

(SE970161)

Features

- Measures the difference in magnitude (ΔU), phase angle ($\Delta\phi$) and frequency (Δf) of two voltage phasors
- Three versions available, each having a fixed frequency difference sensitivity of $\Delta f = 3, 20$ or 200 mHz
- Four modules available with respect to rated voltage (U_n), each with two reconnectible values of rated voltage
- Available with or without voltage-check unit for dead line or bus check
- One of the two voltage inputs designed with extra low burden for connection to CT capacitive taps
- Provides continuous or pulse output
- Two make and two break heavy-duty output contacts
- Includes test switch

Application

The RASC synchronism-check relay is generally used to permit circuit breaker closing only when the measured voltage phasors on either side of an open circuit breaker are within prescribed limits of magnitude, phase angle and frequency. Synchronism-check relays are used to supervise the closing control circuits of circuit breakers where synchronism is established elsewhere on the power system.

In such applications the voltages measured on both sides of the breaker can be determined to have relatively large differences in magnitude (ΔU) and phase angle ($\Delta\phi$) prior to closing, but, essentially no differences in frequency (Δf) can be tolerated. Such conditions can occur when a faulty line is disconnected from an interconnected system and re-energized at one end, resulting in power swings or large load flow through the remaining interconnections.

It is important, in all cases, to block the breaker-closing circuit for frequency differences which can exist between electrically isolated systems.

Synchronism-check function

The RASC synchronism-check function permits CB closing provided that the voltage magnitude on both sides of the CB is higher than 45% of rated voltage (U_r), the difference in voltage magnitude and phase angle is less than the values set on the relay, and the difference in frequency is less than a fixed value of 3, 20 or 200 mHz as determined by versions 1, 2 or 3 respectively. The output signal can be set to be either continuous or a pulse. A single RASC relay can be common to a number of CB's by using it together with a reconnection device.

Application (cont'd)

Variante 1, with $\Delta f = 3$ mHz, is used on very stable systems where stringent demands are imposed on the existence of synchronism.

Variante 2, with $\Delta f = 20$ mHz, is used for autoreclosing on short transmission lines.

Variante 3, with $\Delta f = 200$ mHz, is used for autoreclosing schemes requiring short dead-time intervals.

Voltage-check function

A voltage-check unit, which can be included with RASC, will permit CB closing after an adjustable time delay for "dead" line or bus conditions.

For operation the measured voltage on one side shall be less than 30-80% of rated voltage (continuously adjustable setting) and greater than 80% of rated voltage on the other. The energizing direction preference can be set for bus-to-line, line-to-bus or for no directional preference. When applying the voltage-check unit it should be noted that a disconnected or "dead" line or bus can have a considerable potential on it due to, for instance, inductive coupling from a parallel line or capacitance across open breaker contacts. This potential can be as high as 30% or more of rated voltage.

Design

The RASC synchronism-check relay is a modular design built up of the following functional units:

Test switch RTXP 18

Voltage measuring input as well as output contacts are routed through this device.

Dc-dc converter RXTUG 22H

Converts station supply to the ± 24 V dc required by RASC.

Measuring unit RXNAA 4

Contains the input voltage transformers for U1 and U2, and circuitry for measuring ΔU , $\Delta \phi$, Δf and $U > 45\% U_n$. ΔU and $\Delta \phi$ are settable via digital thumbwheel switches. Three versions of this measuring unit provide different fixed Δf 's.

The input transformer for U1 can, due to its low power consumption, be connected to CT capacitive taps.

Pulse unit RXNAB 2H

Contains the timing circuits for determining the operate time and output pulse duration for the synchronism-check function. Three yellow LED's are mounted on the front and light-up when the set conditions for ΔU , $\Delta \phi$ and Δf are fulfilled. Reconnection from pulse output to continuous output is made at the rear of the unit. Three versions of the pulse unit provide the specific operating times and pulse durations (see Technical data).

Voltage check unit RXNAC 2H

(when ordered)

Provides the "dead" line or bus check function. Via selector switches on the front of this unit, or by remote control, permission to close can be selected to occur for live bus and dead line, live line and dead bus, live line or live bus, or voltage-check function blocked.

