Time Control Technique

MINITIMER
Timer, Release Delay
MK 9962N

• According to IEC/EN 61 812-1
• Release delay, with control signal
• 8 time ranges from 0.05 s to 300 h selectable via rotational switch
• Voltage range AC/DC 12 ... 240 V for auxiliary supply and control input
• Adjustment aid for quick setting of long time values
• With input for interruption of timing
• LED indicators for operation, contact position and time delay
• 2 changeover contacts
• With remote potentiometer facility as option
• Wire connection: also 2 x 1.5 mm² stranded ferruled, or 2 x 2.5 mm² solid DIN 46 228-1/-2/-3/-4
• As option with pluggable terminal blocks for easy exchange of devices
  - with screw terminals
  - or with cage clamp terminals
• 22.5 mm width

Function Diagram

Circuit Diagrams

Indicators

- green LED: on when auxiliary voltage connected
- yellow LED "R/t": shows status of output relay and time delay:
  - LED off output relay not active; no time delay
  - LED continuously on output relay active; no time delay (if B1 input active)
  - LED flashing (long on, short off) time delay

Adjustment assistance

The flashing period of the yellow LED is 1 s ± 4% and can be used to adjust the time. Especially on the lower end of scale and for long times it is suitable as the multiplication factors between the different time ranges are exact without tolerance.

Example:
The required time is 40 min. It has to be adjusted within the range 3 ... 300 min. The time check takes too long as several timing cycles would be necessary for a precise value.

For faster adjustment the setting is made to 0.03 ... 3 min. On this range the potentiometer should be set to 0.4 min (= 24 sec). With the right potentiometer setting the LED must show 24 flashing cycles. After that the time range is switched over to 3 ... 300 min and the setting is complete.

Connection Terminals

<table>
<thead>
<tr>
<th>Terminal designation</th>
<th>Signal description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>L / +</td>
</tr>
<tr>
<td>A2</td>
<td>N / -</td>
</tr>
<tr>
<td>15, 16, 18</td>
<td>Changeover contact</td>
</tr>
<tr>
<td>25, 26, 28</td>
<td>Changeover contact</td>
</tr>
<tr>
<td>B1(+)</td>
<td>Control Input (start time delay)</td>
</tr>
<tr>
<td>X2, X3</td>
<td>Control Input (time interruption with time adding)</td>
</tr>
<tr>
<td>Z1, Z2</td>
<td>Input to connect a remote potentiometer for time setting t1</td>
</tr>
</tbody>
</table>

All technical data in this list relate to the state at the moment of edition. We reserve the right for technical improvements at any time.
### Remote potentiometer
With the variant MK 9962N.82/300 the time setting can also be made via remote potentiometer of 10 kOhms. It is connected to the terminals Z1-Z2. The corresponding potentiometer on the relay has to be set to min. If no remote potentiometer is required the terminals Z1-Z2 have to be linked. The wires to the remote potentiometers should be installed separately from the lines with mains voltage. If this is not possible, a screened cable is recommended where the shield is connected to Z2. To terminals Z1 and Z2 no external voltage must be connected, as the unit might be damaged.

### Control input B1
The unit needs a continuously connected auxiliary supply on A1-A2. The timing is controlled via input B1. The control unit B1 (+ with DC) has to be supplied with voltage against A2. The control signal could be the same as the auxiliary/control voltage of A1 or any other voltage between 12 and 240 V AC or DC. Operating a parallel load (e.g. a contactor) between B1 and A2 is also allowed.

### Time interruption and time addition with X2 - X3
The time delay can be interrupted during timing by bridging the terminals X2 - X3. By opening the bridge the time continues (time addition). While X2 and X3 are bridged the control input is disabled and the yellow LED remains in the state it had at stop. No external voltage must be connected to X2 and X3 as the unit may be damaged.

