# VARIMETER
# Undervoltage Relay
# BA 9043, AA 9943

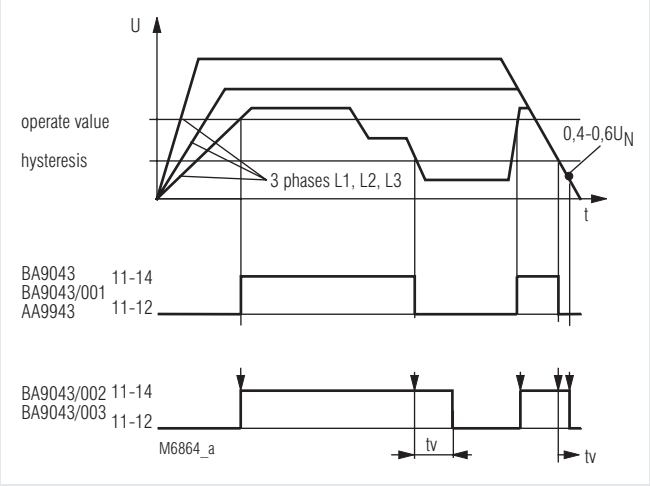
0221539


BA 9043

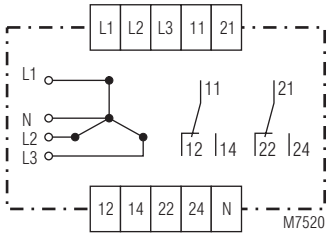

AA 9943

- According to EC/EN 60255-1, IEC/EN 60255-26, VDE 0435 part 303
- 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 optionally with adjustable time delay
- Closed circuit operation
- LED indicator for operation and state of contact
- Insensitive to harmonics
- Frequency up to 400 Hz
- Width 45 mm

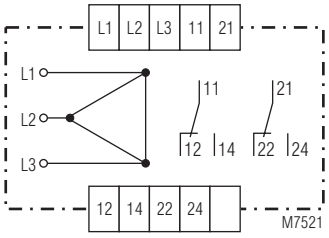
## Function Diagram




## Circuit Diagram



BA 9043, BA 9043/002
AA 9943



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

## Approvals and Marking

A025518 *) see variants

## Application

Undervoltage detection in 3 phase systems

## Indicators

| | |
|---|---|
| upper LED: | on, when voltage connected |
| (only BA 9043) | |
| 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 ≥ 0,6 $U_N$ . At < 0.4 $U_N$ the relay switches off without delay.

## 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:** | ± 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<br>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** | | IEC/EN 60 947-5-1 |
| to AC 15 at 3 A, AC 230 V: | 3 x $10^5$ switching cycles | |
| **Short circuit strength** | | |
| **max. fuse rating:** | 4 A gL | IEC/EN 60 947-5-1 |
| **Mechanical life:** | > 30 x $10^6$ switching cycles | |

### General Data

| | | |
|---|---|---|
| **Operating mode:** | Continuous operation | |
| **Temperature range:** | - 20 ... + 60°C | |
| **Clearance and creepage distances** | | |
| rated impuls voltage / pollution degree: | 4 kV / 2 | IEC 60 664-1 |
| **EMC** | | |
| Electrostatic discharge: | 8 kV (air) | IEC/EN 61 000-4-2 |
| HF irradiation: | 10 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<br>frequency 10 ... 55 Hz | IEC/EN 60 068-2-6 |
| **Climate resistance:** | 20 / 060 / 04 | IEC/EN 60 068-1 |
| **Terminal designation:** | DIN EN 50 005 | |
| **Wire connection:** | 2 x 2.5 mm² solid or<br>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 |
| **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.**

## Standard Type

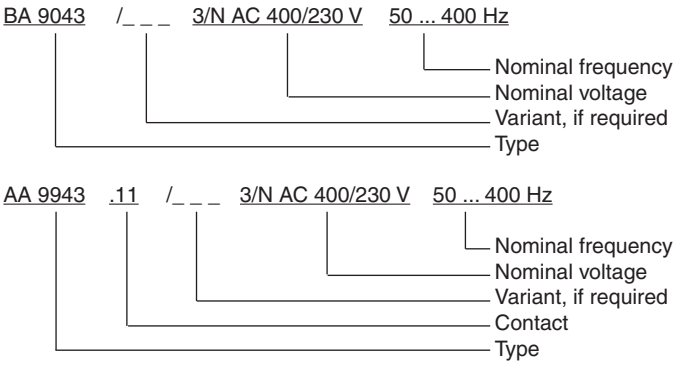
BA 9043 3/N AC 400 / 230 V 50 ... 400 Hz
Article number: 0039676

- 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 ... 10 sec |
| BA 9043/003: | without neutral, adjustable time delay $t_v$ = 0.5 ... 10 sec |
| BA 9043: | with CCC-approval on request |

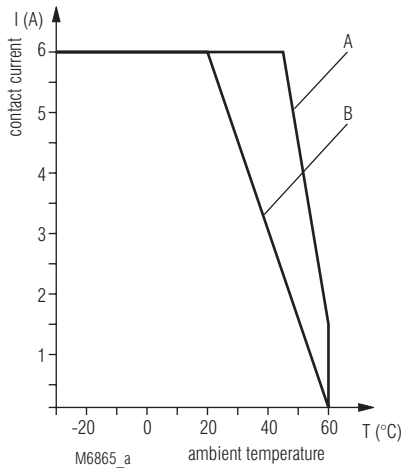
**Ordering example for variants**




## 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

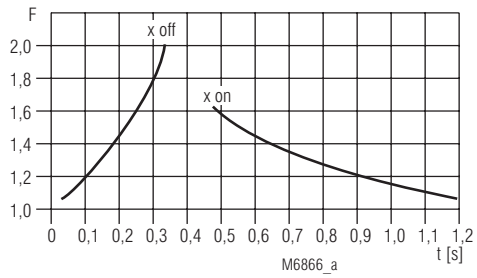



Diagram switching delay

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:

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

U setting = 190 V
U applied = 240 V

according to diagram:
$t_M$on = approx. 800 ms
$t_M$off = approx. 100 ms

## Specification for Tender for BA 9043

Undervoltage relay according to IEC 255, VDE 0435 for nominal voltage of 3 AC 100/57 to 500/290 V. Adjustable operate and release value, for 3p4w systems
Width 45 mm
Type BA 9043
Manufactured by E. DOLD & SÖHNE KG

Undervoltage relay according to IEC 255, VDE 0435 for nominal voltage of 3 AC 100/57 to 500/290 V. Adjustable operate and release value, for 3p4w systems, adjustable time delay up to 10 s.
Width 45 mm
Type BA 9043/002
Manufactured by E. DOLD & SÖHNE KG

Undervoltage relay according to IEC 255, VDE 0435 for nominal voltage of 3 AC 100/57 to 500/290 V. Adjustable operate and release value, for 3p3w systems
Width 45 mm
Type BA 9043/001
Manufactured by E. DOLD & SÖHNE KG

Undervoltage relay according to IEC 255, VDE 0435 for nominal voltage of 3 AC 100/57 to 500/290 V. Adjustable operate and release value, for 3p3w systems, adjustable time delay up to 10 s.
Width 45 mm
Type BA 9043/003
Manufactured by E. DOLD & SÖHNE KG