

# Operating Instructions Frequency Converter FM-1D/K

Digital-analogue-converter  
and flow rate indicator for water meters



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## 1. Description

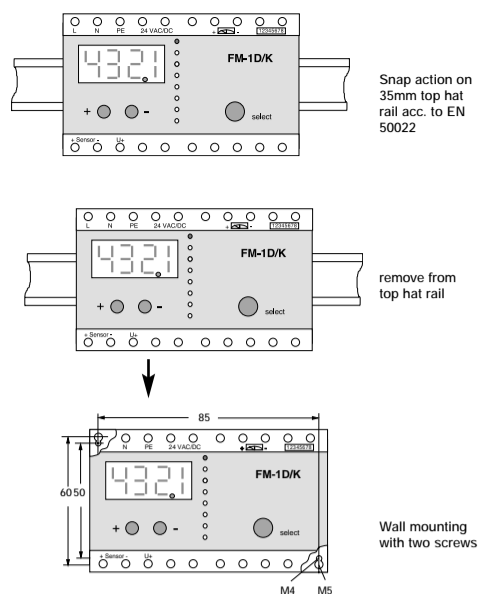
FM-1D/K is a  $\mu$ P-controlled frequency converter with display.

It converts pulses into proportional current for flowrate display.

Input from the pulsers are converted to:

- Standardized current
- Pulse totalization
- LED display

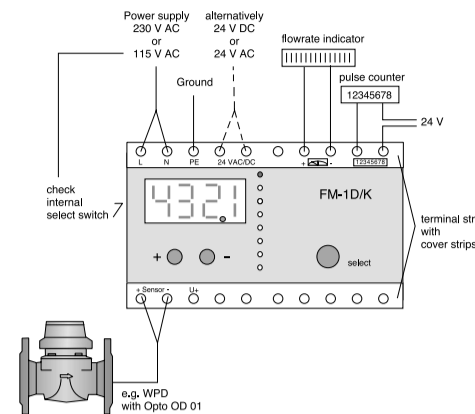
## 2. Mounting



## 3. Connection

Note:

- max cable cross section is 2.5 mm<sup>2</sup>
- check power supply voltage before using
- with 24 VDC operation, the polarity is irrelevant
- Technical Data please see leaflet L S 5100 GB

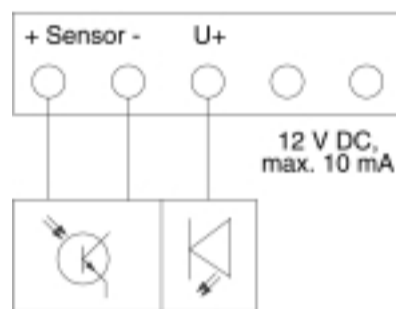


## Safety information

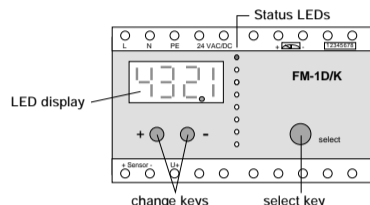
When making the electrical connections, it is essential to disconnect the FM-1 D/K from the power supply.

The connection of the FM-1D/K is only allowed by a specialist in accordance to the common safety standards.

## Connection of 3-wire-sensors



## 4. Calibration by hand



### Calibration

After connecting the FM-1 D/K needs to be calibrated:

1. Select With the SELECT-button the programming parameters can be chosen. The status LED indicates the actual selection.
2. Change By pressing either the (+) or (-) button the status LED and the first placed digit will flash. With the (+) and (-) button the settings can be changed. To activate the second placed digit the SELECT-button must be pressed.
3. Save To save the chosen settings the SELECT-button must be pressed after changing the last right hand digit. The settings will not be lost after a power failure.

