



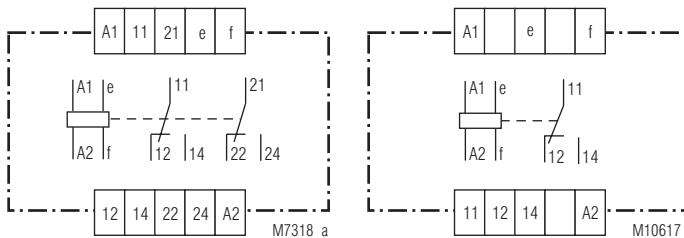
Your Advantages

- Protection against defect by overvoltage
- Preventive maintenance
- For better productivity
- Quicker fault locating
- Precise and reliable

Features

- According to IEC/EN 60 255, DIN VDE 0435-303, IEC/EN 60 947-1
- Monitoring of DC and AC
- With measuring ranges from 15 mV to 1000 V
- High overload possible
- Input frequency up to 5 kHz
- Galvanic separation between Auxiliary Circuit – measuring circuit
- Auxiliary supply AC/DC; BA 9054 with AC
- Optionally with start-up delay
- With time delay, up to max. 100 sec
- Optionally with safe separation to IEC/EN 61140
- As option with manual reset
- LED indicators for operation and contact position
- Width 45 mm

Circuit Diagrams



BA 9054

BA 9054/_ 2 _

Approvals and Markings



* see variants

Applications

Monitoring voltage in AC or DC systems

Connection Terminals

Terminal designation	Signal designation
A1, A2	Auxiliary voltage
i, k	Current measuring input
11, 12, 14	1st changeover contact
21, 22, 24	2nd changeover contact

Function

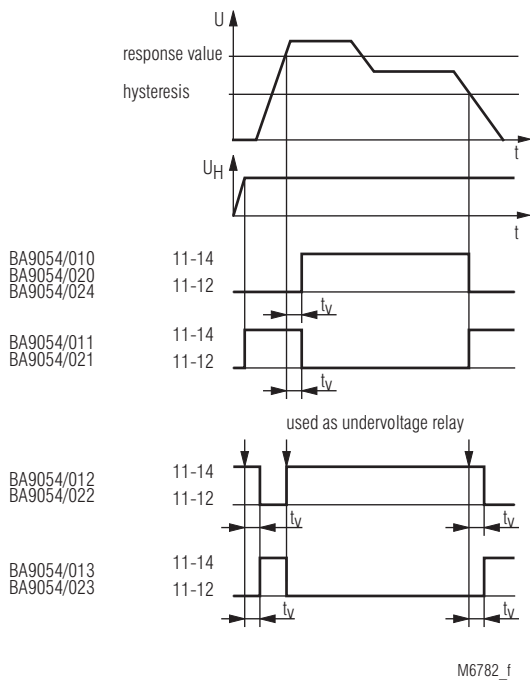
The relays measure the arithmetic mean value of the rectified measuring voltage. The AC units are adjusted to the r.m.s value. They have settings for response value and hysteresis. The units work as overvoltage relays but can also be used for undervoltage detection. The hysteresis is dependent on the response value.

2 time delays are possible in different variants:
The start up delay t_a operates only when connecting the auxiliary supply. The response delay t_v is active after exceeding a response value. On overcurrent relays the delay is active when the current goes over the tripping value, on undercurrent relays when the current drops below the hysteresis value.

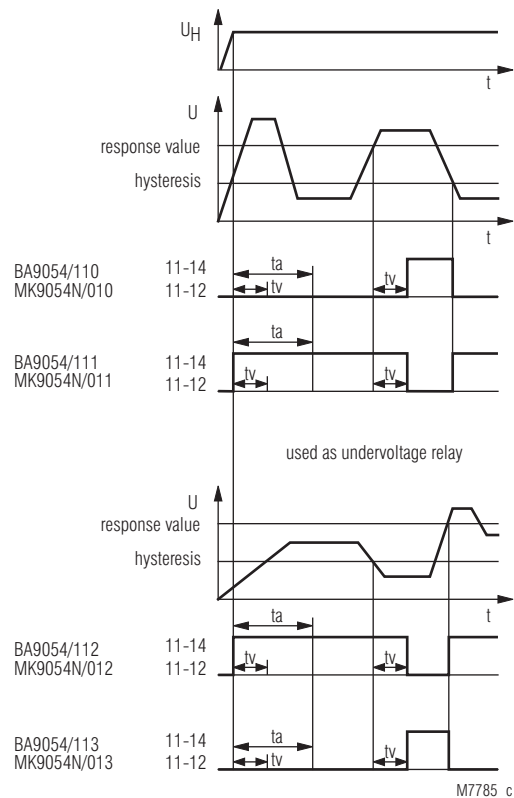
Indicators

green upper LED: on, when auxiliary supply connected
yellow lower LED: on, when output relay activated