### Notes

#### Time circuit

**Time ranges:**
- 0.05 ... 1 s 0.3 ... 30 min
- 0.06 ... 6 s 3 ... 300 min
- 0.3 ... 30 s 0.3 ... 30 h
- 0.03 ... 3 min 3 ... 300 h

**Minimum on time (B1):**
- AC 50 Hz: approx. 15 ms
- DC: approx. 5 ms

**Repeat accuracy:**
- ± 0.5 % of selected end of scale value + 20 ms

**Voltage and temperature influence:**
- ≤ 1 % with the complete operating range

### Technical Data

#### Time circuit
- **Time ranges:** 8 time ranges settable via rotational switch:
  - 0.05 ... 1 s 0.3 ... 30 min
  - 0.06 ... 6 s 3 ... 300 min
  - 0.3 ... 30 s 0.3 ... 30 h
  - 0.03 ... 3 min 3 ... 300 h
- **Continuous, 1:100 on relative scale**

#### Input
- **Auxiliary voltage U_{i1}**
  - AC/DC 12 ... 240 V
- **Voltage range:**
  - 0.8 ... 1.1 U_{N}
- **Frequency range (AC):**
  - 45 ... 400 Hz
- **Nominal consumption at AC 12 V:**
  - approx. 1.5 VA
- **Nominal consumption at AC 24 V:**
  - approx. 2 VA
- **Nominal consumption at AC 240 V:**
  - approx. 3 VA
- **Nominal consumption at DC 12 V:**
  - approx. 1 W
- **Nominal consumption at DC 24 V:**
  - approx. 1 W
- **Nominal consumption at DC 240 V:**
  - approx. 1 W
- **Release voltage (A1/A2):**
  - AC 50 Hz:
    - approx. 7.5 V
  - DC:
    - approx. 7 V
- **Control voltage (B1/A2):**
  - AC/DC 12 ... 240 V
- **Voltage range (B1/A2):**
  - 0.8 ... 1.1 U_{N}
- **Control current (B1):**
  - approx. 1 mA, over complete voltage range
- **Release voltage (B1/A2):**
  - AC 50 Hz:
    - approx. 3.5 V
  - DC:
    - approx. 3 V

#### Output
- **Contacts**
  - MK 9962N.82:
    - 2 changeover contacts
  - **Contact material:** AgNi
  - **Measured nominal voltage:** AC 250 V
  - **Thermal current I_{th}:** see quadratic total current limit curve
  - **Switching capacity to AC 15:**
    - NO contact: 3 A / AC 230 V
    - NC contact: 1 A / AC 230 V
  - **to DC 15:**
    - 1 A / DC 24 V
  - **to AC 15 at 1 A, AC 230 V:**
    - 1.5 x 10^6 switching cycles
  - **Permissible switching frequency:** 6 000 switching cycles / h
  - **Short circuit strength max. fuse rating:** 4 A gG / gL
  - **Mechanical life:** ≥ 30 x 10^6 switching cycles

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**Technical Data**

<table>
<thead>
<tr>
<th>parameter</th>
<th>value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time circuit</td>
<td></td>
</tr>
<tr>
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<td></td>
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</tr>
<tr>
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<tr>
<td></td>
<td>DC:</td>
</tr>
<tr>
<td></td>
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<td><strong>Output</strong></td>
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</tr>
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</tr>
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<tr>
<td>to DC 13:</td>
<td>1 A / DC 24 V</td>
</tr>
<tr>
<td>Electrical life</td>
<td>IEC/EN 60 947-5-1</td>
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<tr>
<td>to AC 15 at 1 A, AC 230 V</td>
<td>1.5 x 10^6 switching cycles</td>
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<td>≥ 30 x 10^6 switching cycles</td>
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</tbody>
</table>
### Technical Data

#### General Data

**Operating mode:** Continuous operation  
**Temperature range:**  
- Operation: -40 ... +60 °C  
  (higher temperature see quadratic total current limit curve)  
- Storage: -40 ... +70 °C  
**Relative air humidity:** 93 % at 40 °C  
**Altitude:** < 2,000 m  
**Clearance and creepage distances**  
- Rated impulse voltage / pollution degree:  
  - Input / Output: 4 kV / 2 (basis insulation) IEC 60 664-1  
  - Output / Output: 4 kV / 2 (basis insulation) IEC 60 664-1  
**Overvoltage category:** III  
**Insulation test voltage, type test:** 2.5 kV; 1 min  
**EMC**  
- 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: 2 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  
- HF-wire guided: 10 V IEC/EN 61 000-4-6  
**Interference suppression:** Limit value class A*)  
*) The device is designed for the usage under industrial conditions (Class A, EN 55011). When connected to a low voltage public system (Class B, EN 55011) radio interference can be generated. To avoid this, appropriate measures have to be taken.

