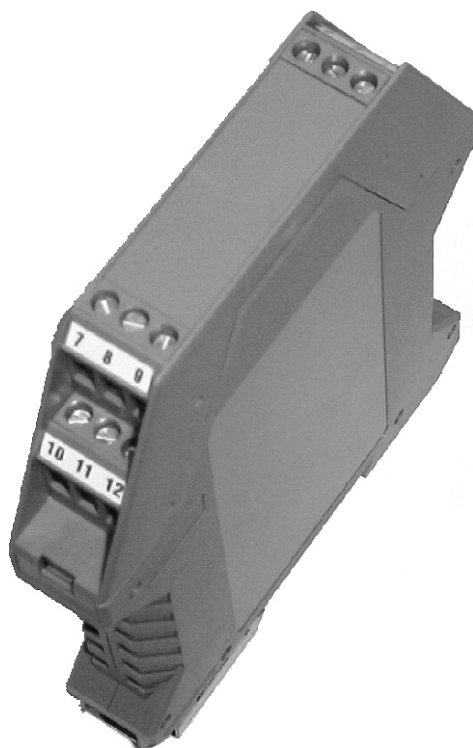

FT 9002

Frequency divider

Instruction Manual



Warranty

For delivered products our "Allgemeine Lieferungs- und Zahlungsbedingungen" are effective. In no event we or our suppliers shall be liable for any other damages whatsoever (including, without limitation, damages for loss of business profits, business interruption or other pecuniary loss) arising out of or inability to use this product.

All our products are warranted against defective material and workmanship for a period of two (2) years from date of delivery. If it is necessary to return the product, the sender is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit. The warranty does not apply to defects resulting from action of the buyer, such as mishandling, improper interfacing, ope-

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1. Description

The converter **FT 9002** is a frequency divider in a snap-in housing for 35mm rail mounting. The frequency divider can be used to divide frequencies up to 50 kHz into lower frequencies. The puls-pause relation of the output frequency is 1:1. The divider can be set by a DIP switch and a jumperblock.

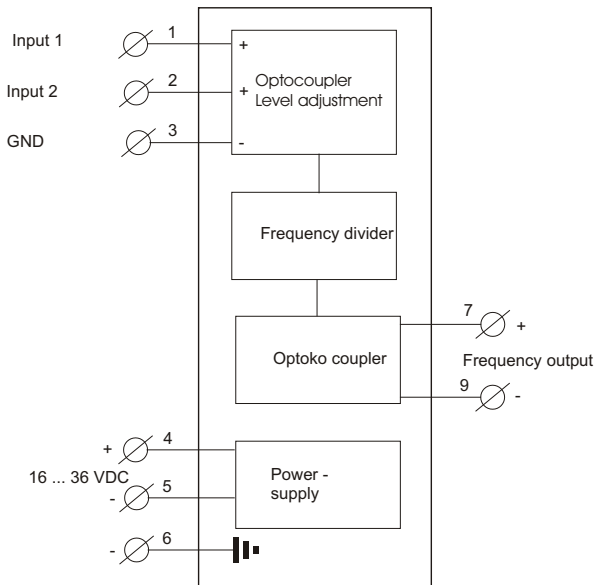
The FT 9002 has two inputs. One input or both inputs can be used. Using both inputs input pulses must be 90° out of phase. In this case a doubling of the input pulses will occur.

The inputs are isolated. Using both inputs a positive signal is needed to drive the input channels. The input current has to be 5 mA minimum. The input voltage level can be set by the user with an internal DIP switch to the input levels of 5 V, 12V and 24 V.

The output channel is also isolated. The FT9002 provides a potential free collector-emitter path; thereby the customer can create an output to his own requirements.

The functional structure of the converter is shown in picture 1. There are two isolated inputs, a input voltage level adjustment, a frequency divider and a isolated opto-coupler output.

The isolated power supply is designed for an input voltages of 5, 12, or 24 VDC. For moer details see ordering information.



