# VARIMETER
# Undervoltage Relay
# BA 9043

**Translation of the original instructions**

0221539

## Product Description

The undervoltage relay BA 9043 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.

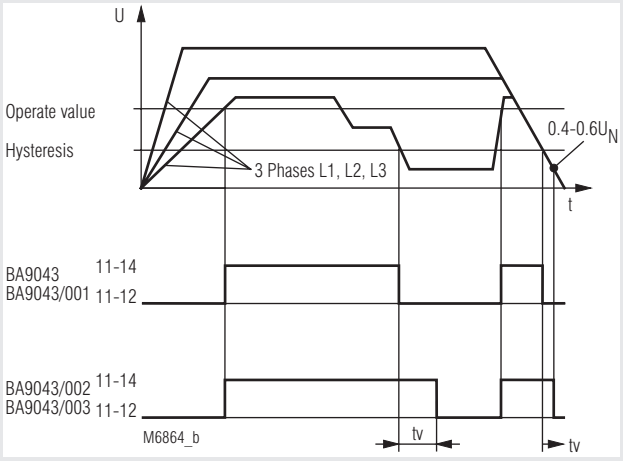
**Your Advantages**
- Preventive maintenance
- For better productivity
- Quicker fault locating

**Features**
- 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
- De-energized on trip operation
- LED indicator for operation and state of contact
- Insensitive to harmonics
- Frequency up to 400 Hz
- Optionally with adjustable time delay
- Width 45 mm

## Approvals and Markings

[1] See variants

## Function Diagram




## Application

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

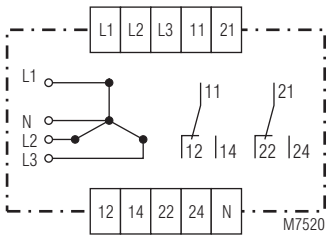
## Indicators

| | |
|---|---|
| Red LED: | On, when voltage connected |
| Green LED: | On, when output contact activated |

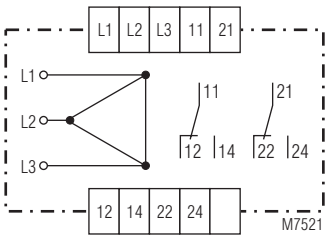
## Notes

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.

## Circuit Diagrams




BA 9043, BA 9043/002




BA 9043/001, BA 9043/003

## 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: | 3/N AC 100/57 V; 220/127 V; 400/230 V 415/240 V; 440/254 V; 500/290 V; 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; 3 AC 690 V |
| **Max. overload:** | 1.2 $U_N$ 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 |

### Output

| | | |
|---|---|---|
| **Contacts:** | 2 changeover contacts | |
| **Thermal current $I_{th}$:** | Continuous current limit curve (max. 6 A per contact) | |
| **Switching capacity** | | |
| 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 |
| To DC 13: | 1 A / DC 24 V | IEC/EN 60947-5-1 |
| **Electrical life** | | IEC/EN 60947-5-1 |
| at 3 A, AC 230 V cos φ = 1: | 2 x $10^5$ switching cycles | |
| **Short circuit strength** | | |
| **max. fuse rating:** | 4 A gG / gL | IEC/EN 60947-5-1 |
| **Mechanical life:** | > 30 x $10^6$ 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: | 6 kV / 2 | IEC 60664-1 |
| Overvoltage category: | III | |
| **EMC** | | |
| Electrostatic discharge: | 8 kV (air) | IEC/EN 61000-4-2 |
| HF irradiation 80 MHz ... 2.7 GHz: | 20 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 frequency 10 ... 55 Hz | IEC/EN 60068-2-6 |
| **Climate resistance:** | 20 / 060 / 04 | IEC/EN 60068-1 |
| **Terminal designation:** | DIN EN 50005 | |

## Technical Data

| | | |
|---|---|---|
| **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:** | Plus-minus terminal screws M3.5 with self-lifting clamp. piece | IEC/EN 60 999-1 |
| **Stripping length:** | 10 mm | |
| **Fixing torque:** | 0.8 Nm | |
| **Mounting:** | DIN rail | IEC/EN 60715 |
| **Weight:** | 310 g | |

### Dimensions

**Width x height x depth:** 45 x 73 x 132 mm

### CCC-Data

**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

| | | |
|---|---|---|
| **Vibration and shock resistance:** | Category 1, Class B | IEC/EN 61373 |
| **Service temperature classes:** | OT1, compliant OT2, 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

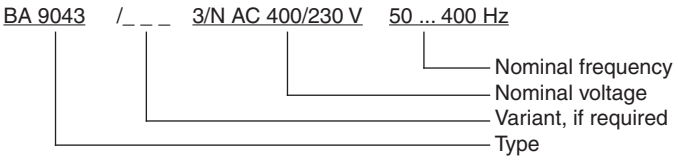
Article number: 0039676

- For 3p4w systems
- Nominal voltage $U_N$: 3/N AC 400 / 230 V
- Output: 2 changeover contacts
- Width: 45 mm

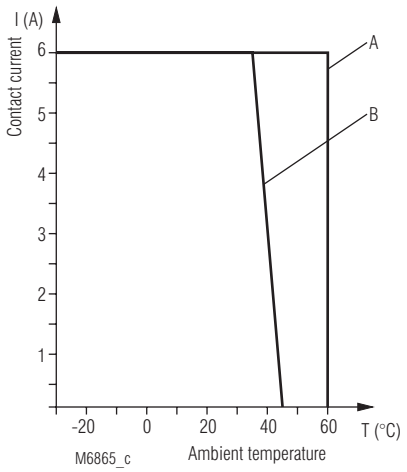
### Variants

| | |
|---|---|
| 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**



## Characteristics




A = Device free-standing
B = Device mounted without distance heated by devices with same load.

Continuous current limit curve

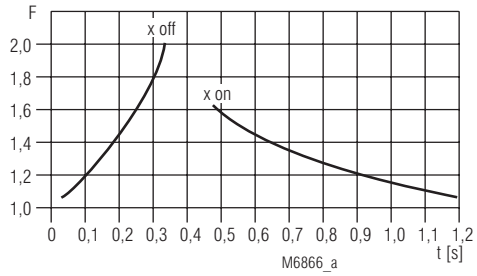



Diagram switching delay

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:

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

U setting = 190 V
U applied = 240 V

According to diagram:
$t_M$on = Approx. 800 ms
$t_M$off = Approx. 100 ms