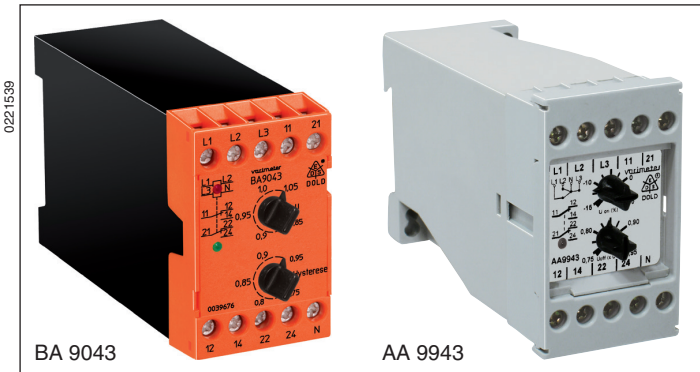


VARIMETER Undervoltage Relay BA 9043, AA 9943

Translation
of the original instructions



- According to EC/EN 60255-1
- 3-phase
- For nominal voltage of 3 AC 100 / 57 to 690 / 400 V
- Measures arithmetic mean value
- Adjustable operate and release value
- For 3p3w or 3p4w systems
- BA 9043 with optionally adjustable time delay
- De-energized on trip operation
- LED indicator for operation and state of contact
- Insensitive to harmonics
- Frequency up to 400 Hz
- Width 45 mm

Product Description

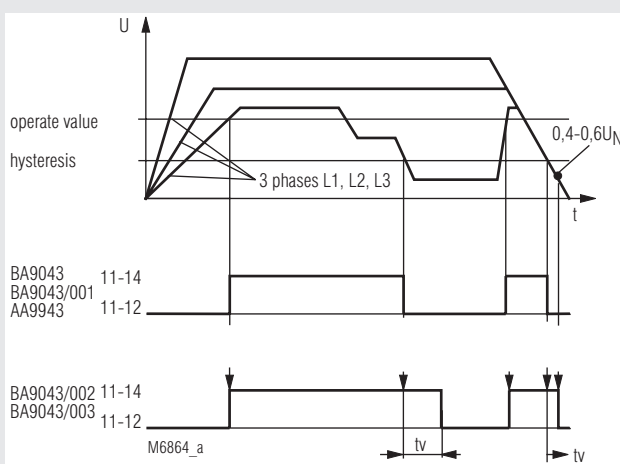
The undervoltage relays BA 9043 and AA 9973 of the VARIMETER series monitor 3-phase AC networks. The measurement is very simple and without extensive wiring as there is no auxiliary power supply necessary. The adjustment of the setting values is user friendly and done on 2 rotary switches on the front of the device.

Approvals and Markings



*) see variants

Function Diagram



Application

- Undervoltage detection in 3 phase systems
- For industrial and railway applications

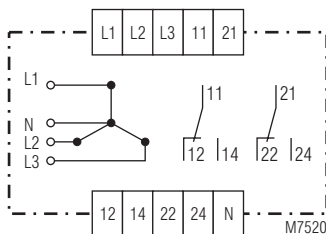
Indicators

- Upper LED (only BA 9043): On, when voltage connected
- Lower LED: On, when output contact activated

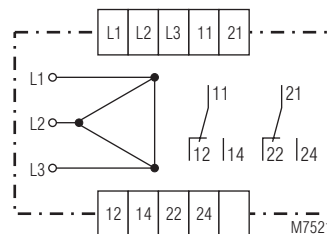
Notes

For determination of the arithmetic mean value of the voltage the 3 phases are measured against N.
The variants without N (/001 and /003) measure L1 and L2 against L3.
delay the delay is only active at $U \geq 0,6 U_N$. At $< 0,4 U_N$ the relay switches off without delay.

