

# Monitoring Technique

**VARIMETER PRO**  
**Phase Monitor**  
**BD 9080/003, BD 9080/004**

Translation  
of the original instructions



### Product Description

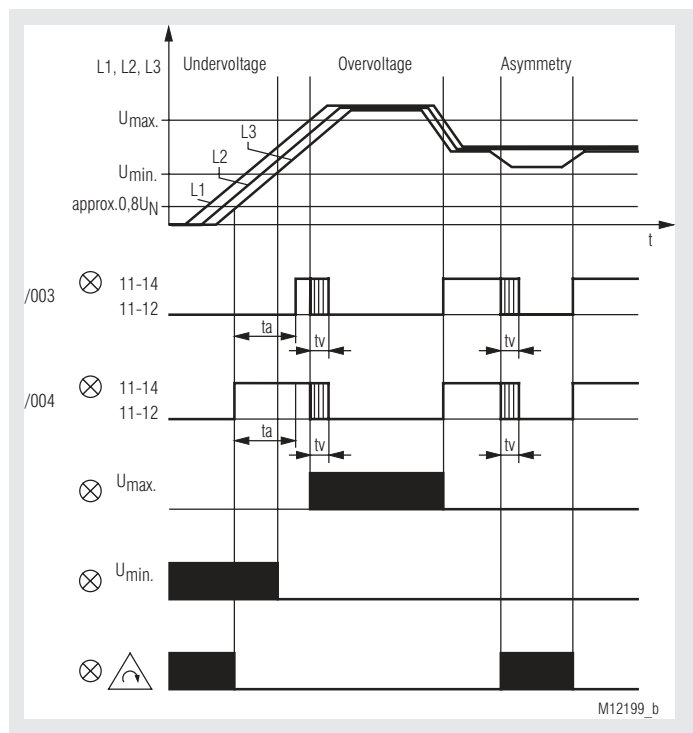
The Phase monitor BD 9080 of the VARIMETER PRO series monitors over and undervoltage, asymmetry, power failure as well as wrong phase sequence at three-phase networks. The measurement is very simple and can be carried out without much wiring effort, as no separate auxiliary voltage is required. Early detection of impending failures and preventive maintenance prevent costly damage and as a user you benefit from the operational safety and high availability of your system.

- According to IEC/EN 60255-1
- Monitoring of
  - Under- and overvoltage up to 3 AC 1000 V max.
  - Asymmetry
  - Phase failure
  - Phase sequence
- Adjustable on delay 0.1 ... 30 s
- Without separate auxiliary voltage
- Start up delay  $t_a$  30 s fixe
- One LED in each case for
  - Operating voltage L1/L3
  - Overvoltage  $U_{max}$
  - Undervoltage  $U_{min}$
  - Asymmetry / Phase sequence / Power failure
  - Contact position
- De-energized on trip
- 2 changeover contacts
- As option available with energized on trip
- Width: 45 mm

### Approvals and Markings



### Function Diagram



### Applications

For monitoring three-phase networks for undervoltage, overvoltage, phase sequence, asymmetry, power failure.

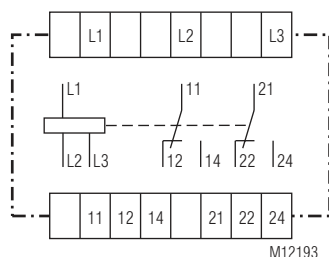
### Indication

- Green LED L1 / L3:
  - Perm. on - On, when supply connected
  - Flashes - Start up delay  $t_a$  on process
- Red LED  $U_{max}$ :
  - Perm. on - On, in event of overvoltage
- Red LED  $U_{min}$ :
  - Perm. on - On, in event of undervoltage
- Red LED  $\Delta$ :
  - Perm. on - On, in event of
    - Asymmetry
    - Incorrect phase sequence
    - Power failure
- Yellow LED:
  - Perm. on - On, when output relay activated
  - Flashes - On delay  $t_v$  on process

### Notes

Measurement procedures:  
Arithmetical mean value measurement over several half-waves of rectified phase voltages L1/L2 and L2/L3. Reference phase is L3. Networks with or without neutral can be monitored.  
The start up delay only acts once after applying the operating voltage to L1 / L3.

### Circuit Diagram



### Connection Terminals

Terminal designation	Signal description
L1, L2, L3	Connection phase voltage (L1, L2, L3)
11, 12, 14	Indicator relay (1. C/O contact)
21, 22, 24	Indicator relay (2. C/O contact)

## Technical Data

### Input Circuit

#### Nominal voltage $U_N$

L1 / L2 / L3:	3 AC 400 V
	Min. voltage: 3 AC 320 V
	Max. voltage: 3 AC 530 V
	3 AC 750 V
	Min. voltage: 3 AC 600 V
	Max. voltage: 3 AC 1000 V
	(other voltages on request)
<b>Setting range:</b>	0.8 ... 1.33 $U_N$
<b>Nominal frequency of <math>U_N</math>:</b>	50 / 60 Hz
<b>Frequency range of <math>U_N</math>:</b>	45 ... 65 Hz
<b>Power consumption with <math>U_N</math>:</b>	L1 approx. 4.3 mA
	L2 approx. 0.3 mA
	L3 approx. 4.5 mA
	$\leq 5\% \times U_A$ ( $U_A$ = Response value)

