Modular Computers ®

CXM-FM

Enhanced CXC Carrier Board

for Fieldbus Modules

Manual ID 19347, Rev. Index 0100
Nov 98

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Revision History

Revision History				
Manual/Product Title:	**CXM-FM**			
Manual ID Number:	**19347**			
Rev. Index	**Brief Description of Changes**	**HW Index**	**SW Index**	**Date of Issue**
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Electronic boards are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times.

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- In performing all necessary installation and application operations, please, follow only the instructions supplied by the present manual.
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- Special care is necessary when handling or unpacking the product. Please, consult the special handling and unpacking instruction on the following page of this manual.

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Board Overview

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1. Board Overview

1.1 Introduction

CXM-FM is a carrier board to adapt the FM-modules to the VME and CXC systems. All CPUs which support enhanced CXC may be used together with the CXM-FM board .

1.1.1 Interfaces

- PEP-defined “FPC” Interface
- Enhanced CXC Interface

1.2 Specifications

Table 1-1: Specification

Interfaces	System bus interface: Enhanced CXC Peripheral Interface: FPC connector (A19:1,D15:0)
Interrupts	Direct routing of FM-module
Power Consumption	50mA at 5V
Front Panel	19”
Size	3U
Width	4HP
Weight	95g
Operating Temperature	Standard: 0°to-70°C Extended: -40°C to -85°C Storage: -55°C to +85°C
Operating Humidity	0 to 95% non-cooling

1.3 Board Overview

1.3.1 Front Panel

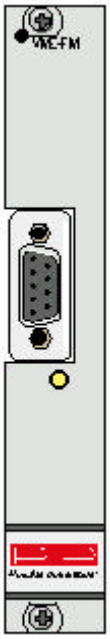


Figure 1-1: CXM-FM+FM-DP/CAN Front Panel

The VME-FM carrier board has no front panel, but when fitted with an FM module, the carrier board assumes the front panel of FM the module (shown at left).

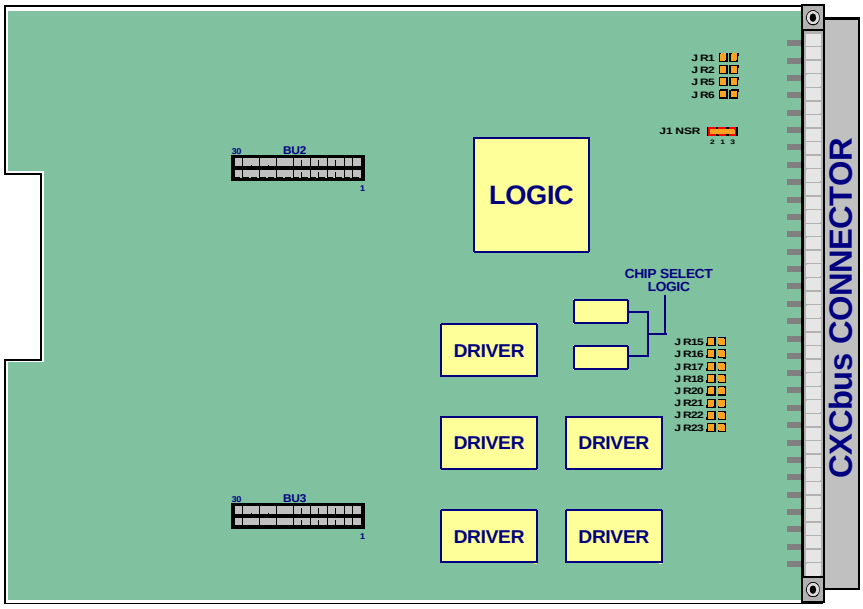
The front panel hosts one I/O connector. It is a 9 pin DSUB socket connector. The exact layout dimensions are fixed in the appended technical drawing. The accompanying figure gives only an overview of the front panel arrangement.

