

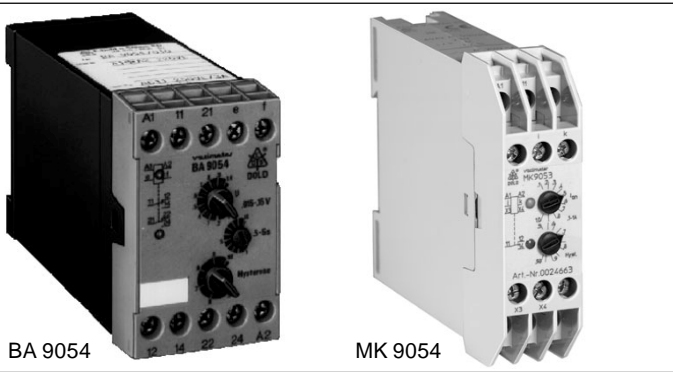
Monitoring technique

Voltage relay BA 9054, MK 9054 varimeter

Now available with new features

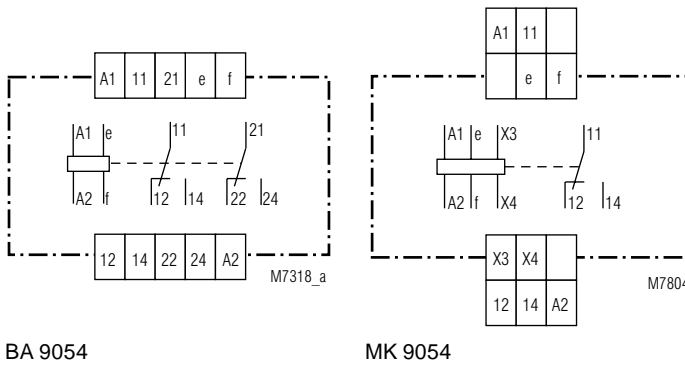


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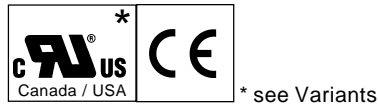


- According to IEC 255, EN 60 255, VDE 0435 part 303
- to monitor DC and AC voltage
- Measuring ranges from 15 mV to 500 V
- BA 9054 optionally with galvanic separated DC auxiliary supply
- MK 9054 optionally with remote potentiometer
- High overload possible
- **Input frequency up to 5 kHz**
- with time delay
- **BA 9054as option with start-up delay**
- **BA 9054 as option with manual reset**
- LED indicators for operation and contact position
- Width MK 9054: 22,5 mm
- Width BA 9054: 45 mm

Circuit diagrams



Approvals and marking



Applications

Monitoring voltage in AC or DC systems

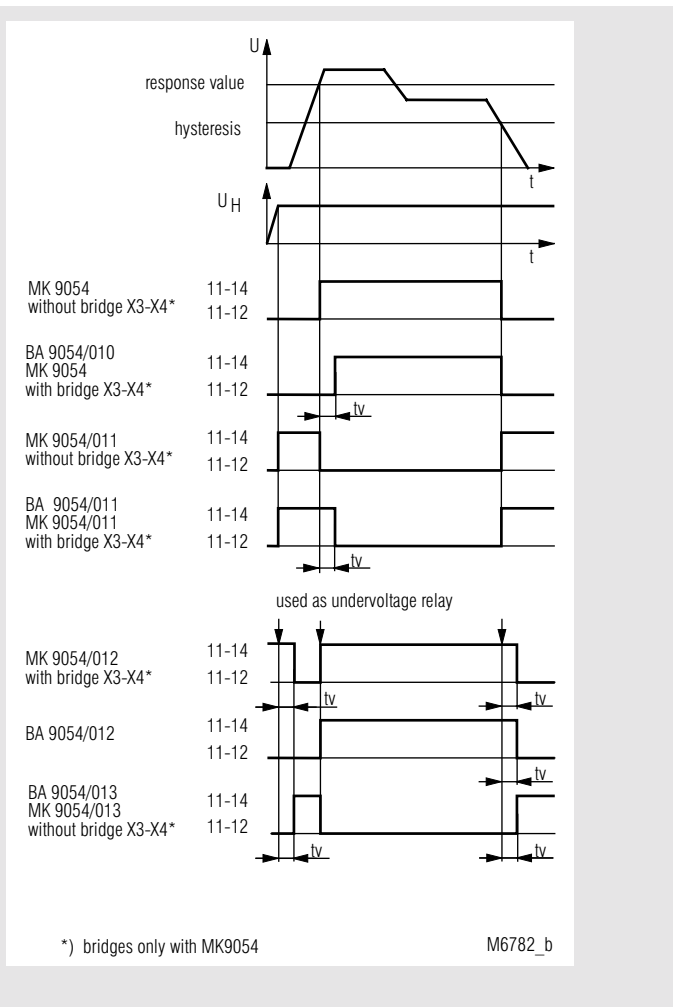
Function

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. The BA 9054 is optionally available with time delay. On the MK 9054 a fixed time delay can be activated by linking terminals X3-X4.

