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# Installation Instruction Fan-O-Matic MICRO

We like to wish you lots of fun installing the Fan-O-Matic Micro. To make the usage problem free, we would like to ask you to read and consider the following guidance exactly! Please accomplish the installation only with switched off and by electricity mains separated computer!!

**Content:**

Here you find an overview of the individual sections from this guidance:

## 1.) Overview:

The Fan-O-Matic Micro is a highly developed Mini-fancontroller, controlled by a microprocessor. It regulates continuously adjustable a fan channel (the fan rpm) depending on a temperature sensor. The desired temperature levels ranging from 20°C to 50°C are freely adjustable. The controller action can be adapted to the main application such as water cooling (regulation of the radiator fan) or air cooling (e.g. regulation of a CPU Fan) through the Jumper. The intelligent micro processor electronic recognizes thereby, how much cooling performance is actualy necessary and regulates the fan accordingly after. The fan turns as fast as absolutely necessary. Thus the computer remains always as quiet as possible! In addition the Fan-O-Matic MICRO offers the possibility of flow monitoring in a water cooling system (with optional flow sensor) as well as an integrated emergency shut-down of the computer in the event of an error. Additionally a connection for a signal LED is present. The innovatek i-bus system makes further connection to a Fan-O-Matic PRO possible, whereby this is extended by a further fan and a further sensor channel. The Fan-O-Matic MICRO can be programmed and controlled by a Fan-O-Matic PRO (including display of the temperatures and numbers of revolutions showing in the Fan-O-Matic PRO Dislplay and the PC-Software).

## 2.) Scope of supply:

Before you start to work with the Fan-O-Matic MICRO and integrate it into your system, we ask you to check the scope of supply. The following parts should be included:

- Fan-O-Matic MICRO basic module
- 4 jumper (are stuck on the basic Module)
- a temperature sensor with a flat sensor head
- a powerswitch connection cable
- a velcro-pad to fasten the Fan-O-Matic MICRO

## 3.) Equipment:

### a. Fan connection with RPM monitoring

- RPMs of the fan are temperature-dependent and steered by a Microcontroller
- Startboost (Control for better starting of the fan - 1sec with higher Voltage)
- The fan channel handles up to 12W !
- Analog voltage regulation, no PWM disturbances (quieter, careful run of the fan)
- Power / electrical short circuit protection
- Several preconfigured rule-curves for fan control are selectable
- Adjustable fan deactivation (switches the fan completely off if not required)

