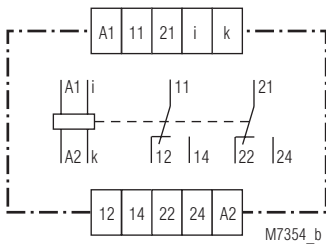


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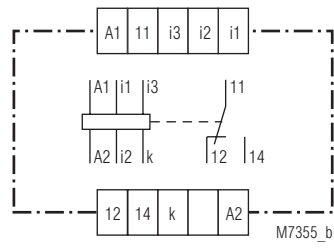


- According to IEC 255, EN 60 255, VDE 0435 part 303
- to: monitor DC and AC
- Measuring ranges from 2 mA to 25 A
- BA 9053 with galvanic separated DC auxiliary supply
- High overload possible
- **Input frequency up to 5 kHz**
- with time delay, up to max. 100 sec
- BA 9053 optionally with 3 current 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

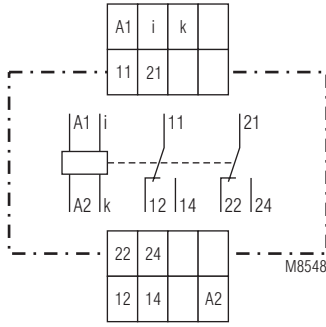
### Circuit diagrams



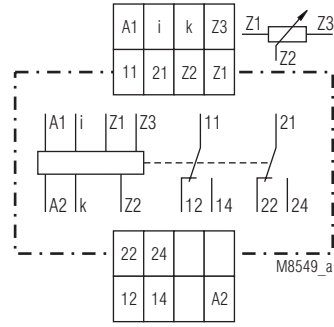
BA 9053



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 \_ \_

### Approvals and marking



\* see Variants

### Applications

Monitoring current in AC or DC systems

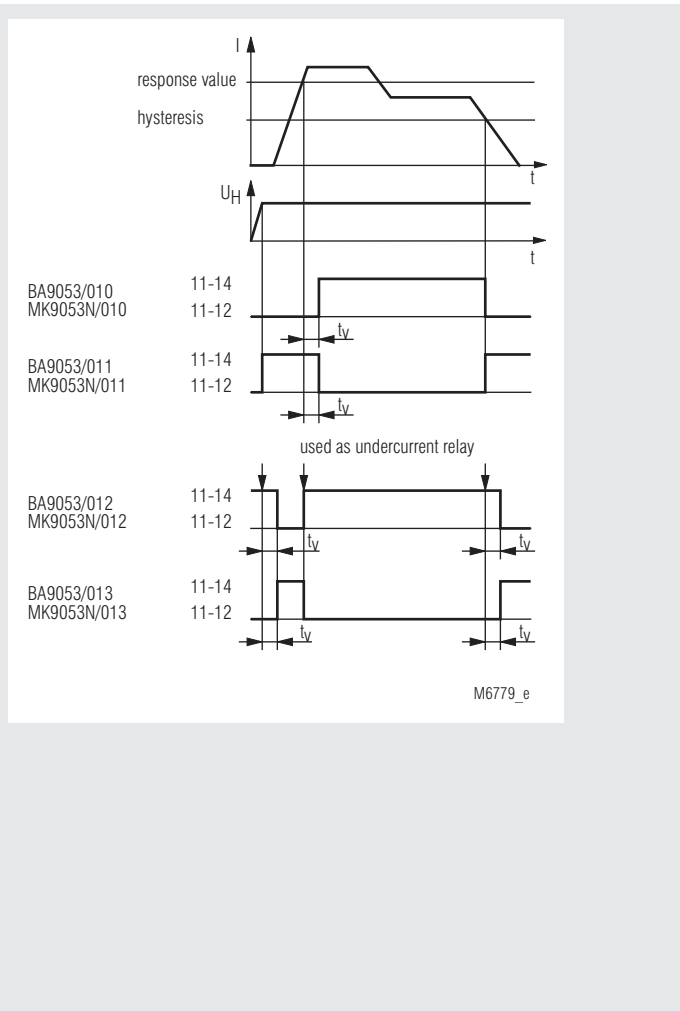
### Function

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.

