VARIMETER
Frequency Relay
BA 9837, AA 9837, AA 9838

0225154

BA 9837

AA 9837

AA 9838

- According IEC/EN 60255-1
- Detection of under- or overfrequency
- Adjustable response value
- Optionally 1 or 2 changeover contacts
- Width 45 mm

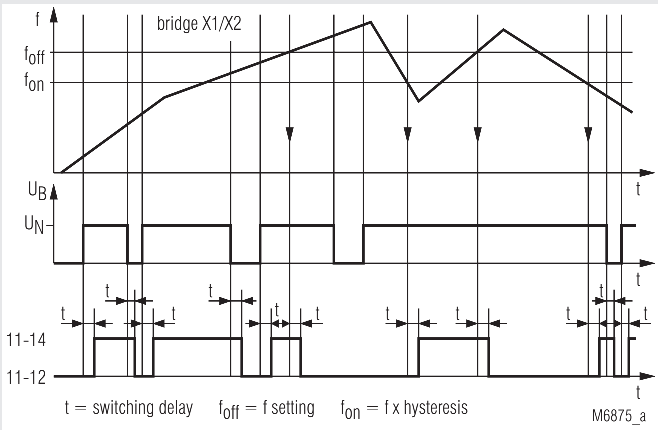
Approvals and Markings

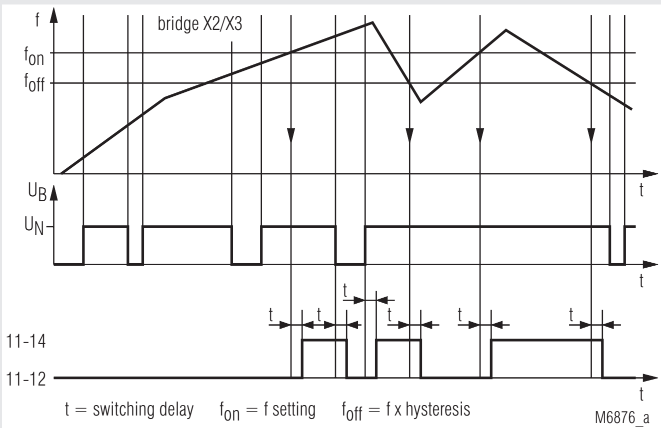
CE

Application

The frequency relay can be used especially in applications where the rotor frequency of a slip-ring motor must be measured. The rotor frequency is reciprocal proportional to the speed (see diagram rotor frequency at contercurrent braking).
This behaviour allows to find speed depending switching values and can be used for start up and contercurrent braking of motors on cranes.

Function Diagram





Function

The device compares 2 frequencies. The measuring frequency is compared to an internally generated, settable frequency reference.

With bridge on X1-X2 the output relay deenergises when the measuring frequency is higher then the setted frequency. The relay energises again when the measuring frequency drops under the setted frequency x hysteresis.

With bridge on X2-X3 the output relay energises when the measuring frequency is higher then the setted frequency. The relay deenergises again when the measuring frequency drops under the setted frequency x hysteresis.

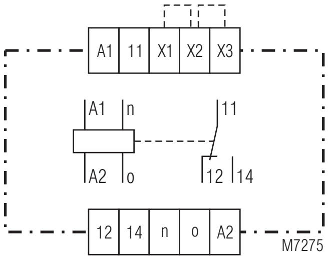
An indicating LED shows that the frequency signal is connected. At low frequency the LED flashes. A second LED indicates the state of the output relay.

Notes

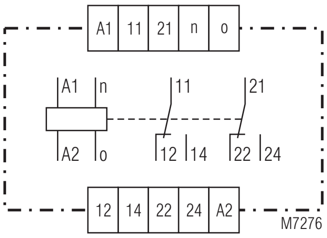
Terminals X1, X2, X3 should only be connected together with the corresponding wire links. Do not connect external voltage, neutral or ground.
The measuring input is designed for an amplitude of AC 8...500 V. Higher values AC 12...800 V can be achieved by connecting a series resistor, type IK 5110 into the measuring circuit either to terminal n or o.

All technical data in this list relate to the state at the moment of edition. We reserve the right for technical improvements and changes at any time.