Picture 1

2. Safety Instructions

This instrument is produced in accordance with Class II of IEC 348 and VDE 0411. When delivered the instrument has been tested to meet all functions described. Before installing the instrument please read the mounting and servicing instructions. We have no liability or responsibility to customer or any other person or entity with respect to any liability, loss or damage caused or alleged to be caused directly or indirectly by equipment or software sold or furnished by us. Read the installation instruction carefully. No liability will be assumed for any damage caused by improper installation. Inspect the instrument module carton for obvious damage. Be sure there are no shipping and handling damages on the module before processing. Do not apply power to the instrument if it has damaged.

Our warranty does not apply to defects resulting from action of buyer, such as mishandling, improper interfacing, operation outside of design limits, improper repair or unauthorized modifications.

2.1. Symbol Explanation



Caution



Attention



Instruction



Tip

Caution: Will be used at **dangerous for life and health !**.

Attention: Will cause **damage**

Instruction: If not noticed, **trouble** may occur

Tip: Useful hints for **better operation**

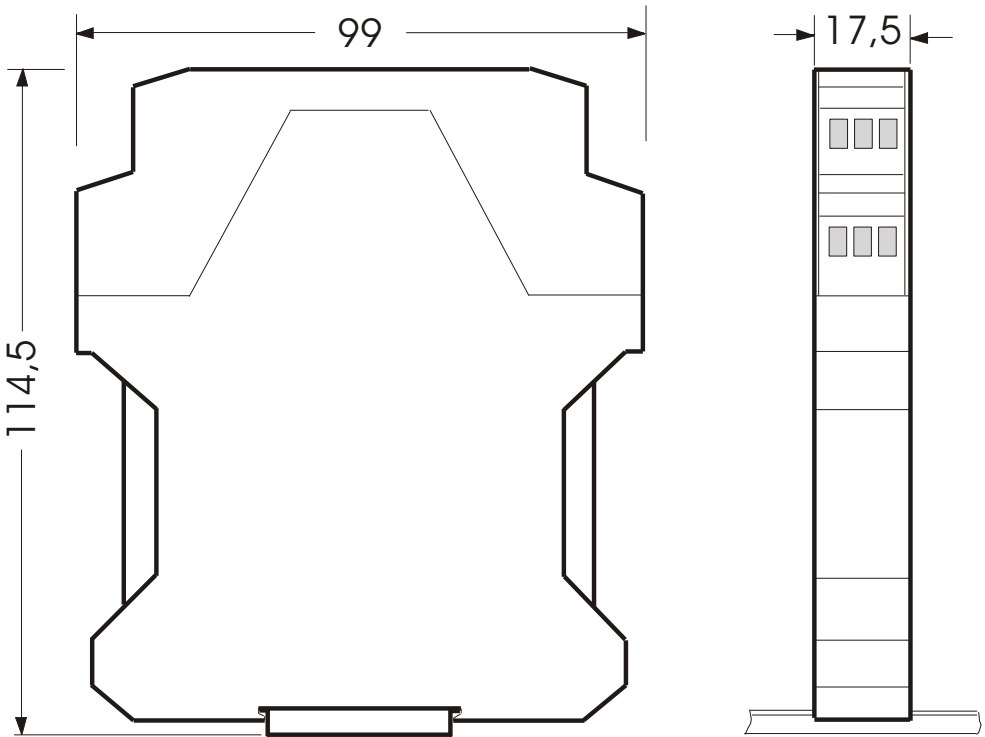
3. Mounting

3.1. Place Of Operation

Attention must be paid to the protection against humidity, dust and high temperatures at the place of operation.

3.2. Mounting Of The Signal Converter

- Through simple snap up at 35 mm rail (DIN EN 50022).



4. *Electrical Connections*

4.1. *General Instructions*




- It is forbidden to plug or unplug terminals with voltage applied.
- Attach input and output wires to terminals only without voltages applied.
- Cords must be provided with sleeves.
- Attention must be paid that the power supply voltage applied will agree with the voltage noticed at the name plate.
- The instrument has no power-on switch, so it will be in operation as soon as the power is connected.

4.2. *Hints Against Noisy Environment*

All inputs and outputs are protected against noisy environment and high voltage spikes. Nevertheless the location should be selected to ensure that no capacitive or inductive interference can have an effect on the instrument or connection lines.

