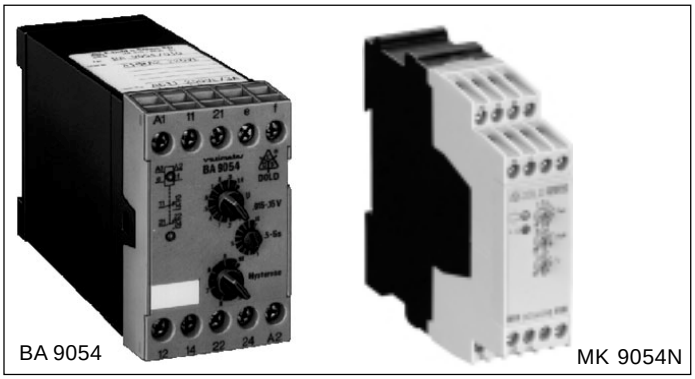
Monitoring technique

Voltage relay BA 9054, MK 9054 varimeter

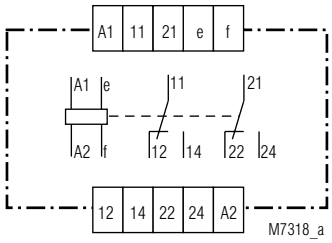
Now available with new features

0221541

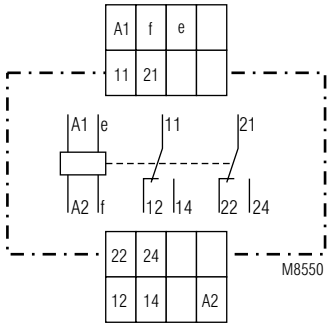


- According to IEC/EN 60 255, DIN VDE 0435-303
- to monitor DC and AC voltage
- Measuring ranges from 15 mV to 500 V
- High overload possible
- **Input frequency up to 5 kHz**
- with time delay
- LED indicators for operation and contact position
- BA 9054 optionally with galvanic separated DC auxiliary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

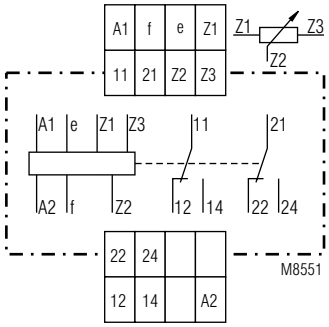
Circuit diagrams



BA 9054



MK 9054N



MK 9054N/1_ _

Approvals and marking

c UL us Canada / USA * see Variants

Applications

Monitoring voltage in AC or DC systems

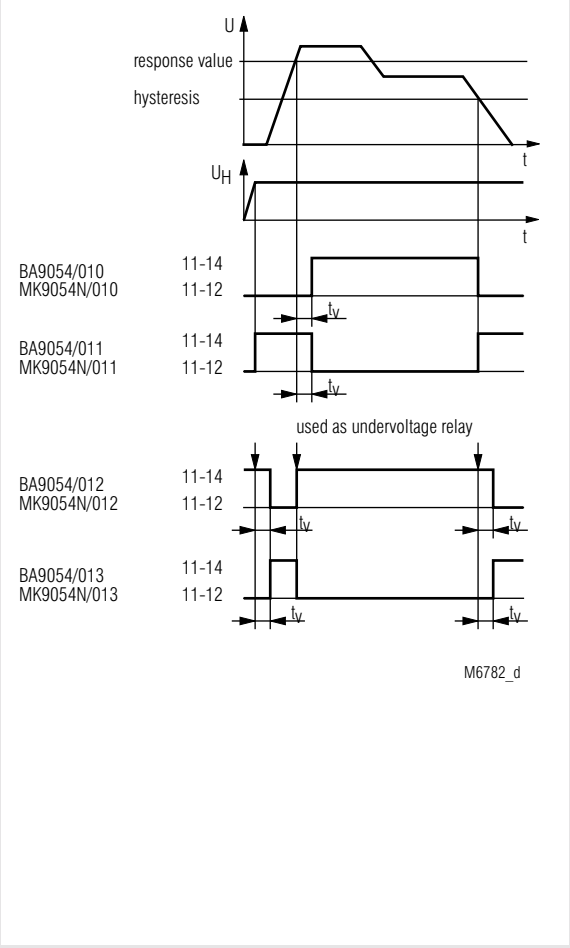
Function

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.

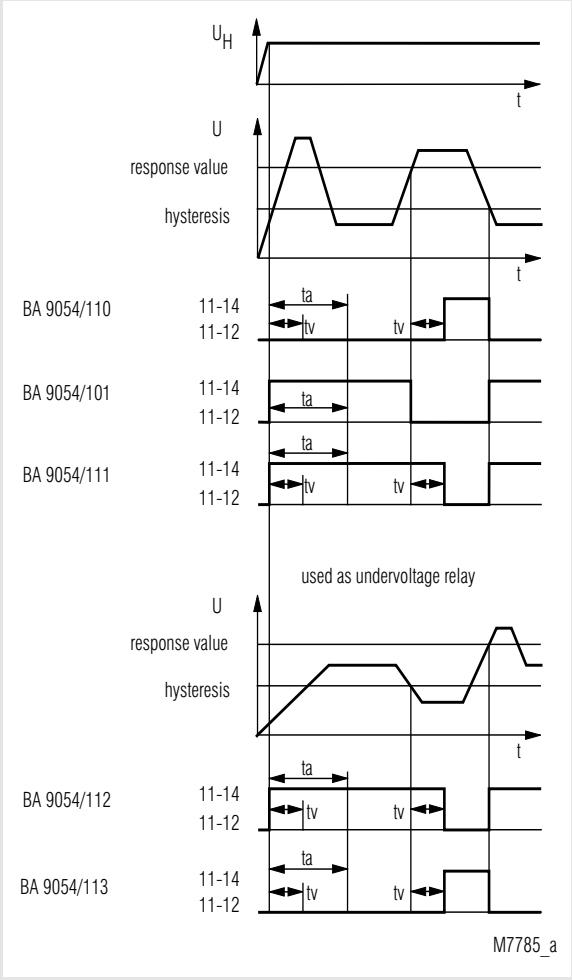
Indicators

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 **a n d** DC

Measuring range[1] AC	Measuring range[1] DC	internal resistance	max. permissible continuous voltage
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 MΩ	700 V[4]
100 -1000 V[3]	90 - 900 V	3 MΩ	1000 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 for AC **a n d** DC