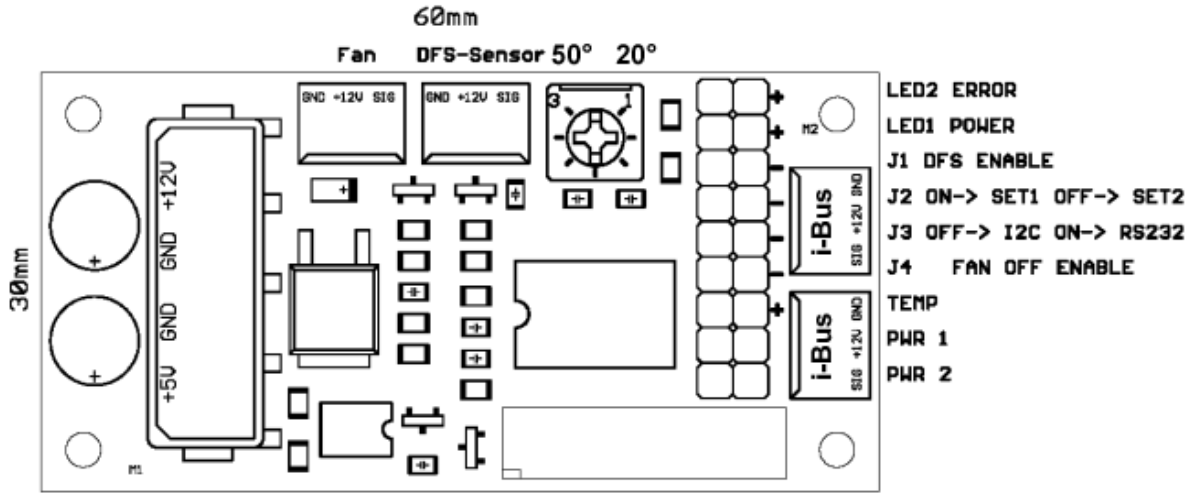
### b. Temperaturesensor

- measuring range of the sensor is 10°C to 100°C
- the extreme flat sensor can be attached almost anywhere
- the following reactions to an excess of the alarm temperatures are possible:
    - optional error LED shines
    - the computer can be switched off completely
- instead of the flat sensor also an Inline water temperature sensor can be used aswell.

### c. Others

- the Fan-O-Matic MICRO can also be configurated to work with the innovatek Flow-Meter rev. 2 (at the connection “DFS-sensor”)
- the desired target temperature is manually adjustable (20°C to 50°C)
- because of it´s own Microcontroller absolutely independent from the computer
- simple and uncomplicated installation
- potential-free switch connection (e.g. for power switch) activates in the event of an error
- connection for Error LED (direct connection of a LED possible)
- connection for Power LED to the operational status indicator (direct connection of a LED possible)
- i-bus system (extension of the Fan-O-Matic PRO and connection to the i-bus system)
- serial interface for displaying operating conditions (with optional converter cable usable)

## 4.) Connections overview:




| | |
|---|---|
| **Power supply:** | Connection with standard 4-Pin Hard Drive plug |
| **Fan:** | Connection for (the one which should be regulated) fan (max 12W) |
| **DFS-Sensor:** | Connection for the Flow-Meter rev. 2 |
| **Potentiometer:** | Temperature adjustments (20°C to 50°C / approx. 3° per scale line) |
| **LED2 ERROR:** | Error LED (directly connectable - reacts to flow, temperature or rpm)<br>– Flashing LED: with reaching the warning value<br>– Steady light of the LED: during excess limit value<br>– LED out: no error |
| **LED1 POWER:** | Function indication (illuminated when in use - LED directly connectable) |
| **J1 (def. = open):** | Activation of the flow monitoring (Jumper attached/closed = activates) |
| **J2 (def. = open):** | Selection rule-curve: Set 1 (closed) = air cooling mode<br>or Set 2 (open) = water cooling mode |
| **J3 (def. = open):** | Selection interface: i-Bus (open) or serial (closed) |
| **J4 (def. = open):** | Fan disconnection activates when temperature is under setting (open) |
| **TEMP:** | Connection for the temperature sensor |
| **PWR 1:** | Connection for the power button in the PC case |
| **PWR 2:** | Connection to the Powerswitch connection to the Mainboard (with Powerswitch cable connection) |
| **i-Bus:** | Connection (2x) for the i-Bussystem (optionally usable) |

**IMPORTANT HINT: Changing the jumper settings is only allowed when powered off !!!**

## 5.) Installation and application:

### a. Location

You can choose a place you like to install the Fan-O-Matic MICRO. We ask you to use the provided velcro-pad to fasten the Fan-O-Matic. The bonding surface must be clean, smooth and grease-free. For sticking please take off the protective foil and press the velcro-pad. Ready. Please avoid any contact of the back of the Fan-O-Matic MICRO with metal parts when assembling, because the CONTROLLER can be damaged thereby irreparably.

