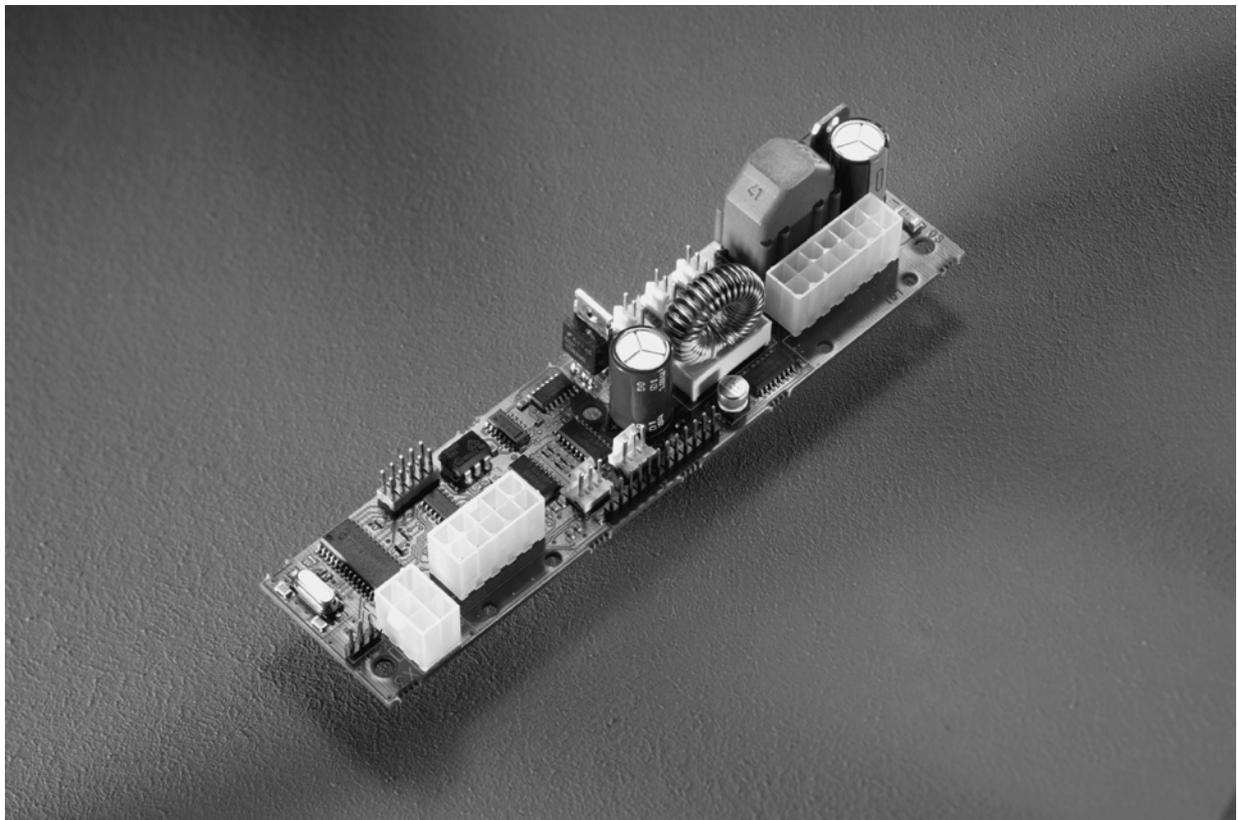


**Operating Instructions
Fan Control Module (FCM)**

Schroff Parts No. 23207-021, 23207-028



Fan Control Module (FCM)

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1 Caution & Notes

NOTE:

Please read this operating instructions carefully before applying power. The warranty is subject to correct input voltages being applied. Repairs or modifications made by anyone other than SCHROFF will invalidate the warranty. This documentation has been compiled with the utmost care. We cannot however guarantee its correctness in every respect.

CAUTION

This component level fan control module is intended exclusively for installation within other equipment by an industrial assembly operation or by professional installers. Fan control board is not designed to be operated outside of an enclosure which provides a means of mechanical, electrical, and fire protection.

FUSING

There are no fuses on the fan control module (FCM) to protect the +5V module power circuit. The installer who installs the FCM in an enclosure has to take care of proper fusing.

The fan voltage supply circuit is galvanically isolated from the +5V module power. The fan voltage supply circuit is protected by a 4 Amps fuse (SMT-device on PCB).

There are no user-serviceable parts on the FCM

FAN ASSEMBLY

Please refer to Chapter 7 to see which fans can be connected to the FCM.

