

# COMBITRON PROGRAM SCHEDULE

COMBITRON are supply and actuator modules for the electromagnet clutches and brakes. As power supply for DC- or AC-side switching different single-wave and bridge rectifiers as well as rapid switchgear of the series COMBITRON are available.

The rectifiers correspond to the low voltage regulation 73/231/EWG of the European Union.

**COMBITRON RECTIFIERS AND SWITCHES**

Half-wave and bridge rectifiers from	0 ... 720 V AC	page 43	<b>COMBITRON 91</b>
Rapid-switching rectifier (for COMBISTOP)		page 44	<b>COMBITRON 98</b>

**TECHNICAL DATA**

Switching mode (AC- / DC-side switching)	page 46
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COMBITRON 91 are rectifiers for power supply of brakes and clutches. AC voltage supply max 720 V AC for AC or DC side switching conform to the low voltage regulation 72/231 EWG of the European Union.

Harmful electromagnetic interferences arise at the switching of electromagnetic clutches and brakes and other inductive DC consumers. The half-wave rectifier 0291010-CEMV limits these interferences to class A according to EN 55011.

All other rectifiers are not equipped with measurements to suppress radio interference. This has to be taken into consideration for the planning of the interference suppression of the plant or the machine. The user is responsible for meeting the EU machine directive.



$U_{in}$ Switching $U_{vmax}$	<b>275 V AC +0%</b> AC/DC 450 V	<b>500 V AC +0%</b> AC/DC 900 V	<b>600 V AC +0%</b> AC 1000 V	<b>720 V AC +0%</b> AC 1600 V
Half wave <sup>4)</sup> $U_{out} = 0,45 * U_{in}$ $I_N (45\text{ }^\circ\text{C}) = 1,0\text{A}$ $I_N (80\text{ }^\circ\text{C}) = 0,5\text{A}$	0291010-CE07 <sup>2)</sup> 	0491010-CE07 <sup>3)</sup> 	0591010-CE09 <sup>2)</sup> 	0691010-CE09 <sup>3)</sup> 
Fullwave <sup>4)</sup> $U_{out} = 0,9 * U_{in}$ $I_N (45\text{ }^\circ\text{C}) = 2,0\text{A}$ $I_N (80\text{ }^\circ\text{C}) = 1,0\text{A}$	0291020-CE07 <sup>2)</sup> 	0491020-CE07 <sup>3)</sup> 	$U_{in}$ maximum input voltage $U_{vmax}$ maximum cut-off voltage $U_{out}$ Output DC voltage AC AC switching DC DC-side switching $I_N (45\text{ }^\circ\text{C})$ Rated output current at the temperature	
Half wave with EMC protection <sup>1)</sup> $U_{out} = 0,45 * U_{in}$ $I_N (45\text{ }^\circ\text{C}) = 1,0\text{A}$ $I_N (80\text{ }^\circ\text{C}) = 0,5\text{A}$	0291010-CEMV <sup>3)</sup> 			

<sup>1)</sup> with internal interference suppression according to EN 55011/ class A

<sup>2)</sup> picture 1 <sup>3)</sup> picture 2

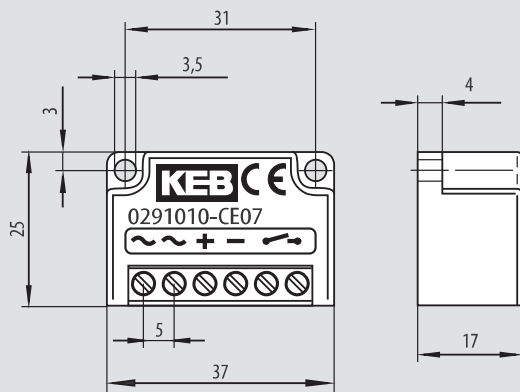
<sup>4)</sup> different values (U, A) when used under UL conditions

### CHARACTERISTICS

- UL - certification (No.: E.308765)
- compact design in a plastic housing
- possible installation into the motor terminal box
- protection against voltage peaks of the switching contacts
- maximal ambient temperature 80 °C

