

# Monitoring Technique

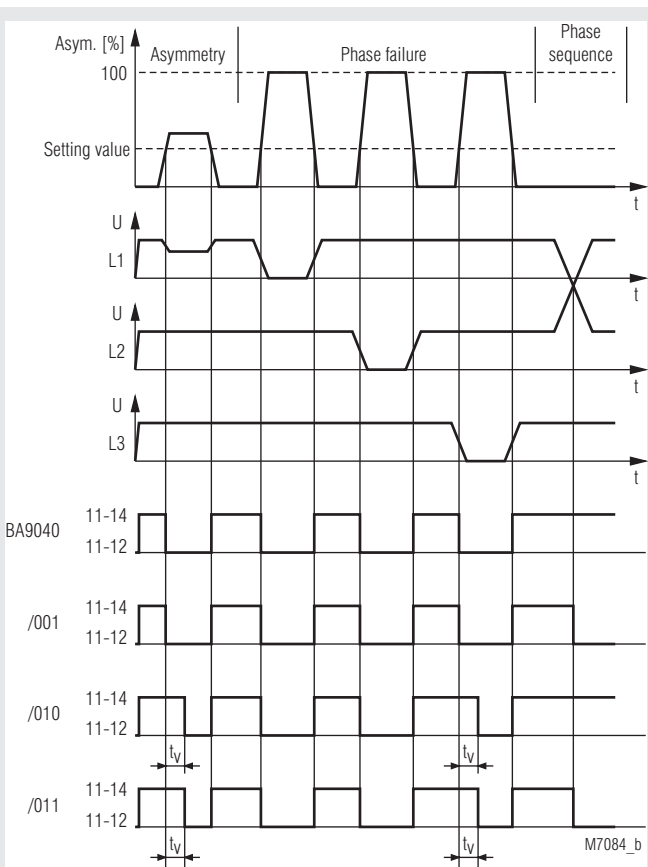
## VARIMETER Asymmetry Relay BA 9040

Translation  
of the original instructions



- 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 46228-1/-2/-3/-4
- Width: 45 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.

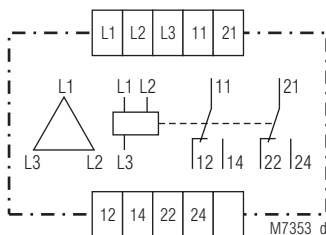
### Indicators

Red LED: On, when supply voltage connected  
Green LED: On, when output relay energized

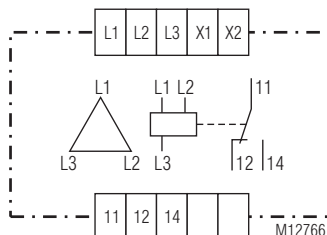
### Connection Terminals

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
X1, X2 (only for /301, /302)	Nominal voltage X1/X2 not bridged: $U_N$ X1/X2 bridged: $U_N^* 1.15$ (/301) $U_N^* 1.10$ (/302)

### Circuit Diagrams



BA 9040.12



BA 9040.11/301  
BA 9040.11/302

## Technical Data

<b>Input</b>	
<b>Nominal voltage <math>U_N</math>:</b>	100, 110, 120, 208, 220, 230, 240, 380, 400, 415, 440, 460, 500, 550, 600, 660, 690 V
<b>Voltage range:</b>	0.8 ... 1.1 $U_N$
<b>Nominal consumption:</b>	Approx. 4.8 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 %
<b>Time delay <math>t_v</math>:</b>	0.5 ... 5 s

