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# Single-phase overexcitation rectifier

33 4331xAx3 Product Specification

The single-phase overexcitation rectifiers specified below are designed to increase the attractive force, to reduce the attraction time of actuating solenoids, to reduce the coupling and disconnection times of clutches and brakes and to reduce the power consumption of clutches, brakes and actuating solenoids.



33 43310A03

**Technical specifications** 

Rectifier type full wave rectifier type synchronous switching function with synchronous switching function with synchronous switching synchronous switching function with synchronous switching synchronous				
Rectifier type         synchronous swi           Input voltage         230 / 115 VAC ±           Frequency         40 - 60 Hz           Output voltage:				
Input voltage	tched			
Frequency 40 – 60 Hz Output voltage:	synchronous switched			
Output voltage:	230 / 115 VAC ± 10%			
_ · · · · ·	40 – 60 Hz			
	Output voltage:			
Overexcitation 205/102 VD	205/102 VDC			
Holding voltage adjustable at 20 – 115 VDC bei 2	20 – 115 VDC bei 230 VAC			
50 Hz 10 – 55 VDC bei 1	10 – 55 VDC bei 115 VAC			
Maximum output current:				
with overexcitation 4 ADC 8	ADC			
holding current 2 ADC 4	ADC			
Overexcitation time adjustable 0.15 – 3 s	0.15 – 3 s			
Min. recovery time 400 ms	400 ms			
Required relay output for 15 mA / 115 / 230	15 mA / 115 / 230 VAC potential separated			
Fuse: Fine wire fuse 5 x 20 as per DIN 41571 T2 E/250 V M6,3	D/250 V			
16-pole plug in s	16-pole plug in screw			
Connection terminals, 2,5 mm <sup>2</sup>	terminals, 2,5 mm² fine wire			
0 – 70 °C	0 – 70 °C			
Ambient temperature See diagram 2 for o	See diagram 2 for derating			
Protection as per EN 60529 IP 00	IP 00			

Specification subject to change without notice. Please observe ordering data!

In order to increase the attractive force of actuating solenoids, the coil is overexcited during the overexcitation time applying a full wave rectified voltage. Afterwards, the rectifier changes over to the selected holding voltage, that shouldn't be higher than the specified nominal voltage of the solenoid. To lower the power consumption the nominal voltage of the solenoid should be not lower than the overexcitation voltage to achieve the nominal attractive force. The holding voltage can be adjusted depending of the dimensioning of the solenoid to a lower value than nominal. Owing to this power saving effect the switch off time will be reduced without the necessity of DC-side switching due to the lower magnetic energy. An integrated protective circuit allows DC side switching, thus reducing fall times, coupling times and disconnection times. The integrated compensation of input voltage changes provides a better stabilized output voltage. The rectifier is designed for powerless switching on and off. Overexcitation can be disabled, to use this device as variable DC-voltage supply for different applications.

Due to their compact plastic housing, these rectifiers can be mounted on top-hat rails in switch cabinets. Plug-in screw terminals ensure simple installation.

### CE

#### EMC Directive 2004/108/EEC:

Compliance with the following standards is confirmed: EN 50081-2 (Emission):

EN 55011 (VDE 0875, part 11, 1992)

Group 1, Class A conducted interference

Group 1, Class B radiated interference

EN 61000-6-2 (Immunity):

EN 61000-4-3 (1997) severity level 3

EN 61000-4-4 (1996) severity level 3

EN 61000-4-5 (1996) severity level 3

# Low Voltage Directive 2006/95/EEC:

Compliance with the following standards is confirmed: HD 625.1S1 (1996), (VDE 0110) insulation coordination, EN 60529 (1991) IP 54 external mounting

**Machinery Directive 2006/42/EC:** These products are considered components in the sense of Machinery Directive 2006/42/EC and must not be put into service until the machinery in which they are incorporated has been declared in conformity with the provisions of the EC Directives.

#### ROHS

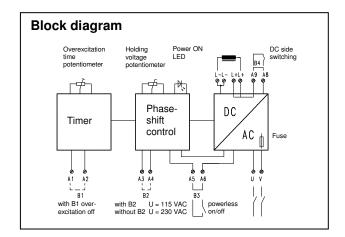
The specified products comply with Directive 2002/95/EC (ROHS).

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# Operating range

Diagram 1: Permissible maximum switch frequency

Rectifiers installed in switch cabinets with a minimum distance of 30 mm to adjacent units.

 $f_s = \frac{{I_{Hmax}}^2 - {I_{H}}^2 * ED}{{\left( {I_{\ddot{U}}}^2 - {I_{Hmax}}^2 \right)} * t_{\ddot{U}}}$ 

## Formula 1: Permissible maximum switch frequency

fs: max. switch frequency

I<sub>Hmax</sub>: max. holding current (see technical data)

I<sub>H</sub>: adjusted holding current ED: Duty cycle

I<sub>Ü</sub>: Overexcitation current

t<sub>0</sub>: Overexcitation time

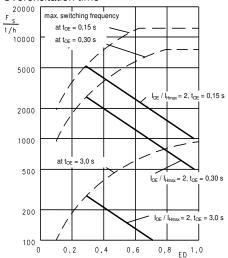
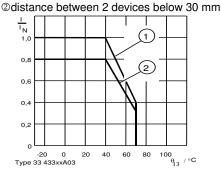
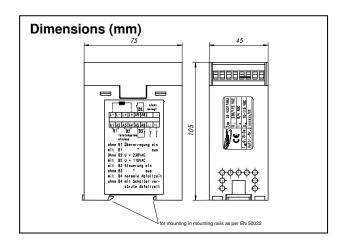


Diagram 2: Admissible current load at ambient temperature ① distance between 2 devices minimum 30 mm





**Factory settings** 

Type 33 433	Overexcitation time to [s]	Holding voltage V [VDC]
	Nominal value	Nominal value
10A03	1.2 ± 0.2	63 ± 3
11A03	1.7 ± 0.2	63 ± 3
11A13	0.6 ± 0.05	57.5 ± 2.5

## **Application hints**

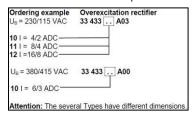
The technical data apply to rectifiers installed in switch cabinets with a minimum distance of 30 mm to adjacent units. In case the distance to other components is less than 30 mm, the power consumption must be reduced by 20%. The rectifier operates as bridge rectifier during the selected overexcitation time and subsequently reduces the output voltage to the selected holding voltage by phase shift control. It is crucial to ensure that the total power consumption does not exceed the rated power of the connected unit. The rectifier must only be used within the limits shown in diagram 1 in order to avoid overloading.

The maximum switching frequency can be determined on the basis of formula 1. The overexcitation time should be lower than 80% of the duty cycle. Ongoing DC-side switching when operating in overexcitation mode isn't allowed due to a possible damage of the protection circuit.

The holding voltage adjustment should be done with connected load.

## Attention!

To use the powerless switching feature a potential free relais contact is necessary because the terminals are internal connected with the AC input.



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