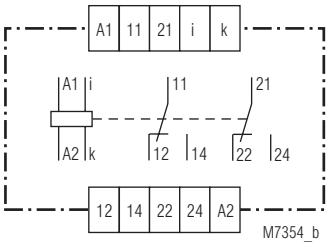
Current relay BA 9053, MK 9053N varimeter

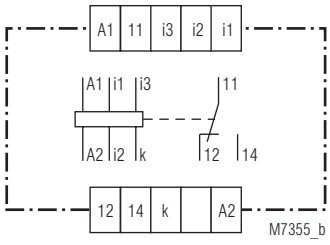
Now available with new features

0221540

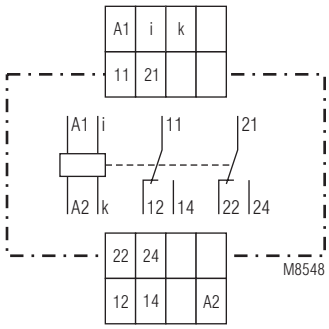
Circuit diagrams



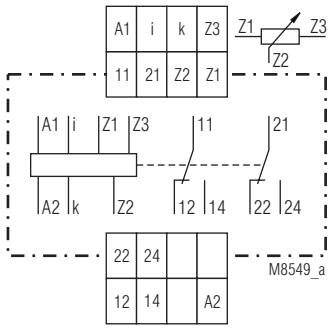
BA 9053



BA 9053/4_ _
e.g.:
Terminals i1/k: 0,1 ... 1 A
Terminals i2/k: 0,5 ... 5 A
Terminals i3/k: 1 ... 10 A



MK 9053N



MK 9053N/1_ _

- According to IEC 255, EN 60 255, VDE 0435 part 303
- to: monitor DC and AC
- Measuring ranges from 2 mA to **25 A**
- BA 9053 with galvanic separated DC auxiliary supply
- High overload possible
- **Input frequency up to 5 kHz**
- with time delay, up to max. 100 sec
- BA 9053 optionally with 3 current ranges 0,1 to **25 A**
- BA 9053 optionally with safe separation to IEC/EN 61 140 IEC/EN 60 947-1
- **BA 9053 as option with start-up delay**
- **BA 9053 as option with manual reset**
- MK 9053N optionally with remote potentiometer
- LED indicators for operation and contact position
- Width MK 9053N: 22,5 mm
  Width BA 9053: 45 mm