#### Degree of protection

**Housing:** IP 40 IEC/EN 60 529  
**Terminals:** IP 20 IEC/EN 60 529  
**Vibration resistance:** Thermoplastic with V0 behaviour according to UL subject 94  
**Climate resistance:**  
- Frequency: 10 ... 55 Hz, IEC/EN 60 068-2-6  
  - EN 50 005  
**Wire connection**  
- Screw terminals fixed: AWG 20 - 12 Solid/Str, Torque 0.8 Nm  
- Plug in screw: AWG 20 - 14 Solid Torque 0.8 Nm  
- Plug in cage clamp: AWG 20 - 12 Sol/Str  
**Insulation of wires or sleeve length:** 8 mm  
**Plug in with screw terminals**  
- Max. cross section: 1 x 4 mm² solid or  
  - 1 x 2.5 mm² stranded ferruled or  
  - 2 x 1.5 mm² stranded ferruled or  
  - 2 x 2.5 mm² solid  
**Insulation of wires or sleeve length:** 8 mm  
**Plug in with cage clamp terminals**  
- Max. cross section: 1 x 4 mm² solid or  
  - 1 x 2.5 mm² stranded ferruled  
- Min. cross section: 0.5 mm²  
- Insulation of wires or sleeve length: 12 ±0.5 mm  
**Wire fixing:**  
- Plus-minus terminal screws M 3.5, box terminals with wire protection or cage clamp terminals, max. 0.8 Nm  
**Fixing torque:**  
**Mounting:** DIN rail IEC/EN 60 715  
**Weight:** 150 g  

#### Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>Width x height x depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK 9962N</td>
<td>22.5 x 90 x 97 mm</td>
</tr>
<tr>
<td>MK 9962N PC</td>
<td>22.5 x 111 x 97 mm</td>
</tr>
<tr>
<td>MK 9962N PS</td>
<td>22.5 x 104 x 97 mm</td>
</tr>
</tbody>
</table>

#### UL-Data

**Switching capacity:** Ambient temperature 60 °C: Pilot duty B300  
- 50 250 Vac G.P.  
**Wire connection:**  
- 60 °C / 75 °C copper conductors only  
**Screw terminals fixed:**  
- AWG 20 - 12 Solid/Str Torque 0.8 Nm  
**Plug in screw:**  
- AWG 20 - 14 Solid Torque 0.8 Nm  
**Plug in cage clamp:**  
- AWG 20 - 12 Sol/Str

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

### Technical Data

#### Standard Type

<table>
<thead>
<tr>
<th>MK 9962N.82/61</th>
<th>AC/DC 12 ... 240 V</th>
<th>0.05 ... 300 h</th>
<th>Article number: 0054105</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output:</td>
<td>2 changeover contacts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auxiliary voltage U_H:</td>
<td>AC/DC 12 ... 240 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time ranges:</td>
<td>0.05 ... 300 h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width:</td>
<td>22.5 mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Variants

MK 9962N.82/300/61: Connection facility for a remote potentiometer 10 kΩ to adjust the time

#### Ordering example for variants

MK 9962N _82_ _ _ / _ _ _ /61 AC/DC 12 ... 240 V 0.05 s ... 300 h

**Time range**  
**Auxiliary voltage with UL-approval**  
**Variant, if required**  
**Type of terminals without indication:**  
- terminal blocks fixed, with screw terminals  
- PC (plug in cage clamp): pluggable terminal blocks with cage clamp terminals  
- PS (plug in screw): pluggable terminal blocks with screw terminals  
**Contacts**  
**Type**
## Options with Pluggable Terminal Blocks

<table>
<thead>
<tr>
<th>Screw terminal</th>
<th>Cage clamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>(PS/plugin screw)</td>
<td>(PC/plugin cage clamp)</td>
</tr>
</tbody>
</table>

### Notes

Removing the terminal blocks with cage clamp terminals

1. The unit has to be disconnected.
2. Insert a screwdriver in the side recess of the front plate.
3. Turn the screwdriver to the right and left.
4. Please note that the terminal blocks have to be mounted on the belonging plug in terminations.

### Accessories

**AD 3:**

External potentiometer 10 kΩ

Article number: 0028962

The external potentiometer is used for remote setting of the time delay. The internal potentiometer of the timer must be set to min. time delay.

Degree of protection:

- front side: IP 40

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### Connection Examples

#### Options with Pluggable Terminal Blocks

#### Characteristics

<table>
<thead>
<tr>
<th>$I^2$ ($A^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 10 20 30 40 60 80</td>
</tr>
</tbody>
</table>

Quadratic total current limit curve

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#### Control with parallel connected load

Connection with 2 different control voltages

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11.03.19 en / 079A