LIMITED WARRANTY

Schroff warrants each FCM of its manufacture for a period of two (2) years from the date of original shipment. This warranty applies to defects in materials and workmanship that result in non-performance to published specifications. The product(s) must be returned to Schroff by prepaid freight for repair with a Schroff pre-assigned RMA number.

Schroff assumes no liabilities for consequential damages of any kind through the use or misuse of its products by any user. No other obligations are expressed or implied. Please note that the specifications, terms, and conditions stated are subject to change without notice.

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2 Introduction

Today most applications require air cooling inside the cabinet. The cooling must meet the following conditions.

- Report failure of fans or sensor
- Speed up the fans in case of a failure of one fan
- Low Noise under normal operating conditions
- Sufficient cooling power in case of a failure

The FCM Board monitors up to four fans and controls their speed via the temperature. It reports the failure of a fan or temperature sensor.

3 Functional Description

The FCM monitors up to four fans. The fan speed is controlled by the temperature through a PWM signal that will change the fan supply voltage. If a failure occurs, an open collector signal and an LED signal (Fan Fail) is switched on. If one fan signals a failure (fan is defective or wire is broken), the other fans will accelerate to their maximum speed.

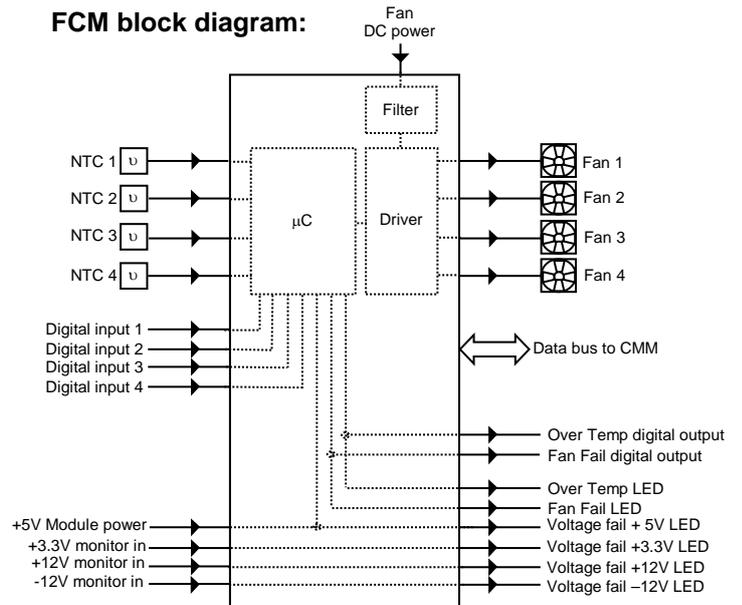
A Temp Fail signal is generated if one of the temperature signals is too high or a wire of a temperature sensor is broken.

The current is filtered. The inrush current is limited.

The FCM is able to communicate with the chassis monitor module (CMM). One connector ensures direct connection to the CMM, power supply and communication.

An optional LED display can be connected for the following signals: +3.3V, +5V, +12V, -12V OverTemp and FanFail.

FCM block diagram:



4 Technical Data

FCM power supply

Supply Voltage: 5 VDC / 500mA max.

The input voltage of the board must be equal to or lower than the maximum operation voltage of the respective connected fans.

Max. Fan supply current: 2.5A

The fan supply circuit is protected by a 4 Amps fuse (SMT-device on PCB) See figure on page 5 for fuse location.

Mechanical Dimensions

PCB and components 38mm x 160mm x 25mm (W x L x D)

Ambient temperature

Service	..0 °C+70 °C
Storage	-40 °C ...+85 °C

Humidity

30 – 80 %, no condensation

Shock and vibrations

According to EN 60068-2-6 and EN 60068-2-27

Flammability

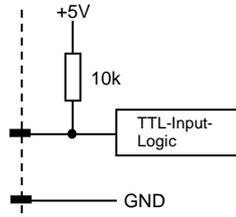
Material according UL94 V-2

5 Signal Input Monitoring

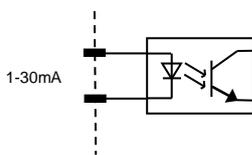
The following signals are being monitored continuously:

- Digital Inputs

⇒ 2 x TTL (5V to GND) Digital Inputs:



⇒ 2 x photo coupler digital input:



REMARK:

The four digital inputs have default assignments:

DIN1 (TTL): if connected to GND, fan speed goes to 100%

DIN2 (TTL): if connected to GND, fan speed goes to 0%

DIN3 (Opto): if output transistor of opto-coupler is low impedance, fan speed goes to 0%

DIN4 (Opto): if output transistor of opto-coupler is low impedance, fan speed goes to 100%

DIN1 and DIN4 have priority to DIN2 and DIN3 (100% input overrules 0% input)

Temperature Sensor

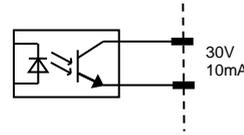
⇒ Up to 4 NTC temperature sensors can be connected to the FCM. The number of connected NTCs is automatically detected in the configuration mode of the FCM. If one or more NTCs exceed 60°C, the TempFail LED output and the TempFail Digital output are activated.