The yellow LED on the FM module's front panel has the following meaning:

•LED "ON" = Module Tx active

1.3.2 Board Layout

Figure 1-2: CXM-FM Board Overview (FrontView)



Legend:

NSR = Not System Relevant

Chapter 2

Functional Description

2.1 CXC-Interface ..... 2 - 3

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2. Functional Description

The CXC Interface is built as an Enhanced CXC to support the 1MB address range required by the FM-Boards.

2.1 CXC-Interface

Chip Select Signals CS7..CS0 are routed through resistors for fixed configuration to form a common _CS for the board. The Interrupt line from the FM-module is connected via resistors to PB[11:8] of the CXC interface.

The chip select signals for the FM-interface are generated in the onboard logic (_CSF1, _CSF2, _CSF3). Address and data bus are buffered between CXC and FM-interface.

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Configuration

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3. Configuration

3.1 Address Configuration

3.1.1 CXC Address Map

Table 3-1: CXC Address Map

CXM-FM Signal On	CXC Address
_csf3	0x xx xx
_csf2	1x xx xx
_csf1	2x xx xx

3.1.2 Chip Select Configuration

The eight 0-ohm resistors R15-18,R20-23 correspond to the chip select signals from the CXC-interface. All resistors may be installed (default) by using with PEP backplanes, the choice being dependant on the slot position.

Table 3-2: Relationship between CXC chip select signal and resistor

CXC Chip Select Signal	0 Ohm Resistor (Functioning as Jumper)
CS0	R15
CS1	R16
CS2	R17
CS3	R18
CS4	R20
CS5	R21
CS6	R22
CS7	R23

If a specific chip select is chosen all other 0-ohm resistors may be removed. Instead of using 0-ohm resistors the connection might be soldered .

3.2 Interrupt Configuration

There are four 0-ohm resistors to connect the interrupt coming from the FM-module to the interrupt lines of the CXC (PB8..11).

Table 3-3: Interrupt Configuration

Interrupt Line	Resistor (0 Ohm), Functioning as Jumper
_IRQ_1	R1
_IRQ_2	R2
_IRQ_3	R5
_IRQ_4	R6

These interrupts are directly routed from the FM-module via the resistor to the CXC.

3.3 Pinouts

3.3.1 FM Module Connectors

The FM module connectors BU2/BU3 are 30-pin SMD pin row connectors.

Figure 3-1: FM-Module Connector BU3 Pinout

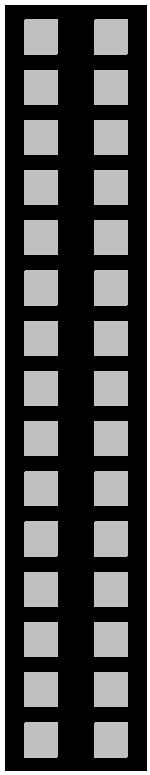
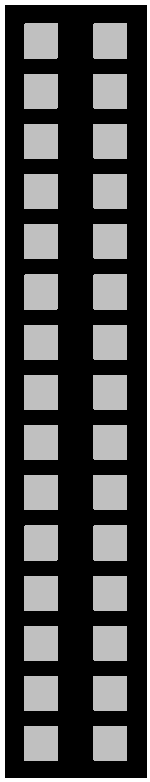
BU3 FPC-A				
GND	29		30	GND
D1	27		28	D0
D3	25		26	D2
D5	23		24	D4
D7	21		22	D6
D9	19		20	D8
D11	17		18	D10
D13	15		16	D12
D15	13		14	D14
A18	11		12	A19
A16	9		10	A17
A14	7		8	A15
A12	5		6	A13
A10	3		4	A11
VCC	1		2	VCC

Figure 3-2: FM Module Connector BU2 Pinout)

BU2 FPC-B				
GND	29		30	GND
CLKOUT	27		28	_CSF3
_DTACK	25		26	Res (_CS_ SPI)
_RESET	23		24	Res (MISO)
(SYNCLK) Res	21		22	Res (MOSI)
_BOOTSE	19		20	_INT
(ALE)_ AS	17		18	(R/_ W) _OE
(_UDS)_WEH	15		16	(_LDS)_WEL
_CSF2	13		14	GND
A8	11		12	A9
A6	9		10	A7
A4	7		8	A5
A2	5		6	A3
CSF1	3		4	A1
VCC	1		2	VCC