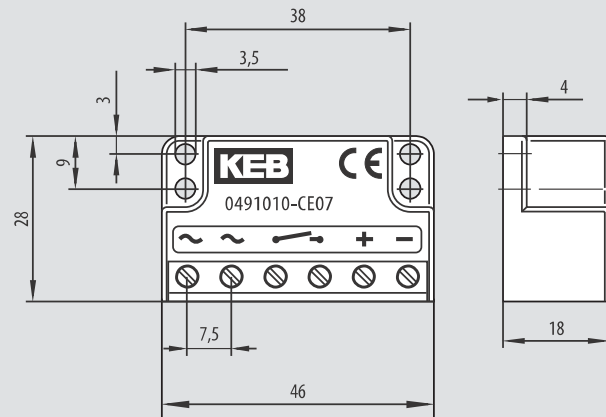
Nominal voltage magnet	Coil voltage tolerance $U_2 (U_{out})$	AC voltage supply $U_1 (U_{in})$	Type of rectifier
24 V DC			
105 V DC	93 - 118	230 V AC	half wave rectifier (0291010-CE07)
205 V DC	182 - 230	230 V AC	full wave rectifier (0291020-CE07)
180 V DC	162 - 198	400 V AC	half wave rectifier (0491010-CE07)

picture 1



Terminal cross section 1.5 mm<sup>2</sup>

picture 2



Terminal cross section 2.5 mm<sup>2</sup>

# COMBITRON 98

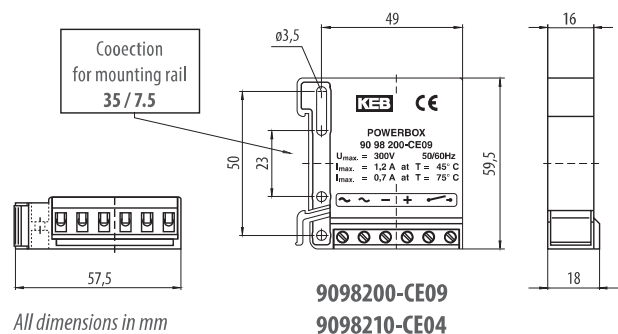
COMBITRON 98 rapid-switching rectifiers with overexcitation for optimal turn-on and turn-off times of spring-applied brakes and electromagnets. Two Powerbox versions with similar right housing to fit on DIN rail or bolt on version.

COMBITRON 9098200-CE09 UL - certification (No.: E.308765)



	9098210-CE04	9098200-CE09 <sup>1)</sup>
Input voltage	24 V DC $\pm 20\%$	180-300 V AC $\pm 0\%$
Overexcitation time	800 ms $\pm 15\%$	350 ms $\pm 10\%$
Cable length	max. 10 m to brake coil	max. 100 m to brake coil
Current I <sub>N</sub> 45 °C	1.2 A continous 7 A for 800 ms	1.2 A continous 2.4 A for 350 ms
Current I <sub>N</sub> 75 °C	0.6 A continous 3.5 A for 800 ms	0.7 A continous 1.4 A for 350 ms
Temperature	CCV -40° ... 75°	CCV -40° ... 75°
Switching rate	max. 6 per minute at max current	max. 1 per minute at max current
Side altitude above sea level	> 1,000 m - 1 % current reduction/100 m	> 1,000 m - 1 % current reduction/100 m
Wiring diagrams		