It is advisable:

- 
- To use shielded cables.
 - The wiring of shields and ground (0V) should be star-shaped.
 - The distance to interference sources should be as far as possible. If necessary, protective screen or metal enclosures must be provided.
 - Coils of relays must be supplied with filters.
 - Parallel wiring of input signals and AC power lines should be avoided.
 - The parallel output lines must be as short as possible.
- It is necessary to use shielded twisted pair cable for the RS422-lines as well as for the SSI signal lines.

5. Function

The default setting of the device provides a dividing factor of 1. Switch number 1 of the DIP switch SW2 is set to “on”, switches number 2-8 are set to “off” and the jumper in the jumperblock is set to 1-2. With these settings the output frequency is the same as the input frequency. The user can modify the output frequency with two frequency dividers. One divider is set with the DIP switch and the other one with the jumper setting in jumperblock 3.

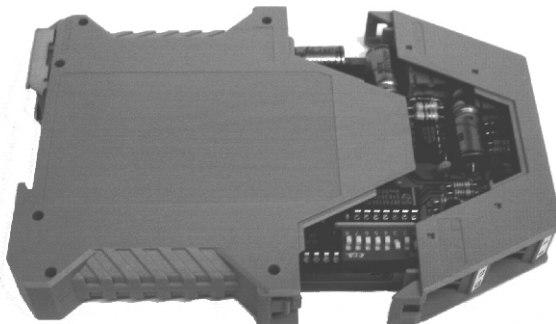
With the DIP switch SW1 the first divider can be set to a value between 1 and 255. With the setting of the jumper it is possible to set an additional divider which can have 5 possible values: 1, 2, 4, 8 and 16. The total value of the two divider results from the multiplication of the two settings.

The output of the frequency divider drives an opto-coupler. The output of the opto-coupler is potential free emitter-collector path of a transistor. Therefore it is possible to design a high-sided output as well as a low sided output.

6. DIP-Switch Configuration

With the default settings of the FT 9002 the output frequency is the same as the input frequency. It is possible to order the device with a customized default value.

Inside the housing are a DIP switch (SW2) and a jumperblock (jumperblock 3) to adjust the dividing factor. With the DIP switch the input frequency can be divided by 1 to 255 and with the setting of the jumperblock is additional division by 1, 2, 4, 8 or 16 possible. To access the DIP switch and the jumperblock the housing has to be opened. To open the Housing of the DS 9000 only a small screwdriver is needed. With the screwdriver the two little flat links between the top and the base of the housing have to be pressed inwardly on both sides. When the flat links were pressed, the top can be separated from the base. Now, the PCB can be pulled out together with the top of the housing (pic.2).



Picture 2

6. DIP-Switch Configuration

Picture 3 shows the component plan. The DIP switch and the jumperblock are marked with **SW2** and **jumperblock 3**.

Example

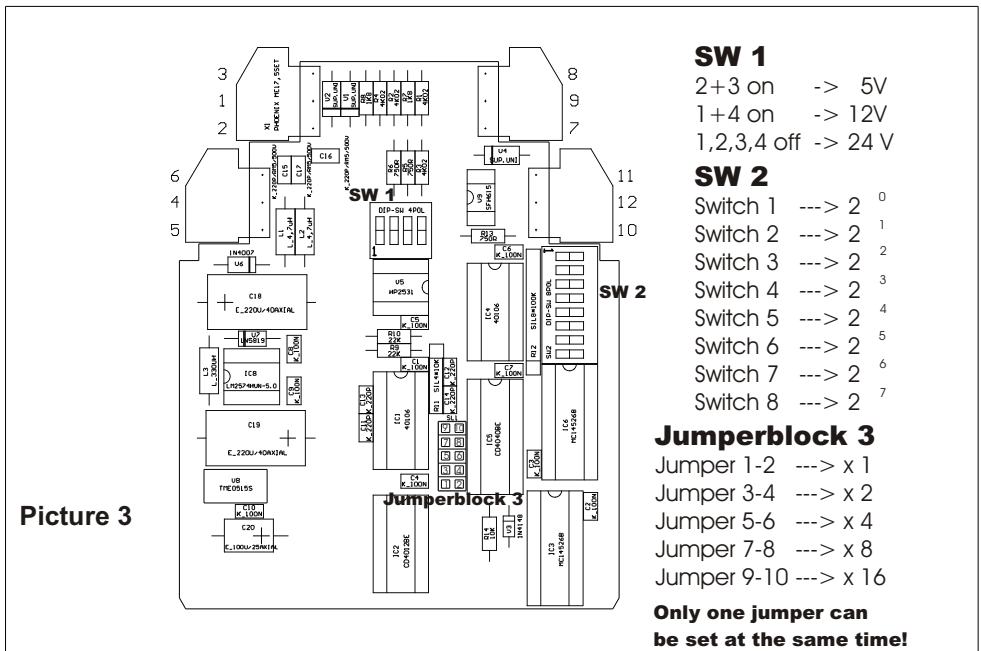
An input frequency of 25 kHz is to be divided to an output frequency of 25 Hz. To get this output frequency the 25 kHz has to be divided by 1000.

