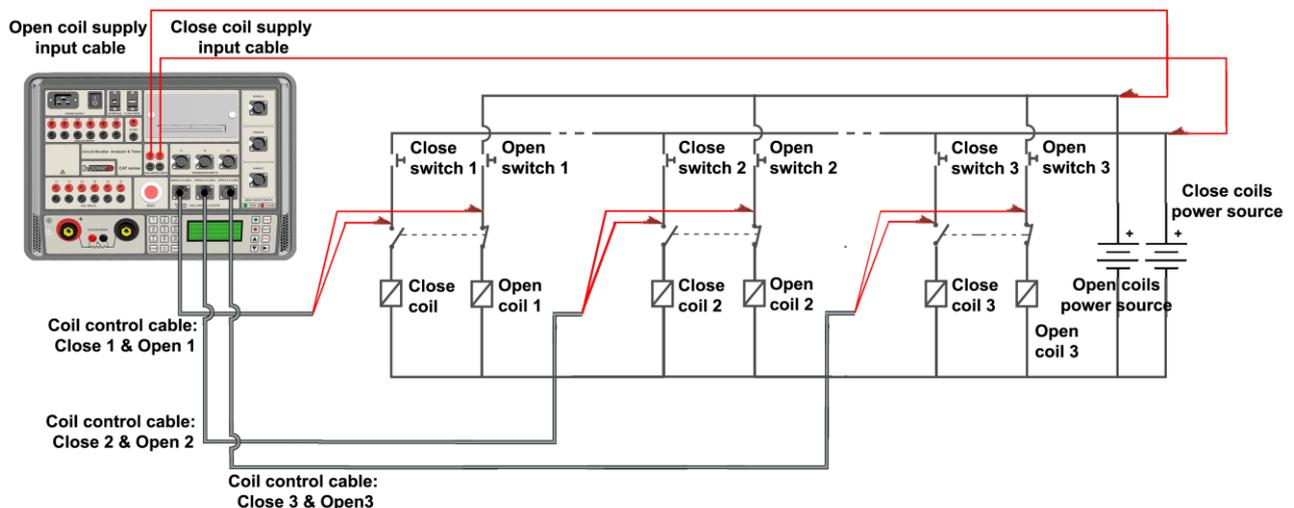


Figure 4: Connection of the Coil control cable to the operating coils of independent-pole controlled circuit breaker with substation power supply used as a power source

The connection shown in the Figure 4. is established in the following way:

- Connect all three Coil control cables to the Coil control outputs of the CAT instrument according to labels on the cables and outputs;
- Connect the red banana connector of the red lead labeled "CLOSE 1" to the positive pole (+) of the circuit breaker Close coil 1, the red banana connector labeled "CLOSE

2" to the positive pole (+) of the Close coil 2 and the red banana connector labeled with "CLOSE 3" to the positive pole (+) of the Close coil 3 (including auxiliary contacts "b" type control circuit);

- Connect the red banana connector of the red lead labeled "OPEN 1" to the positive pole (+) of the circuit breaker Trip coil 1, the red banana connector labeled "OPEN 2" to the positive pole (+) of the Trip coil 2 and the red banana connector labeled with "OPEN 3" to the positive pole (+) of the Trip coil 3 (including auxiliary contacts "a" type control circuit);
- Connect red connector of Open coil supply input to positive pole (+) of Open coils power source (substation battery) (as shown in the Figure 4).
- Connect red connector of Close coil supply input to positive pole (+) of Open coils power source (substation battery).

In case when some independent external power source (e.g. SAT or POB) is used as voltage supply for coils of independent-pole operated circuit breaker or when there is no permanent minus of voltage supply at coils (e.g. since there is control switches at both sides of coil) in case of substation battery supply, the connection diagram is as shown in the Figure 5. Also, this connection diagram is applied for circuit breakers having different rated values of voltage supply for close and open coils. Otherwise, if there is one power source for both close and open coils, Coil supply inputs should be short-circuited and connected to power source.

