ECKELMANN
Industrieautomation

E•FBM

Digital Input Modules DIM08, DIM16

Technical Manual

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2.10, 2.11	03/14/05	WN	Fault corrected for Life-LED in diagram	
1.4, 9	12/05	WN	New chapter standards, CE declaration deleted	
2.2.2, 6.1	02 / 07	JP	Additional module variant with int. CAN-Address switch	
	10/2011	WN	V2.4: All chapters concerning Cross communication deleted, humidity changed	

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1 Introduction

Together with the technical data, this documentation includes general information and instructions regarding the intended use of the digital input modules DIM08 and DIM16 of series E•FBM.

1.1 System manual E•FBM

The system manual includes general information about the field bus modules of series E•FBM.

Moreover, this manual includes the respective instructions regarding the intended use of the field bus modules.

1.2 Intended use

The components are supplied ex works with a fixed hardware and software configuration setting suited to meet the respective field of application. Modifications shall be permitted only within the framework of the options documented in the manuals. All other modifications to the hardware and software as well as the not intended use of the components shall exclude any liability of the ECKELMANN AG.

1.3 Use of the product and documentation

The use of the product described in this manual is intended to be made exclusively by technically qualified and especially trained staff with a training in PLC programming, by skilled persons or by persons trained by skilled persons who are in addition familiar with the valid standards.

Knowledge, correct interpretation and technically perfect implementation of the included provisions and instructions are the prerequisite for a safe installation, commissioning and operation of the described components. Reference to additional documentation is made, if necessary. This documentation is to be used within the same meaning.

ECKELMANN AG shall assume no liability for misaction and damage to Eckelmann products or products of third supplies caused by the non-observance of the information included in this manual.

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1.4 Standards and approvals

The product complies with the following directives

89/336/EEC	Electromagnetic compatibility	EMC directive
73/23/EEC	Electrical Equipment designed for use within certain voltage limits	Low voltage directive LVD

The CE-conformation declaration is available from ECKELMANN AG.

2 Characteristic features of the module

2.1 General

The modules are input modules for 8 or 16 digital 24V inputs. Potential-free contacts (N/O contacts) are provided for the connection of an available voltage of 24 V DC with the input.

2.2 Module variants, options

This manual is valid for the following module variants.

2.2.1 Variants of the DIM08

	Order number	**8 digital inputs for potential-free contacts Autobaud recognition at the CAN bus**
DIM08	FBMDIM0801	With screw-type terminal connection
	FBMDIM0805	With COMBICON connection plug

Note: On principle, the manual is also valid for previous module types with screw-type terminal connection and fixed baud rate setting of 500 KBaud (order no. FBMDIM0806). In case of replacement, these modules can be replaced by the FBMDIM0801.

2.2.2 Variants of the DIM16

	Order number	**16 digital inputs for potential-free contacts Autobaud recognition at the CAN bus**
DIM16	FBMDIM1601	With screw-type terminal connection
	FBMDIM1602	With screw-type terminal connection and int. CAN-Addess switch
	FBMDIM1606	With COMBICON connection plug and int. CAN-Addess switch

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2.2.3 Accessories

Order number	Accessories for	
FBMSTS404	FBMDIM0805	Set of matching plugs for COMBICON connection, 4 plugs screw-type terminal (Phoenix Contact MSTB 2.5/ 4-ST KMGY, no. 1946312)
FBMSTF404	FBMDIM0805	Set of matching plugs for COMBICON connection, 4 plugs spring-force terminal (Phoenix Contact FKCT 2.5/ 4-ST KMGY, no. 1921900)
FBMSTS408	FBMDIM1605	Set of matching plugs for COMBICON connection, 8 plugs screw-type terminal (Phoenix Contact MSTB 2.5/ 4-ST KMGY, no. 1946312)
FBMSTF408	FBMDIM1605	Set of matching plugs for COMBICON connection, 8 plugs spring-force terminal (Phoenix Contact FKCT 2.5/ 4-ST KMGY, no. 1921900)
KLZCP0001	FBMDIM0805 FBMDIM1605	Coding section (Phoenix Contact CP-MSTB, no. 1734634) for COMBICON terminal (packing unit=100) Coding element (Phoenix Contact CR-MSTB, no. 1734401) for COMBICON housing (packing unit=100)

2.3 Characteristic features of the DIM08 with screw-type terminal connection

- Digital input module for 8 optoisolated 24 V signals with 2 conductor wiring
- High-active invertible to low-active via the software
- Signal pre-processing selectable, e.g. parameterizable debouncing, inverting of the input logics per input
- Integrated sensor supply 24V DC for potential-free switching contacts
- 8 indicator LED for the signaling of the input states
- Indicator LED for life check
- Module address settable on the front by means of rotary switch
- 16 modules per node that can be addressed at the CAN bus
- Autobaud recognition at the CAN bus
- Screw-type terminal connection, variant with plugable terminals available
- Width of module housing 22.5 mm

The electrical characteristics of the module with COMBICON connection are the same as those of the module with screw-type terminal connection.