#### Hysteresis:

#### Asymmetry detection

Voltage:	$U_A \pm 8 \dots 20\%$
<b>Fault angle:</b>	Approx. $120^\circ \pm 15^\circ$
<b>Temperature influence:</b>	$\leq 0.08\% / K$

### Output Circuit

<b>Contacts:</b>	2 changeover contacts	
<b>Response-/Release time:</b>	Approx. 900 / 150 ms	
<b>On delay <math>t_v</math>:</b>	0.1 ... 30 s	
<b>Start up delay <math>t_a</math>:</b>	30 s fixe or alternatively $t_a = t_v$	
<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 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 4 A, AC 230 V $\cos \varphi = 1$ :	5 x $10^5$ switch. cycles	
<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 $10^6$ switching cycles	

### General Data

<b>Operating mode:</b>	Continuous operation	
<b>Temperature range</b>		
Operation:	- 25 ... + 60 °C	
Storage:	- 40 ... + 85 °C	
<b>Altitude:</b>	< 2000 m	
<b>Clearance and creepage distances</b>		
Rated impulse voltage / pollution degree		
Measuring input / contact:	8 kV / 2	IEC 60664-1
Contact / contact:	6 kV / 2	IEC 60664-1
Overvoltage category:	III	
<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
Langsame gedämpfte schwingende Wellen		
Gegentaktspannung:	1 kV	IEC/EN 61000-4-18
Gleichtaktspannung:	2.5 kV	IEC/EN 61000-4-18
Fast transients:	2 kV	IEC/EN 61000-4-4
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
<b>Degree of protection:</b>		
Housing:	IP 40	IEC/EN 60529
Terminals:	IP 20	IEC/EN 60529
<b>Housing:</b>	Thermoplastic with V0 behaviour according to UL subject 94	
<b>Vibration resistance:</b>	Amplitude 0.35 mm	
	Frequency 10 ... 55 Hz, IEC/EN 60068-2-6	
<b>Climate resistance:</b>	20 / 060 / 04	IEC/EN 60068-1

## Technical Data

**Wire connection:** DIN 46228-1/-2/-3/-4

### Fixed screw terminals

Cross section:	0.1 ... 4 mm <sup>2</sup> (AWG 28 - 12) solid or 0.1 ... 2.5 mm <sup>2</sup> (AWG 28 - 12) stranded wire with ferrules
Stripping length:	10 mm
<b>Fixing torque:</b>	0.8 Nm
<b>Wire fixing:</b>	Cross-head screw / M3,5 box terminals
<b>Mounting:</b>	DIN rail IEC/EN 60715
<b>Weight:</b>	325 g

### Dimensions

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

### Classification to DIN EN 50155

<b>Vibration and shock resistance:</b>	Category 1, Class B	IEC/EN 61373
<b>Protective coating of the PCB:</b>	No	

### Standard Type

BD 9080.12/003	3 AC 750 V	0.1 ... 30 s	30 s
Article number:	0068847		
• Output:	2 changeover contacts		
• Nominal voltage $U_N$ :	3 AC 750 V		
• De-energized on trip			
• On delay $t_v$ :	0.1 ... 30 s		
• Start up delay $t_a$ :	30 s fixe		
• Width:	45 mm		
BD 9080.12/004	3 AC 400 V	0.1 ... 30 s	$t_a = t_v$
Article number:	0068849		
• Output:	2 changeover contacts		
• Nominal voltage $U_N$ :	3 AC 400 V		
• De-energized on trip			
• Response delay $t_v$ :	0.1 ... 30 s		
• Start up delay $t_a$ :	$t_a = t_v$		
• Width:	45 mm		

### Notes



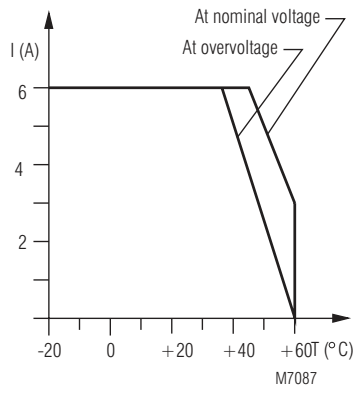
**Risk of electrocution!**  
**Danger to life or risk of serious injuries.**

- Disconnect the system and device from the power supply and ensure they remain disconnected during electrical installation.
- The voltage of the monitored voltage system is connected to terminals L1/L2/L3 Please observe sufficient distance to terminals of neighbour devices and to the grounded metal cabinet or box (min 0.5 cm).

### Ordering example

BD 9080	.12	/003	3 AC 750 V	0.1 ... 30 s	30 s
					Start up delay $t_a$
					Response delay $t_v$
					Nominal voltage $U_N$
					Variant
					Contacts
					Type

## Characteristic



Continuous current limit curve

## Connection Examples