Measuring range[1] AC	Measuring range[1] DC	internal resistance	max. permissible continuous voltage
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 MΩ	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[2]	45 - 450 V	2 MΩ	500 V[2]

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

[2] not for 400 / 690 V-(systems)

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: ($\overline{U}$ = 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: ≤ ± 0,5 %
Time delay t_v: infinite variable at logarythmic scale from 0 - 20 s, 0 - 30 s, 0 - 60 s, 0 - 100 s
Setting 0 s = without time delay
Start-up delay
BA 9054/1_ _: 1 ... 20 s; 1 ... 60 s; 1 ... 100 s, adjustable on logarythmic scale.
t_a 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 9054N: AC 24, 42, 110, 127, 230 V
Voltage range: 0,8 ... 1,1 U_H
DC (battery operated): 0,8 ... 1,3 U_H
Nominal consumption:
BA 9054: approx 2,5 VA
MK 9054N: approx. 2,0 VA
Nominal frequency: 50 / 60 Hz
Frequency range: ± 5 %

Output

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

Technical data

General data

Operating mode: Continuous operation
Temperature range:
BA 9054: - 40 ... + 60°C
MK 9054N: - 20 ... + 60°C
Clearance and creepage distances
BA 9054: 6 kV / 2 IEC 60 664-1
MK 9054N: 4 kV / 2 IEC 60 664-1
EMC
Electrostatic discharge: 8 kV (air) IEC/EN 61 000-4-2
HF irradiation: 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: 20 / 060 / 04 IEC/EN 60 068-1
Terminal designation: EN 50 005
Wire connection
BA 9054: 2 x 2,5 mm² solid or
2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3/-4
MK 9054N: 1 x 4 mm² solid or
1 x 2,5 mm² stranded wire with sleeve or 2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3/-4
Wire fixing: Flat terminals with self-lifting clamping piece IEC/EN 60 999-1
Mounting: DIN rail IEC/EN 60 715
Weight:
BA 9054: AC-device: 270 g
AC/DC-device: 200 g
MK 9054N: 175 g

Dimensions

Width x height x depth
BA 9054: 45 x 75 x 120 mm
MK 9054N: 22,5 x 90 x 97 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 9054N/010 AC 25 ... 250 V AC 230 V 0 ... 20 s
Article number: 0054098 stock item
- for Overvoltage monitoring
- Measuring range: AC 25 ... 250 V
- Auxiliary voltage U_H: AC 230 V
- Time delay by U_{an}: 0 ... 20 s
- deenergised on undervoltage
- Width: 22,5 mm

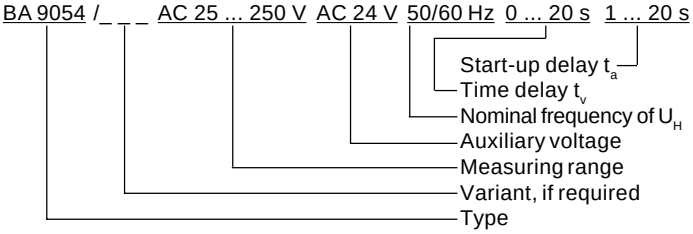
MK 9054N/012 AC 25 ... 250 V AC 230 V 0 ... 20 s
Article number: 0056073 stock item
- for Undervoltage monitoring
- Measuring range: AC 25 ... 250 V
- Auxiliary voltage U_H: AC 230 V
- time delay by U_{ab}: 0 ... 20 s
- deenergised on undervoltage
- Width: 22,5 mm

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 5µm gold plated contacts
BA 9054/5_ _:	with positive guided contacts
BA 9054/6_ _:	with manual reset, resetting by disconnecting the power supply
MK 9054N/61:	with UL approval (Canada/USA)
MK 9054N/_11:	deenergised on overvoltage
MK 9054N/_13:*	energised on undervoltage
MK 9054N/0_ _:	standard version without remote potentiometer
MK9054N/1_ _:	with remote potentiometer for 470 kΩ

* The units BA 9054/_13, MK 9054N/_13 are normally used for undervoltage. The delay starts when the voltage drops under the hysteresis value.

Ordering example for Variants



Accessories

for MK 9054N

ET 4752-143:	Marking plate
AD 3:	Remote potentiometer 470 kW (article number 0050174)

Setting

Example:
Voltage relay BA 9054 / MK 9054N 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: $U = 0{,}9 \times U_{eff.}$

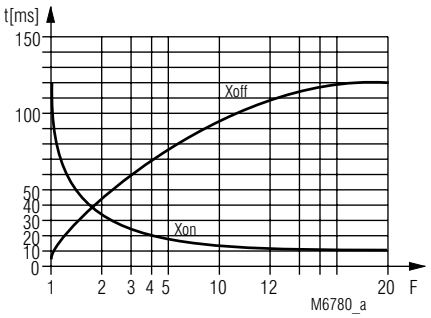
AC 25 ... 250 V is equivalent to DC 22,5 ... 225 V

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.

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