ASEA INFORMATION

RK 40—309 E

Reg. 5623

RELAY DESCRIPTION

Static over-and under-voltage relay RREF 2

GENERAL

RREF 2 is a solid-state voltage relay with both maximum and minimum operation, i.e. it operates for both decreases and increases in voltage and for phase open circuit. The relay is used in for example under-voltage protection. It is manufactured in two versions; for single-phase a.c. networks and for d.c. networks. Both versions of RREF 2 occupy two relay seats in the ASEA plug-in system RR for relays but, for relay contact function, must be complemented with one-seat output relays of type RRM 17 for 24 V or similar. RREF 2 can either have separate output relays for over-voltage and under-voltage operation or only one output relay which has the same operation when the input voltage is over or under the set maximum and minimum values.

In the a.c. design the relay requires an auxiliary voltage supply of 24 V, d.c., while the d.c. relay can obtain its supply directly from the d.c. mains. The auxiliary voltage supply should preferably be obtained from either of the supply devices RRTUB 2 or RRTNC 1 according to Information RK 70-304 E. For solid-state under-voltage protections in three-phase designs, see Information RK 40-307 E and RK 40-308 E which deal with RROTC 2 and RROTF 4 respectively. RREF 2 is also avaliable in a simpler design with less advanced temperature and voltage stabilizing circuits at lower requirements on the accuracy.

Fig. 1. RREF 2 (75645).

RFR, Nov. 1969, Edition 1.

BL. 720 R (954) 100 000 © 2698

DESIGN AND MODE OF OPERATION

The in-put supervised voltage is stepped down and then rectified and smoothed. Thereafter it is applied to two separate voltage level sensing transistor circuits. At operation these circuits control two transistors to limitation, one for maximum operation and one for minimum operation, which in turn affect the respective output relays.

All the transistors are of the silicon type and operate in switch connections. The setting of the level detectors is carried out with the aid of the front setting knobs which are continonsly adjustable. Each level sensing circuit is supplied from separate stabilized supply circuits. These comprise so called π-stabilized Zener diode chains in which the components are chosen so as to obtain a constant voltage if the supply voltage varies within the tolerances. The nominal voltage is 24 V. The relay is so designed that separate maximum and minimum operations are normally obtained when two auxiliary relays are connected. If required, however, it is possible, by means of an external reconnection, to make the auxiliary relay with the minimum operation trip also at maximum operation. The auxiliary relays are normally energized. RRM 17-6002 according to Catalogue RK 11 E should preferably be used as an output relay.

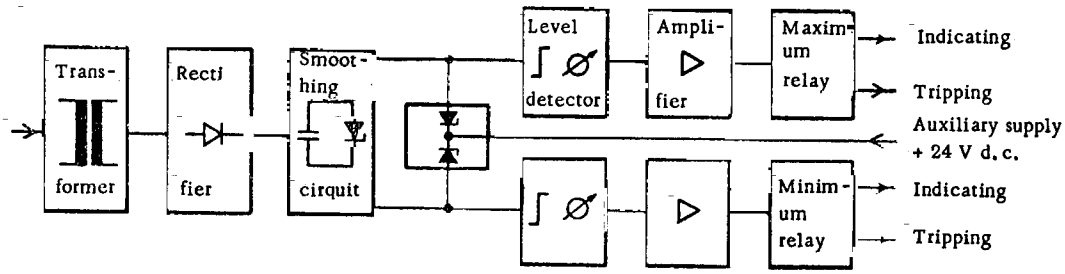

Fig. 2. Block diagram

RREF 2 for direct voltage is built up in the same way as the a.c. single-phase relay, with the difference that the input transformer and the full-wave rectifier have been replaced with suitable resistors for voltage division on the input. Furthermore, the supply of the relay differs from that of the single-phase relay in such a way that is supplied from the stabilized voltage across a suitable resistor. It can also be supplied separately if common earth points are taken into consideration.