<sup>1)</sup> different values (U, A) when used under conditions of UL





# COMBITRON SWITCHING ARRANGEMENTS

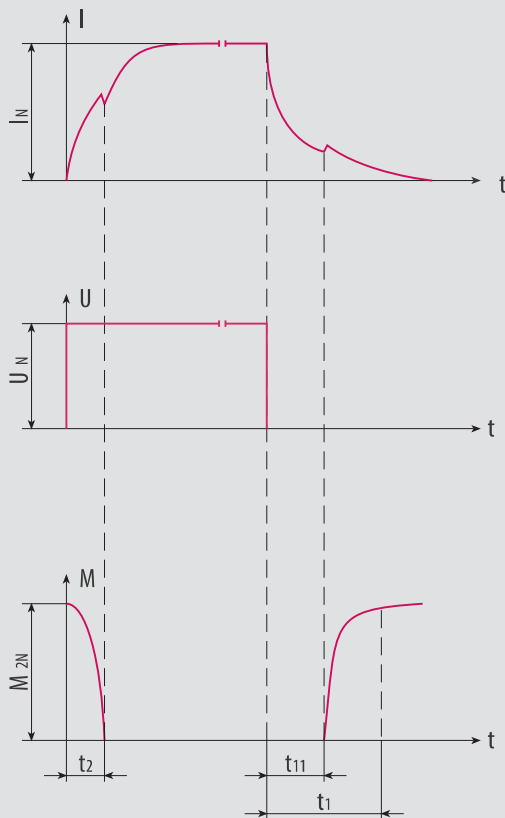
## AC-SIDE SWITCHING

When switching before the rectifier on the AC-side the magnetic field decays slowly. At this mode of switching the tripping delay is quite long. The AC-side switching requires no protective measurements for the coil and the switching contacts. On disconnection the rectifier diodes act as free-wheeling diodes.

The switching times  $t_{11}$  for AC-side switching increase when the rectifier is connected directly in the motor terminal box (2). When the motor slows down a generative voltage is applied to the motor terminals. The wiring (2 and 3) is not permitted for frequency inverter operation.

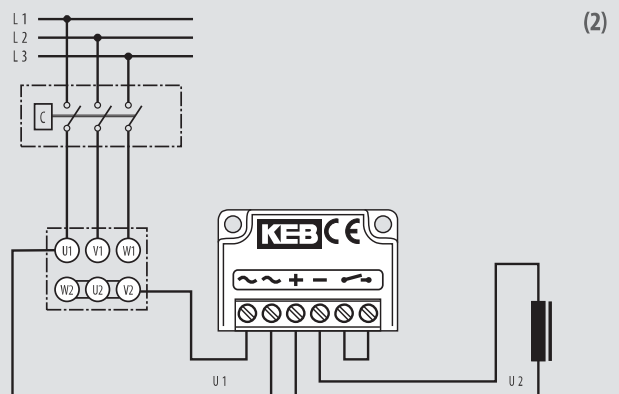
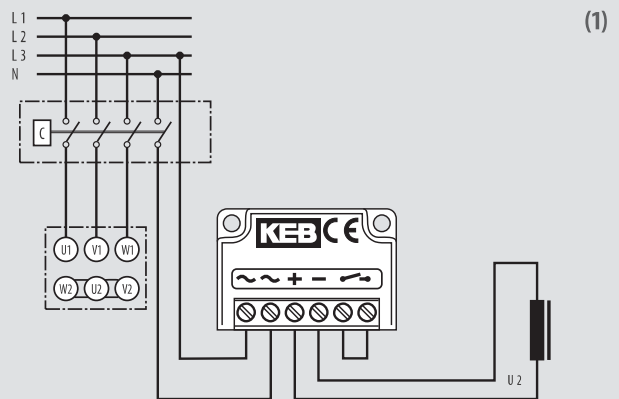
For line lengths of more than 10 m between rectifier and brake at AC-side switching the regulations prescribe the use of a separate switch (1). In this case the supply voltage may not be tapped behind the motor contactor (2). If it is not possible to install an additional switch the use of special rectifiers becomes necessary.