The operate time can be selected to be affixed 0.2 s or adjusted between 1-20 s with a knob on the front. Another knob on the front sets the minimum voltage level for recognition of a "dead" bus or line condition and is continuously adjustable between 30-80% of rated voltage, U_r . Live line or bus conditions are recognized at a fixed value of $> 80\%$ or U_n . The output of the unit can be selected for pulse or continuous energizing of the output relay and an LED on the front lights, when the set conditions are fulfilled.

Output relay RXME 1

This is a general purpose heavy-duty auxiliary relay, having four contacts, two make and two break to be used in the breaker-closing control circuits and monitoring systems.

All of the functional units are mounted either directly or via terminal bases to a pair of apparatus bars sized for the required length. RASC, without the voltage check unit, is provided on a pair of 36C apparatus bars and with this unit on 42C bars.

Technical data

Table 1:

| | |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Rated voltage U_r , reconnectible | 58 and 100 V or 63,5 and 110 V or 115 and 200 V or 127 and 220 V ac |
| Rated frequency | 50-60 Hz |
| Overload capacity | 140% of U_r cont. |
| Auxiliary dc voltage | 24-250 V, -20 to +10% |
| Synchronism-check | |
| Max. voltage diff. ΔU | Adjustable within 7,5-67,5% of U_r in steps of 7,5% |
| Max. phase-angle diff. $\Delta\phi$ | Adjustable within 5°-75° in steps of 5° |
| Graduation error | < 2,5° |
| Voltages U_1 and U_2 variant 1 variant 2 variant 3 | > 45% of U_n 3 mHz 20 mHz 200 mHz |
| Max. frequency diff. Δf | 3, 20 or 200 mHz |
| Operate time variant 1 variant 2 variant 3 | 9-12 s 0,25-0,50 s 0,15-0,20 s |
| Resetting time variant 1 variant 2 variant 3 | 3 s approx 120 ms approx 75 ms |
| Duration of output signal variant 1 variant 2 variant 3 | 0,2-0,3 s or continuous 80-120 ms or cont. 80-120 ms or cont. |
| Voltage-check (Energization) | |
| Voltage "low" | Adjustable 30-80% of U_r |
| Setting and graduation error (% of highest setting) | < 3% |
| Voltage "high" Operate time at $U = U_r$ | 80% of U_r < 0,2 s or adjustable 1-20 s |
| Setting and graduation error (% of highest setting) | < 5% |
| Resetting time | 70-130 ms |
| General | |
| Power consumption ac circuit U_1 ac circuit U_2 dc circuit | 15-35 mVA 90-250 mVA < 12 W |
| Permitted ambient temperature | -20 to +55°C |
| Insulation Tests: Dielectric tests Voltage circuits Impulse voltage test | 50 Hz, 2,0 kV, 1 min 1,2/50 μ s, 5,0 kV, 0,5 J |
| Disturbance Tests: Fast transient test 1 MHz burst test ESD-test | 4-8 kV, 2 min 2,5 kV, 2 s 8 kV |
| Weight | approx. 5 kg |
| Contact data output relay RXME 1 | See 1MRK 508 015-BEN |