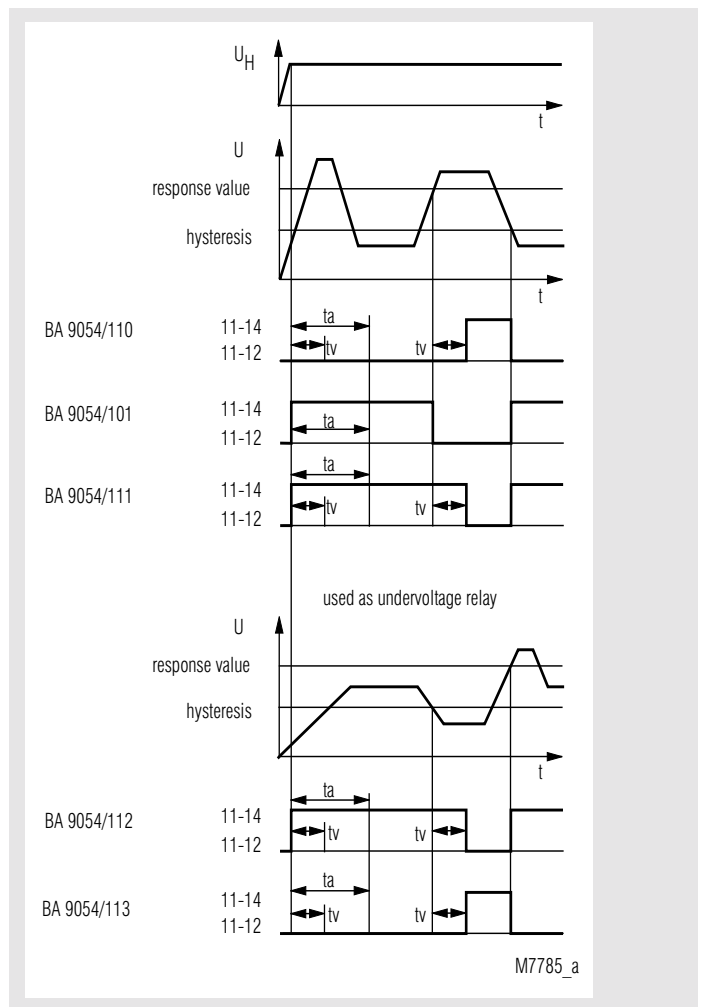
Indicators

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

Function diagram without start-up delay



Function diagram with start-up delay



On model 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

BA 9054 with 1 Measuring range for AC and DC			
Measuring range ¹⁾		internal resistance	max. permissible continuous voltage
AC	DC		
15 - 150 mV	13,5 - 135 mV	40 kΩ	100 V
50 - 500 mV	45 - 450 mV	270 kΩ	250 V
0,5 - 5 V	0,45 - 4,5 V	500 kΩ	300 V
1 - 10 V	0,9 - 9,0 V	1 kΩ	300 V
5 - 50 V	4,5 - 45 V	2 MΩ	500 V ²⁾
25 - 250 V	22,5 - 225 V	2 MΩ	500 V ²⁾
50 - 500 V	45 - 450 V	2 MΩ	500 V ²⁾
70 - 700 V ³⁾	63 - 630 V	3 kΩ	700 V ⁴⁾

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

²⁾ at Overvoltage category II: 600 V

³⁾ only with BA 9054/_20; /_21; /_22; /_23; /_24
(model: 1 changeover contact, auxiliary voltage U_H: AC 24, 110, 127, 230, 400 V)

⁴⁾ at overvoltage category II: 1000 V

MK 9054 with 1 Measuring range		
Measuring range ¹⁾	internal resistance	max. permissible continuous voltage
15 - 150 mV	40 kΩ	100 V
50 - 500 mV	270 kΩ	250 V
0,5 - 5 V	500 kΩ	300 V
1 - 10 V	1 MΩ	300 V
5 - 50 V	2 MΩ	500 V ²⁾
25 - 250 V	2 MΩ	500 V ²⁾
50 - 500 V	2 MΩ	500 V ²⁾

¹⁾DC or AC voltage 50 ... 60 Hz (to be ordered)

²⁾ at Overvoltage category II: 600 V

Please note:

To avoid measuring mistakes, on units with mV input the input must always be terminated. In addition screened wires should be used.