Circuit Diagrams



BA 9837.11,
AA 9837.11, AA 9838.11



BA 9837.12,
AA 9837.12

Connection Terminals

Terminal designation	Signal designation
A1	+ / L
A2	- / N
n, o	Measuring input
X1, X3	Control input
X2	Control output
11, 12, 14, 21, 22, 24	Changeover contacts

Technical Data

Input

Measuring input:	AC Amplitude AC 8 ... 500 V r.m.s internal resistance: > 400 kΩ	
Setting range:		
BA 9837, AA 9837:	5 ... 15 Hz	40 ... 120 Hz
	10 ... 30 Hz	100 ... 300 Hz
	20 ... 60 Hz	200 ... 600 Hz
	30 ... 90 Hz	
AA 9838:	20 ... 80 Hz	
Setting:	infinite on absolute scale	
Response value:	≥ setting value	
Hysteresis:		
BA 9837, AA 9837:	0.8 ... 0.97 of response value	
AA 9838:	0.96 of response value	
Accuracy:	< ± 1 %	
Temperature influence:	< ± 0.15 % /°C	
Influence of auxiliary supply:	< ± 0.5 % at 0.8 ... 1.1 U_N	

Auxiliary Circuit

Auxiliary voltage U_H:	
BA 9837, AA 9837:	AC 24, 42, 110, 127, 230, 240 V
AA 9838:	AC 48, 110, 230 V
Voltage range of U_H:	0.8 ... 1.1 U_H
Nominal consumption U_H:	< 3 VA
Nominal frequency of U_H:	50 / 60 Hz ± 5 %

Output

Contacts

BA 9837.11, AA 9837.11, AA 9838.11:	1 changeover contact
BA 9837.12, AA 9837.12:	2 chanceover contacts

Switching delay:

setting range (Hz)	bridge X1-X2	bridge X2-X3
5 - 15	500 - 800	650 - 1 000
10 - 30	250 - 300	600 - 800
20 - 60	120 - 150	300 - 430
20 - 80	100 - 120	290 - 430
30 - 90	90 - 120	280 - 400
40 - 120	60 - 80	140 - 210
100 - 300	25 - 45	70 - 120
200 - 600	15 - 25	70 - 100
	switching delay in ms	

Technical Data

Thermal current I_{th}:	6 A	
Switching capacity		IEC/EN 60 947-5-1
to AC 15, AC 230 V:	3 A / AC 230 V	
Electrical life		IEC/EN 60 947-5-1
to AC 15, at 3 A, AC 230 V:	2.5 x 10^5 switching cycles	
Short circuit strength max. fuse rating:	4 A gL	IEC/EN 60 947-5-1
Mechanical life:	> 30 x 10^6 switching cycles	

General Data

Operating mode:	Continuous operation	
Temperature range:		
Operation:	- 20 ... + 60°C	
Storage:	- 20 ... + 70°C	
Altitude:	< 2.000 m	
Clearance and creepage distances		
rated impulse voltage / pollution degree:	4 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation		
80 MHz ... 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
Interference suppression:	Limit value class B	EN 55 011
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, frequency 10 ... 55 Hz,	IEC/EN 60 068-2-6
Climate resistance:	20 / 060 / 04	IEC/EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2.5 mm^2 solid or 2 x 1.5 mm^2 stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece	IEC/EN 60 999-1
Screw mounting:	35 x 50 mm and 35 x 60 mm	
Fixing torque:	0.8 Nm	
Mounting:	DIN rail	IEC/EN 60 715
Weight:	250 g	

Dimensions

Width x height x depth:	45 x 77 x 127 mm

Standard Type

BA 9837.11 30 / 90 Hz AC 230 V AC 50 / 60 HZ

Article number: 0050216
- Output: 1 changeover contact
- Measuring frequency: 30 / 90 Hz
- Auxiliary voltage U_H: 230 V
- Width: 45 mm

Variants

Frequency relay with 2 changeover contacts and internal bridges (X1, X2, X3)

BA 9837.12/010:	with internal bridge X1 - X2
BA 9837.12/020:	with internal bridge X2 - X3
AA 9837.12/010:	with internal bridge X1 - X2
AA 9837.12/020:	with internal bridge X2 - X3

Ordering example for variants

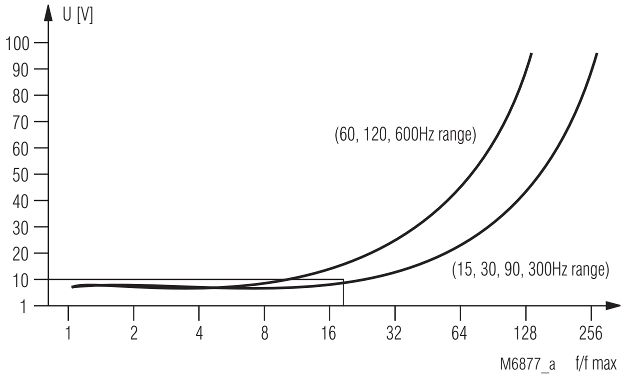
BA 9837 .12 /_ _ _ AC 230 V 50/60 Hz 20/60 Hz

