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1 TRIP RELAY GROUPS

1.1 Application

1.1.1 Trip units

The trip coil in the circuit breaker normally consumes about 200-300 W per operating unit. This means that the trip current can be 2-3 A. The trip coil in the circuit breaker is normally connected in series with an auxiliary contact, this contact breaks the current to the trip coil when the main CB contact opens. The auxiliary contact is mechanically connected to the main contact, and therefore gives a very reliable operation in the circuit. For circuit breakers with this auxiliary contact that interrupts the trip current, the trip relay needs only to make and conduct the current to the trip coil. Therefore, a high-speed trip relay of type RXMS or an equivalent can be used.

If the circuit breaker does not have this auxiliary contact, the trip relay must also be capable of breaking the current to the trip coil, in order not to weld the relay contact or burn the coil.
By using a relay with stronger contacts in parallel with the high-speed contacts, a higher breaking capacity can be achieved.

In multibreaker arrangements it is common to use different voltages for protective relays and the circuit breaker trip coil. With the use of an external trip unit, a galvanic separation is achieved and different voltages can be used.

Capacitive discharge
In case of a DC earth fault in the trip circuit, there is a risk of a capacitive discharge through the trip relay coil. The problem can occur if the trip relay and the protective relay are located in different panels, with a cable distance between. In order to minimise this, a trip relay (RXMS) with a higher pick-up value can be used.

1.1.2 Lock-out trip relays

For objects in a station arrangement with persistent faults, e.g. a transformer, reactor, or generator, blocking of the close circuit after tripping can be used. This is to prevent an accidental closing of the circuit breaker after a trip. The trip unit is then equipped with a remanence relay of type RXMVE, and a manually or electrically reset push-button.. The lock-out relay can be activated from a contact in the trip unit, or direct from a protection function.

1.1.3 Trip circuit supervision

The trip circuit supervision relay (type SPER) will give continuous supervision of the circuit breaker trip circuits. The trip circuit is supervised both when the CB is open and closed. The relay will detect faults such as loss of voltage, interruption and poor contact in the supervised circuit.

1.2 Theory of operation

Introduction

The following trip units are available as a complement to REB 551.

- Single-phase and three-phase trip unit.
- Single-phase / three-phase trip unit with lock-out relay and trip-coil supervision.
- Three-phase trip unit
- Three-phase trip unit with lock-out relay and trip-coil supervision.

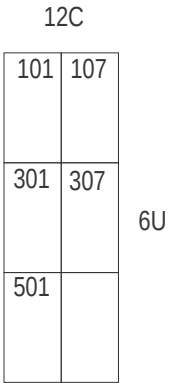
The REB 551 unit occupies an ABB case of size 6U 3/4”. The single-phase/three-phase trip unit and the three-phase trip-unit are mounted in an ABB case of size 6U 1/4” or 1/2”. This means that the REB 551 unit and the trip unit with 6U 1/4” can be mounted mechanically in the same rack. However, if the optional test switch (RTXP 24) should be mounted in the same rack as the REB 551 unit, the arrangement will require two racks of 6U height. (See Fig. 1) For circuit diagrams of the trip units, see section 11, “Terminal diagrams and default configurations”.

1.2.1 Single-phase and three-phase trip unit

Order no: 1MRK000300-AA
Drawing no: 1MRK 000384-AA
Case size: 6 U 1/4” ABB case size.

Single-phase and three-phase trip unit with high speed trip relays type RXMS.
The trip-unit is built-up with 4 RXMS 1 relays and 1 RXMA 1 relay, and includes potential free contacts which can be used for:

- Three-phase or single-phase trip of the circuit breaker
- Single-phase or three-phase start of the breaker failure protection
- Start of the autoreclosing



101 RXMS 1

107 RXMS 1

301 RXMS 1

307 RXMS 1

501 RXMA 1

(X80075-2)

Fig. 1 Single-phase and three-phase trip unit.

1.2.2 Single -phase and three-phase trip unit, with lock-out relay and trip-coil supervision

Order no: 1MRK 000301-AA
Drawing no: 1MRK 000387-AA
Case size: 6 U 1/2” size ABB case.

Single-phase and three-phase trip unit, with high-speed trip relays of type RXMS. Lock-out relay (RXMVE) and trip-coil supervision type SPER. The trip unit is built up of 4 RXMS 1 relays and 1 RXMVE relay as a lock-out relay. The lock-out relay can be reset either by a manual push-button or electrically. 3 SPER 1C1 relays are used for trip-coil supervision, one per phase.

