VARIMETER
Asymmetry Relay
BA 9040

Translation of the original instructions

DOLD

0221538

Your Advantages
- Correct direction of rotation of drives
- Simple wiring

Features
- According to IEC/EN 60255-1
- Recognition of
  - Voltage asymmetry
  - Phase failure
  - Voltage feedback
  - Optionally with phase sequence recognition
- 2 LED displays for power supply and state of contact
- Optionally with adjustable response delay
- Wire connection: Also 2 x 1.5 mm² stranded ferruled, or 2 x 2.5 mm² solid DIN 46228-1/-2/-3/-4
- Width: 45 mm

Product Description

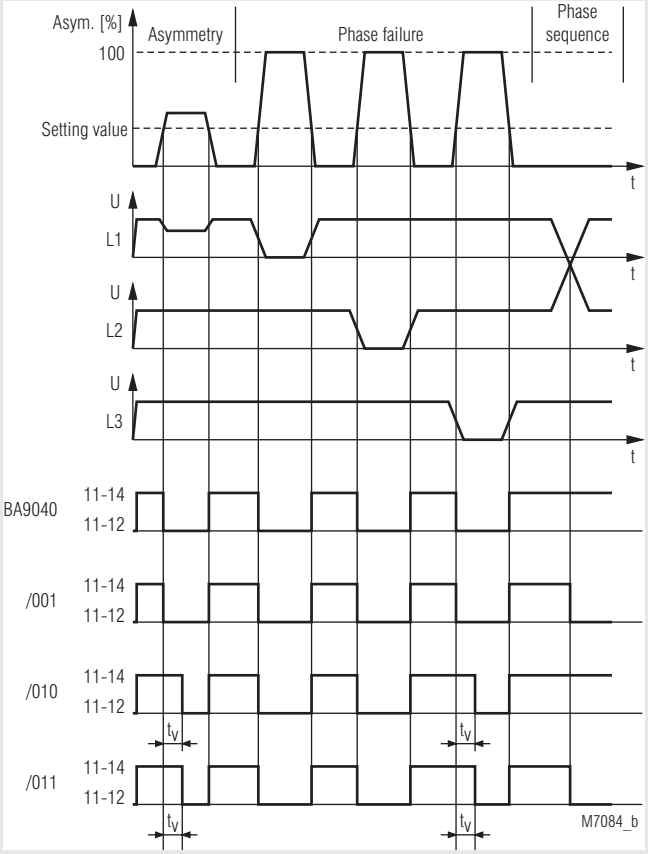
The asymmetry relay BA 9040 of the VARIMETER series monitors asymmetry, reverse voltages, phase failure and incorrect phase sequence in three-phase networks. The early detection of impending failures and preventive maintenance prevent costly damage and as a user you benefit from the operational reliability and high availability of your system.

Approvals and Markings

CE, cULus Canada / USA *, CCC *, UKCA

* see variants

Function Diagram



Applications

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

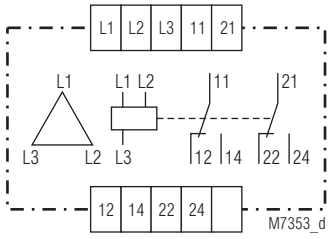
Indicators

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

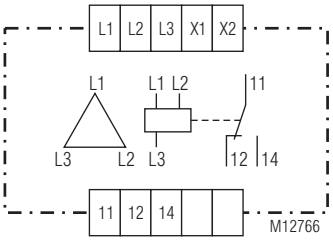
Connection Terminals

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 bridged: U_N X1/X2 not 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

Input

Nominal voltage U_N:	100, 110, 120, 208, 220, 230, 240, 380, 400, 415, 440, 460, 500, 550, 600, 660, 690 V
Voltage range:	0.8 ... 1.1 U_N
Nominal consumption:	Approx. 4.8 VA
Nominal frequency:	50 / 60 Hz
Frequency range:	45 ... 65 Hz
Temperature influence:	< 0.05 % / K
Frequency influence:	< 0.02 % / Hz