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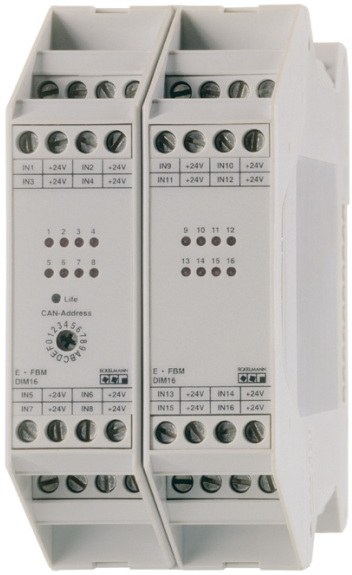
2.4 Characteristic features of the DIM16



- Digital input module for 16 optoisolated 24 V signals with 2 conductor wiring
- High-active invertible to low-active via the software
- Signal pre-processing selectable, e.g. parameterizable debouncing, inverting of the input logics per input
- Integrated sensor supply 24V DC for potential-free switching contacts
- 16 indicator LED for the signaling of the input states
- Indicator LED for life check
- Module address settable on the front by means of rotary switch
- 16 modules per node that can be addressed at the CAN bus
- Autobaud recognition at the CAN bus
- Screw-type terminal connection, variant with plugable terminals available
- Width of module housing 45 mm

The electrical characteristics of the module with COMBICON connection are the same as those of the module with screw-type terminal connection.

2.5 Additional functions

Inverting of the inputs

The module includes an inverting of the inputs parameterizable by the software.

Debouncing of the inputs

The module includes a debouncing of the inputs parameterizable by the software. The input states are scanned in parameterizable intervals and are stored in a ring buffer.

2.6 Voltage range input

The module makes available the 24 V DC supply voltage from the ME bus to the parallelly switched terminals in the upper part of the housing.

This supply voltage can be connect with the inputs via potential-free switching contacts.

Alternatively, the inputs can be switched via an external network. The input recognizes an external voltage of 11...32 V DC as „High“. The reference potential of the external power supply module must be on the potential of the 24V supply of the control electronics on the ME bus, since otherwise, the integrated input logics have no reference potential.

The inputs are passive and, therefore, sink-mode inputs. The switching threshold is between 7.0 V and 9.0 V.

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2.7 LED per input

For each input, a LED is positioned in the upper part of the module. The LED is positioned in the input part and indicates, therefore, that the 24V signal is available at the respective input terminal. The respective LED is on if voltage is available at the respective input

The inverting of the inputs is parameterizable by the software. This parameterizing does not affect the logics of the LED.

2.8 Life LED indicating the operating state of the module

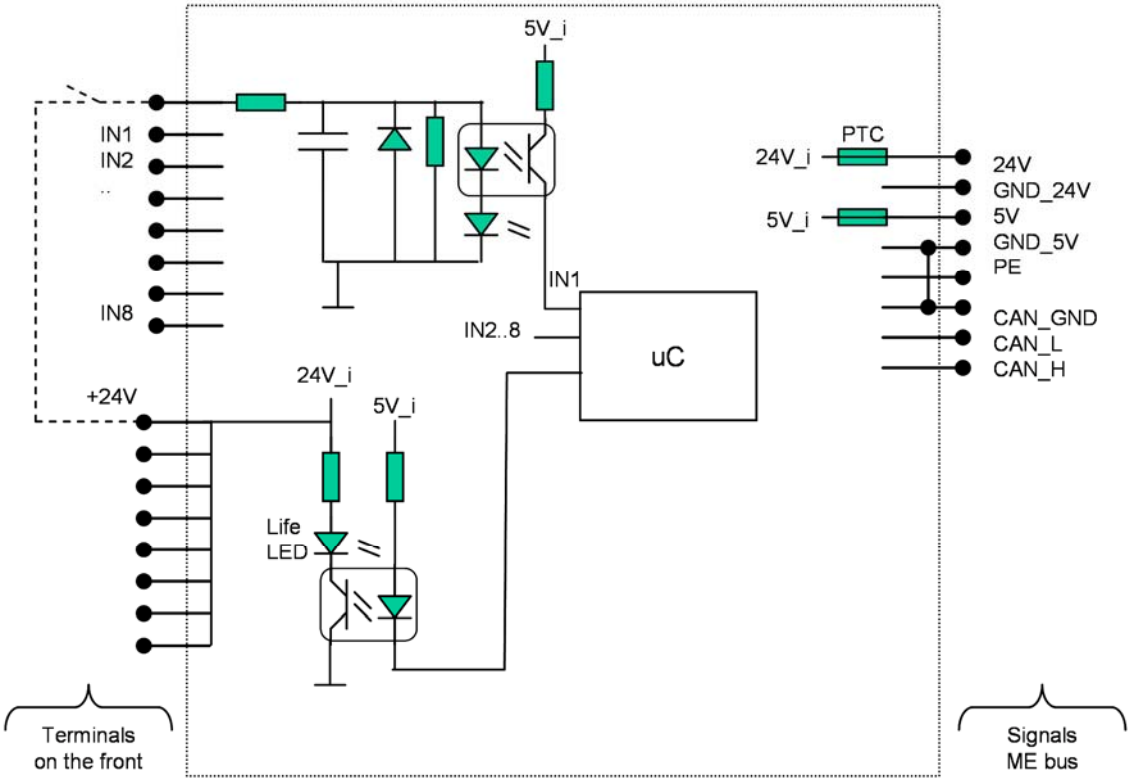
The life LED (“life light”) is positioned in the upper part of the module and indicates the operating state of the module. Both the single operating states of the module and the life LED are described in the chapter Start-up. The function of the life LED can be parameterized via the CAN bus by means of object 2000H.

