

## ■ FD 9000 Frequency-, speed- and zero-speed monitor

### Highlights

- Rotation speed monitor
- Zero speed detection
- Input for start-up inhibit
- Simple adjustments by DIP-Switches
- 2 Relay outputs
- Low power consumption
- High reliability
- Standard housing for DIN rail mounting



### General

The FD 9000 can be used to detect over speed, under speed or for zero speed detection. To achieve fast response times the FD 9000 operates on a pulse-width measurement. At slow frequency the digital system measures the time between two consecutive pulses and at high frequency the shortest measurement time is 16 ms.

### Input channels

There are 3 optically isolated input channels A, B, and C provided. Their threshold voltage can be selected between 5, 12, or 24 V. Applied sensors must have pnp or push-pull output circuits (source currents  $\geq 5$  mA). Max. input frequency for input channel A is 50 kHz. Input channel C can be used for start-up inhibit. Input B is not used.

### Relay outputs

Two relays are provided. Relay output contact 1 is used to signal overspeed or underspeed. The selection between the signaling of overspeed or underspeed is made by an internal jumper setting. Relay output contact 2 is used to signal a zero speed. The contact rating for both relays is 250 VAC / 3 A.

### Digital adjustment

There are two internal 8-pol DIP-switches provided for the digital adjustments. Possible adjustments:

- A 3-decade value for speed level adjustment (BCD-code)
- Four speed level multipliers can be set with 2 additional DIP-switches (x0,1/x1/x10/x100)
- The zero speed detection works with four selectable measuring times at input A. A detected zero speed will close relay output 2.

### Power supply

The FD 9000 is designed for different power supplies. See order key for details. The power supply input is isolated from all input and output channels.

### Housing

The FD 9000 is provided for DIN-rail mounting according to EN 50022. The case is of Polyamid PA 6.6. For connecting inputs, outputs and power supply there are 12 screw terminals provided.

### Technical specifications

#### Input channels

Input voltage level	: 24 V, 12 V, 5 V selectable
Tolerance	: +/-20% of selected level
Isolation	: opto isolated 500 V
Input current	: $\geq 5$ mA, pnp or push-pull
Input channel A, frequency	: 0,1... 50.000 Hz
Input channel B	: reserve
Input channel C	: start-up inhibit

#### Limit adjustment

3-decade	: 1...999
Range	: 0,1, 1, 10, 100, selectable
Hysteresis, fixed	: 3% of selected setpoint

#### Zero speed detection

Time for no pulses at input A	: 0,1/ 1/ 2/ 10 sec, selectable
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#### Relay outputs

Speed monitoring	: contact of relay 1
Relay function	: selectable by jumper
Zero speed detection	: contact of relay 2
Contact ratings	: 3 A / 250 VAC

#### Power supply

Voltage	: see ordering information
Current	: max. 40 mA (24VDC)

#### Case

Dimensions	: 99 x 114,5 x 17,5 mm
Screw terminals	: 12
Protection	: IP40
Mounting	: EN 50022 (DIN-rail mount.)

#### Environmental

EMV	: EG-direction 89/336/EWG
Operating temperature	: -5 to +55 °C

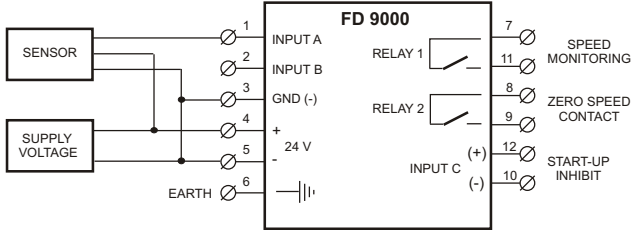
### Ordering Information

FD 9000	-	X	0	0	
					Reserved
					Reserved
					<b>Power supply</b>
			0		4.5 ... 9 V DC, (option)
			1		9 ... 18 V DC, (option)
			2		18 ... 36 V DC, (standard)
			3		36 ... 48 V DC, (option)