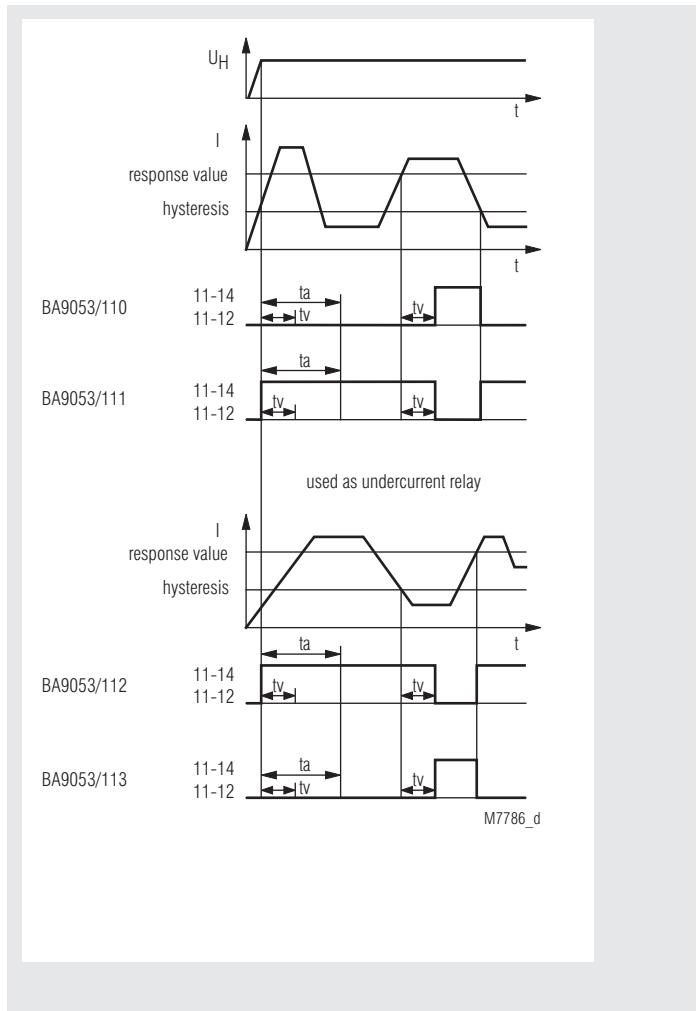
### Indicators

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

### 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 <b>and</b> 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	4 A	12 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<sup>2/3</sup> Hz, on request)

MK 9053N with 1 Measuring range for AC <b>and</b> DC					
Measuring range*		intern. resistance	max. permissible continuous current		max. permiss. current for 3s on, 100 s off
AC	DC		dev. mount. without dist.	with 5 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 A	4 A	8 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 +	20 ... 200 mA +	2,0 ... 20 mA
AC and DC	0,09 ... 0,9 A +	18 ... 180 mA +	1,8 ... 18 mA
AC and DC	1,0 ... 10 A +	0,5 ... 5 A +	0,1 ... 1 A
AC and DC	0,9 ... 9 A +	0,45 ... 4,5 A +	0,09 ... 0,9 A
AC and DC	2,5 ... 25 A +	1,0 ... 10 A +	0,5 ... 5 A
AC and DC	2,25 ... 22,5 A +	0,9 ... 9 A +	0,45 ... 4,5 A

#### Extending of measuring range:

For DC-current higher then the highest measuring range the voltage relay BA9054 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.

<sup>1)</sup> with 3 Measuring ranges

Technical Data	
<b>Measuring principle:</b>	arithmetic mean value
<b>Adjustment:</b>	The AC - devices can also monitor DC current. The scale offset in this case is: —
( $I = 0,90 I_{eff}$ )	
<b>Temperature influence:</b>	< 0,05 % / K
Setting ranges	
<b>Setting:</b>	
Response value:	infinite variable $0,1 I_N \dots 1 I_N$ relative scale
Hysteresis:	infinite variable 0,5 ... 0,98 of setting value
<b>Accuracy:</b>	$\leq \pm 0,5 \%$
<b>Time delay <math>t_V</math>:</b>	infinite variable at logarithmic scale from 0-20 s, 0-30 s, 0-60 s, 0-100 s setting 0 s = without time delay
<b>Start-up delay</b> 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	
<b>Auxiliary voltage <math>U_H</math> (A1, A2)</b>	
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
<b>Voltage range:</b>	0,8 ... 1,1 $U_H$
<b>Nominal consumption:</b>	
BA 9053:	2,5 VA
MK 9053N:	approx. 2 VA
<b>Nominal frequency:</b>	50 / 60 Hz
<b>Frequency range:</b>	$\pm 5 \%$
Output	
<b>Contacts</b>	
BA 9053:	2 changeover contacts
MK 9053N:	2 changeover contacts
<b>Thermal current <math>I_{th}</math>:</b>	2 x 5 A or 1 x 8 A
<b>Switching capacity</b> 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
<b>Electrical life</b>	IEC/EN 60 947-5-1
BA 9053	
to AC 15 at 3 A, AC 230 V:	5 x 10 <sup>5</sup> switching cycles
MK 9053N:	
to AC 15 at 3 A, AC 230 V:	10 <sup>5</sup> switching cycles
<b>Short-circuit strength</b> <b>max. fuse rating:</b>	6 AgL IEC/EN 60 947-5-1
<b>Mechanical life</b>	
BA 9053:	50 x 10 <sup>6</sup> switching cycles
MK 9053N:	30 x 10 <sup>6</sup> switching cycles
General Data	
<b>Operating mode:</b>	Continuous operation
<b>Temperature range:</b>	
BA 9053:	
$\leq 10$ A:	- 40 ... + 60°C
$\geq 15$ A:	- 40 ... + 50°C
MK 9053N:	- 20 ... + 50°C
<b>Clearance and creepage distances</b> rated impuls voltage / pollution degree:	4 kV / 2 IEC 60 664-1
<b>EMC</b>	
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