2.9 Electrical isolation

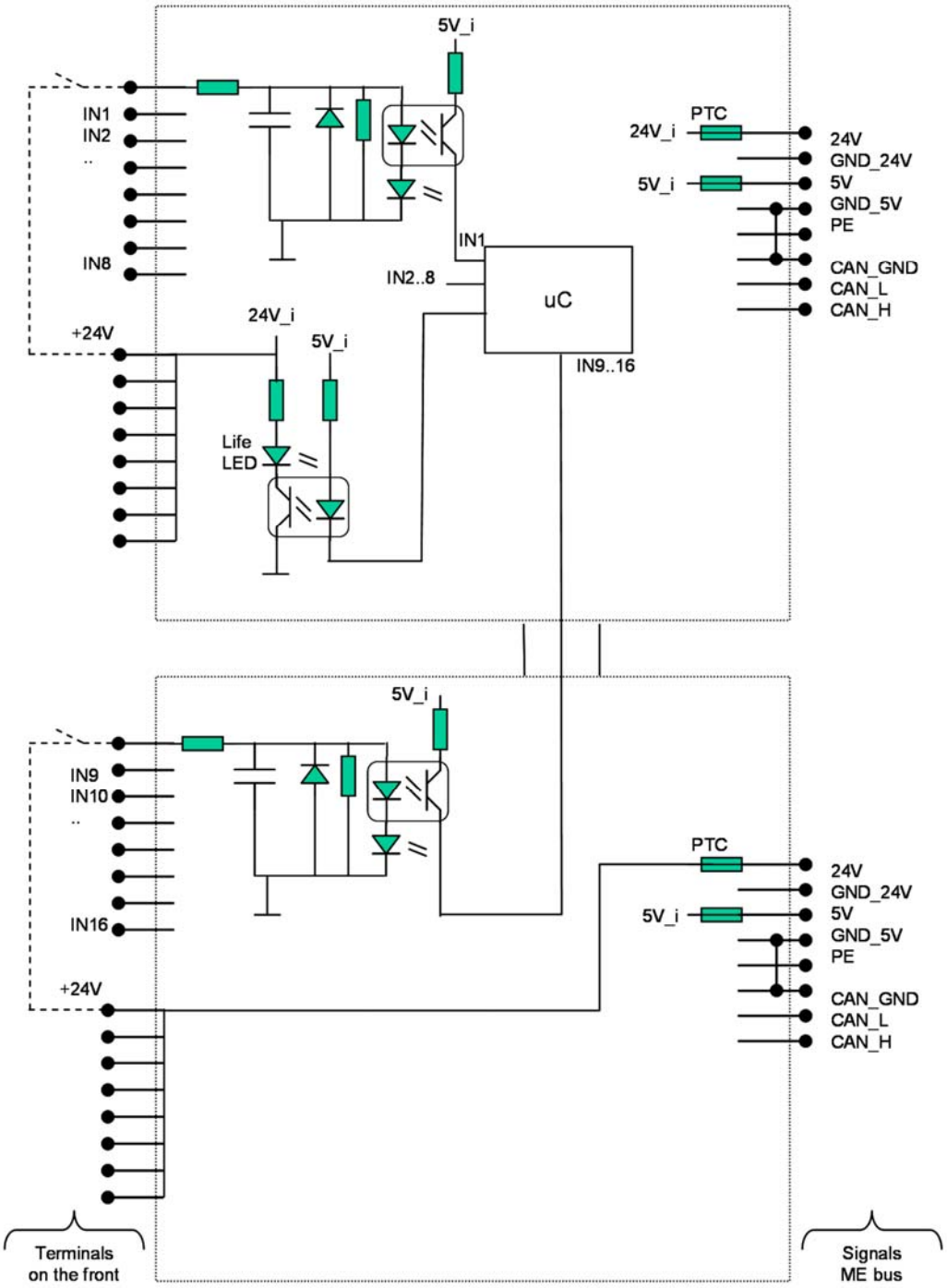
The electrical isolation is made between the A/D converters and the microcontroller All inputs are electrically isolated from the microcontroller. The electrical isolation is made between the input circuit and the microcontroller.

It is important that both the external 24V field voltage and the 24V supply voltage of the control electronics have the same mass, since otherwise, the integrated input logics of the semi-conductor switches have no reference potential.

