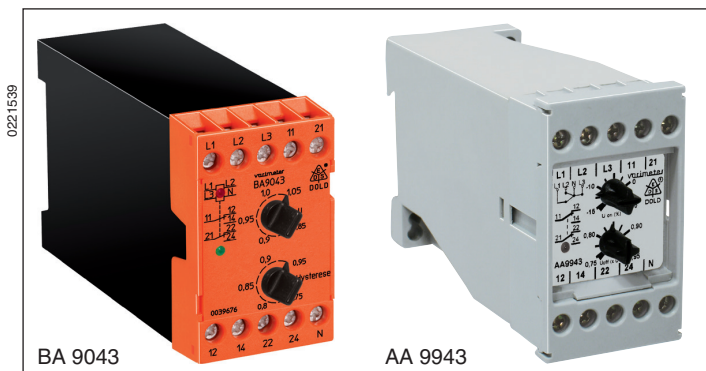


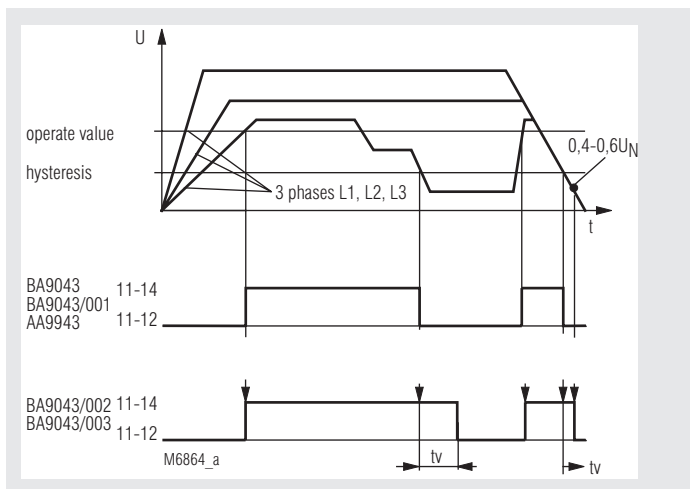
VARIMETER

Undervoltage Relay
BA 9043, AA 9943



- 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

Function Diagram



Approvals and Markings



*) see variants

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

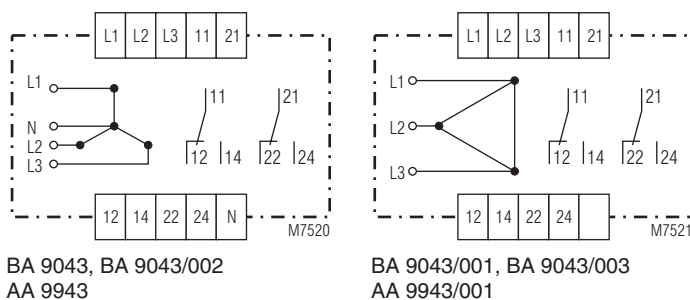
Notes

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



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:
BA 9043/001, BA 9043/003,
AA 9943/001: 3/N AC 690/400 V
- BA 9043/001, BA 9043/003:
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:

± 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:** ≤ ± 10 %
- Switching delay t_M:** see diagram switching delay
- Time delay t_v:** 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

Technical Data

Output

Contacts

BA 9043:	2 changeover contacts
AA 9943.11:	1 changeover contact
AA 9943.12:	2 changeover contacts
Thermal current I_{th}:	6 A; see diagramm Continuous current limit curve

Switching capacity

to AC 15		
NO contact:	3 A / AC 230 V	IEC/EN 60 947-5-1
NC contact:	1 A / AC 230 V	IEC/EN 60 947-5-1
to DC 13		
NO contact:	1 A / DC 24 V	IEC/EN 60 947-5-1
NC contact:	1 A / DC 24 V	IEC/EN 60 947-5-1

Electrical life

to AC 15 at 3 A, AC 230 V:	3 x 10 ⁵ switching cycles
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Short circuit strength

max. fuse rating:	4 A gL	IEC/EN 60 947-5-1
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Mechanical life:

> 30 x 10⁶ switching cycles

General Data

Operating mode:

Continuous operation

Temperature range

Operation: - 20 ... + 60°C

Storage: - 25 ... + 60°C

Altitude: < 2.000 m

Clearance and creepage distances

rated impulse voltage / pollution degree:	4 kV / 2	IEC 60 664-1
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EMC