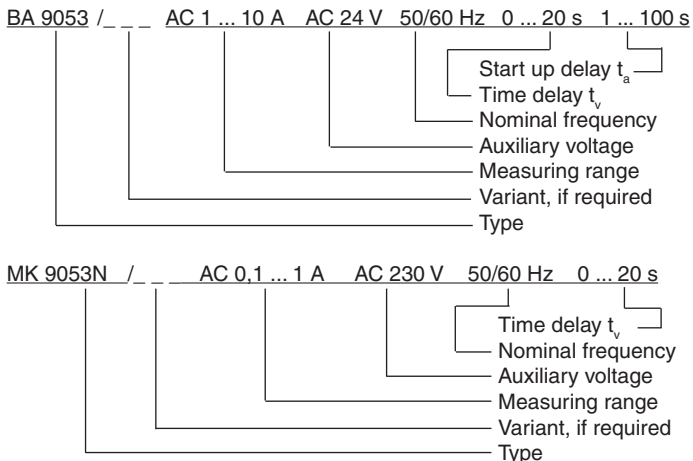
Technical Data	
<b>Degree of protection</b>	
Housing:	IP 40 IEC/EN 60 529
Terminals:	IP 20 IEC/EN 60 529
<b>Housing:</b>	Thermoplastic with V0 behaviour according to UL subject 94
<b>Vibration resistance:</b>	Amplitude 0,35 mm IEC/EN 60 068-2-6 frequency 10 ... 55 Hz
<b>Climate resistance</b>	
BA 9053	
$\leq 10$ A:	40 / 060 / 04 IEC/EN 60 068-1
$\geq 15$ A:	40 / 050 / 04 IEC/EN 60 068-1
MK 9053N:	20 / 060 / 04 IEC/EN 60 068-1
<b>Terminal designation:</b>	EN 50 005
<b>Wire connection</b>	
BA 9053:	2 x 2,5 mm <sup>2</sup> solid or 2 x 1,5 mm <sup>2</sup> stranded wire with sleeve DIN 46 228-1/-2/-3/-4
MK 9053N:	1 x 4 mm <sup>2</sup> solid or 1 x 2,5 mm <sup>2</sup> stranded wire with sleeve or 2 x 1,5 mm <sup>2</sup> stranded wire with sleeve DIN 46 228-1/-2/-3/-4
<b>Wire fixing:</b>	
BA 9053:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1
MK 9053N:	Box terminal with wire protection
<b>Mounting:</b>	DIN rail IEC/EN 60 715
<b>Weight:</b>	
BA 9053:	AC-devices: 280 g AC/DC-devices: 200 g
MK 9053N:	175 g
Dimensions	
<b>Width x height x depth</b>	
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 electrical separation of input- and output circuit, according to DIN/EN 61140; <b>DIN/EN 60947-1; 4 kV/2 in relation of overvoltage category II with basic insulation to DIN/EN 60664-1 of 2,5 kV</b> 1 changeover contact Measuring ranges up to max. 1 ... 10 A with 5 $\mu$ m gold plated contacts
BA 9053/3__:	with 3 measuring ranges,
BA 9053/4__:	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:	de-energized on overcurrent
MK 9053N/_13:*	energized on undercurrent
MK 9053N/0__:	standard version without remote potentiometer
MK 9053N/1__:	connection of remote potentiometer for 470 k $\Omega$ , <b>at this version there is no potentiometer for the response value</b>

\*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

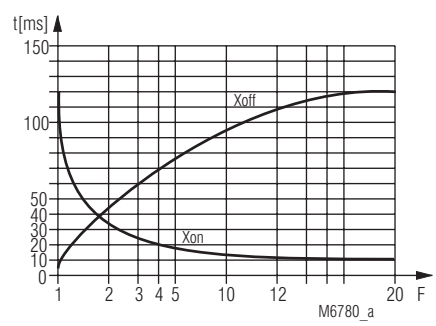


#### Accessories

AD 3: Remote potentiometer 470 k $\Omega$   
(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:	$\bar{I} = 0,90 \times I_{eff}$
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.

$$F = \frac{I_{applied}}{I_{setting}}$$