## Setting example

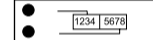
Water meter WPD DN 80  
Pulser Opto OD 01 (1 imp = 1 Ltr.)  
Current output 0 ... 20 mA  
Max. flowrate 0 ... 100 m<sup>3</sup>/h  
Pulse output 1 Imp. = 1 m<sup>3</sup>

### 1. Flowrate range



After switching on, the display indicates "0000.". Pressing either the (+) or (-)-button the FM-1 D/K changes to the programming mode. The left digit of the display will flash. Set the digit "0" with the (+) or (-)-button. Pressing the SELECT-button changes to the second digit. As described set the 2.,3.,4. digit and the decimal point. The display should indicate "0100.". The possible flowrate range is 0.001 ... 9999. m<sup>3</sup>/h

### 2. Counter reading



The FM-1 D/K counter reading can be set to match the counter reading of the water meter. When the upper status LED blinks the first 4 digits can be set and when

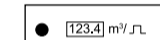
the lower status LED blinks the last 4 digits can be set. The setting is identical as described in point 1. The position of the decimal point depends on the output pulse value ( see point 4)

### 3. Pulser



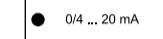
The setting of the pulse value of the sensor in litre per pulse. In this example with 1 litre per pulse the display is to be set to "0001.". The possible input pulse range is 0.001 ... 9999. litres/pulse. After the pulse value programm the signal mode suitable for the connected pulser.  
InPu= Opto OD 01-04 without evaluation of the direction signal  
InPb= Opto OD 01-04 with evaluation of the direction signal  
InPr= Opto OD 01-04 without direction signal

### 4. Pulse output



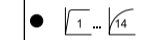
For example to set 1 pulse per m<sup>3</sup>, the display must indicate "0001.". The setting is identical as described in point 1. The possible output pulse value is 0.001 ... 9999.m<sup>3</sup>. Note ! The output pulse value has to be > to the input pulse value. At max. flowrate the output pulse rate must not exceed 1 Hz.

### 5. Current output



The actual current output range will be indicated at the display. With the (+) or (-)-button it can be toggled between 0...20mA and 4...20mA. Pressing the SELECT button saves the setting.

### 6. Damping



The damping determines the response time of the current output and the flowrate indication. If there are no special requirements for the response time please set damping value "0004".  
Setting 1 - no damping Setting 14 - max. damping

\*) from serial no. 105.000

## 5. Protection

The FM-1D/K can be protected against unintentional changes to the setting. In the protect-mode all settings and measuring values can be displayed. Changing the values is not possible.

Simultaneously by pressing (+) and (-)-buttons and the SELECT-button, the present mode will be displayed.

- display "LOC 6"
- device in programming mode,
- display "LOC 8"
- device protected.

With the (+) or (-)-buttons modes can be toggled between "LOC 6" and "LOC 8". Pressing the SELECT button saves the setting.

## 6. Test mode



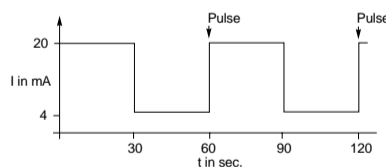
In the test-mode the digital and analogue output of the FM-1D/K can be checked on the integral counter and flowrate indicator, without having a pulser connected to the pulse input.

First the firmware revision will be indicated.

By pressing the (+) or (-)-buttons the test mode starts: The current output toggles, as indicated on the display, in a 30 second interval between 0(4) und 20 mA. The flowrate indicator should alternate between "0" and full scale.

At the pulse output terminals a pulse will be generated every 60 seconds. These pulses will be indicated on the pulse counter.

Pressing the SELECT-button leaves the test mode and changes into the standard mode.



## 7. Standard mode

Rapid flashing of all status LED's indicates incoming pulses.

The permanently illuminated status LED indicates the measuring units on the display.