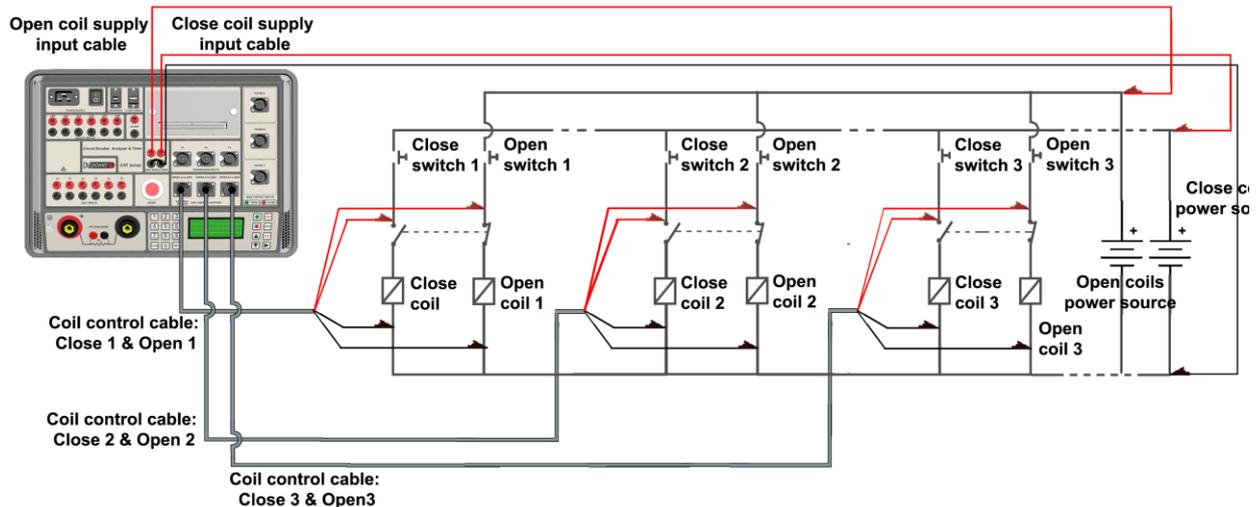


Figure 5. Connection diagram of the coil control cables for independent-pole operated circuit breakers with separated external power voltage supply for close and open coil

The connection shown in the Figure 5. is established in the following way:

- Connect all three Coil control cables to the Coil control outputs of the CAT instrument according to labels on the cables and outputs;
- Connect the black banana connector of the black lead labeled "CLOSE 1" to the negative pole (-) of the circuit breaker Close coil 1, the black banana connector labeled "CLOSE 2" to the negative pole (-) of the Close coil 2 and the black banana connector labeled with "CLOSE 3" to the negative pole (-) of the Close coil 3;
- Connect the black banana connector of the black lead labeled "OPEN 1" to the negative pole (-) of the circuit breaker Trip coil 1, the black banana connector labeled "OPEN 2" to the negative pole (-) of the Trip coil 2 and the black banana connector labeled with "OPEN 3" to the negative pole (-) of the Trip coil 3;
- Connect the red banana connector of the red lead labeled "CLOSE 1" to the positive pole (+) of the circuit breaker Close coil 1, the red banana connector labeled "CLOSE 2" to the positive pole (+) of the Close coil 2 and the red banana connector labeled with "CLOSE 3" to the positive pole (+) of the Close coil 3 (including auxiliary contacts "b" type control circuit);
- Connect the red banana connector of the red lead labeled "OPEN 1" to the positive pole (+) of the circuit breaker Trip coil 1, the red banana connector labeled "OPEN 2" to the positive pole (+) of the Trip coil 2 and the red banana connector labeled with "OPEN 3" to the positive pole (+) of the Trip coil 3 (including auxiliary contacts "a" type control circuit);
- Connect red connector of Open coil supply input to positive pole (+) of Open coils power source (substation battery) (as shown in the Figure 4).
- Connect red connector of Close coil supply input to positive pole (+) of Open coils power source (substation battery).

After established connection turn CAT power switch on. CAT is now ready to operate.



Note: The CAT Coil control circuit can actuate any AC or DC, trip or close coil. CAT control outputs can control voltage levels ranging from 10 V to 300 V DC (250 V AC) and current up to 35 A.

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