2.10 Schematic diagram DIM08



2.11 Schematic diagram DIM16



3 Technical data

General data	
Use: DIM 08 DIM 16	 8-channel input module 24V DC 16-channel input module 24V DC
Indication	LED indicating operating state
Module addressing	4 bit, freely selectable in the range 50h to 5Fh
Connection system	Direct screw-type terminals optionally COMBICON connector system with screw-type terminals or spring-force plugs
Installation height incl. clearance	min. 180mm
Weight: DIM08 DIM16	 120 g 215 g
Dimensions (H x W x D): DIM08 DIM16	 99 mm x 22.5 mm x 114.5 mm 99 mm x 45.0 mm x 114.5 mm The dimensions are valid for the screw-type terminals and the COMBICON connection plugs without matching plugs

Supply	
Supply voltages: Available switching voltage of the inputs Logic voltage	 typ. 24V DC (18...32V DC) via ME bus typ. 5V DC (4.75...5.25V DC) via ME bus
Current input of the logic part via the internal bus 5V: DIM08 DIM16 Current input 24V DC: DIM08 DIM16	 typ. 70 mA, max. 90 mA typ. 90 mA, max. 120 mA typ. 90 mA, max. 105 mA typ. 145 mA, max. 175 mA
Power loss: DIM08 DIM16	 typ. 3.0 W typ. 4.7 W

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Inputs	
Inputs	Digital sink-mode input
Type of inputs	11.0 to 32.0 V DC
Voltages of state „1"	-3 to +5 V DC
Voltages of state „0"	
Min. input current per channel	3 mA
Max. input current per channel	12 mA
Max. switching frequency at the input	approx. 250 Hz
Input indication	1 LED per input, series connection with the input terminal.
Electrical isolation	A connection of the inputs is made via the common mass potential

Fusing	
Fusing: 24V DC Logic part	 PTC resistor SMD fuse 500 mA slow
Recovery	Up to max. ±32V are possible at an input/output terminal
Protection	Infeed is protected against polarity reversal.
Electrical isolation between logic part and input terminals	500 V DC

Environment	**Transportation and storage**	**Operation**
Ambient temperature	-20°C to +70°C	0°C to +50°C In case of max. load, vertical mounting and sufficient convection
Temperature change	max. 20 K/h	max. 10 K/h
Relative humidity (not condensing)	5% to 95%	5% to 95%
Shock (10 ms)	max. 15 G	max. 5 G
Vibration (10 to 100 Hz)	max. 2 G	max. 0.5 G
Air pressure	660 hPa to 1060 hPa	860 hPa to 1060 hPa
Type of protection	IP20	

4 Mounting and installation

4.1 Module housing

All modules of series E•FBM have modular ME BUS housings. As a general rule, the housing is composed of a lower part and an upper part with the electronic system. For further details regarding the housing design please check the system manual.

4.2 Mounting

All modules of series E•FBM can be directly snapped on a mounting rail TS35 with a height dimension of 7.5 or 15mm as per European Standard EN 50022.

The mounting is easy and space-saving. The single modules are safely connected and positioned thanks to the 10-pole cross connection integrated in the housing bottom. Both the energy supply of the control electronics and the transmission of the bus signals are made via this cross connection.

The installation position must be vertical in order to ensure sufficient ventilation. On the top and on the bottom, a clearance of at least 80 mm should be kept for the module.

4.3 ESD protection

When handling the module, always take suited ESD protective measures, such as bracelets, conductive supports and suited packing material.

Make the following checks:

- Checking of the entire system for correct wiring
- Checking of the set CAN address
- Checking of the correct ME bus contacting
- Checking of the correct grounding

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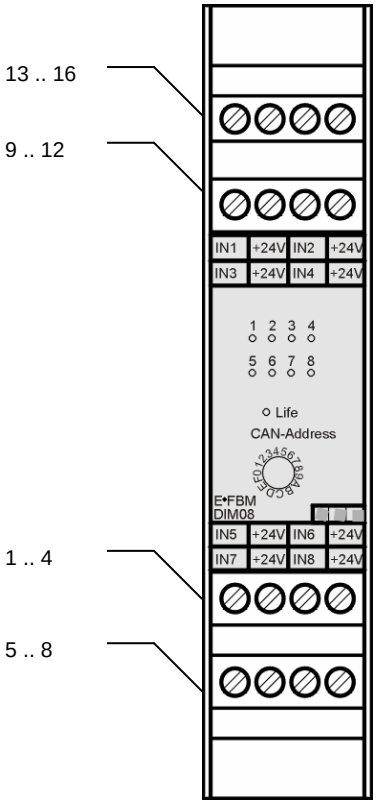
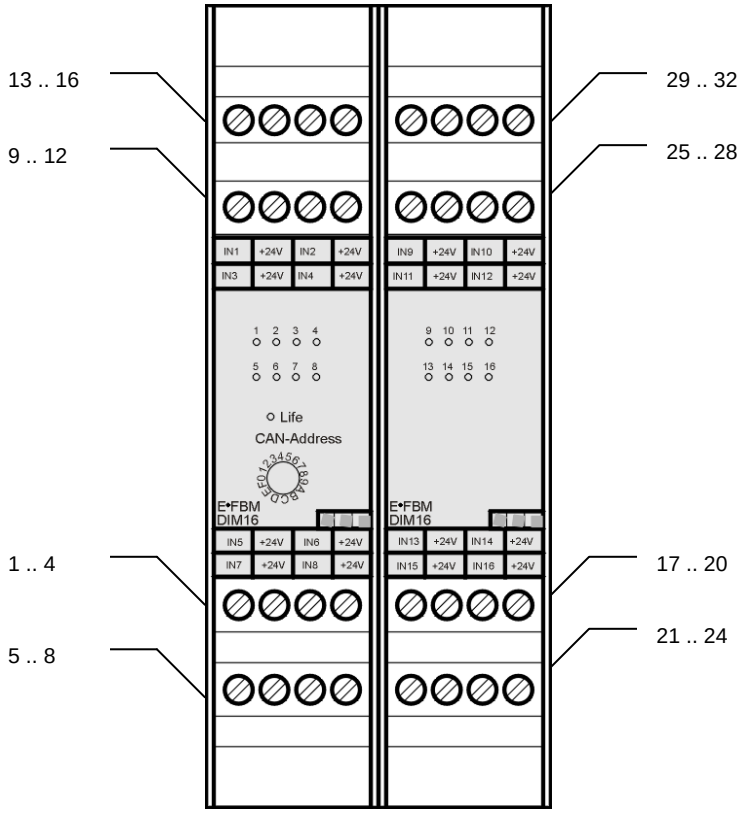
4.4 Terminal markings DIM08