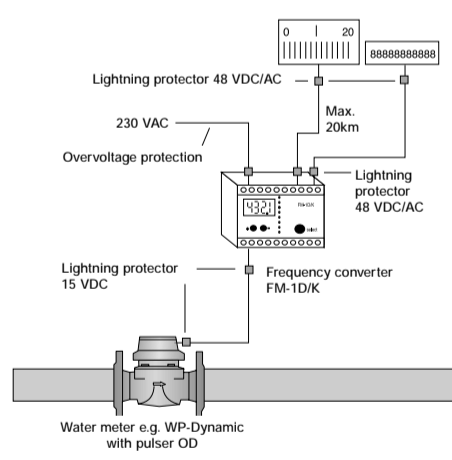
The display can switch between:

- Flowrate indication  
At reverse flow direction the display shows "-000" \*)
- Counter reading (first 4 digits)
- Counter reading (last 4 digits)
- Pulse value of the pulser input(Sensor)
- Pulse value of the pulse output
- Current output range
- Damping
- Firmware revision (Test)  
\*) from serial no. 105 000

## 8. Lightning protection

To protect the FM-1D/K from voltage surges caused by lightning, installation of an adequate lightning protection device is recommended.

Depending on the situation on site, we recommend the



## 9. Trouble Shooting

Error Symptom	Cause	Remedy
Status lamps and LED display not working	No power supply	Check supply voltage For 230V: Check voltage selector (Pos. 230 V) and fuse F 91 (200 mA m) For 24 V: Check fuse F 92 (200 mA m)
No current output but internal display indicates flowrate	Error in the current output circuit	Check current output using the test mode Check connected indicator. Check external totalizer and its power supply
No pulse output but the internal display counts the volume	Error in the pulse output circuit	Check pulse output using the test mode Check external totalizer and its power supply

## Trouble Shooting

Error Symptom	Cause	Remedy
Flowrate display "0" and no output pulses but the water meter is working and the pulser is connected.	Error in the pulse input circuit.	If status LED's are flashing acc. to the incoming pulses: Check the settings of FM-1D/K.  If the status LED's are not flashing acc. to the sensor pulses: Check input. Remove pulser, shortcircuit the sensor terminals (+) and (-) with a wire.  - If status LED's flash: Replace pulser.  - If status LED's don't flash: Check fuses F 111 and F 112 (32 mA m).

## Trouble Shooting

Error Symptom	Cause	Remedy
FM-1D/K refuses programming	The device is locked against programming	Unlock device. (please see chapter 5, Protection).
Reading ---	Flowrate is too high	Check input pulse value. Increase max. value of flowrate.
Reading ouer	Input frequency higher than 1 kHz e.g. caused by bouncing Reed pulser	- Check settings - Exchange pulser (Opto or inductive) - Use additional contact protection relay
Indication "InPe"	Pulse error	- Change pulse signal, "InPb" or "InPu" for Opto OD, "InPr" for Reed RD.

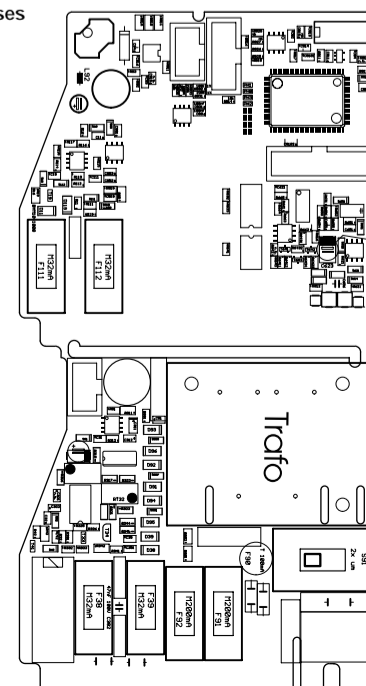
## 10. Replacing fuses

- Disconnect the power from the FM-1 D/K
- Remove the 4 screws from the front plate
- Remove front plate with boards from the housing
- Remove the board with the blown fuse from the front plate
- Open the holding device; check and change the defective fuse
- Assemble the FM-1 D/K in reverse order

Size of fuses used

F 38	fuse	32 mA	medium
F 39	fuse	32 mA	medium
F 91	fuse	200 mA	medium
F 92	fuse	200 mA	medium
F 111	fuse	32 mA	medium
F 112	fuse	32 mA	medium

## Layout and Fuses



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