

High Impedance Protection Relay

SPAE010, SPAE011

Product Guide



Features

- High impedance type differential current earth-fault protection, so called restricted earth-fault relay
- Earth-fault protection relay for transformers, motors and generators
- Required stabilizing resistors built-in into the relay
- Short total operating time together and high stability
- High immunity against all types of mechanical and electrical interference
- High accuracy and long time stability features due to a digital and software based design
- CE marking according to the EC directive for EMC

Application

The protection relays type SPAE 010 and SPAE 011 have identical functions. The only difference between the relays is their auxiliary supply voltage ranges. The auxiliary supply

range of the relay SPAE 010 is 80...265 V ac and that of SPAE 011 is 18...80 V dc.

Design

The relay measures voltage, though it is connected to the current transformers of the protected object, see block diagram. The earth-fault current is measured on either side of the protected object and the differential current is forced to flow through an external voltage dependent resistor R_U . The voltage thus created is measured by the relay.

The high impedance type differential relay is stable for all types of faults outside the zone of protection. The relay is stabilized by means of resistors in the differential circuit. The stabilizing resistors are integrated into the relay.

The stability of the protection is based on the circumstance that the impedance of a current transformer quickly decreases as the current transformer saturates. The reactance of the excitation circuit of a fully saturated current transformer approaches zero and the impedance is purely winding resistance. By means of the resistor in the differential current circuit the secondary current fed by a non-saturated current transformer is forced to flow through the secondary circuit of a saturated current transformer.

The start level of the relay must be given such a value, that no relay operation is obtained at faults outside the zone of protection.

When a fault arises within the zone of protection, both current transformers strive to feed current through the differential current circuit and the relay operates.

Self-supervision

The relay incorporates a sophisticated self-supervision system, which increases the availability of the relay and the reliability of the system. The self-supervision system continuously monitors the hardware and the software of the relay. The system also supervises the operation of the auxiliary supply module.

Auxiliary supply voltage

The relay is provided with a built-in power supply unit. The specified auxiliary voltage range of the relay SPAE 010 is 80...265 V ac/dc and the auxiliary voltage range of the relay SPAE 011 is 18...80 V dc.

Technical data

Table 1: Energizing inputs

Terminals	40-41	40-42	40-43
Rated voltage U_n	50 V	100 V	200 V
Thermal withstand capability	continuously	$1.3 \times U_n$	
	for 1 s	$10 \times U_n$	
Rated frequency f_n , according to order	50 Hz or 60 Hz		

Table 2: Protection characteristics

Voltage setting range, $U>/U_n$	$0.4 \dots 1.2 \times U_n$
Operating current	9...27 mA
Operating time	17...80 ms
Drop-off time	120 ms
Drop-off/pick-up ratio	0.8

Table 3: Output contact ratings

Type of contact	Tripping	Signalling	
Terminals	65-66, 74, 75	67-68-69, 70-71-72	
Rated voltage	250 V ac/dc		
Thermal withstand capability	Carry continuously	5 A	5 A
	Make and carry for 0.5 s	30 A	10 A
	Make and carry for 3 s	15 A	8 A
Breaking capacity for dc, when the control/signalling circuit time constant $L/R \leq 40$ ms, at the control voltages	220 V dc	1 A	0.15 A
	110 V dc	3 A	0.25 A
	48 V dc	5 A	1 A

Table 4: Auxiliary power supply

Supply voltage, SPAE 010	80...265 V ac/dc
Supply voltage, SPAE 010	18...80 V dc
Power consumption	~5 W

Table 5: Tests and standards

Test voltages	Dielectric test voltage, inputs and outputs as per IEC 60255-4, Series C)	2 kV, 50 Hz, 1 min
	Impulse test voltage, inputs and outputs as per IEC 60255-5	5 kV, 1.2/50 μ s, 0.5 J
	HF disturbance test voltage, inputs and outputs as per IEC 60255-6, Appendix C, Class III	2.5 kV, 1 MHz
	Spark interference test voltage, inputs and outputs as per SS 436-15-03, PL 4	4...8 kV
Environmental conditions	Specified ambient service temperature range	-10...+55°C
	Long term damp heat withstand (IEC 60068-2-3)	<95%, +40°C, 56 d/a
	Transport and storage temperature range	-40...+70°C
	Degree of protection by enclosure for panel mounted relay	IP 54
	Weight of fully equipped relay	~2 kg