Approvals and marking

c UL us Canada / USA, CE * see Variants

Applications

Monitoring current in AC or DC systems

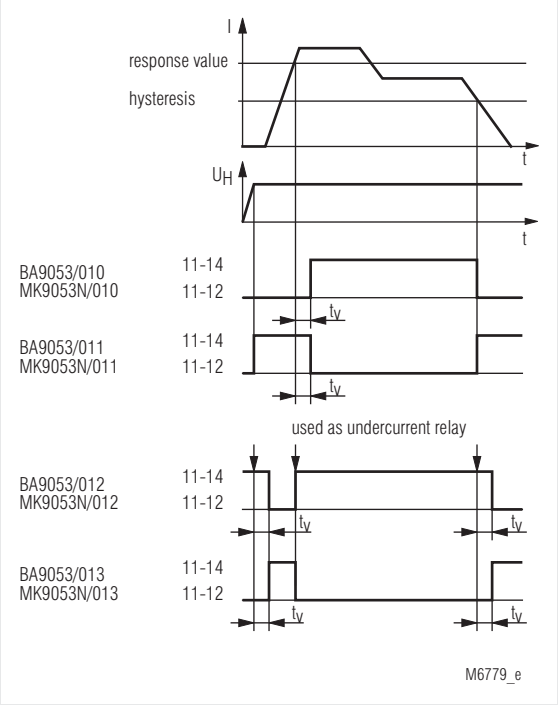
Function

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

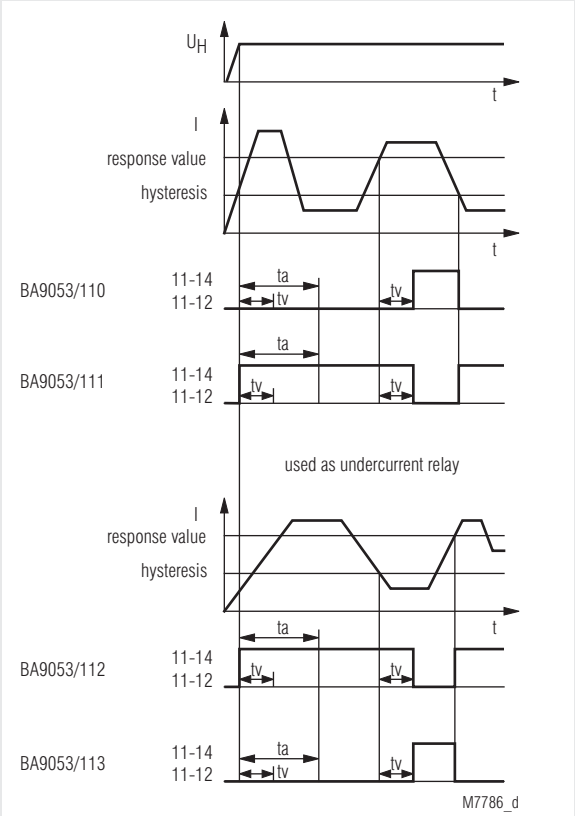
Indicators

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 9053/6_ _ 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 9053 with 1 Measuring range for AC **a n d** DC				
Measuring range*		internal resistance	max. permiss. continuous current	max. permiss. current for 3 s on, 100 s off
AC	DC			
2 - 20 mA	1,8 - 18 mA	1,5 Ω	0,7 A	1 A
20 - 200 mA	18 - 180 mA	0,15 Ω	2 A	4 A
30 - 300 mA	27 - 270 mA	0,1 Ω	2,5 A	8 A
50 - 500 mA	45 - 450 mA	0,1 Ω	2,5 A	8 A
80 - 800 mA	72 - 720 mA	40 mΩ	4 A	12 A
0,1 - 1 A	0,09 - 0,9 A	30 mΩ	5 A	15 A
0,5 - 5 A	0,45 - 4,5 A	6 mΩ	10 A	30 A
1 - 10 A	0,9 - 9 A	3 mΩ	20 A	40 A
1,5 - 15 A	1,35 - 13,5 A	3 mΩ	25 A	40 A
2 - 20 A	1,8 - 18 A	3 mΩ	25 A	40 A
2,5 - 25 A	2,25 - 22,5 A	3 mΩ	25 A	40 A

* DC or AC current 50 ... 5000 Hz
(other frequency ranges of 10 ... 5000 Hz, e.g. 16 $^{2}/_{3}$ Hz,on request)

MK 9053N with 1 Measuring range for AC **a n d** DC				
Measuring range* intern.		resis-tance	max. permissible continous current	max. permiss. current for 3 s
AC	DC		dev. mount.5 without dist. / with mm dist.	
2 - 20 mA	1,8 - 18 mA	1,5 Ω	0,5 A / 0,7 A	1 A
20 - 200 mA	18 - 180 mA	0,15 Ω	1,5 A / 2 A	4 A
30 - 300 mA	27 - 270 mA	0,1 Ω	2 A / 2,5 A	8 A
50 - 500 mA	45 - 450 mA	0,1 Ω	2 A / 2,5 A	8 A
0,1 - 1 A	0,09 - 0,9 A	30 mΩ	3,5 A / 5 A	10 A
0,5 - 5 A	0,45 - 4,5 A	6 mΩ	8 A / 11 A	20 A
1 - 10 A	0,9 - 9 A	3 mΩ	12 A / 15 A	20 A

*DC or AC current 50 ... 5000 Hz
(to be ordered)

BA 9053/4_ _[1]:

	terminals i3/k	terminals i2/k	terminals i1/k
AC and DC	0,1 ... 1 A + 0,09... 0,9 A	20 ... 200 mA + 18 ... 180 mA	2,0 ... 20 mA + 1,8 ... 18 mA
AC and DC	1,0 ... 10 A + 0,9 ... 9 A	0,5 ... 5 A + 0,45 ... 4,5 mA	0,1 ... 1 A + 0,09 ... 0,9 mA
AC and DC	2,5 ... 25 A + 2,25...22,5A	1,0 ... 10 A + 0,9 ... 9 A	0,5 ... 5 A + 0,45 ... 4,5 A

Extending of measuring range:

For DC-current higher then the highest measuring range the voltage relay BA 9054 or MK 9054N measuring range 15 ... 150 mV can be used together with secondary winding of 150 mV. The nominal load of the CT should be ≥ 2,5 VA.