- 20/60 Hz: Measuring frequency
- 50/60 Hz: Nominal frequency
- AC 230 V: Auxiliary voltage
- /_ _ _: Variant, if required
- .12: Contacts
- BA 9837: Type

Accessories

IK 5110:	Series resist or for higher measuring voltage AC 12 ... 800 V eff. Article number: 0015751

Characteristics



Measuring sensitivity

The diagram shows the sensitivity of the input of the frequency relay AA 9837. If the measuring voltage is lower then the curve values the frequency cannot be measured anymore. Please note.
Superimposed interference voltages on the measuring input with a ration.

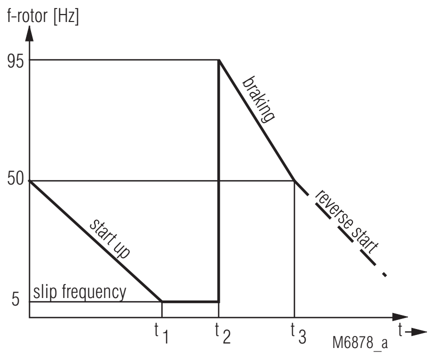
$$\frac{f}{f_{max}}$$

above the curve values can influence the measuring results.
f - frequency on input
f_{max} - highest value of the actual frequency range

Example:
$U_{meß}$: 10 V; measuring frequency: f = 4 800 Hz
chosen frequency range: 100 - 300 Hz, f_{max} = 300 Hz

$$\frac{f}{f_{max}} = \frac{4\,800\text{ Hz}}{300\text{ Hz}} = 16$$

The meauring frequency is detected, as the measuring voltage is above the response curve.

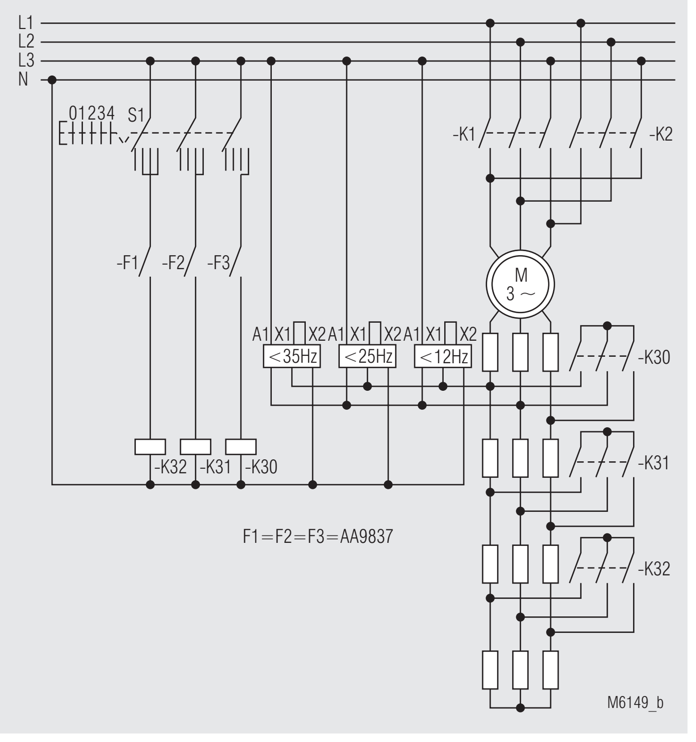


t_1 nominal speed reached
t_2 start braking
t_3 standstill (end of braking to avoid reverse start)

Rotor frequency at countercurrent braking

Braking:
When reversing the phases for braking the rotor frequency changes and drops proportional to the speed to mains frequency. E.g. when the rotor frequency is 5 Hz at nominal speed, it to 95 Hz. When the motor is at stand still the rotor frequency is nominal frequency. At this point the frequency relay has to give the signal to stop braking, before the motor starts up in the opposite direction.

Connection Example



Motor control with starting resistance

Start:
To achieve an optimum speed depending starting inertia, different starting resistors are switched into the rotor circuit, when certain speed values are reached. Often this procedure is controlled with timers, but with small loads the motor reaches the speed to switch over much faster then with high loads and the motor still runs on the lower stage. When the switching of the resistors is controlled speed depending by frequency relays, the start up cycles can be shortened and the plant can be used more effective.