6 Signal Outputs

The following output signals are available:

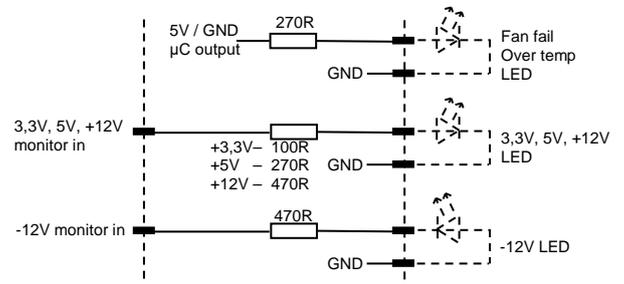
Digital Output

⇒ 2 outputs isolated by photo coupler: Fan Fail and Temp Fail



LED-display

⇒ 1 connector to an optional LED display with LEDs for 3,3V; 5V; 12V; -12V Fan Fail and Temp Fail.



7 Fans

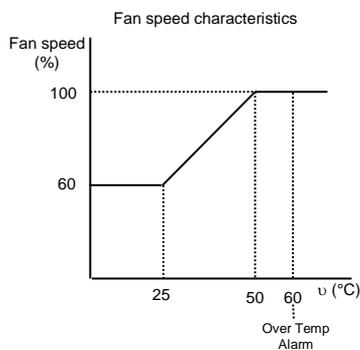
Use Schroff recommended fans only:

company	Type	company	Type
Papst	414/2	Papst	431x/2
Papst	8414/2	NMB	4712KLxx-P50
NMB	3110KL05-P50	Papst	418xN/2
Papst	8314/2	NMB	4715KLxx-P50
Papst	3414/2	Papst	5214N/2
NMB	3615KL05-P50		
NMB	4710KL05-P50		

Maximum fan supply current is 2.5A.

The following table shows the fan speed characteristics and the temperature alarm level. These settings cannot be changed by the user. The actual fan speed is given by the NTC with the highest temperature value.

A fan failure or a broken NTC cable cause the fans to speed up to 100%.



Possible Fan Voltages:

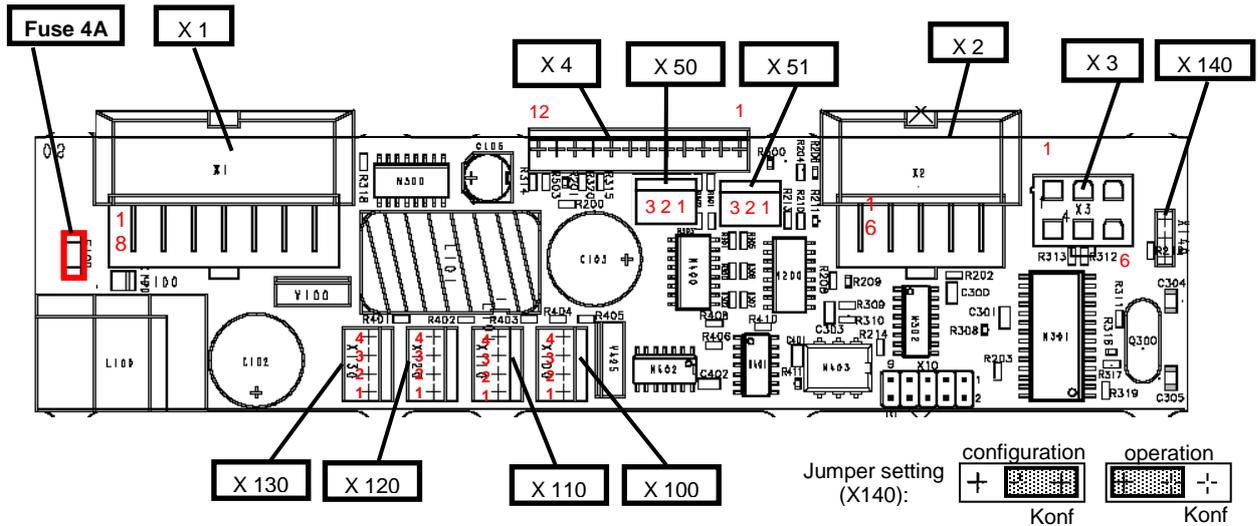
- 12V to GND;
- 12V to -12V;
- 24V to GND;
- 48V to GND

The fan voltage supply circuit is galvanically isolated from the +5V module power

8 Connection to the CMM

The FCM can be connected to the CMM by the internal bus (I2C-bus). If the +5V and GND wire of the "CMM connector" X3 are used, the CMM does supply +5V module power for the FCM.