[1] with 3 Measuring ranges

Technical data

Measuring principle: arithmetic mean value
Adjustment: The AC - devices can also monitor DC current. The scale offset in this case is: ($\overline{T} = 0{,}90\ I_{eff}$)
Temperature influence: < 0,05 % / K

Setting ranges

Setting:
Response value: infinite variable 0,1 I_N ... 1 I_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
BA9053/1 _ _: 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.

Auxiliary circuit

Auxiliary voltage U_H (A1, A2)
BA 9053: AC 24, 110, 127, 230, 400 V AC/DC 24 ... 60 V, AC/DC 110 ... 230 V, DC 12 V
MK 9053N: AC 24, 42, 110, 127, 230 V, DC 12 V
Voltage range: 0,8 ... 1,1 U_H
Nominal consumption:
BA 9053: 2,5 VA
MK 9053N: approx. 2 VA
Nominal frequency: 50 / 60 Hz
Frequency range: ± 5 %

Output

Contacts
BA 9053: 2 changeover contacts
MK 9053N: 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 9053
to AC 15 at 3 A, AC 230 V: 5 x 10^5 switching cycles
MK 9053N:
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 9053: 50 x 10^6 switching cycles
MK 9053N: 30 x 10^6 switching cycles

General data

Operating mode: Continuous operation
Temperature range:
BA 9053:
≤ 10 A: - 40 ... + 60°C
≥ 15 A: - 40 ... + 50°C
MK 9053N: - 20 ... + 50°C
Clearance and creepage distances
rated impuls voltage / pollution degree: 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

Technical data

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
BA 9053
≤ 10 A: 40 / 060 / 04 IEC/EN 60 068-1
≥ 15 A: 40 / 050 / 04 IEC/EN 60 068-1
MK 9053N: 20 / 060 / 04 IEC/EN 60 068-1
Terminal designation: EN 50 005
Wire connection
BA 9053: 2 x 2,5 mm² solid or
2 x 1,5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3/-4
MK 9053N: 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:
BA 9053: Flat terminals with self-lifting clamping piece IEC/EN 60 999-1
MK 9053N: Box terminal with wire protection
Mounting: DIN rail IEC/EN 60 715
Weight:
BA 9053: AC-devices: 280 g
AC/DC-devices: 200 g
MK 9053N: 175 g

Dimensions

Width x height x depth
BA 9053: 45 x 75 x 120 mm
MK 9053N: 22,5 x 90 x 97 mm

Standard types

BA 9053/010 AC 0,5 ... 5 A AC 230 V
Article number: 0053128 stock item
- for Overcurrent monitoring
- Measuring range: AC 0,5 ... 5 A
- Auxiliary voltage U_H: AC 230 V
- time delay by I_{an}: 0 ... 20 s
- Width: 45 mm

BA 9053/012 AC 0,5 ... 5 A AC230V
Article number: 0053192 stock item
- for Undercurrent monitoring
- Measuring range: AC 0,5 ... 5 A
- Auxiliary voltage U_H: AC 230 V
- time delay by I_{ab}: 0 ... 20 s
- Width: 45 mm

MK 9053N/010 AC 0,5 ... 5 A AC 230 V 0 ... 20 s
Article number: 0056068 stock item
- for Overcurrent monitoring
- Measuring range: AC 0,5 ... 5 A
- Auxiliary voltage U_H: AC 230 V
- Time delay by I_{an}: 0 ... 20 s
- Width: 22,5 mm