### CURRENT-TIME-/VOLTAGE-TIME-/TORQUE-TIME- DIAGRAM



$t_1$  = Engagement time  
 $t_{11}$  = Engagement delay time  
 $t_2$  = Release time

### WIRING DIAGRAM



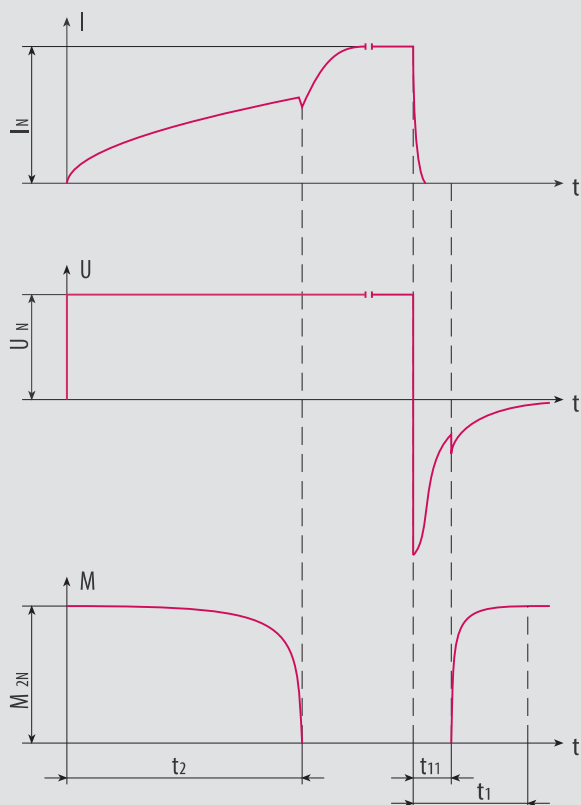
## DC-SIDE SWITCHING

The switching is done between the rectifier and the magnet. At this mode of switching the tripping delay is short, since the energy of the magnetic field is absorbed by the rectifier. The voltage peaks that occur at switching are limited to a harmless level for the rectifier.

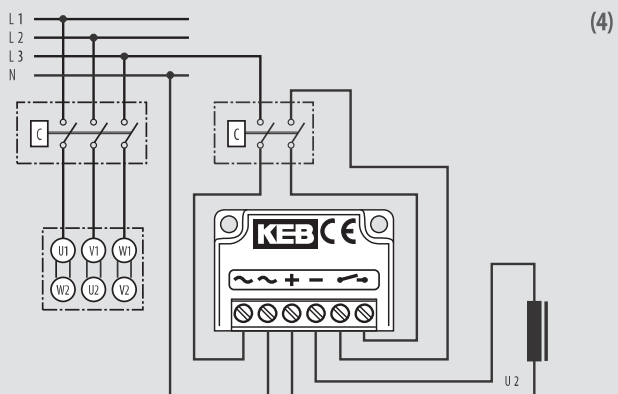
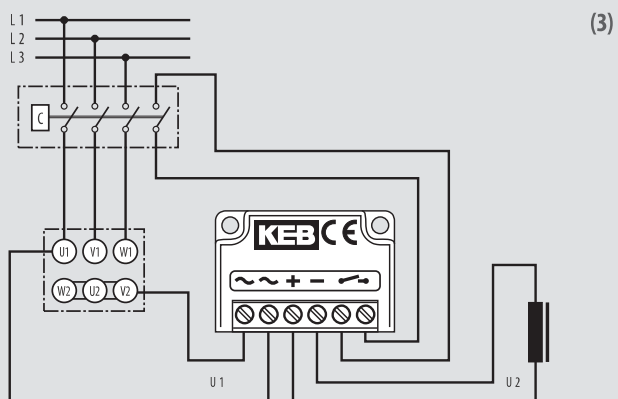
The maximal permissible switching frequency for the DC-side switching of rectifiers depends on the energy content of the magnet for COMBISTOP. Higher switching frequencies are achieved by the external connection of a varistor in parallel to the brake or to the terminals + and - DC of the rectifier.

Rectifier	KEB-article	varistor
0291	0090045-2753	S20K275
0491	0090045-6257	S20K625
0591	0090045-6257	S20K625

### CURRENT-TIME-/VOLTAGE-TIME-/ TORQUE-TIME- DIAGRAM



### WIRING DIAGRAM



The simultaneous AC and DC-side switching, shown in example 4 guarantees short disconnecting times and reduces the contact erosion.