Circuit Diagrams



BA 9043, BA 9043/002
AA 9943



BA 9043/001, BA 9043/003
AA 9943/001

Connection Terminals

Klemmenbezeichnung	Signalbeschreibung
L1, L2, L3, N	Connection of the monitoring 3-phase system
11, 12, 14	1. changeover contact
21, 22, 24	2. changeover contact

Technical Data

Input

Nominal voltage U_N

BA 9043, BA 9043/002

AA 9943: 3/N AC 100/57 V; 220/127 V; 400/230 V
415/240 V; 440/254 V; 500/290 V

BA 9043, BA9043/002: 3/N AC 690/400 V

BA 9043/001, BA 9043/003,

AA 9943/001: 3 AC 100 V; 220 V; 400 V; 415 V, 440 V;
500 V

BA 9043/001, BA 9043/003: 3 AC 690 V

Max. overload

BA 9043: 1.2 U_N continuously

AA 9943: 1.1 U_N continuously

Nominal consumption: AC 4 VA

Nominal frequency: 50 ... 400 Hz

Frequency range: $\pm 5\%$

Temperature influence: $< 0.05\% / K$

Setting Ranges

Response value: 0.85 ... 1.05 U_N , infinite variable with
upper potentiometer

Hysteresis: 0.75 ... 0.95 of operate value

Setting accuracy: $\leq \pm 10\%$

Switching delay t_M : See diagram switching delay

Time delay t_r : Infinite variable from 0.5 ... 10 sec for

BA 9043/002, BA 9043/003

Between 0.4 and 0.6 U_N the contacts

fall back according to the diagram

without additional delay

Output

Contacts

BA 9043: 2 changeover contacts

AA 9943.11: 1 changeover contact

AA 9943.12: 2 changeover contacts

Thermal current I_{th} : Continuous current limit curve
(max. 6 A per contact)

Switching capacity

BA 9043, AA 9943.12

To AC 15

NO contact: 2 A / AC 230 V IEC/EN 60947-5-1

NO contact at 0.1 Hz: 3 A / AC 230 V IEC/EN 60947-5-1

NC contact: 1 A / AC 230 V IEC/EN 60947-5-1

AA 9943.11

NO contact: 3 A / AC 230 V IEC/EN 60947-5-1

NC contact: 1 A / AC 230 V IEC/EN 60947-5-1

BA 9043, AA 9943

To DC 13: 1 A / DC 24 V IEC/EN 60947-5-1

Electrical life IEC/EN 60947-5-1

To AC 15 at 3 A, AC 230 V: 3 x 10⁵ switching cycles

BA 9043, AA 9943.11

at 3 A, AC 230 V $\cos \varphi = 1$: 2 x 10⁵ switching cycles

AA 9943.12

at 3 A, AC 230 V $\cos \varphi = 1$: 5 x 10⁵ switching cycles

Short circuit strength

max. fuse rating: 4 A gG / gL IEC/EN 60947-5-1

Mechanical life: $> 30 \times 10^6$ switching cycles

General Data

Operating mode: Continuous operation

Temperature range

Operation: - 20 ... + 60°C

Storage: - 25 ... + 60°C

Altitude: ≤ 2000 m

Clearance and creepage distances

Rated impulse voltage /
pollution degree

BA 9043: 6 kV / 2 IEC 60664-1

AA 9943: 4 kV / 2 IEC 60664-1

Overvoltage category:

BA 9043: III

AA 9943: III to 300 V

II > 300 V

Technical Data

EMC

Electrostatic discharge: 8 kV (air) IEC/EN 61000-4-2

HF irradiation

80 MHz ... 2.7 GHz

BA 9043: 20 V/m IEC/EN 61000-4-3

AA 9943: 10 V/m IEC/EN 61000-4-3

Surge voltages

Between

wires for power supply: 1 kV IEC/EN 61000-4-5

Between wire and ground: 2 kV IEC/EN 61000-4-5

HF wire guided: 10 V IEC/EN 61000-4-6

Interference suppression: Limit value class B EN 55011

Degree of protection

Housing: IP 40 IEC/EN 60529

Terminals: IP 20 IEC/EN 60529

Housing: Thermoplastic with V0 behaviour

according to UL subject 94

Vibration resistance: Amplitude 0.35 mm IEC/EN 60068-2-6

frequency 10 ... 55 Hz

Climate resistance: 20 / 060 / 04 IEC/EN 60068-1

Terminal designation: DIN EN 50005

Wire connection: DIN 46228-1/-2/-3/-4

2 x 2.5 mm² solid or

2 x 1.5 mm² stranded wire with sleeve

Wire fixing IEC/EN 60 999-1

BA 9043: Plus-minus terminal screws M3.5 with

self-lifting clamping piece

AA 9943: Flat terminals with self-lifting

clamping piece

Stripping length: 10 mm

Fixing torque: 0.8 Nm

Mounting: DIN rail IEC/EN 60715

Weight

BA 9043: 310 g

AA 9943: 300 g

Dimensions

Width x height x depth

BA 9043: 45 x 73 x 132 mm

AA 9943: 45 x 77 x 127 mm

CCC-Data for BA 9043

Thermal current I_{th} : 5 A



Technical data that is not stated in the CCC-Data, can be found
in the technical data section.

Classification to DIN EN 50155 for BA 9043

Vibration and

shock resistance: Category 1, Class B IEC/EN 61373

Ambient temperature: OT1, OT2 compliant

OT3 and OT4 with operational limitations

Protective coating of the PCB: No

Standard Type

BA 9043 3/N AC 400 / 230 V 50 ... 400 Hz

Article number: 0039676

• For 3p4w systems

• Nominal voltage U_N : 3/N AC 400 / 230 V

• Output: 2 changeover contacts

• Width: 45 mm

Variants

AA 9943/001:	Without neutral
AA 9943/075:	For nuclear power plants with neutral
AA 9943/175:	For nuclear power plants without neutral
BA 9043/001:	Without neutral
BA 9043/002:	With neutral, adjustable time delay $t_v = 0.5 \dots 10 \text{ sec}$
BA 9043/003:	Without neutral, adjustable time delay $t_v = 0.5 \dots 10 \text{ sec}$
BA 9043:	With CCC-approval on request

Ordering example for variants

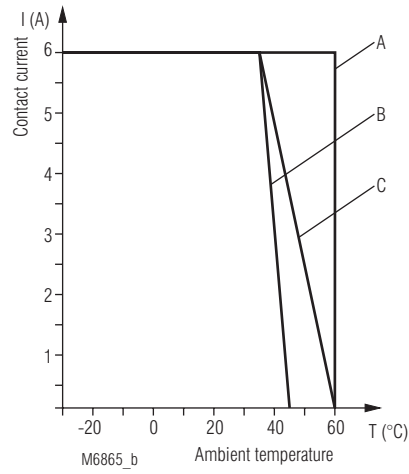
BA 9043	/	3/N AC 400/230 V	50 ... 400 Hz	
				Nominal frequency
				Nominal voltage
				Variant, if required
				Type

AA 9943	.11	/	3/N AC 400/230 V	50 ... 400 Hz	
					Nominal frequency
					Nominal voltage
					Variant, if required
					Contact
					Type

Accessories

AA 9943:	Cover
K 70-34	Article number: 0011790

Characteristics



- A = Device free-standing
- B = BA 9043: Device mounted without distance heated by devices with same load.
- C = AA 9943: Device mounted without distance heated by devices with same load.

Continuous current limit curve

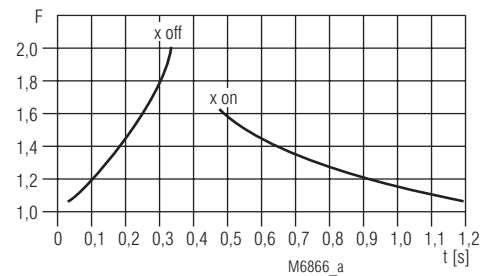


Diagram switching delay

Switching delay t_M :

When the voltage changes fast on the measuring input, the arithmetic mean value can only adjust after a short delay.

Example:

$$F = \frac{U_{\text{applied}}}{U_{\text{setting}}} \qquad F = \frac{240 \text{ V}}{190 \text{ V}} = 1.26$$

U setting = 190 V
U applied = 240 V

According to diagram:

$t_{M,\text{on}}$ = approx. 800 ms
 $t_{M,\text{off}}$ = approx. 100 ms