### b. Connection and wiring

**Accomplish this task only with switched off and from the power source separated computer !!**

First please connect the temperature sensor cable with the port "TEMP" on the Pin row of the Fan-o-Matic MICRO (references to the mounting of the temperature sensor can be found in the chapter 7.a."suggestions"-Installation of the sensors). Afterwards put the Fan, which has to be regulated on the connection "Fan". If necessary a Molex extension or y-cables can be used for the usage with 2 fans (together max. 12W). If you want to use the PC emergency shut-down, you have to take the housing power switch plug off from the Mainboard and connect it with the port "PWR 1" on the Fan-O-Matic MICRO. Afterwards you put the provided power SWITCH cable connection on the power connection at the Mainboard (from that you took off the housing power switch plug before). The other end has to be connected with the port "PWR 2" on the Fan-O-Matic MICRO. If you want to use the "function display" or the "error display", simply connect the appropriate LED's (e.g. the LEDS in the housing front) directly (without pre-resistor) with the ports "LED1 POWER" and/or "LED2

ERROR". If you want to use flow monitoring, please consider the section "Flow monitoring" of this Chapter. Now the appropriate Jumper must be only set. This is further described in the following chapters.

**c. Water cooling mode basic setting**

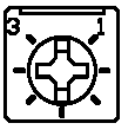
Please set the Jumper "J2" to open (default) in order to use the Fan-O-Matic to control the Radiator fan or any other fan in your computer. Thus the Fan-O-Matic MICRO regulates the attached Fan optimally to the needs of a water cooling system. It is most appropriate to install the temperature sensor at the return of the radiator (further references to mounting of the temperature sensor, you will find in the chapter 7.a. "suggestions"-Installation of the sensors). With the temperature regulator (Potentiometer) you are able to adjust the desired water temperature of e.g. 40°C. The Fan-O-Matic MICRO will then regulate and adjust the fan of the radiator in such a way that this temperature will not exceed.

**d. Air cooling mode basic setting**

Please set the Jumper "J2" on off in order to use the Fan-O-Matic to control the CPU cooler or any other Fan in your computer. Thus the Fan-O-Matic MICRO regulates the attached Fan optimally to the needs of an air cooling system. You can attach the temperature sensor to a suitable and/or the place in the PC housing, which is to be supervised. (references to the mounting of the temperature sensor can be found in chapter 7.a. "suggestions"-Installation of the sensors). With the temperature regulator (potentiometer) you are able to adjust the desired temperature. The Fan-O-Matic MICRO will then regulate and adjust the fan on the radiator in such a way that this temperature will not exceed. In this way it is ensured that the fan only turns as fast as absolutely necessary.

**e. Temperature settings / adjustment**

The desired temperature can be set with a screwdriver on the poti. The spectrum of adjustment ranges from 20°C (Scala=1/left turn) to 50°C (Scala=3/right turn). Each division line equals a temperature change of approx. 3°C.




**Notice:** Are lower values adjusted than the cooling system is able to reach, the fan will be regulated up to 12V , because the adjusted temperature cannot be achieved. In order to use the equipment optimally, please adjust the maximal possible temperature, which makes safe usage possible (recommendation for our cooling systems: 40°C). Thus you have an optimal compromise between volume and cooling efficiency. A higher need of the cooling performance will be recognized automatically and readjusted by the equipment - thus sufficient cooling performance is always present. Even with higher operating temperatures. When not in use the attached fan switches itself off completely. If the fan is not to switch itself off with subnormal temperature, then simply close the Jumper "J4". With the restart of the fan, it operates automatically 1sec with a higher voltage, in order to ensure a safe start of the fan.

**f. Flow monitoring**

Fan-O-Matic MICRO - in connection with a Flow-Meter rev.2 - can be used for flow monitoring and emergency shut-down in the event of an error. For this the flow sensor has to be connected with the "DFS-Sensor" and the Jumper J1 closed. In case of falling below of 0,3 l/min. (recommended minimum flow quantity) the error LED (LED2) flashes. When the flow rate drops below 0,1 l/min. the error LED shines durably and the computer will be automatically completely switched off (only with looped through power connection - PWR1 and PWR2 are attached).