Terminal	Marking	Signal	Comment
13, 15, 9, 11, 1, 3, 5, 7	IN1..IN8	8 digital inputs 24V	
14, 16, 10, 12, 2, 4, 6, 8	+24V	Sensor supply 24V	Terminals internally bridged

4.5 Terminal markings DIM16

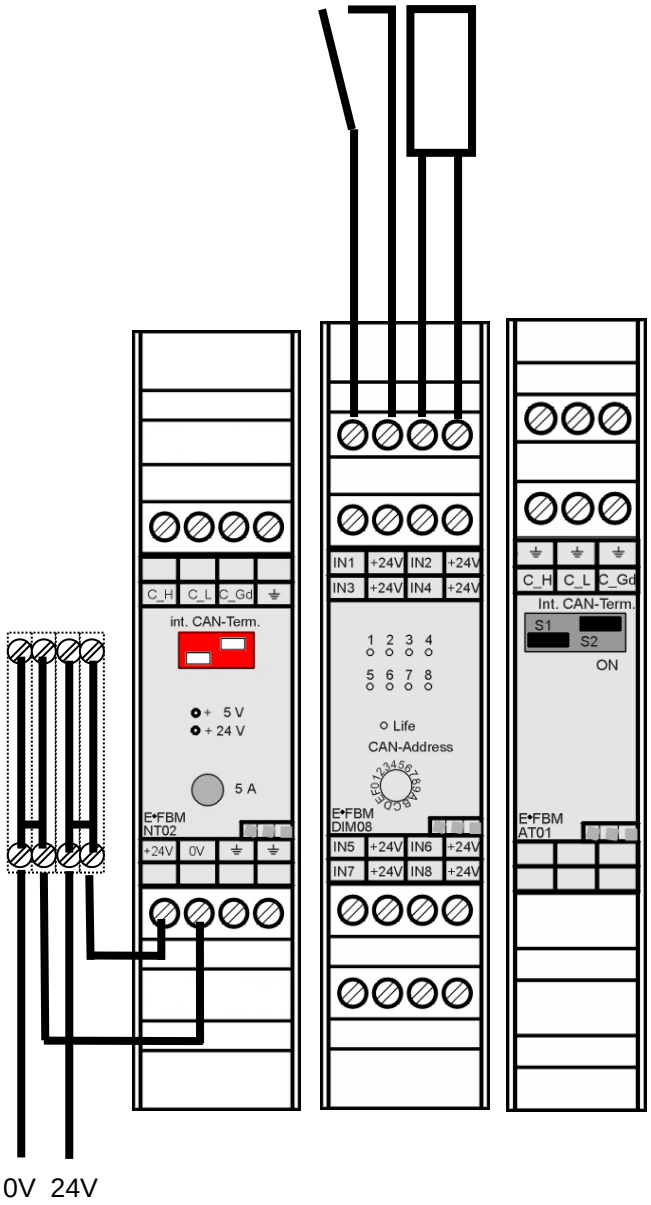


Terminal	Marking	Signal	Comment
13, 15, 9, 11, 1, 3, 5, 7, 29, 31, 25, 27, 17, 19, 21, 23	IN1..IN16	16 digital inputs 24V	
14, 16, 10, 12, 2, 4, 6, 8, 30, 32, 26, 28, 18, 20, 22, 24	+24V	Sensor supply 24V	Terminals internally bridged

4.6 Example of connection DIM08

The following two examples show the connection possibilities of the inputs of a module DIM08 via a power supply module and an external 24V supply as smallest configuration.

The termination of the internal CAN bus line is made via the power supply module NT02 and the termination module AT01 (switch S1= ON).