Electrostatic discharge: 8 kV (air) IEC/EN 61 000-4-2

HF irradiation

80 MHz ... 1 GHz: 10 V/m IEC/EN 61 000-4-3

1 GHz ... 2.5 GHz: 3 V/m IEC/EN 61 000-4-3

2.5 GHz ... 2.7 GHz: 3 V/m IEC/EN 61 000-4-3

Fast transients: 2 kV IEC/EN 61 000-4-4

Surge voltages

between

wires for power supply: 1 kV IEC/EN 61 000-4-5

between wire and ground: 2 kV IEC/EN 61 000-4-5

HF wire guided: 10 V IEC/EN 61 000-4-6

Interference suppression: Limit value class B EN 55 011

Degree of protection

Housing: IP 40 IEC/EN 60 529

Terminals: IP 20 IEC/EN 60 529

Housing:

Thermoplastic with V0 behaviour

according to UL subject 94

Vibration resistance: Amplitude 0.35 mm IEC/EN 60 068-2-6

frequency 10 ... 55 Hz

20 / 060 / 04 IEC/EN 60 068-1

Climate resistance: DIN EN 50 005

Terminal designation:

Wire connection: 2 x 2.5 mm² solid or

2 x 1.5 mm² stranded wire with sleeve

DIN 46 228-1/-2/-3/-4

Wire fixing: Flat terminals with self-lifting

clamping piece IEC/EN 60 999-1

Fixing torque: 0.8 Nm

Mounting: DIN rail IEC/EN 60 715

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

Thermal current I_{th} : 5 A

Switching capacity

to AC 15: 2 A / AC 230 V IEC/EN 60 947-5-1

to DC 13: 1 A / DC 24 V IEC/EN 60 947-5-1



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 61 373

Ambient temperature: T1 compliant

T2, T3 and TX 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 9943/175: for nuclear power plants

BA 9043/001: without neutral

BA 9043/002: with neutral, adjustable time delay

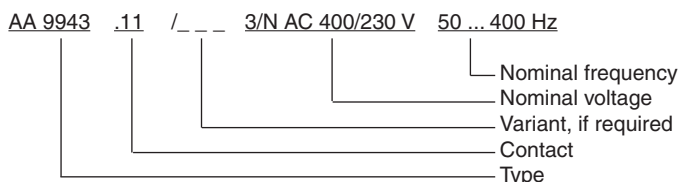
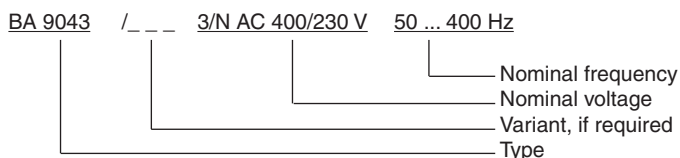
$t_v = 0.5 \dots 10$ sec

BA 9043/003: without neutral, adjustable time delay

$t_v = 0.5 \dots 10$ sec

BA 9043: with CCC-approval on request

Ordering example for variants



Accessories

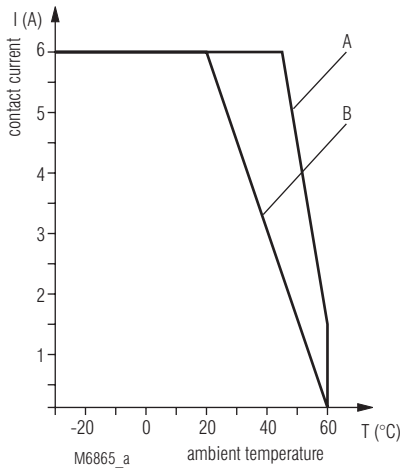
AA 9943:

K 70-34

Cover

Article number: 0011790

Characteristics



Continuous current limit curve

A = Devices mounted with 2 cm distance

B = Devices mounted without distance

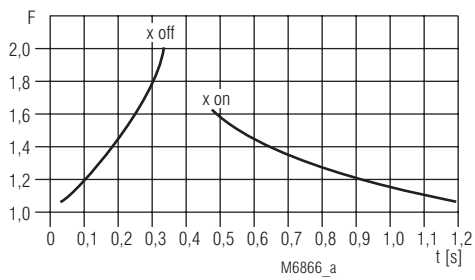


Diagram switching delay

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:

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

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