The unit includes contacts which can be used for:

- Three-phase or single-phase trip of the circuit breaker
- Single-phase or three-phase start of BFP
- Start of autoreclosing
- Alarm contacts for trip circuit supervision

24C

101	107	113	119
301	307	313	319
501	507		

6U

101	RXMS 1
107	RXMS 1
113	RXMS 1
119	RXMS 1
301	SPER 1C1
307	SPER 1C1
313	SPER 1C1
319	RXMA 1
501	RXMVE 1
507	RXTNT 11

(X80075-3)

Fig. 2 Single-phase and three-phase trip unit, with lock-out relay and trip-coil supervision.

1.2.3 Three-phase trip unit

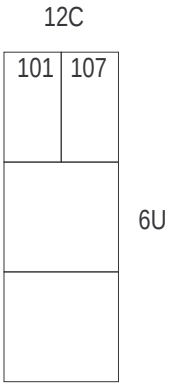
Order no: 1MRK 000304-AA
Drawing no: 1MRK 000390-AA
Case size: 6 U 1/4” size ABB case.

Three-phase trip unit with high-speed trip relay type RXMS. The trip unit is built up of 1 RXMS 1 relay and 1 RXME 18 relay, and includes:

- Red flag indication for trip (RXME 18)

Potential free contacts which can be used for:

- Three-phase start of BFP (breaker failure protection)
- Three-phase start of autoreclosing



101 RXMS 1

107 RXME 18 (X80075-4)

Fig. 3 Three-phase trip unit with indication flag.

1.2.4 Three-phase trip unit with relay and trip-coil supervision

Order No: 1MRK 000 305-AA
Drawing no: 1MRK 000 393-AA
Rack size: 6U 1/4” size ABB case.

Three-phase trip unit with lock-out relay and trip-coil supervision.
The unit includes:

- High-speed trip relays type RXMS 1
- Red flag indication for trip (RXME 18)
- Lock-out relay (RXMVE) with indication flag and push-button for manual reset.
- Trip-circuit supervision relay (SPER), with alarm trip contact.

Potential free contacts which can be used for:

- Three-phase start of BFP (breaker failure protection)
- Three-phase start of autoreclosing

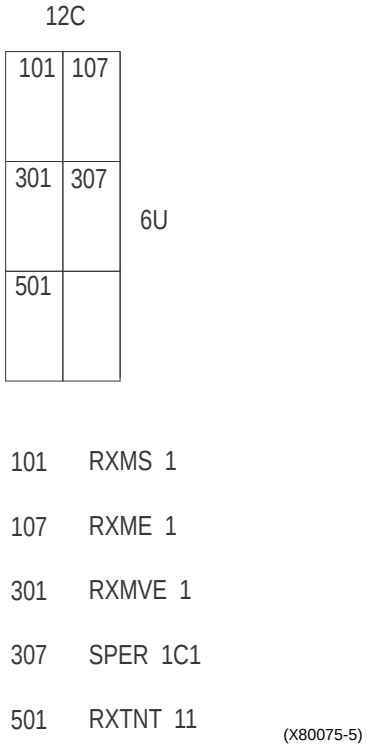


Fig. 4 Three-phase trip unit with lock-out relay and trip-coil supervision

1.3 Testing

A secondary injection test set is used to operate the protection function or the trip unit. The trip circuits to the breaker are opened either at a test switch or at the connecting terminals with links.

Since the trip units are built up with normal COMBIFLEX auxiliary relays, the function of these relays are tested according to normal routines. If several trip units are used, for example in a 1 1/2 circuit-breaker arrangement, the function of the trip units must be tested according to the overall system design diagram.

1.4 Technical data

Table 1: Contact data for additional relays

Function or quantity	Trip relays RXMS 1	Other relays RXMA 1
Max. system voltage	300/250 V dc/ac.	300/250 V dc/ac.
Test voltage across open contact, 1 min	2,0 kV ac	2,0 kV ac
Current carrying capacity continuous 1 s 200 ms	 4 A 20 A 35 A	 5 A 50 A 90 A
Breaking capacity for ac, PF > 0,1	250 V / 10 A	250 V / 10 A
Breaking capacity for dc with L/R < 40 ms: 48V 110V 220V	Var. A and B / E 1,2 A / 1,4 A 0,3 A / 0,35 A 0,15 A / 0,17 A	 1,5 A 0,4 A 0,2 A

Function or quantity	Heavy duty trip and close relays RXME 18	Lock-out relay RXMVE 1
Max. system voltage	450/400 V dc/ac.	250 V ac, dc.
Test voltage across open contact, 1 min	2,5 kV ac	1,0 kV ac
Current-carrying capacity continuous 1 s 200 ms	 6 A 30 A 55 A	 5 A 30 A
Breaking capacity for ac, PF > 0,1	250 V / 20 A	250 V / 10 A
Breaking capacity for dc with L/R < 40 ms 48V 110V 220V	 18 A 3 A 1 A	 1,5 A 0,4 A 0,2 A