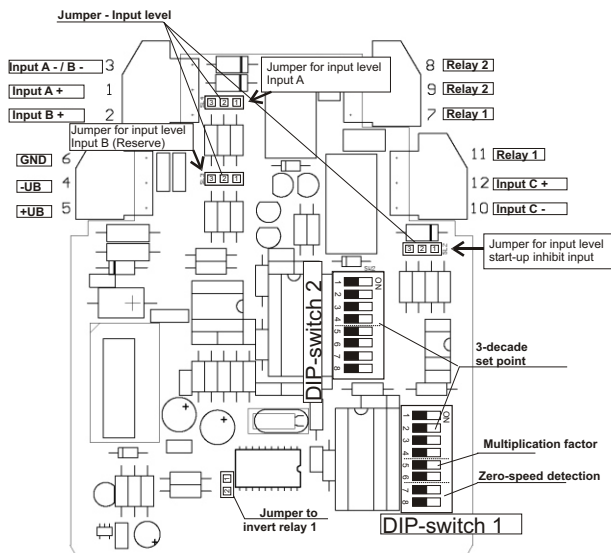
**Connection**

Example for the connection of a rotational encoder to the FD 9000. The FD 9000 and the encoder are supplied with the same 24 VDC voltage source.

**Connection of the device - Example**



**FD 9000 - Printed board layout**



**Jumper-Adjustment for the input voltage level**

- 1-2-3 open = 24 V
- 2-3 closed = 12 V
- 1-2 closed = 5 V

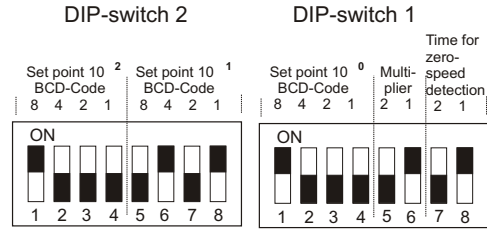
**Jumper-Adjustment for relay 1 - speed monitoring**

- Jumper open = contact closed, if applied frequency > setpoint
- Jumper closed = contact closed, if applied frequency < setpoint

**Function of the start-up inhibit input**

The set point is not monitored as long as the voltage which is set with the jumpers for the input voltage level is applied to the start-up inhibit input. The zero-speed detection is not affected by this setting.

**Examples for DIP-switch settings**



**Example**  
Set point: 858  
Multiplier: 1  
Time for zero-speed detection [s]: 1

**Limit adjustment**

The set point is set BCD coded. The decades are assigned to the DIP-switches as follows:

- DIP-switch 1 - switch 1-4 10<sup>0</sup>
- DIP switch 2 - switch 5-8 10<sup>1</sup>
- DIP-switch 2 - switch 1-4 10<sup>2</sup>

The valencies within the decades are shown in the picture above.

**Multiplication factor and zero-speed detection**

The multiplication factor and the time presetting for the zero-speed detection are each set with 2 switches of DIP-switch 1.

**Multiplication factor for the limit adjustment**

DIP-switch setting	Multiplication factor
5 off, 6 off	0,1
5 off, 6 on	1
5 on, 6 off	10
5 on, 6 on	100

**Zero-speed detection time**

DIP-switch setting	Time in seconds
7 off, 8 off	0,5
7 off, 8 on	1
7 on, 8 off	2
7 on, 8 on	10

**Hysteresis**

The FD 9000 has a preset hysteresis of 3 %. The hysteresis is only effective when the measured value falls below the set point.

**Example:**

Set point: 100 Jumper for relay 1 is not set

The relay stays opened as long as the measured value is below 100. If the measured value reaches 100 the relay will close. It will open again if the measured value falls below 97. (100 - 3%)

**Important!**

To take over DIP-switch changes the device has to be disconnected from the power supply for a short time.