MOUNTING

Over- and under-voltage relay RREF 2 is a part of the ASEA plug-in system RR and is intended to be inserted in a case for plug-inrrealys, where it occupies two relay seats (approx 80 x 55 mm). The ASEA plug-in system RR for relays is described in Catalogue RK 92-1 E. The auxiliary relay RRM 17-6002 is described in Catalogue RK 11 E.

MAINTENANCE

RREF 2 does not require any special maintenance under normal conditions. The cover must be properly fitted and the door closed to prevent the ingress of dust. Burnt contacts should be carefully dressed with a diamond file or a very fine file. Emery cloth or the like are not suitable for the dressing of the auxiliary relay contacts since grains may become detached and remain on the contact surfaces, thus causing contact failure due to their insulating properties.

TECHNICAL DATA
Single-phase a.c.
Over- and under-voltage relay
RREF 2

1. Rated voltage	U_n: reconnectible 380 V or 220 V (50-60 Hz)
2 Auxiliary voltage	24 V, d.c.
3. Power consumption:	
measuring circuit	approx. 0·2 VA at 220 V and 380 V
auxiliary voltage circuit	approx. 3·8 W at 24 V, d.c.
4. Overload capacity	2 x U_n
5. Operating time:	
Over-voltage relay	<160 ms at ≥1·05 x U_s
Under-voltage	<160 ms at ≤ 0·8 x U_s
	U_s = set value
6. Setting range	Under-voltage setting: 80-95 % Over-voltage setting: 105-120 % The possibility is available for setting 97 % and 103 % for the minimum and the maximum operation respectively.
7. Resetting ratio:	
Maximum relay	98-99 % of set value
Minimum relay	101-102 % of set value
8. Accuracy	Max. ± 1 % deviation from set value at room temperature if the ambient temperature varies between + 5 °C and + 50 °C and the auxiliary voltage varies between 20 V and 30 V.
9. Frequency dependence	The operating value of the over-voltage relay is independent of the frequency, while the resetting value is reduced be approx. 2 % when the frequency increases from 50 Hz to 400 Hz. The operating value of the under-voltage relay is reduced by approx. 2 % at the lowest setting, while the resetting value is increased by approx. 2 % when the frequency increases from 50 Hz to 400 Hz.

D.c. over-and under-voltage relay RREF 2

Rated voltage	U_n: 24,36,48,60,220 and 400 V
2. Auxiliary supply	

3. Power consumption

P_{total} (W)	$P_{measuring\ circuit}$ (W)	U_n (V)
4.0	0.10	24
6.2	0.14	36
8.0	0.19	48
10.0	0.24	60
37.0	0.87	220
68.8	1.60	400

Where $P_{total} = P_{measuring\ circuit} + P_{supply}$

4. Overload capacity $1 \cdot 3 \times U_n$

5. Operating time:

Over-voltage relay <160 ms at $\geq 1 \cdot 05 \times U_s$
Under-voltage relay <160 ms at $\leq 0 \cdot 8 \times U_s$
U_s = set value

6. Setting range

Under-voltage setting: 80-95 %
Over-voltage setting: 105-120 %
The possibility is available for setting 97 % and 103 % for the minimum and the maximum operation respectively.

7. Resetting ratio:

Over-voltage relay >98 % of set value
Under-voltage relay <102 % of set value

8. Accuracy

The same as that of the a.c. relay (+-1 %) but the variation of the auxiliary voltage must be included when the auxiliary voltage is obtained from the voltage that the relay supervises.

CONNECTION DIAGRAM

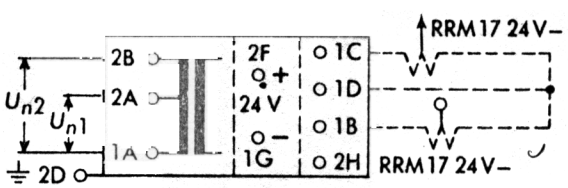

Fig. 3. Connection diagram for RREF 2