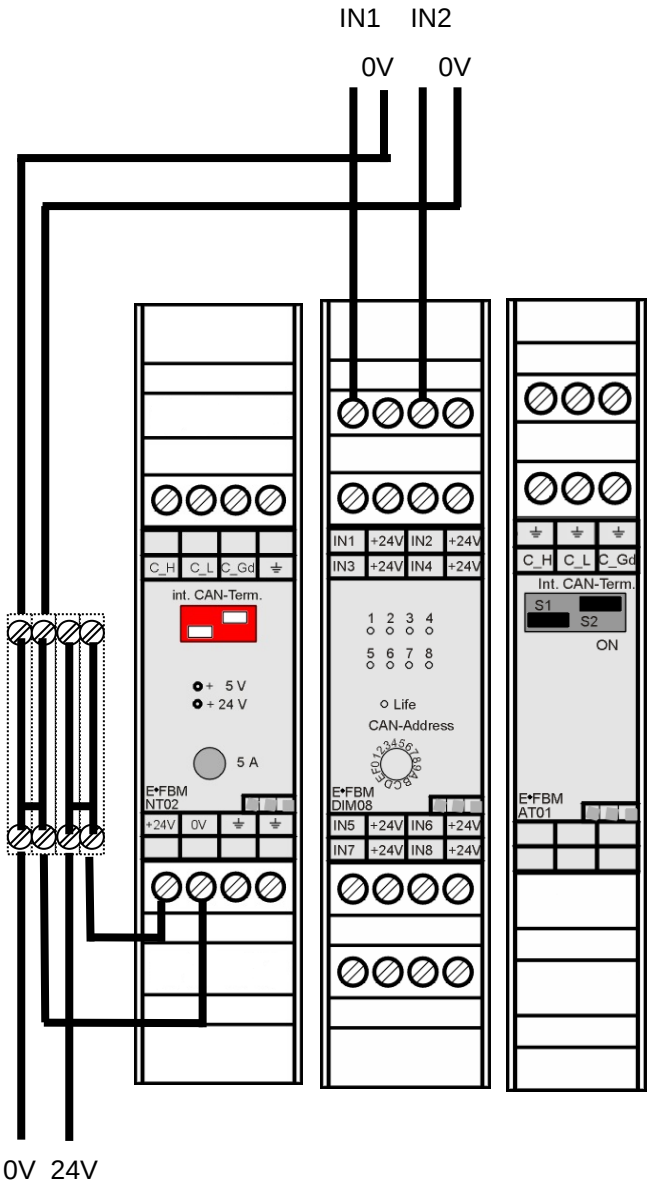


In the example, the 24V supply required for the input signal is taken from the module.

Terminal markings:

IN1..IN8: input 24V

+24V: sensor supply 24V



The example shows the connection possibility of an external 24V supply.

The reference potential 0V of the external supply voltage of the inputs and the reference potential 0V of the power supply module are to be connected with each other.

Terminal markings:

IN1..IN8: input 24V

+24V: sensor supply 24V

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5 Start-up

The start-up of the module can be made after the mechanical and the electrical installation of the field bus modules.

Supply voltage on: As soon as the supply voltage has been switched on, the module is in the state of automatic baud rate recognition. The life LED in the upper part of the module is flashing at 8 Hz. Upon recognition of the baud rate, an internal initialization of the module is made. Subsequently, the module is in the internal state „*Pre-operational*“. The module is now ready for operation and attends control signals via the CAN bus. The life LED is flashing at 0.25 Hz.

Initialization of the module: Upon successful initialization of the module via the CAN bus (e.g. by a controller) with the signal „Start-remote-node“, the module is in state „*Operational*“. The life LED is on (permanently).

All inputs are to be controlled and the specified voltage and current values are to be checked.

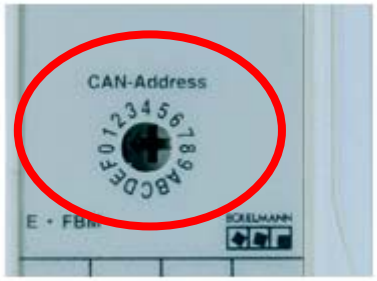
Module stopped: If the signal „Stop-remote-node“ is sent via the CAN bus, the module passes to the state „*Stopped*“. The module attends the respective signal to leave this state. In this state, the life LED is permanently off.

The life LED mode can be modified via the CAN bus (see chapter Parameterizing). Therefore, the statements made for the life LED are only valid for the default setting.

6 Programming and parameterizing

6.1 Setting of the node address

Each E•FBM module of a line is to be set with an unambiguous node address at the CAN bus.



The setting of the node address is made via a hexagonal switch on the front (4 low-value address bits) and via hard-wired bridges inside the housing (3 higher-value address bits). Therefore, max. 16 modules are possible within one module type.

Module type	Higher-value address bits hard-wired	Low-value address bits, settable on the front via the hexagon switch	Set node address (hex)	Set node address (decimal)
DIMxx	50H	0…FH	50H…5FH	80 .. 95

When setting the node address, make sure that no double assigning of modules to the same node address at the CAN bus occurs, i.e. several modules of the above table at the same CAN bus need to have differently set hexagon switches.