Terminal diagrams

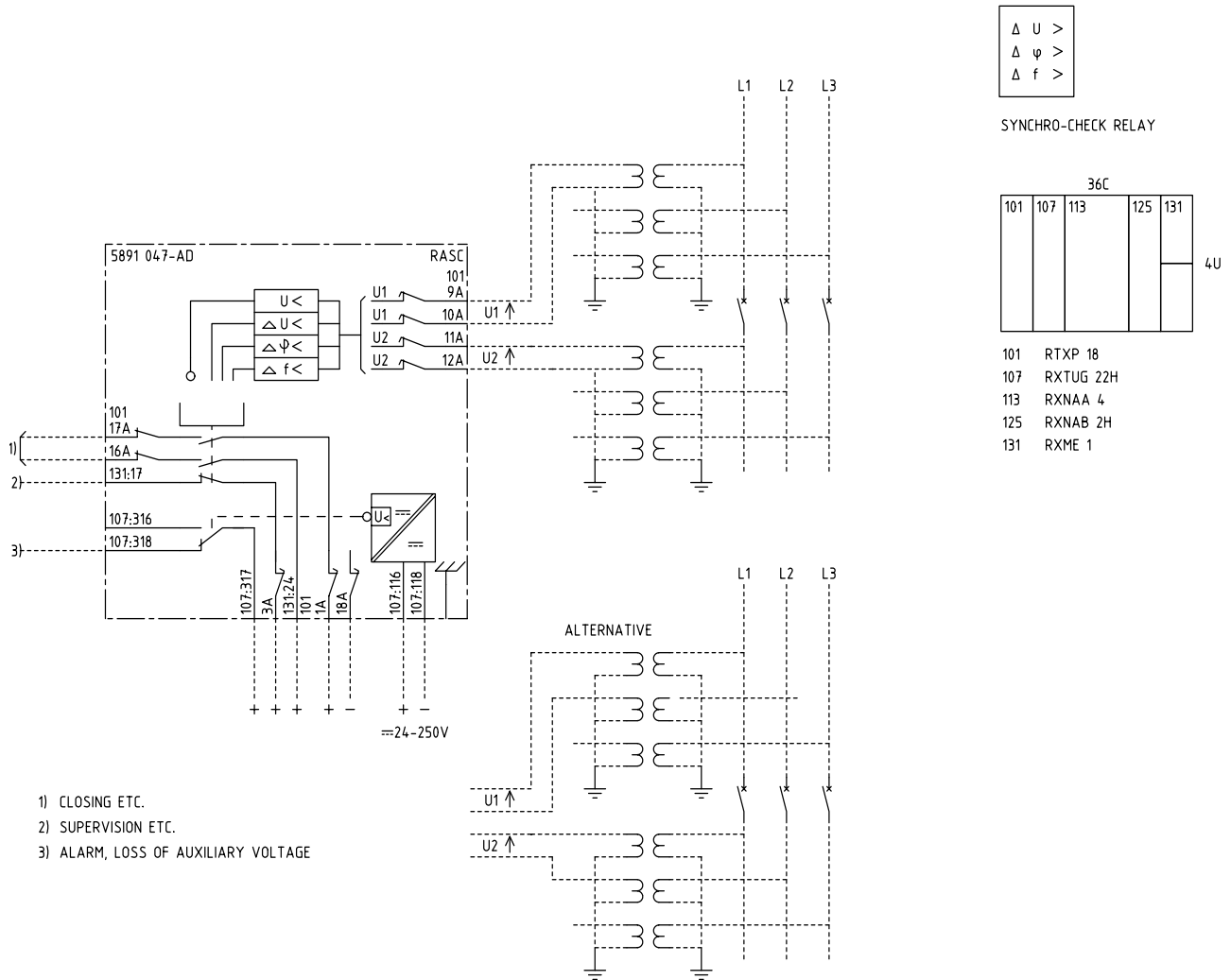


Fig. 1 Terminal diagram 5891 047-ADA for RASC without voltage-check unit.