The dividing factor results from the multiplication of the following two values:

- the value set with the DIP switch SW2 → **D** (1...255)
- the value set in the jumperblock (only **one** jumper is possible!) → **J** (1, 2, 4, 8, 16)

There are two possibilities to get a dividing factor of **1000**: **125*8** or **250*4**

The DIP switch SW2 is binary coded. The value **D** has to be added up with the 8 switch positions. (see table 1 on the next page)



Picture 3

6. DIP-Switch Configuration

Settings of DIP switch SW2

Table 1

DIP-switch number	Value of the switch
1	1
2	2
3	4
4	8
5	16
6	32
7	64
8	128

With the jumperblock J3 the multiplier for the value of DIP switch SW2 is set. It can only be set **one** jumper.

Table 2

Jumper	Value
1-2	x1
3-4	x2
5-6	x4
7-8	x8
9-10	x16

Settings for **125*8**

$D = 125 = 64 + 32 + 16 + 8 + 4 + 1$ = switch 7, 6, 5, 4, 3, and 1 set to "on" (SW2)

$J = 8$ = the jumper in jumperblock 3 has to be set to 7-8

Settings for **250*4**

$D = 250 = 128 + 64 + 32 + 16 + 8 + 2$ = switch 8, 7, 6, 5, 4, and 2 set to "on" (SW2)

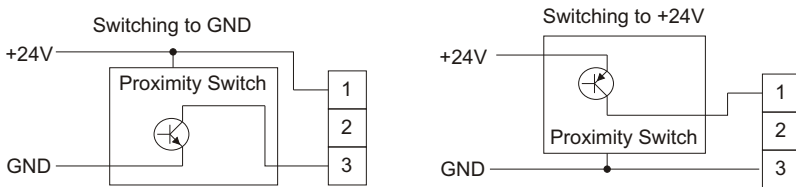
$J = 4$ = the jumper in jumperblock 3 has to be set to 7-8

7. Connection and pin assignment

Plug-in screw terminal assignment:

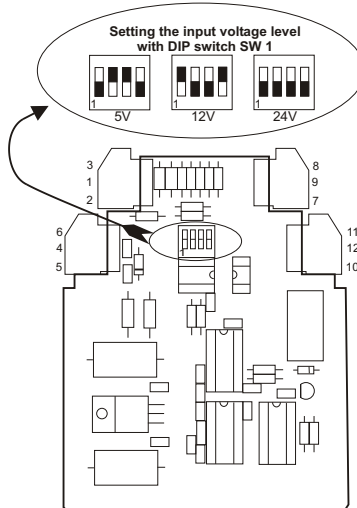
1	Input Channel A	7	Collector Output (+)
2	Input Channel B	8	nc
3	Input Channels GND	9	Emitter Output (-)
4	Power supply voltage DC (+)	10	nc
5	Power supply voltage DC (Gnd)	11	nc
6	Ground connection	12	nc