Technical data

Measuring principle:	arithmetic mean value
Adjustment:	The AC-devices can also monitor DC-voltage. The scale offset in this case is: ($\bar{U} = 0,90 U_{eff}$)
Temperature influence:	< 0,05 % / K
Setting ranges	
Setting:	
Response value:	infinite variable 0,1 U_N ... 1 U_N relative scale
Hysteresis:	infinite variable 0,5 ... 0,98 of setting value
Accuracy:	$\leq \pm 5 \%$
Time delay t_v	
BA 9054:	infinite variable at logarithmic scale from 0 - 20 s, 0 - 30 s, 0 - 60 s, 0 - 100 s only with BA 9054/_10, BA 9054/_11, BA 9054/_12, BA 9054/_13
MK 9054:	approx. 1 s or 5 s, fixed The units are delivered with a bridge between terminals X3 - X4. If this bridge is removed the time delay is inactive
Start-up delay	
BA 9054/1__:	1 ... 20 s; 1 ... 60 s; 1 ... 100 s, adjustable on logarithmic scale. t_s is started by connecting the auxiliary supply. During start-up time the contact is in "good" state.

Auxiliary circuit

Auxiliary voltage U_H:	
BA 9054:	AC 24, 110, 127, 230, 400 V AC/DC 24 ... 60 V, AC/DC 110 ... 230 V
MK 9054:	AC 24, 42, 110, 127, 230 V
Voltage range:	0,8 ... 1,1 U_H
Nominal consumption:	
BA 9054:	approx. 2,5 VA
MK 9054:	approx. 2,0 VA
Nominal frequency:	50 / 60 Hz
Frequency range:	$\pm 5 \%$

Output

Contacts	
BA 9054:	2 changeover contacts
MK 9054:	1 changeover contact
Thermal current I_{th}	
BA 9054:	2 x 5 A or 1 x 8 A
MK 9054:	5 A
Switching capacity	
to AC 15:	
NO contact (MK9054):	3 A / AC 230 V EN 60 947-5-1
NC contact (MK 9054):	1 A / AC 230 V EN 60 947-5-1
Electrical life	
to AC 15 at 3 A, AC 230 V:	EN 60 947-5-1
BA 9054:	5 x 10 ⁵ switching cycles
MK 9054:	10 ⁵ switching cycles
Short-circuit strength	
max. fuse rating:	6 AgL EN 60 947-5-1
Mechanical life	
BA 9054:	50 x 10 ⁶ switching cycles
MK 9054:	30 x 10 ⁶ switching cycles

Technical data

General data

Operating mode:	Continuous operation
Temperature range:	
BA 9054:	- 40 ... + 60°C
MK 9054:	- 20 ... + 60°C

Clearance and creepage distances

overvoltage category / contamination level:	4 kV / 2	IEC 60 664-1
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EMC

Electrostatic discharge:	8 kV (air)	EN 61 000-4-2
HF irradiation:	10 V/m	EN 61 000-4-3
Fast transients:	4 kV	EN 61 000-4-4

Surge voltages

between wires for power supply:	2 kV	EN 61 000-4-5
between wire and ground:	4 kV	EN 61 000-4-5

Interference suppression:	Limit value class B	EN 55 011
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Degree of protection:

Housing:	IP 40	EN 60 529
Terminals:	IP 20	EN 60 529

Housing: Thermoplastic with V0 behaviour according to UL subject 94

Vibration resistance:	Amplitude 0,35 mm	
	frequency 10 ... 55 Hz	EN 60 068-2-6
	20 / 060 / 04	EN 60 068-1

Climate resistance:

Terminal designation:

Wire connection

BA 9054:	2 x 2,5 mm ² solid or 2 x 1,5 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4
MK 9054:	2 x 1,5 mm ² solid or 2 x 1 mm ² stranded wire with sleeve DIN 46 228-1/-2/-3/-4