**Notice:** The Controller is function co-ordinated with the flow-Meter rev2. Using other flow meters: the evaluation can supply wrong values - or worse – the Controller can be damaged. (Please consider the flow direction when installing the flow-Meters rev2) In order to use the flow monitoring, please connect the flow sensor with the "DFS sensor" connection on the Fan-O-Matic MICRO. In order to activate the function, you only have to close the Jumper "J1".
**Notice:** There is permanent 12V
**Suggestion:** The shut down process of the computer can be partly specified in the BIOS of the computer.

**g. Fan shut off**

The adjustable fan deactivation allowes to switch the fan completely off if not required (e.g. in case of low temperature).
To activate the fan shut off mode (so the fan will shut of completely) close jumper “J4” (default setting is “open” – the fan will not switch off completely with open jumper)
When restarting the fan the Fan-O-Matic MICRO will “boost” up the fan with a higher voltage for about 1sec to ensure the save starting of the fan.

## 6.) FOR EXPERTS: adjustment and setup:

The Fan-O-Matic MICRO has two preset rule-curves, which can be selected over the Jumper J2. The set2 is optimal for the use of a water cooling, because it makes a slow-acting responsing mode possible. If you want to use the Fan-O-Matic MICRO for an air cooler, you have to select set1. This reflects in a faster response and is therefore optimal for the targeted use. The set 3 (Setting 3) is only programmable and selectable by the Fan-O-Matic PRO.

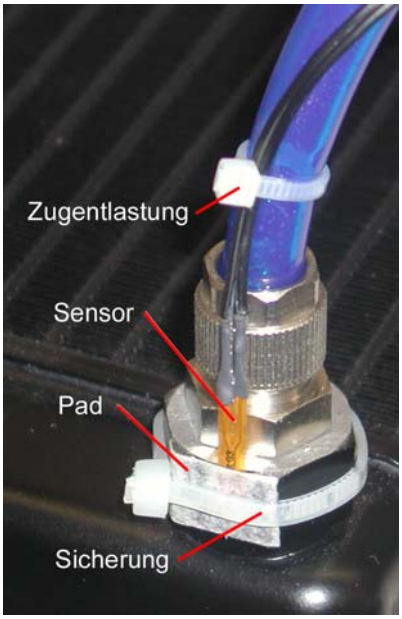
| **Settingvalues / reaction:** | **Setting 1** | **Setting 2** | **Setting 3** |
|---|---|---|---|
| Fanspeed warning at | 300 RPM | 300 RPM | via FOM |
| Fanspeed Error at | 100 RPM | 100 RPM | via FOM |
| Flow warning | 0,3 l/min | 0,3 l/min | via FOM |
| Flow error | 0,1 l/min | 0,1 l/min | via FOM |
| Temperature warning | 50°C | 50°C | via FOM |
| Temperature error | 55°C | 55°C | via FOM |
| Minimum Voltage Fan | **3** V | **4** V | via FOM |
| Maximum Voltage Fan | **12** V | **8** V | via FOM |
| Startboostvoltage | 8 V | 8 V | via FOM |
| Integralvalue | 0,1 V / step | 0,1 V / step | via FOM |
| Proportionalvalue | **0,4** V / difference | **0,2** V / difference | via FOM |
| Switching intervall | **5** seconds | **30** seconds | via FOM |
| Delay of fan switch off | **10** seconds | **25** seconds | via FOM |

**Term explanation:**
Integral value: Over this value the Fan Voltage is increased when exceeding the adjusted temperature after achieving the rule interval time, and/or decreased when falling below.
Proportional value: The fan Voltage is increased immediately in the case of a deviation more than 1° of the desired value by the proportional value multiplied by the diviations. Diviation adjusting takes place by means of proportional controllers only once.
Example: Desired value (adjusted at the potentiometer) 25°C actual value (measured with sensor) 28°C
proportional value (adjusted Setting 1) 0,4V
setting (the fan Voltage around this value is changed) (25-28)*0,4 = 1,2V
Switching intervall: Time interval between the rule steps

## 7.) Hints:

### a. Installation of the sensors

In order to use the regulation optimally, you have to pay attention to some points when installing the sensors:
The sensor should not lie directly in the air flow of a fan. For slower acting as in a watercooling system is the position at the intake side of the radiator optimal. The agile behaviour you can achieve by installing the sensor at the outtake side of the radiator.
In the case of use with air coolers the optimal point is at the lower surface of the cooler out of the air flow. For the precise measurement of the water temperature we recommend the Inline temperature sensor (art. No. 500,504). This makes a more accurate measurement for the water temperature possible.
As is to be seen in the picture at the right, the temperature sensor can be fastened with a cable strap and also simply and fast directly to the in- or outtake side of the radiator.




