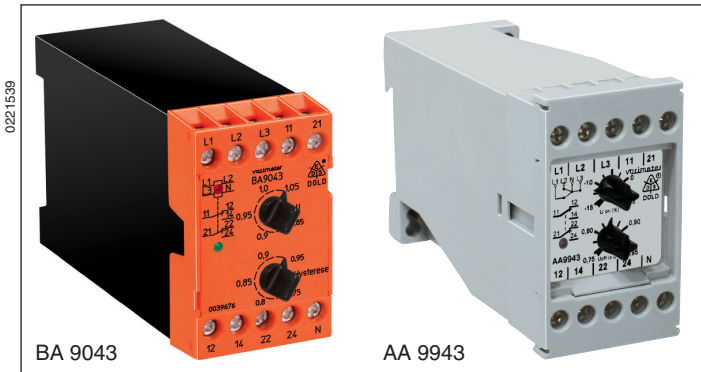
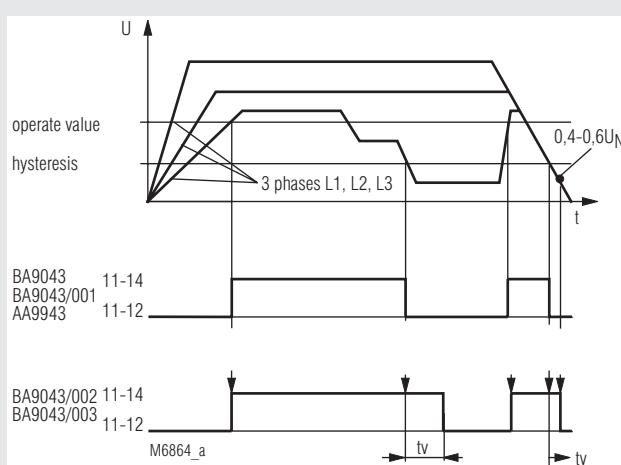


## VARIMETER Undervoltage Relay BA 9043, AA 9943



- 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

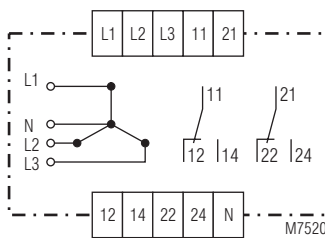
### Notes

For determination of the arithmetic mean value of the voltage the 3 phases are measured against N.

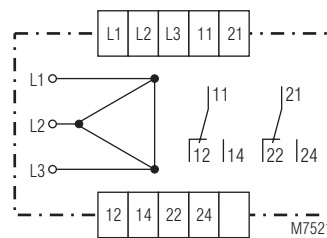
The variants without N ( /001 and /003) measure L1 and L2 against L3.

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



BA 9043, BA 9043/002  
AA 9943



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

### Technical Data

#### Input

**Nominal voltage U<sub>N</sub>**  
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 AC 100 V; 220 V; 400 V; 415 V, 440 V;  
500 V  
3 AC 690 V

#### Max. overload

BA 9043: 1.2 U<sub>N</sub> continuously  
AA 9943: 1.1 U<sub>N</sub> 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<sub>N</sub>, infinite variable with upper potentiometer
- Hysteresis:** 0.75 ... 0.95 of operate value
- Setting accuracy:** ≤ ± 10 %
- Switching delay t<sub>M</sub>:** see diagram switching delay
- Time delay t<sub>v</sub>:** infinite variable from 0.5 ... 10 sec for BA 9043/002, BA 9043/003  
Between 0.4 and 0.6 U<sub>N</sub> 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
<b>Thermal current <math>I_{th}</math>:</b>	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 <sup>5</sup> switching cycles
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### Short circuit strength

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

> 30 x 10<sup>6</sup> 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:** 2 x 2.5 mm<sup>2</sup> solid or

2 x 1.5 mm<sup>2</sup> stranded wire with sleeve

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

**Wire connection:** 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

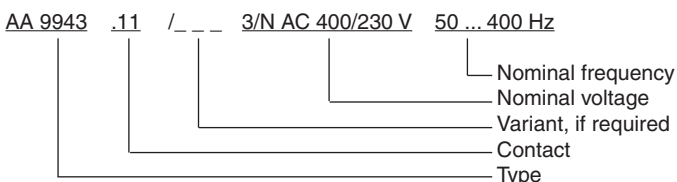
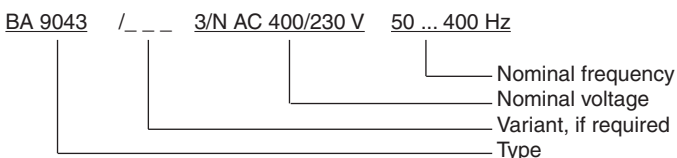
$t_v = 0.5 \dots 10$  sec

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

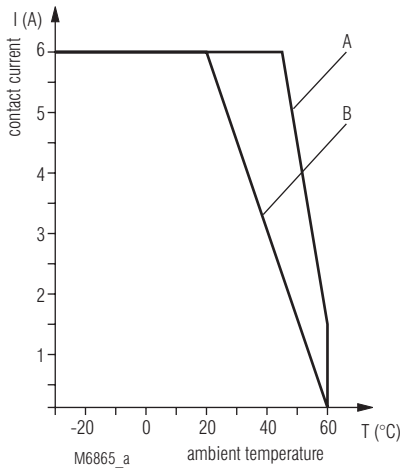


## Accessories

AA 9943: Cover

K 70-34 Article number: 0011790

## Characteristics



Continuous current limit curve

A = Devices mounted with 2 cm distance

B = Devices mounted without distance

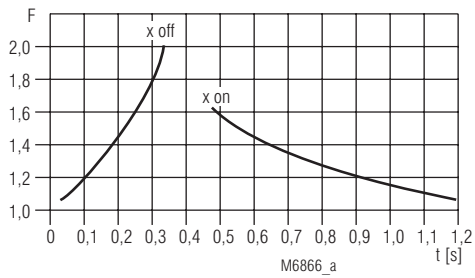


Diagram switching delay

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