If the two modules (CMM and FCM) are connected, the CMM can read the average fan speed and the maximum temperature of the four connected NTCs. Additionally, the FCM "FanFail" and "TempFail" signals can be used to switch a digital output of the CMM



9 Connectors

X1: Connector for signals and power

Straight 180°: 39-31-0140 Molex
Angular 90°: 15-24-9144

Pin	Name	Description
1	Fan power pos	Power for fan; Current: 2.5A
8	Fan power neg	Ground for fan Current: 2.5A
2	+12V in	12V monitor in
9	-12V in	-12V monitor in
3	+3,3V in	3,3V monitor in
10	Vcc (+5V)	Power supply input (current: 0,5A) and +5V monitor in
11	GND	Ground (current: 1A)
4	Temp Fail collector	Opto coupler digital output collector
5	Temp Fail emitter	Opto coupler digital output emitter
6	Fan Fail collector	Opto coupler digital output collector
7	Fan Fail emitter	Opto coupler digital output emitter
13	CMM BUS SCL	Communication Bus
12	CMM BUS SDA	Communication Bus
14	GND	Ground

X3: Connector for CMM direct wiring

39-28-1063 Molex

Pin	Name	Description
1	CMM BUS SCL	Communication Bus
2	CMM BUS SDA	Communication Bus
3	GND	Ground
4	Vcc (+5V)	Power supply input
5	GND	Ground
6	nc	

X4: Connector for LED display

Male connector: 2,54 mm grid

Pin	Name	Description
1	+3,3V anode	LED output anode
2	nc	
3	+5V anode	LED output anode
4	nc	
5	+12V anode	LED output anode
6	nc	
7	-12V anode (GND)	LED output anode
8	nc	
9	Fan Fail anode	LED output anode
10	Temp Fail anode	LED output anode
11	Cathode common (GND)	3,3V; 5V; 12V; Fan Fail; Temp Fail
12	-12V cathode	LED output cathode

X2: Connector for temperature sensors and digital input

Straight 180°: 39-31-0100 Molex
Angular 90°: 15-24-9104

Pin	Name	Description
7	DIN1	Digital input 1 (TTL)
8	DIN2	Digital input 2 (TTL)
9	DIN3 anode	Digital input 3 (opto)
10	DIN3 cathode	Digital Input 3 (opto)
1	Temp1 +	Temp sensor 1
2	Temp1 -	Temp sensor 1
3	Temp2 +	Temp sensor 2
4	Temp2 -	Temp sensor 2
5	Temp3 +	Temp sensor 3
6	Temp3 -	Temp sensor 3

X50: 3pin connector for one temperature sensor

MLSS 100-03 Pancon

Pin	Name	Description
1	Temp4 +	Temp sensor 4
2	Temp4 -	Temp sensor 4
3	nc	

X51: 3pin connectors for one digital input

MLSS 100-03 Pancon

Pin	Name	Description
1	DIN4 anode	Digital input 4 (opto)
2	DIN4 cathode	Digital Input 4 (opto)
3	nc	

X100 – X130: 4pin connectors for fans

MLSS 100-04-D Pancon

Pin	Name	Description
1	Supply voltage +	Fan power +
2	Supply voltage -	Fan power -
3	Tacho signal	FAN Tacho signal output
4	reserved	

10 Configuration of the FCM

- Disconnect power from FCM
- Connect the required number of fans and NTC Temperature sensors.
- Plug in the jumper on connector X140 pin 2-3. See jumper setting details on page 3.
- First apply the fan supply voltage, then the +5V module power (or at the same time)
- The FCM automatically detects the number of connected fans and NTC temperature sensors
- The configuration is completed when the number of detected Fans and sensors is indicated by flashing of the external FanFail and TempFail LEDs (after about 1 minute).
The number FanFail LED flashes shows the detected number of fans. The number of TempFail LED flashes shows the detected number of sensors.
- After the completion of the configuration, the jumper can be removed during operation. The jumper can be plugged on connector X140 pin 1-2 during operation (See jumper setting details on page 3) If the jumper is not removed from pin 2-3 after the configuration is completed, the configuration is repeated after each power up of the FCM.