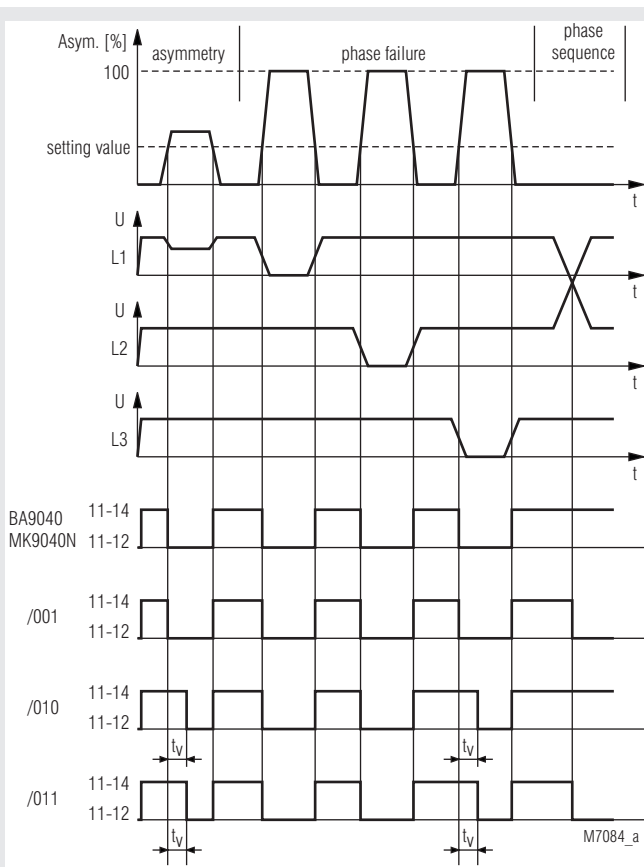


## VARIMETER Asymmetry Relay BA 9040, MK 9040N



- According to IEC/EN 60255-1
- Recognition of
  - Voltage asymmetry
  - Phase failure
  - Voltage feedback
  - Optionally with phase sequence recognition
- Optionally with adjustable response delay
- 2 LED displays for power supply and state of contact
- Wire connection: also 2 x 1.5 mm<sup>2</sup> stranded ferruled, or 2 x 2.5 mm<sup>2</sup> solid DIN 46 228-1/-2/-3/-4
- As option with pluggable terminal blocks for easy exchange of devices
  - With screw terminals
  - Or with cage clamp terminals
- BA 9040: width 45 mm
- MK 9040N: width 22.5 mm

### Function Diagram



### Approvals and Markings



\* see variants

### Applications

Monitoring three-phase mains for voltage asymmetry, phase failure or incorrect phase sequence, e.g. in elevators, escalators, crane systems etc.

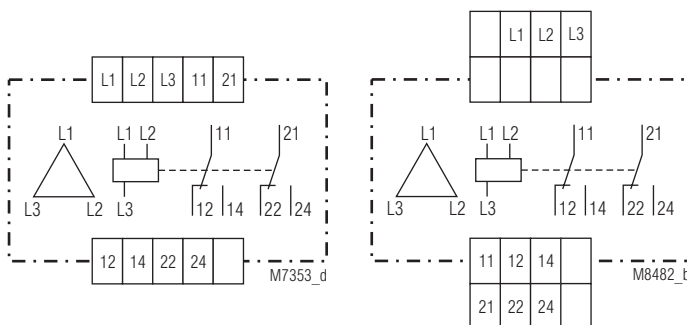
### Indicators

Upper LED: On, when supply voltage connected  
Lower LED: On, when output relay energized

### Connection Terminals

Terminal designation	Signal description
L1, L2, L3	Connection of the monitoring 3-phase system
11, 12, 14	1. changeover contact
21, 22, 24	2. changeover contact

### Circuit Diagrams



BA 9040.12

MK 9040N.12

## Technical Data

### Input

<b>Nominal voltage <math>U_N</math>:</b>	3 AC 400 V
<b>Voltage range:</b>	0.8 ... 1.1 $U_N$
<b>Nominal consumption:</b>	
BA 9040:	approx. 4.8 VA
MK 9040N:	7 VA
<b>Nominal frequency:</b>	50 / 60 Hz
<b>Frequency range:</b>	45 ... 65 Hz
<b>Temperature influence:</b>	< 0.05 % / K
<b>Frequency influence:</b>	< 0.02 % / Hz

### Setting Ranges

<b>Setting range:</b>	5 ... 15 % voltage asymmetry
<b>Repeat accuracy</b> (constant parameters):	≤ 0.5 %
<b>Release ratio:</b>	< 4 % $U_N$
<b>Voltage feedback recognition:</b>	up to 100 % - setting value, e.g. when setting value = 5 % asymmetry, 100 % - 5 % = 95 % Recognition of voltage feedback up to 95 %

### Time delay $t_d$

BA 9040:	0.5 ... 5 s
MK 9040N:	0.5 ... 10 s

### Output

<b>Contacts</b>	2 changeover contacts	
<b>Response/release time:</b>		
BA 9040:	≤ 1 s / ≤ 250 ms	
MK 9040N:	≤ 1.5 s / ≤ 250 ms	
<b>Thermal current <math>I_{th}</math>:</b>	6 A (see continuous current limit curve)	
<b>Switching capacity</b> to AC 15		
NO contact:	2 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
MK:		
to AC 15		
NO contact:	1,5 A / AC 230 V	IEC/EN 60 947-5-1
NC contact:	1 A / AC 230 V	IEC/EN 60 947-5-1
<b>Electrical life:</b>		
at 3 A, AC 230 V $\cos \varphi = 1$ :	10 <sup>5</sup> switching cycles	IEC/EN 60 947-5-1
<b>Permissible switching frequency:</b>	6 000 switching cycles / h	
<b>Short circuit strength</b>		
<b>max. fuse rating:</b>	4 A gG / gL	IEC/EN 60 947-5-1
<b>Mechanical life:</b>	10 x 10 <sup>6</sup> switching cycles	