3.3.2 Enhanced CXC Interface Connecter

Table 3-4: Enhanced CXC Interface Connecter Pinout – Row “A”

Pin	Signal	Pin	Signal
1	_IRQ_1	17	_R/W
2	_IRQ_2	18	_UDS
3	_IRQ_3	19	_LDS
4	_IRQ_4	20	Vcc
5	N/C	21	A1
6	N/C	22	A2
7	Vcc	23	A3
8	N/C	24	A4
9	N/C	25	A5
10	N/C	26	Vcc
11	N/C	27	D0
12	N/C	28	D1
13	N/C	29	D2
14	Vcc	30	D3
15	N/C	31	D4
16	_AS	32	D5

(N/C = not connected)

Table 3-5: Enhanced CXC Interface Connecter Pinout – Row “B”

Pin	Signal	Pin	Signal
1	N/C	17	_SYSR
2	N/C	18	GND
3	GND	19	_EDTACK
4	N/C	20	CXC-CLK
5	N/C	21	GND
6	GND	22	_CS0
7	N/C	23	_CS1
8	N/C	24	GND
9	GND	25	A6
10	N/C	26	A7
11	N/C	27	GND
12	GND	28	D6
13	N/C	29	D7
14	N/C	30	GND
15	GND	31	D8
16	N/C	32	D9

(N/C = not connected)

Table 3-6: Enhanced CXC Interface Connecter Pinout – Row “C”

Pin	Signal	Pin	Signal
1	N/C	17	N/C
2	N/C	18	N/C
3	N/C	19	Vcc
4	N/C	20	_CS2
5	N/C	21	_CS3
6	N/C	22	_CS4
7	Vcc	23	_CS5
8	N/C	24	_CS6
9	N/C	25	_CS7
10	N/C	26	Vcc
11	N/C	27	D10
12	N/C	28	D11
13	N/C	29	D12
14	Vcc	30	D13
15	N/C	31	D14
16	N/C	32	D15

(N/C = not connected)

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Chapter 4

Fieldbus Modules

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4. Fieldbus Modules

The FM fieldbus modules are slave interfaces designed for field I/O controlling. Depending on the requirements of your fieldbus system, the following fieldbus module options are available:

Table 3-1: SM2 Fieldbus Modules

Module	Application Highlight
FM-DP	PROFIBUS DP protocol
FM-CAN	CAN bus protocol

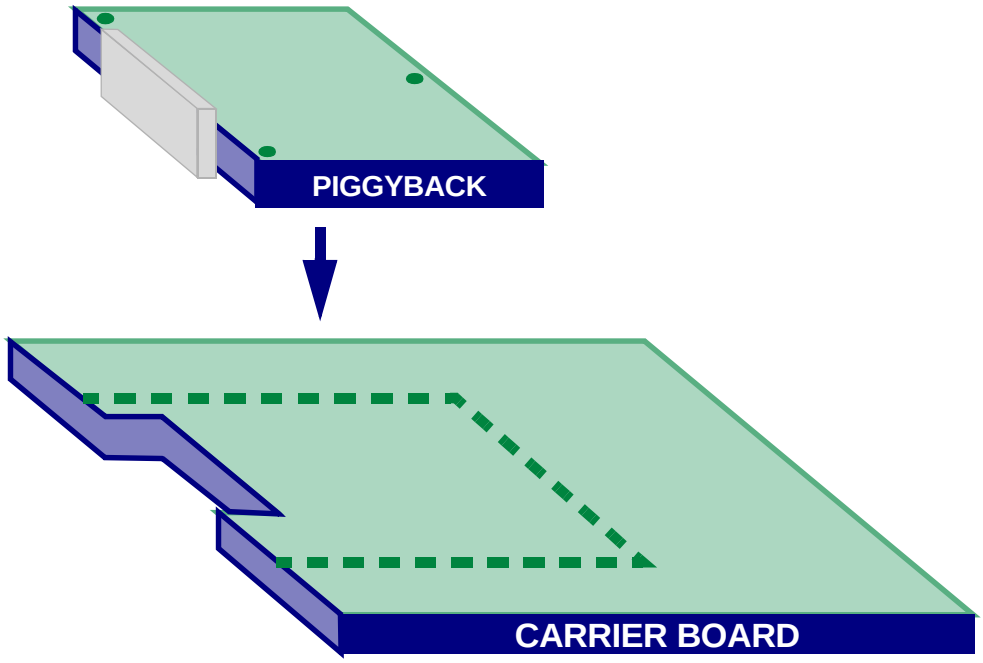
Software

The FM fieldbus modules do not require any programming or jumper setting. However, the possibility of programming the FLASH memory via FPC interface is envisaged for updating purposes.

Installation

Due to the basic hardware concept of the FM fieldbus modules, they can be used together with a VME-FM or a CXC-FM carrier board.

Figure 4-1: Typical Carrier / FM- Module



4.1 FM-DP

The FM-DP module is a PROFIBUS DP slave interface capable of high Baud rates, i.e. up to 12 MBd. The layer 2 functions of the DP stack of the module are implemented by hardware. Fieldbus initialization software is stored in on-board memory. Communication with a controller module is accomplished by a shared-memory interface. An LED indicates that data exchange is taking place on the PROFIBUS.

Software

The FM fieldbus modules do not require any programming or jumper setting. However, the possibility of programming the FLASH memory via FPC interface is envisaged for updating purposes.

4.1.1 Main Features

The FM-DP key function is PROFIBUS-based communication with shared memory.