Function Diagram without Start-up Delay



Function Diagram with Start-up Delay



Version BA 9054/_1_: 2 changeover contacts

Version BA 9054/_20, /_21, /_22, /_23, /_24: 1 changeover contact, measuring range $\geq 70 \dots 700 \text{ V}$

At version BA 9054/6__ with manual reset the contacts remain in the fault state after detecting a fault or after to has elapsed. The contacts are reset by disconnecting the supply voltage.

Technical Data

Input (e, f)

With 1 Measuring range for AC and DC			
Measuring range ¹⁾		internal resistance	max. permissible contin. voltage
AC	DC		
6 ... 60 mV	5.4 ... 54 mV	20 k Ω	10 V
15 ... 150 mV	13.5 ... 135 mV	40 k Ω	100 V
50 ... 500 mV	45 ... 450 mV	270 k Ω	250 V
0.5 ... 5 V	0.45 ... 4.5 V	500 k Ω	300 V
1 ... 10 V	0.9 ... 9.0 V	1 M Ω	300 V
5 ... 50 V	4.5 ... 45 V	2 M Ω	500 V ²⁾
25 ... 250 V	22.5 ... 225 V	2 M Ω	500 V ²⁾
50 ... 500 V	45 ... 450 V	2 M Ω	500 V ²⁾
70 ... 700 V ³⁾	63 ... 630 V	3 M Ω	700 V ⁴⁾
100 ... 1000 V ³⁾	90 ... 900 V	3 M Ω	1000 V ⁴⁾

¹⁾ DC or AC voltage 50 ... 5000 Hz
(Other frequency ranges of 10 ... 5000 Hz, e.g. 16 $\frac{2}{3}$ Hz on request)

²⁾ at Overvoltage category II: 600 V

³⁾ only with BA 9054/_20; /_21; /_22; /_23; /_24
(Version: 1 changeover contact)

⁴⁾ at overvoltage category II: 1000 V

Please note:

Measuring ranges 6 ... 60 mV only available at variant BA 9054/080
(Using only for current sensing via shunt!)

Measuring principle:

arithmetic mean value

Adjustment:

The AC-devices can also monitor DC-voltage. The scale offset in this case is
($\bar{U} = 0.90 U_{\text{eff}}$)

Temperature influence:

< 0.05 % / K

Setting Ranges

Setting

Response value: infinite variable $0.1 U_N \dots 1 U_N$
relative scale

Hysteresis

at AC: infinite variable 0.5 ... 0.98 of setting value
at DC: infinite variable 0.5 ... 0.96 of setting value

Accuracy:

Response value at
Potentiometer right stop (max): 0 ... + 8 %
Potentiometer left stop (min): - 10 ... + 8 %

Adjustment by rotational potentiometer on the front panel of the device is not calibrated. For accurate adjustment it is necessary to use an external measuring instrument.

Repeat accuracy:

$\leq \pm 0.5 \%$

Recovery time

at devices with manual reset
(Reset by braking of the auxiliary voltage)

BA 9054/6__:

$\leq 1 \text{ s}$
(dependent to function and auxiliary voltage)
infinite variable at logarithmic scale
from 0 ... 20 s, 0 ... 30 s, 0 ... 60 s, 0 ... 100 s
setting 0 s = without time delay

Time delay t_v:

Start-up delay t_a:

BA 9054/1 __:

1 ... 20 s; 1 ... 60 s; 1 ... 100 s,
adjustable on logarithmic scale.
t_a is started when the supply voltage is connected. During elapse of time the output contact is in good state

Technical Data

Auxiliary Circuit

Auxiliary voltage U_H (A1, A2)