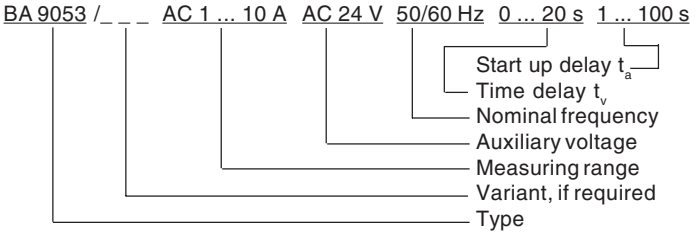
MK 9053N/012 AC 0,5 ... 5 A AC 230 V 0 ... 20 s
Article number: 0056070 stock item
- for Undercurrent monitoring
- Measuring range: AC 0,5 ... 5 A
- Auxiliary voltage U_H: AC 230 V
- time delay by I_{ab}: 0 ... 20 s
- Width: 22,5 mm

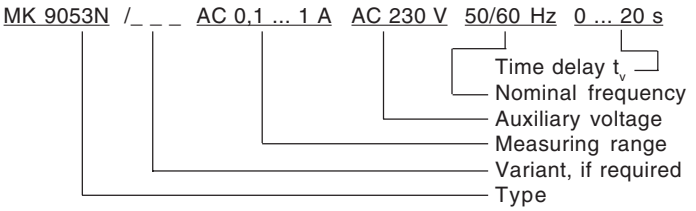
Variants

BA 9053/_11:	same as BA 9053/010 but with inverted relay output (see Function diagram) with time delay by I_{an}
BA 9053/_13:*	same as BA 9053/012 but with inverted relay output (see Function diagram) with time delay by I_{ab}
BA 9053/61:	with UL approval, only with 1 current range up to 10 A, U_H max. AC 120 V
BA 9053/0_ _:	standard version without options BA 9053/1_ _ up to BA 9053/6_ _
BA 9053/1_ _:	with start-up delay (1 ... 100 s)
BA 9053/2_ _:	with safe separation according to VDE 0106, not possible for auxiliary supply AC/DC. Measuring ranges up to max. 1 ... 10 A
BA 9053/3_ _:	with 5 µm gold plated contacts
BA 9053/4_ _:	with 3 measuring ranges, 1 changeover contact
BA9053/431:	with safe separation, 3 current ranges up to 10 A, 1 changeover contact
BA 9053/5_ _:	with positive guided contacts
BA 9053/6_ _:	with manual reset, resetting by disconnecting the power supply
MK 9053N/_11:	deenergised on overcurrent
MK 9053N/_13:*	energised on undercurrent
MK 9053N/0_ _:	standard version without remote potentiometer
MK 9053N/1_ _:	connection of remote potentiometer for 470 kΩ, **at this version there is no potentiometer for the response value**

* The units BA 9053/_13, MK 9053N/_13 are normally used for undercurrent. The delay starts when the current drops under the hysteresis value.

Ordering example for Variants





Accessories

AD 3:	Remote potnetiometer 470 KΩ (article number 0050174)

Setting

Example:
Current relay BA 9053 / MK 9053N AC 0,5 ... 5 A

AC according to type plate:
i.e. the unit is calibrated for AC
0,5 ... 5 A = measuring range

Response value AC 3 A
Hysteresis AC 1,5 A

Settings:

upper potentiometer:	0,6 (0,6 x 5 = 3 A)
lower potentiometer:	0,5 (0,5 x 3 = 1,5 A)

The AC - devices can also monitor DC current. The scale offset in this case is: $\overline{I} = 0{,}90 \times I_{eff}$

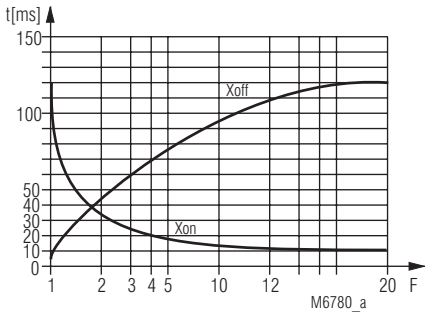
AC 0,5 ... 5 A is equivalent to DC 0,45 ... 4,5 A

Response value DC 3 A
Hysteresis DC 1,5 A

Settings:

upper potentiometer:	0,66 (0,66 x 4,5 = 3 A)
lower potentiometer:	0,5 (0,5 x 3 = 1,5 A)

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.

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