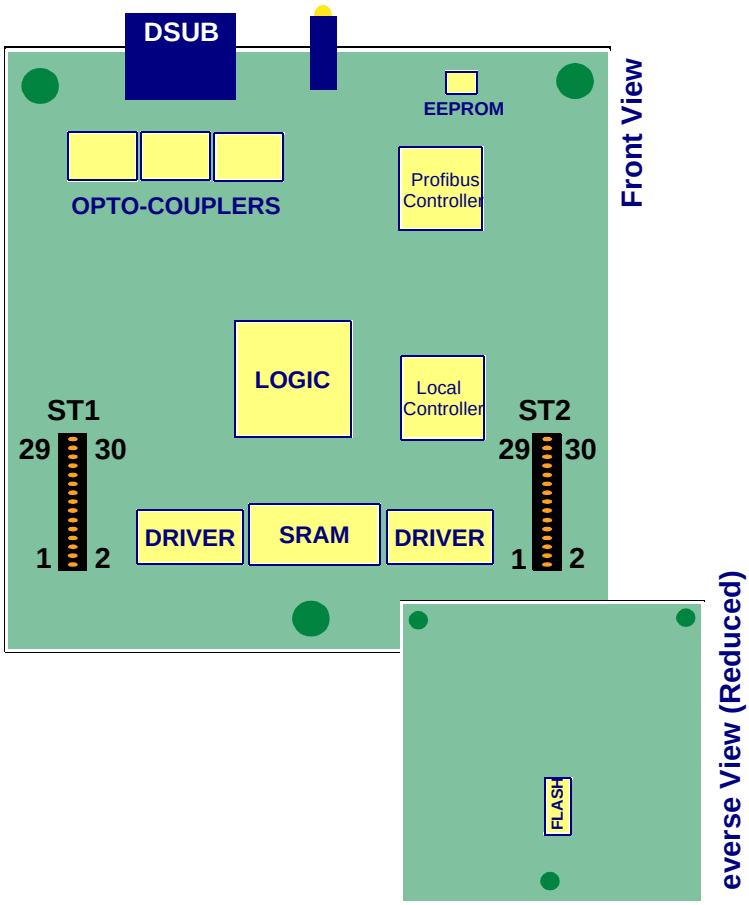
4.1.2 Specifications

Table 1-4: FM-DP Technical Specifications

SM2-DP	Specifications
Controllers	• 80C31 controller at 24 MHz • 12 MBd SPC3 DP slave controller
Power Consumption	Typically 250 mA at 5 V DC and 24 MHz
Local Power-up/Reset	4.65 V sense level
Local Watchdog	1.6 s
FLASH	64 kByte
SRAM	32 kByte
LED	Data exchange (yellow)
ID Byte	None
Interfaces	• 9-pin DSUB serial PROFIBUS interface (12 MBd); • FPC connector to controller module;
PROFIBUS Isolation	1 kV DC
Temperature Range: Industrial Extended	 0°C to +70°C -40°C to +85°C
Operating Humidity	0% to 95%, non-condensing.

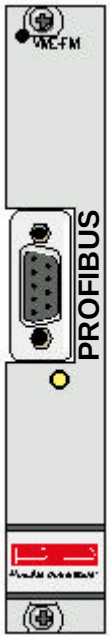
4.1.3 Board Overview

Figure 4-2: FM-DP Schematical Board Layout



4.1.4 Front Panel View

Figure 4-3: Combined Carrier Board / FM-DP Front Panel Layout



4.1.5 Functional Description

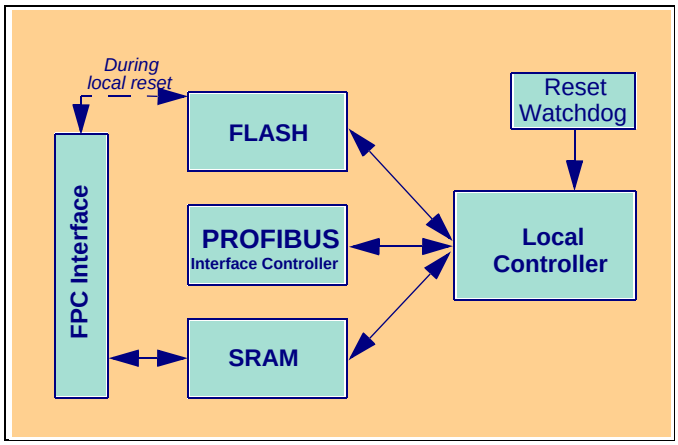
The FM-DP fieldbus module is provided with a 12 MBd PROFIBUS DP interface controller and a 24 MHz local controller. An on-board FLASH memory contains the local firmware.

The local controller initializes the RS485 interface controller and handles the communication with the shared memory (FPC connection to the FM-CPU module). The interface controller is opto-isolated from the system side. Its signals are connected to a 9-pin DSUB according to DIN/PROFIBUS specifications.

After powerup the local controller switches to reset mode. At this point, the CPU main controller starts the local firmware via the local controller. In the event of power failure and abnormal software hang-ups a local reset/watchdog restarts the controller.

4.1.5.1 Functional Block Diagram

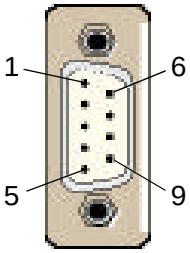
Figure 4-4: FM-DP Block Diagram



4.1.5.2 Pinouts

The PROFIBUS connector is a DIN-compliant 9-pin female DSUB socket supplying a potential-free termination power.

Table 1-5: FM-DP PROFIBUS Connector Pinouts

Shield	**Pin 1**		**Pin 6**	5 V
—	**Pin 2**		**Pin 7**	—
Positive data	**Pin 3**		**Pin 8**	Negative data
—	**Pin 4**		**Pin 9**	—
Ground	**Pin 5**			

4.1.5.3 Useful Information on Hardware

Cable Shielding

The cable shielding has to be connected to the DSUB housing/pin 1. The housing and pin 1 are routed to the FM-DP/CPU metal distance screws.