### General Data

<b>Operating mode:</b>	Continuous operation	
<b>Temperature range</b>		
Operation:	- 20 ... + 60 °C	
Storage:	- 20 ... + 60 °C	
<b>Altitude:</b>	< 2,000 m	
<b>Clearance and creepage distances</b>		
rated impulse voltage / pollution degree:	4 kV / 2	IEC 60 664-1
Overvoltage category:	III *)	
	*) up to 3 AC 480 V	
<b>EMC</b>		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF irradiation		
80 MHz ... 2.7 GHz:	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:	2 kV	IEC/EN 61 000-4-5
between wire and ground:	4 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
<b>Degree of protection</b>		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
<b>Housing:</b>	Thermoplast with V0 behaviour according to UL subject 94	

## Technical Data

<b>Vibration resistance:</b>	Frequency 10 ... 55 Hz, Amplitude 0.35 mm IEC/EN 60 068-2-6
<b>Climate resistance:</b>	20 / 060 / 04 IEC/EN 60 068-1
<b>Wire connection:</b>	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
Stripping length:	10 mm
<b>Wire fixing:</b>	
BA 9040:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1
MK 9040N:	Box terminal with wire protection
<b>Fixing torque:</b>	0.8 Nm
<b>Mounting:</b>	DIN rail IEC/EN 60 715
<b>Weight:</b>	325 g

### Dimensions

<b>Width x height x depth:</b>	
BA 9040:	45 x 74 x 133 mm
MK 9040N:	22.5 x 90 x 100 mm

### CSA-Data

<b>Switching capacity:</b>	3A 230Vac
<b>Wire connection:</b>	60°C / 75°C copper conductors only AWG 20 - 14 Sol Torque 0.8 Nm AWG 20 - 16 Str Torque 0.8 Nm



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

### CCC-Data

<b>Thermal current <math>I_{th}</math>:</b>	5 A
<b>Switching capacity</b> 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.

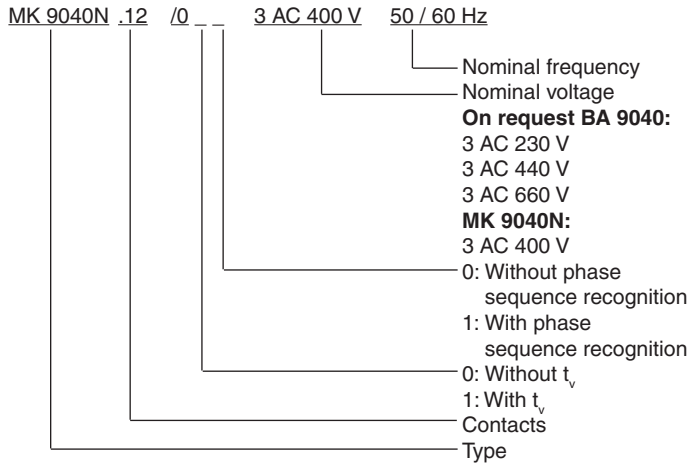
### Standard Types

BA 9040.12/001	3 AC 400 V	50/60 Hz
Article number:	0043764	
• With phase sequence detection		
• Without operate delay		
• Output:	2 changeover contacts	
• Nominal voltage $U_N$ :	3 AC 400 V	
• Width:	45 mm	
MK 9040N.12/001	3AC 400 V	50/60 Hz
Article number:	0055712	
• With phase sequence detection		
• Without operate delay		
• Output:	2 changeover contacts	
• Nominal voltage $U_N$ :	3 AC 400 V	
• Width:	22.5 mm	

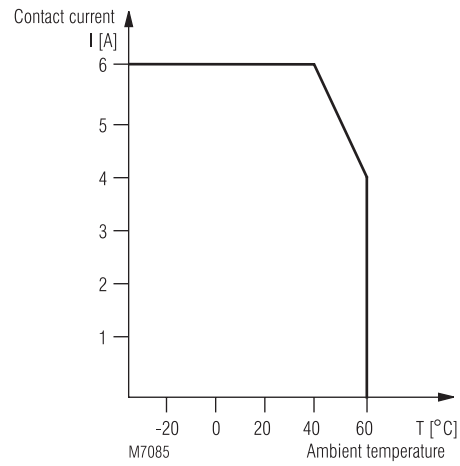
## Variants

BA 9040.12/60:	With CSA approval on request
BA 9040:	With CCC approval on request
BA 9040.12/0_0:	Without phase sequence detection
BA 9040.12/0_1:	With phase sequence detection
BA 9040.12/00_:	Without time delay
BA 9040.12/01_:	With adjustable time delay
	$t_v$ : 0 ... 5 s
MK 9040N.12/0_0:	Without phase sequence detection
MK 9040N.12/0_1:	With phase sequence detection
MK 9040N.12/00_:	Without time delay
MK 9040N.12/01_:	With adjustable time delay
	$t_v$ : 0 ... 10 s

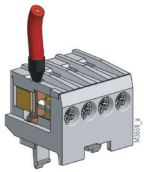
## Ordering example for variants



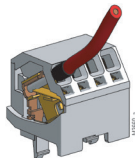
## Characteristic



## Options with Pluggable Terminal Blocks



Screw terminal  
(PS/plugin screw)



Cage clamp  
(PC/plugin cage clamp)