### c. Switch off function by critical temperature

In the case of reaching the warning temperature of 50°C the error LED begins to flash. When exceeding 55°C at the sensor the LED shines durably and the Fan-O-Matic MICRO switches the computer off with attached power SWITCH cable connection (PWR 1 and 2) after 4 seconds. This monitoring is not deactivatable. If you do not want to use this, you can do simply without the power SWITCH cable connection.
**Hint:** The pre-programmed maximum temperature values can be individually adjusted by the Fan-O-Matic PRO.

## 8.) General information:

### a. Worth knowing about - Technology

The controlling of the fan is analog. Thus one, contrary to pulsed regulations, reaches that no pulsating or background noise of the fan arises. Disadvantages to the durability of the regulated fan are also avoided. Pulsed regulations are often used because of cost reasons. In the whole Fan-O-Matic family is consciously set on high-quality analog technic, in order to prevent the disadvantages of the PWM disturbances.

### b. i-Bussystem

The Fan-O-Matic MICRO has connections for the i-bus system. Over this transmission system several devices can communicate with each another and exchange data and/or control instructions. The factory standard setting of the Fan-O-Matic MICRO is 0xB0. All devices on the i-bus have to be assigned an exclusive address. The maximum recommended length of the i-bus amounts to 1m, the distances (cable lengths) between the devices are thereby insignificant. For the connection of several Fan-O-Matic MICRO´s is individually (in each case) an address allocation necessary. Further information for this you will find in the operating instructions of the Fan-O-Matic PRO.

### c. Usage with Fan-O-Matic PRO

The Fan-O-Matic MICRO can be connected with the Fan-O-Matic PRO by the i-bus and therefor be controlled and read out. For connection we ask you to use the special i-bus cable. The connection takes place at one of the two blue contact strips (arbitrary). The equipment emerges then as a further channel in the menu of the Fan-O-Matic PRO. Thus it can be supervised and programmed. Further information you will find in the operating instructions of the Fan-O-Matic PRO.

### d. Features at Fan-O-Matic PRO

Connecting the Fan-O-Matic MICRO with the Fan-O-Matic PRO, the system recognizes it as an additional fan channel and sensor entrance. All other functions of the Fan-O-Matic MICRO are deactivated and the control is taken over completely by Fan-O-Matic PRO. After the separation from the i-bus the equipment works again completely independently and all functions are activated again. With existing connection to the Fan-O-Matic PRO the Setting values (Setting3) of the Fan-O-Matic MICRO can be changed and the Setting3 for the usage without Fan-O-Matic PRO can be activated. The position of the J2 is then ignored. Further information for this you will find in the operating instructions of the Fan-O-Matic PRO.

## 9.) Options:

To extend the Fan-O-Matic MICRO following products are available:

| | |
|---|---|
| - Flow-Meter rev.2 flow rate gauging turbine – for monitoring of the water flow | **ArtNr: 500 389** |
| - Inline water temperature sensor – for exact measuring of the water temperature | **ArtNr: 500 504** |
| - Temperature sensor – as spare part | **ArtNr: 500 506** |
| - Powerswitch cable – as spare part | **ArtNr: 500 582** |

You find further accessories on our homepage.

## 10.) Support

You have a question or a problem? By questions to Fan-O-Matic MICRO please simply write an email to **info@innovatek.de** or contact our manufacturer forum under **www.innovatek.de/forum**.