Setting Ranges

Setting range:	5 ... 15 % voltage asymmetry
Repeat accuracy (constant parameters):	≤ 0.5 %
Release ratio:	< 4 % U_N
Voltage feedback recognition:	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_v:	0.5 ... 5 s

Output

Contacts		
.11:	1 changeover contact (/301, /302)	
.12:	2 changeover contacts	
Response/release time:	≤ 1 s / ≤ 250 ms	
Thermal current I_{th}:	6 A (see continuous current limit curve)	
Switching capacity		
to AC 15		
NO contact:	2 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
Electrical life		
at 3 A, AC 230 V cos φ = 1:	10^5 switching cycles	IEC/EN 60947-5-1
Permissible switching frequency:	6000 switching cycles / h	
Short circuit strength max. fuse rating:	4 A gG / gL	IEC/EN 60947-5-1
Mechanical life:	10 x 10^6 switching cycles	

General Data

Operating mode:	Continuous operation	
Temperature range		
Operation:	- 20 ... + 60 °C	
Storage:	- 20 ... + 60 °C	
Altitude:	≤ 2000 m	
Clearance and creepage distances		
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	
EMC		
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
Degree of protection		
Housing:	IP 40	IEC/EN 60529
Terminals:	IP 20	IEC/EN 60529
Housing:	Thermoplast with V0 behaviour according to UL subject 94	
Vibration resistance:	Frequency 10 ... 55 Hz, Amplitude 0.35 mm	IEC/EN 60068-2-6
Climate resistance:	20 / 060 / 04	IEC/EN 60068-1

Technical Data

Wire connection:	2 x 2.5 mm² solid or 2 x 1.5 mm² stranded wire with sleeve DIN 46228-1/-2/-3/-4	
Stripping length:	10 mm	
Wire fixing:	Flat terminals with self-lifting clamping piece	IEC/EN 60999-1
Fixing torque:	0.8 Nm	
Mounting:	DIN rail	IEC/EN 60715
Weight:	325 g	

Dimensions

Width x height x depth:	45 x 74 x 133 mm

CSA-Data

Switching capacity:	3A 230Vac
Wire connection:	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

Thermal current I_{th}:	5 A	
Switching capacity		
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

- With phase sequence detection
- Without operate delay
- Output: 2 changeover contacts
- Nominal voltage U_N: 3 AC 400 V
- Width: 45 mm

Variants

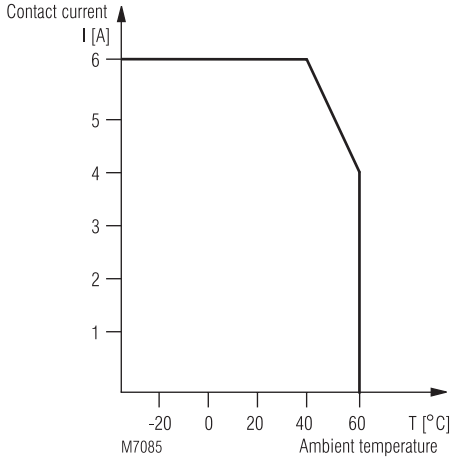
BA 9040.12/60:	With CSA approval on request
BA 9040:	With CCC approval on request
BA 9040.11/301:	Like BA 9040/001, with bridge X1/X2: U_N without bridge X1/X2: U_N * 1.15 Both LEDs green, 1 changeover contact
BA 9040.11/302:	Like BA 9040, with bridge X1/X2: U_N without bridge X1/X2: U_N * 1.1 1 changeover contact

Ordering example for variants

BA 9040N .12 /0 _ _ 3 AC 400 V 50 / 60 Hz

- 50 / 60 Hz: Nominal frequency
- 3 AC 400 V: Nominal voltage
- _ _: 0: Without phase sequence recognition; 1: With phase sequence recognition
- _: 0: Without t_v; 1: With t_v
- .12: Contacts
- BA 9040N: 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.