7.1. Connecting Input Signals

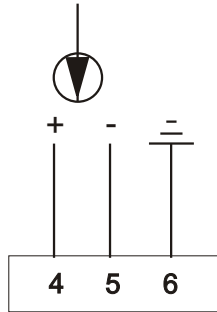


8. Setting The Input Voltage Level

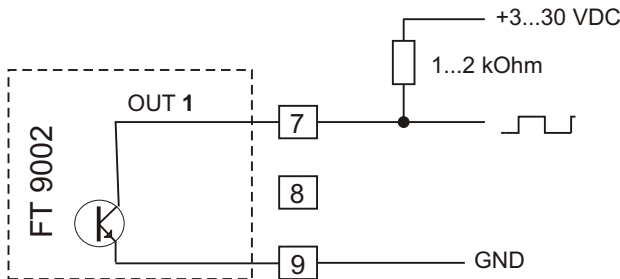
DIP switch SW1 can be used to set the correct input voltage level



8.1. Power Supply



8.2. Pin Assignment Of Frequency Output



Important notes about the frequency output:

The output of the FT 9002 consists of a collector-emitter path, which must be externally wired accordingly.

The external voltage and the resistance must be chosen so that the equipment is operated within its specifications.



The following should be considered when dimensioning the load resistor:

- The higher should be the output frequency, the smaller the value of the load resistor must be chosen. When an external voltage of 24 VDC, the value of the load resistor 800 should - be 1000 ohms to still obtain a sufficiently high signal edge at the maximum output frequency of 25 kHz.



- the maximum allowable current for the collector-emitter path is 25 mA
- should there be problems with the output frequency, it is recommended to control the output signal with an oscilloscope and adjust the load resistor according to the specifications.

(see table on next page)

9. Startup Procedure

Data of optocoupler output:

max. voltage: 30 V

max. current : 25 mA

Isolation voltage: 500 V

Table load resistors

max. output frequency	max. load resistor
25 kHz	1 kOhm
20 kHz	1 kOhm
15 kHz	1,5 kOhm
10 kHz	3 kOhm
5 kHz	6 kOhm
1 kHz	>6 kOhm

9. *Startup Procedure*

Attention must be paid that power supply voltage applied will agree with the voltage noticed at the name plate.

When delivered, the instrument is adjusted with a standard configuration (default value of the divider = 1). By changing the adjustment the customer can alter the standard configuration according to his measuring task.

Attention ! When the instrument is built in a machine and the customer wants to change the configuration, attention must be paid, that no damage will occur to the machine!

10. Handling Of Misfunctions

All devices of ERMA-Electronic GmbH are tested for perfect function during production as well as when delivered. Nevertheless it is possible that a device won't work. That is not always a reason by the new device. There are many small reasons that will result in misfunctions. If the FT 9002 won't work properly, please check the following points.

- Look for proper supply voltage
- Look for proper wiring of supply
- Look for proper configuration of the divider value
- Look if high voltage spikes are existing and have an influence to the device.

If all tests are all right, the device must be send back for controlling.

11. Technical Datas

11.1. Electrical Datas

Input Channels

Voltage	: 5, 12 or 24 V DC (optional 48 VDC)
Tolerance	: +/- 20%
Max. Frequency	: 50 kHz
Input current	: 5 mA.
Isolation voltage	: 500 V

Output

Max.voltage	: 30 V
Max. current	: 25 mA
Max. frequency	: 25 kHz
Isolation voltage	: 500 V

Supply Voltage DC

Supply Voltage DC	: 18 ... 24 V DC
Power consumption	: max. 25 mA (24 V DC)
Isolation voltage	: 500 V / 1 min

11.2. Mechanical Datas

Case	: DIN rail mounting DIN EN 50022
	: 35 mm
Dimensions (W x H x D)	: 114.5 x 99 x 17.5 mm
Weight	: appr.100 g
Connection	: screw terminals

11.3. Environmental Conditions

Operating temperature	: 0 .. 50 °C
Storage temperature	: -20 .. 70 °C
Humidity	: < 80 %, not-condensing
SProtection	: class II
Field of application	: class 2
	: overvoltage protection II
CE	: EMC 2014/30/EU
	: LVD 2014/35/EU
	: ROHS 2011/65/EU+2015/863

12. Ordering Information

FT 9002-			
			Special model
			0 standard
			1 reserved
			Input voltage
			0 standard
			1 48 V
			Power supply
		0	18 ... 36 V DC, (standard)
		1	4,5 ... 9 V DC, (option)
		2	9V ... 18 V DC, (option)
		3	36 ... 48 V DC, (option)

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