Block diagram

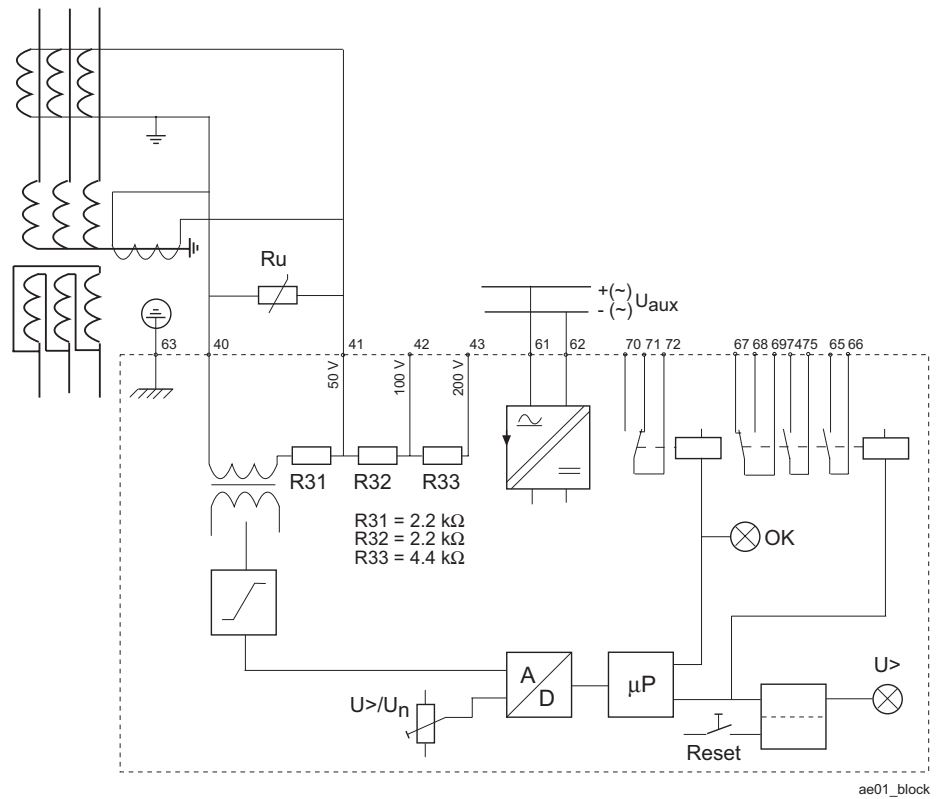


Fig. 1 Block diagram and sample connection diagram

Mounting and dimensions

Flush mounting

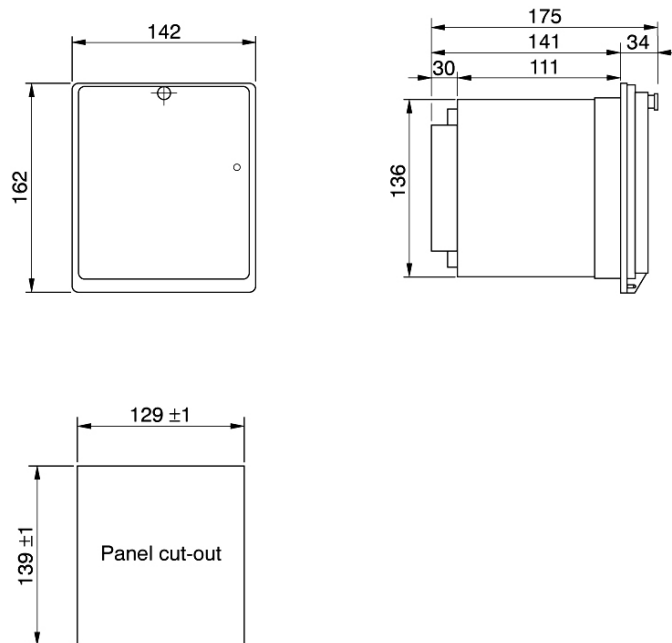


Fig. 2 Flush-mounting relay case (dimensions in mm)

Flush and surface mounting

The relay is housed in a normally flush-mounted case. If needed, it can also be sur-

face mounted. The relay case is made of a black anodized, extruded aluminium profile.

Ordering

When ordering, please specify:

Ordering information	Ordering example
1. Type designation and quantity	SPAE 010, 5 pieces
2. Order number	RS 493 001-MA
3. Rated frequency	$f_n = 50 \text{ Hz}$
4. Auxiliary voltage	$U_{aux} = 110 \text{ V dc}$
5. Accessories	-
6. Special requirements	-

Order numbers

High impedance protection relay SPAE 010/SPAE 011	
SPAE 010	RS 493 001-MA or RS 493 001-NA
SPAE 011	RS 493 002-NA or RS 493 002-MA
The last two letters of the order number the auxiliary voltage U_{aux} of the relay as follows:	MA equals $U_{aux} = 80 \dots 265 \text{ V ac/dc}$
	NA equals $U_{aux} = 18 \dots 80 \text{ V dc}$

High impedance protection relay SPAE 010/SPAE 011 with test adapter RXP 18	
SPAE 010	RS 493 201-MA or RS 493 201-NA
SPAE 011	RS 493 202-NA or RS 493 202-MA
The last two letters of the order number the auxiliary voltage U_{aux} of the relay as follows:	MA equals $U_{aux} = 80 \dots 265 \text{ V ac/dc}$
	NA equals $U_{aux} = 18 \dots 80 \text{ V dc}$

References

Additional information

User's manual and Technical description "High impedance protection relay SPAE 010, SPAE 011"	1MRS 750063-MUM EN
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