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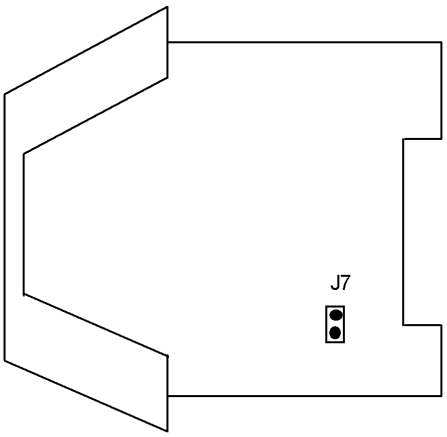
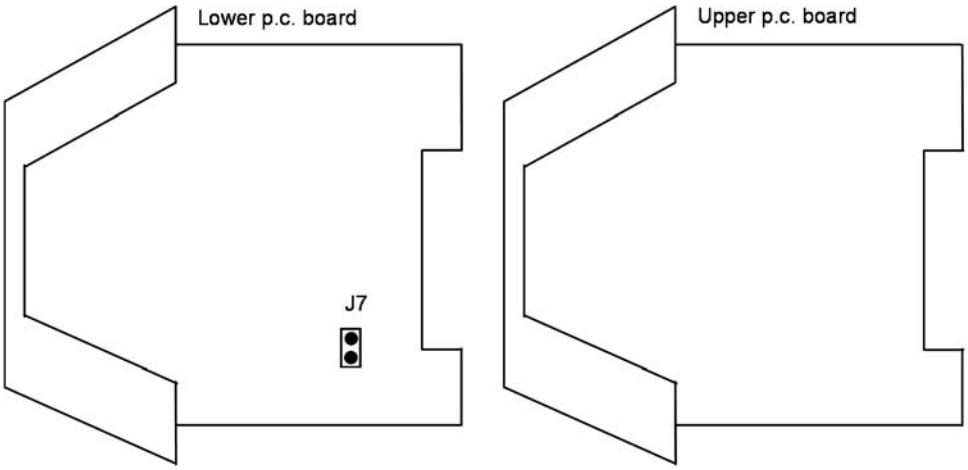
6.2 DIM08 bridges

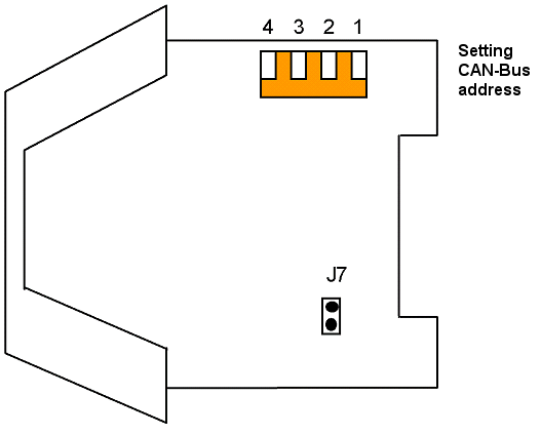


6.3 DIM16 bridges



In the module, the lower and the upper p.c. board are connected electrically and mechanically by means of a dual in-line connector. The two p.c. boards can be separated from each other by drawing them carefully. After a checking or setting of the bridges, the two p.c. boards are reconnected via the dual in-line connector.

For module variant FBMDIM1602 ans FBMDIM1606 only:



The basis address (higher-value address bits) of the CAN bus can be modified by means of the 4-pole DIL switch. Normally, the preset address should not be modified.

Note: The setting of the basis address is made by means of the DIL switches 1 .. 3. The setting of the DIL switches 4 (ON or OFF) has no influence on the resulting basis address.

DIL switch 1	DIL switch 2	DIL switch 3	DIL switch 4	Resulting basis address
OFF	OFF	OFF	OFF	00H
ON	OFF	OFF	OFF	10H
OFF	ON	OFF	OFF	20H
ON	ON	OFF	OFF	30H
OFF	OFF	ON	OFF	40H
ON	OFF	ON	OFF	50H
OFF	ON	ON	OFF	60H
ON	ON	ON	OFF	70H

Bridge J7 is provided for an optional termination of the CAN bus. With closed bridge, a resistance of 120 Ohm is added on the ME bus between the lines CAN_L and CAN_H. In normal operation, the bridge must not be closed.