Nominal voltage:	AC 24, 42, 110, 127, 230, 400 V
Voltage range:	0.8 ... 1.1 U_H
Nominal frequency:	50 / 60 Hz
Frequency range:	± 5 %
Nominal consumption:	2.5 VA
	4 VA; 1.5 W at AC 230 V Rel. energized
	1 W at DC 80 V Rel. energized

Nominal voltage	Voltage range	Frequency range
AC/DC 24 ... 80 V	AC 18 ... 100 V	45 ... 400 Hz; DC 48 % W
	DC 18 ... 130 V	$W \leq 5 \%$
AC/DC 80 ... 230 V	AC 40 ... 265 V	45 ... 400 Hz; DC 48 % W
	DC 40 ... 300 V	$W \leq 5 \%$
DC 12 V	DC 10 ... 18 V	battery voltage

Output

Contacts:	2 changeover contacts
Thermal current I_{th}:	2 x 4 A
Switching capacity	
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:	1 A / DC 24 V IEC/EN 60 947-5-1
Electrical life	IEC/EN 60 947-5-1
to AC 15 at 3 A, AC 230 V:	5 x 10 ⁵ switching cycles
Short-circuit strength	
max. fuse rating:	6 AgL IEC/EN 60 947-5-1
Mechanical life:	50 x 10 ⁶ switching cycles

General Data

Operating mode:	Continuous operation
Temperature range:	- 40 ... + 60°C
Storage	
Climate class in accordance to IEC60721 (without condensation and icing):	
Long term storage:	1K4 IEC 60 721-3-1
Transport:	1K3 IEC 60 721-3-2
Stationary use:	3K5 IEC 60 721-3-3
Mechanical stress in accordance to IEC60721:	
Long term storage:	1M3 IEC 60 721-3-1
Transport:	2M2 IEC 60 721-3-2
Stationary use:	3M4 IEC 60 721-3-3
Clearance and creepage distances	
rated impulse voltage / pollution degree:	6 kV / 2 IEC 60 664-1
EMC tested according to railway standard EN 50155	
Electrostatic discharge:	8 kV (air) IEC/EN 61 000-4-2
HF irradiation	
80 MHz ... 1 GHz:	20 V/m IEC/EN 61 000-4-3
1 GHz ... 2.7 GHz:	10 V/m IEC/EN 61 000-4-3
Fast transients:	4 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
Interference suppression:	Limit value class B EN 55 011
Degree of protection	
Housing:	IP 40 IEC/EN 60 529
Terminals:	IP 20 IEC/EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94
Vibration resistance:	Amplitude 0.35 mm IEC/EN 60 068-2-6
	frequency 10 ... 55 Hz
Climate resistance:	40 / 060 / 04 IEC/EN 60 068-1
Terminal designation:	EN 50 005
Wire connection:	2 x 2.5 mm ² solid or
	2 x 1.5 mm ² stranded wire with sleeve
Wire fixing:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1
Mounting:	DIN-rail IEC/EN 60 715
Weight	
AC-device:	280 g
AC/DC-device:	200 g

Dimensions

Width x height x depth: 45 x 75 x 120 mm

UL-Data

Auxiliary voltage U_H (A1, A2):	AC 24, 42, 48, 110, 115, 120 V
Thermal current I_{th}:	2 x 5 A
Clearance and creepage distances:	4 kV / 2 IEC 60 664-1
HF irradiation	
(80 MHz ... 2.7 GHz)	10 V/m IEC/EN 61 000-4-3
Switching capacity:	Pilot duty B150
Ambient temperature:	- 40 ... + 60°C



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

CCC-Data

Switching capacity	
to AC 15:	1.5 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 9054/010	AC 25 ... 250 V	AC 230 V
Article number:		
• for Overcurrent monitoring		
• Measuring range:	AC 25 ... 250 V	
• Auxiliary voltage U_H :	AC 230 V	
• Time delay t_v by U_{an} :	0 ... 20 s	
• Width:	45 mm	

BA 9054/012	AC 25 ... 250 V	AC 230 V
Article number:		
• for Undercurrent monitoring		
• Measuring range:	AC 25 ... 250 V	
• Auxiliary voltage U_H :	AC 230 V	
• Time delay t_v by U_{ab} :	0 ... 20 s	
• Width:	45 mm	