Wire fixing:	Flat terminals with self-lifting clamping piece	EN 60 999
	DIN rail	EN 50 022

Mounting:

Weight:

BA 9054:	AC-device: 270 g
	AC/DC-device: 200 g
MK 9054:	160 g

Dimensions

Width x height x depth

BA 9054:	45 x 73 x 132 mm
MK 9054:	22,5 x 82 x 102 mm

Standard types

BA 9054/010 AC 25 ... 250 V AC 230 V

Article number: 0053639

- for Overvoltage monitoring
- Measuring range: AC 25 ... 250 V
- Auxiliary voltage U_H : AC 230 V
- time delay by U_{an} : 0 ... 20 s
- Width: 45 mm

BA 9054/012 AC 25 ... 250V AC 230 V

Article number: 0053711

- for Undervoltage monitoring
- Measuring range: AC 25 ... 250 V
- Auxiliary voltage U_H : AC 230 V
- time delay by U_{ab} : 0 ... 20 s
- Width: 45 mm

MK 9054 AC 25 ... 250 V AC 230 V 1 s

Article number: 0026686 stock item

- for Overvoltage monitoring
- Measuring range: AC 25 ... 250 V
- Auxiliary voltage U_H : AC 230 V
- Time delay by U_{an} : 1 s
- deenergised on undervoltage
- Width: 22,5 mm

MK 9054/012 AC 25 ... 250 V AC 230 V 1s

Article number: 0033073 stock item

- for Undervoltage monitoring
- Measuring range: AC 25 ... 250 V
- Auxiliary voltage U_H : AC 230 V
- time delay by U_{ab} : 1 s
- deenergised on undervoltage
- Width: 22,5 mm

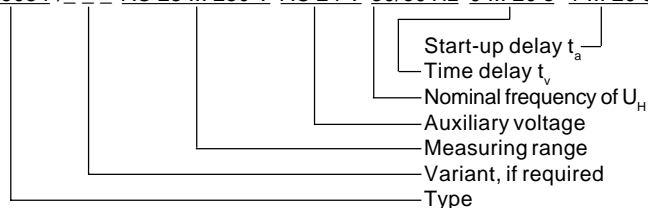
Variants

- BA 9054/_11: BA 9054/010 but with inverted relay output (see Function diagram) with time delay by U_{an}
- BA 9054/_13:* BA 9054/012 but with inverted relay output (see Function diagram) with time delay by U_{ab}
- BA 9054/61: BA 9054/_01 with UL approval
- BA 9054/0__ : standard version without options
- BA 9054/1__ up to BA 9054/6__
- BA 9054/1__ : with start-up delay
- BA 9054/2__ : with safe separation according to VDE 106, not possible for auxiliary supply AC/DC
- BA 9054/3__ : with 5 μ m gold plated contacts
- BA 9054/5__ : with positive guided contacts
- BA 9054/6__ : with manual reset, resetting by disconnecting the power supply
- MK 9054/61: with UL approval (Canada/USA)
- MK 9054/_11: deenergised on overvoltage
- MK 9054/_13:* energised on undervoltage
- MK 9054/0__ : standard version without remote potentiometer
- MK9054/1__ : with remote potentiometer for 470 k Ω

* The units BA/MK9054/_13 are normally used for undervoltage. The delay starts when the voltage drops under the hysteresis value.

Ordering example for Variants

BA 9054 / _ _ _ AC 25 ... 250 V AC 24 V 50/60 Hz 0 ... 20 s 1 ... 20 s



Accessories

for MK 9054

ET 4752-143:

AD 3:

Marking plate

Remote potentiometer 470 k Ω
(article number 0050174)

Setting

Example:

Voltage relay BA 9054 / MK 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 = 150 V)

lower potentiometer: 0,5 (0,5 x 150 = 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

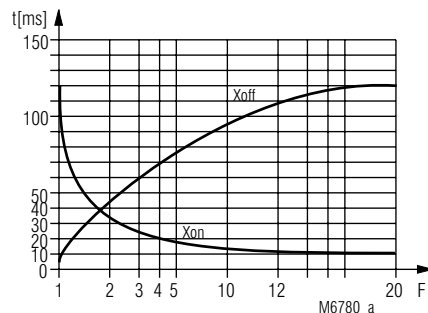
Hysteresis DC 75 V

Settings:

upper potentiometer: 0,67 (0,67 x 225 = 150 V)

lower potentiometer: 0,5 (0,5 x 150 = 75 V)

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.

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