Connector and Line Termination

The DSUB connector assures connection to termination power. No termination network is available on the FM-DP itself.

Important!

The SM2-DP has no internal line termination which, therefore, must be installed at the ends of the network (ISO 11898).

Important!

The maximum allowed auxiliary termination power is 90 mA/5 V DC. Assuming a power supply voltage of +5V emanating from the PROFIBUS connector (pin 6), the following resistor value is recommended:

R_{DP} 124 ohm ± 2%, min. 0.25 W

4.1.6 Programming

For information about Programming please see separate Software Manual.

4.2 FM-CAN

The FM-CAN module is a CAN interface designed for reliable field I/O control, capable of higher-distance networking, i.e. up to 1 km length, and is therefore particularly suitable for applications in the industrial and automotive field etc.

The layer 2 functions are implemented by hardware. Fieldbus initialization software is stored in on-board memory. Communication with a controller module is accomplished by a shared-memory interface. An LED indicates that data exchange is taking place on the CAN bus.

Software

The FM fieldbus modules do not require any programming or jumper setting. However, the possibility of programming the FLASH memory via FPC interface is envisaged for updating purposes.

4.2.1 Main Features

The FM-CAN key function is CAN based communication with shared memory.

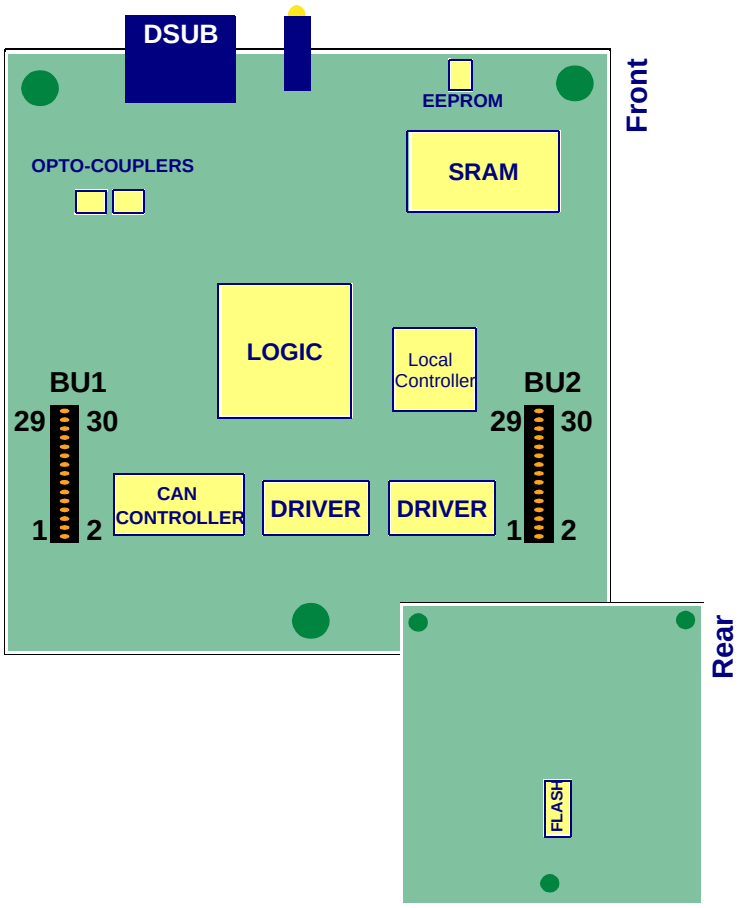
4.2.2 Specifications

Table 1-6: FM-CAN Technical Specifications

FM-CAN	Specifications
Controllers	• 80C31 controller at 24 MHz • 1 MBd SJA1000 CAN 2.0B controller
Power Consumption	Typically 290 mA at 5 V DC and 24 MHz
Local Power-up/Reset	4.65 V sense level
Local Watchdog	1.6 s
FLASH	64 kByte
SRAM	56 kByte
LED	Firmware controlled (yellow)
ID Byte	None
Interfaces	• 9-pin DSUB CAN interface (1 MBd); • FPC connector to controller module;
Network Performance	• max. 40 m at 1 MBd • max. 1000 m at 50 kBd
CAN bus Isolation	1 kV DC
Temperature Range: Industrial Extended	 0°C to +70°C -40°C to +85°C
Operating Humidity	0% to 95%, non-condensing.