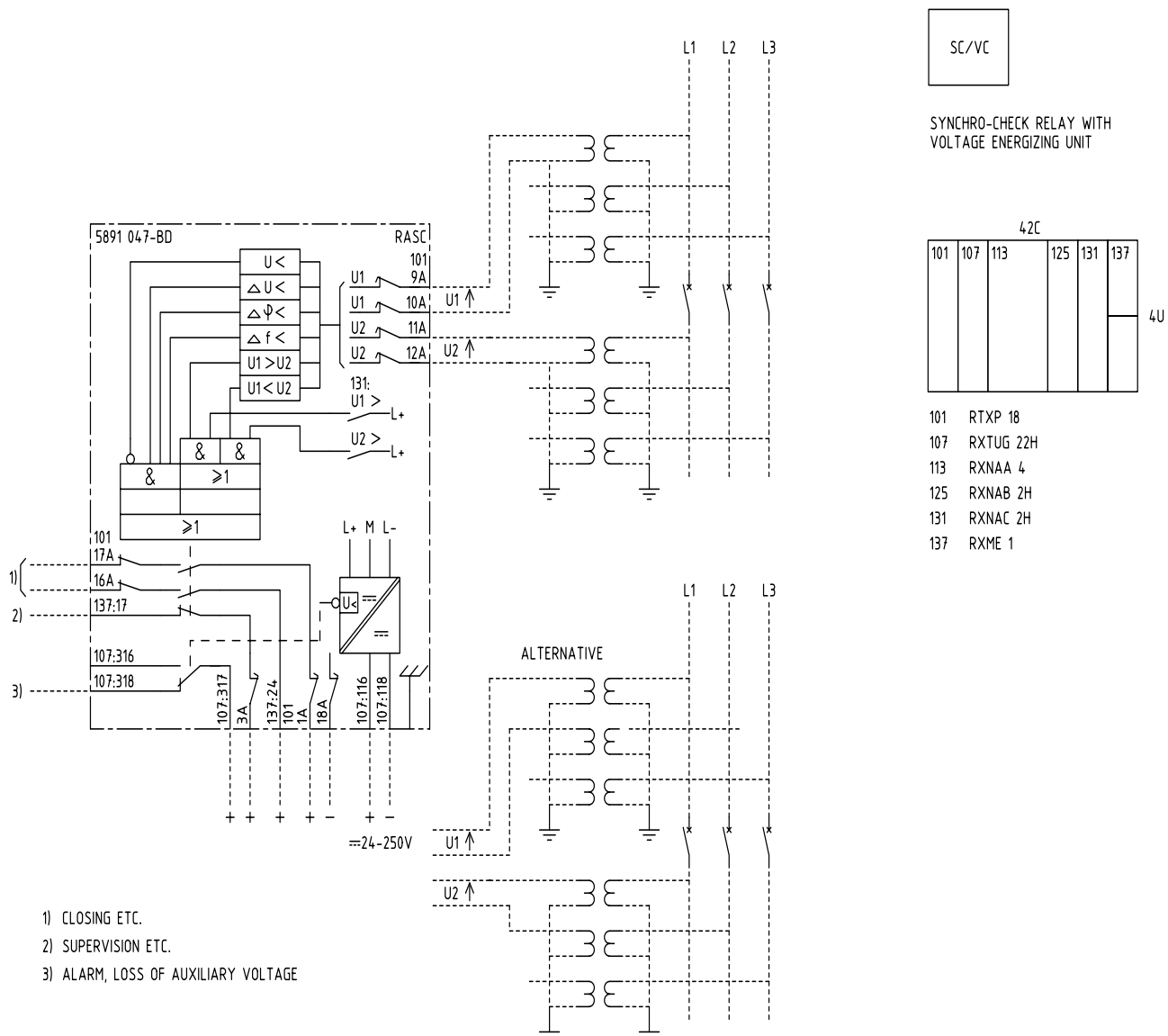


Fig. 2 Terminal diagram 5891 047-BDA for RASC with voltage-check unit

Ordering

Specify:

- Quantity
- Ordering No.
RK 862 001-AC
without voltage-check unit
RK 862 001-BC
with voltage-check unit
- Rated ac voltage U_r
- Auxiliary dc voltage
- Variant 1, 2 or 3

- Desired wording on the lower half of the test switch face plate max. 13 lines with 14 characters per line.
- Mounting and connection
- RASC is provided in either 36C or 42C apparatus bars and is pre-wired at the factory. For mounting in rack, case or cubicle, see Mounting Systems.

Reference

RXME

1MRK 508 015-BEN

RXTUG 22H

1MRK 513 001-BEN

Manufacturer

ABB Automation Products AB
Substation Automation Division
SE-721 59 Västerås
Sweden
Tel: +46 (0) 21 34 20 00
Fax: +46 (0) 21 14 69 18