Accessories

AD 3:	Remote potentiometer 470 kW (article number 0050174)
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Setting

Example:
Voltage relay BA 9054 AC 25 ... 250 V

AC according to type plate:
i.e. the unit is adjusted to AC voltage
25 ... 250 V = measuring range

Response value AC 150 V
Hysteresis AC 75 V

Settings:	
upper potentiometer:	0.6 (0.6 x 250 V = 150 V)
lower potentiometer:	0.5 (0.5 x 150 V = 75 V)

The AC-devices can also monitor DC current. The scale offset in this case is: $\bar{U} = 0.9 \times U_{eff}$.

AC 25 ... 250 V is equivalent to DC 22.5 ... 225 V

Response value DC 150 V
Hysteresis DC 75 V

Settings:	
upper potentiometer:	0.66 (0.66 x 225 V = 150 V)
lower potentiometer:	0.5 (0.5 x 150 V = 75 V)

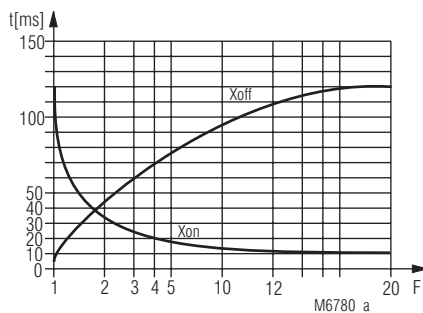
Ordering example for variants

BA 9054 / /61 AC 25 ... 250V AC 230 V 0 ... 20 s 1 ... 20 s

- Start up delay t_a
- Time delay t_r
- Auxiliary voltage
- Measuring range
- With UL-approval
- 10 Overcurrent relay energized on trip time delay at setting value
- 11 Overcurrent relay de-energized on trip time delay at setting value
- 12 Undercurrent relay energized on trip time delay at hysteresis value
- 13 Undercurrent relay de-energized on trip time delay at hysteresis value
- 21 Same as BA 9054/011, but with measuring range $\geq 70 \dots 700 \text{ V}$, 1 C/O contact
- 22 Same as BA 9054/012, but with measuring range $\geq 70 \dots 700 \text{ V}$, 1 C/O contact
- 23 Same as BA 9054/013, but with measuring range $\geq 70 \dots 700 \text{ V}$, 1 C/O contact
- 24 Same as BA 9054/010, but with measuring range $\geq 70 \dots 700 \text{ V}$, 1 C/O contact
- 0 Standard version
- 1 With start up delay t_a
- 2 With safe electrical separation of input- and output circuit according to DIN 61140
- Meas. range up to $\leq 10 \text{ A}$: DIN EN 60947-1; 4 kV/2 in relation of overvoltage category III with basic insulation to DIN EN 60664-1 of 4 kV;
- Meas. range up to $\geq 15 \text{ A}$: overvoltage category II with basic insulation of 2.5 kV
- 3 With 5 μm gold plated contacts
- 5 With forcibly guided contacts
- 6 With manual reset, resetting by disconnecting the power supply

Type

Characteristics



Switching delay

The characteristic shows the switching delay depending on the values of X_{on} - X_{off} when switching the current on or off. A slow current change reduces the delay.

$$F = \frac{U_{\text{applied}}}{U_{\text{setting}}}$$

Maintenance, repair and disposal

Maintenance and repairs

- The device contains no parts that require maintenance.
- In case of failure, do not open the device but send it to manufacturer for repair.

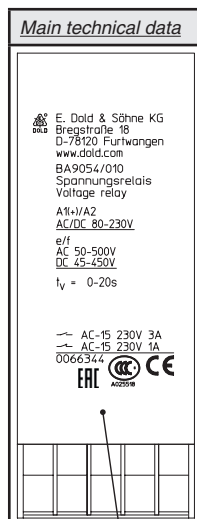
Regular checks

- In addition to the tests during set up, a functional test must be made in regular intervals (at minimum annually) and after all maintenance work.
- By use in room temperature we recommend an exchange of the module after 8 years

Disposal

- Unserviceable devices that cannot be repaired must be disposed in accordance with the relevant country-specific waste disposal regulations.

Product appearance



Sticker

- Year / Month of production
- Data for internal use