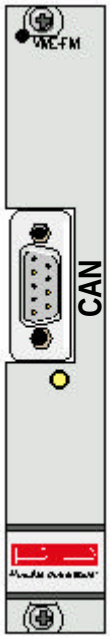
4.2.3 Board Overview

Figure 4-5: FM-CAN Schematical Board Layout



4.2.4 Front Panel Layout

Figure 4-6: Combined FM-CPU/CAN Front Panel Layout



4.2.5 Functional Description

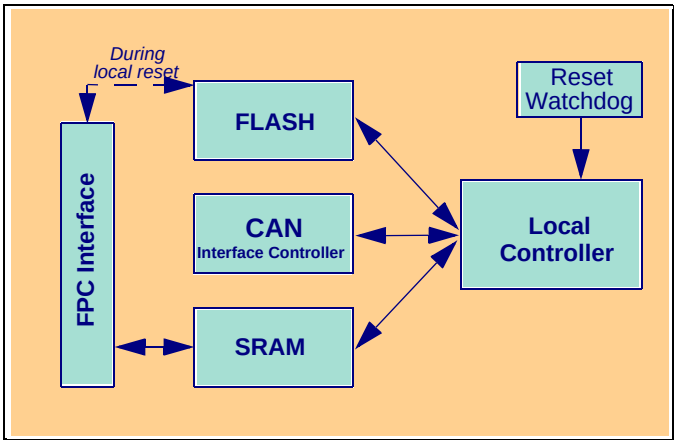
The FM-CAN fieldbus module is provided with a CAN interface controller and a 24 MHz local controller. An on-board FLASH memory contains the local firmware.

The local controller initializes the RS485 interface controller and handles the communication with the shared memory (FPC connection to the system CPU module). The interface controller is opto-isolated from the system side. Its signals are connected to a 9-pin DSUB according to CAN specifications.

After powerup the local controller switches to reset mode. At this point, the CPU main controller starts the local firmware via the local controller. In the event of power failure and abnormal software hang-ups a local reset/watchdog restarts the controller.

4.2.5.1 Functional Block Diagram

Figure 4-7: FM-CAN Block Diagram

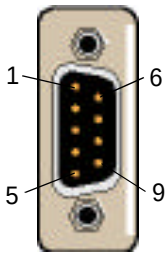


4.2.5.2 Pinouts

The CAN connector is a 9-pin DSUB socket complying with CAN specifications and supplying a potential-free termination power.:

Table 1-7: FM-CAN CANbus Connector Pinouts

—	**Pin 1**		**Pin 6**	Ground
Differential transceiver low	**Pin 2**		**Pin 7**	Differential transceiver high
Ground	**Pin 3**		**Pin 8**	—
—	**Pin 4**		**Pin 9**	*5 V**
Shield	**Pin 5**			



* Pin 9 is not connected to the on-board circuitry (optional).

4.2.5.3 Useful Information on Hardware

Cable Shielding

The cable shielding has to be connected to the DSUB housing/pin 1. The housing and pin 1 are routed to the FM-CAN/CPU metal distance screws.

Connector and Line Termination

The DSUB connector assures connection to termination power. No termination network is available on the FM-CAN itself.



Important!

The FM-CAN has no internal line termination which, therefore, must be installed at the ends of the network (ISO 11898).



Important!

The maximum allowed auxiliary termination power is 90 mA/5 V DC. Assuming a power supply voltage of +5V emanating from the CAN connector (pin 6), the following resistor value is recommended:

R_{CAN} 150 ohm ± 2%, min. 0.25 W

4.2.6 Programming

For information about Programming please see separate Software Manual.

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