## Output

<b>Contacts</b>	
.11:	1 changeover contact (/301, /302)
.12:	2 changeover contacts
<b>Response/release time:</b>	≤ 1 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	2 A / AC 230 V IEC/EN 60947-5-1
NO contact:	1 A / AC 230 V IEC/EN 60947-5-1
NC contact:	1 A / AC 230 V IEC/EN 60947-5-1
To DC 13	
NO contact:	1 A / DC 24 V IEC/EN 60947-5-1
NC contact:	1 A / DC 24 V IEC/EN 60947-5-1
<b>Electrical life</b>	
at 3 A, AC 230 V $\cos \varphi = 1$ :	10 <sup>5</sup> switching cycles IEC/EN 60947-5-1
<b>Permissible switching frequency:</b>	6000 switching cycles / h
<b>Short circuit strength</b> <b>max. fuse rating:</b>	4 A gG / gL IEC/EN 60947-5-1
<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>	≤ 2000 m	
<b>Clearance and creepage distances</b>		
Rated impulse voltage / pollution degree:	4 kV / 2	IEC 60664-1
Terminals X1 / X2:	No galvanic separation to L1 / L2 / L3	
Overvoltage category:	III up to 3 AC 480 V II > 3 AC 480 V	
<b>EMC</b>		
Electrostatic discharge:	8 kV (air)	IEC/EN 61000-4-2
HF irradiation		
80 MHz ... 2.7 GHz:	10 V / m	IEC/EN 61000-4-3
Fast transients:	2 kV	IEC/EN 61000-4-4
Surge voltages between wires for power supply:	2 kV	IEC/EN 61000-4-5
Between wire and ground:	4 kV	IEC/EN 61000-4-5
HF wire guided:	10 V	IEC/EN 61000-4-6
Interference suppression:	Limit value class B	EN 55011
<b>Degree of protection</b>		
Housing:	IP 40	IEC/EN 60529
Terminals:	IP 20	IEC/EN 60529
<b>Housing:</b>	Thermoplast with V0 behaviour according to UL subject 94	
<b>Vibration resistance:</b>	Frequency 10 ... 55 Hz, Amplitude 0.35 mm IEC/EN 60068-2-6	
<b>Climate resistance:</b>	20 / 060 / 04	IEC/EN 60068-1

## Technical Data

<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 46228-1/-2/-3/-4
Stripping length:	10 mm
<b>Wire fixing:</b>	Flat terminals with self-lifting clamping piece IEC/EN 60999-1
<b>Fixing torque:</b>	0.8 Nm
<b>Mounting:</b>	DIN rail IEC/EN 60715
<b>Weight:</b>	325 g

## Dimensions

<b>Width x height x depth:</b>	45 x 74 x 133 mm
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## 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 60947-5-1
To DC 13:	1 A / DC 24 V IEC/EN 60947-5-1



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	
<ul style="list-style-type: none"> <li>• With phase sequence detection</li> <li>• Without operate delay</li> </ul>		
• Output:	2 changeover contacts	
• Nominal voltage $U_N$ :	3 AC 400 V	
• Width:	45 mm	

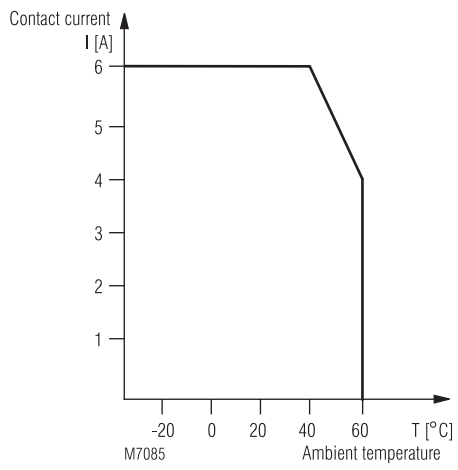
## Variants

BA 9040.12/60:	With CSA approval on request
BA 9040:	With CCC approval on request
BA 9040.11/301:	Like BA 9040/001, with bridge X1/X2: $U_N$ without bridge X1/X2: $U_N^* 1, 15$ , Both LEDs green, 1 changeover contact
BA 9040.11/302:	Like BA 9040, with bridge X1/X2: $U_N$ without bridge X1/X2: $U_N^* 1, 1$ , 1 changeover contact

## Ordering example for variants

MK 9040N .12 /0	3 AC 400 V	50 / 60 Hz	
			Nominal frequency
			Nominal voltage
			0: Without phase sequence recognition
			1: With phase sequence recognition
			0: Without $t_v$
			1: With $t_v$
			Contacts
			Type

## Characteristic



Continuous current limit curve

## Safety Remark



**Danger due to electric shock!**  
**Danger to life or serious injury.**

The terminals X1 - X2 have no galvanic isolation from the measuring circuit L1 - L2 - L3. They must therefore be controlled with potential-free contacts.