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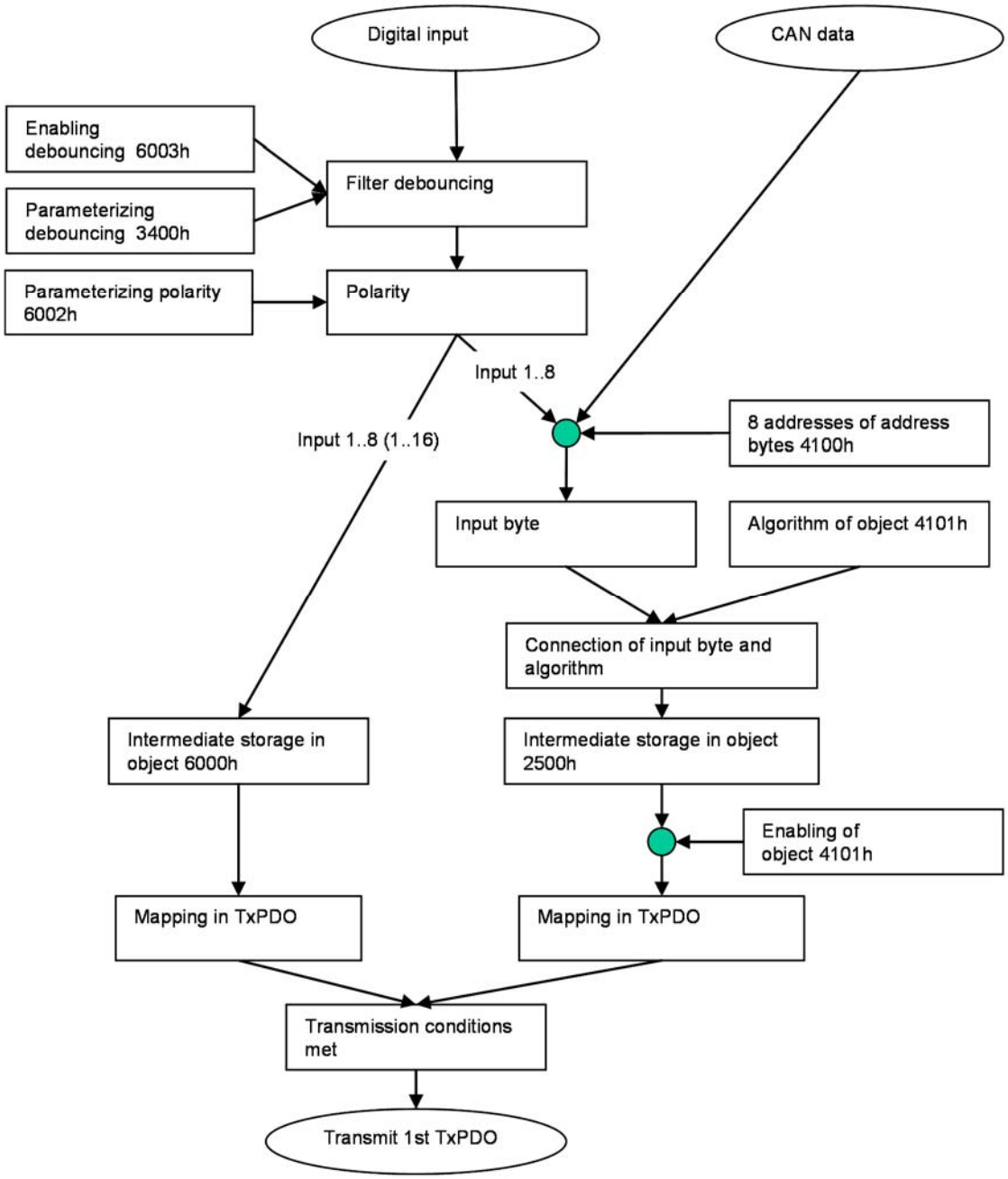
6.4 Signal and data flow

The configuration parameters and the data flow are displayed in the following diagram.



6.5 Parameterizing

After power-on and the subsequent internal initialization it is possible to parameterize the following objects by means of SDO transfer:

Communication profile area:

Parameter	Object (hex)	Sub-index	Type	Admissible input	Preset value
Guard time (ms)	100C	0	unsigned 16	0 .. 65535	0
Life time factor	100D	0	unsigned 8	0 .. 255	0
Heartbeat time (ms)	1017	0	unsigned 16	0 .. 65535	0
Inhibit time for 1. TxPDO (0.1 ms)	1800	3	unsigned 16	0 .. 2550	0

Standardized device profile area::

Parameter	Object (hex)	Sub-index	Type	Admissible input	Preset value
Inverting of polarity of the outputs	6002	1, 2	See the following chapter		
Input filter for a debouncing of the inputs	6003	1, 2	See the following chapter		
NMT behavior of the module in case of severe communication errors	67FE	1	unsigned 8	0: pre-operational 1: not modified 2: stopped	0

Manufacturer-specific profile area:

Parameter	Object (hex)	Sub-index	Type	Admissible input	Preset value
Mode of life LED	2000	1	See the following chapter		
Filter parameters of debouncing	3400	1, 3	See the following chapter Debouncing of the inputs		

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6.5.1 Inverting of the polarity of the inputs

The polarity of the inputs (object 6002h) can be inverted with this function in compliance with the requirements of use. The function requires the following parameters:

Parameter	Object (hex)	Sub-index	Type	Admissible input	Preset value
Inverting of the polarity of the inputs 1..8	6002	1	Unsigned 8	Bit mask 0 -> Input n not modified 1 -> Input n inverted	0
Inverting of the polarity of the inputs 9..16 (only DIM16)	6002	2	Unsigned 8	Bit mask 0 -> Input n not modified 1 -> Input n inverted	0

The bit pattern is shown in binary representation.

Example input	Not modified	Inverted
1	(Index 6002h, sub-index1) = xxxxxxx0	(Index 6002h, sub-index1) = xxxxxxx1
5	(Index 6002h, sub-index1) = xxx0xxxx	(Index 6002h, sub-index1) = xxx1xxxx
8	(Index 6002h, sub-index1) = 0xxxxxxx	(Index 6002h, sub-index1) = 1xxxxxxx
9	(Index 6002h, sub-index2) = xxxxxxx0	(Index 6002h, sub-index2) = xxxxxxx1
13	(Index 6002h, sub-index2) = xxx0xxxx	(Index 6002h, sub-index2) = xxx1xxxx
16	(Index 6002h, sub-index2) = 0xxxxxxx	(Index 6002h, sub-index2) = 1xxxxxxx

6.5.2 Input filter for the debouncing of the inputs

In case of activate debouncing, a modification of the input state is suppressed if the state is shorter than a parameterizable time period (number of scanning operations).

The time delay between the modification of an input value and the transmission of the CAN message is max. 5 ms (at min. deboucing time).

The function requires the following parameters:

Parameter	Object (hex)	Sub-index	Type	Admissible input	Preset value
Enabling of debouncing of the inputs 1..8	6003	1	unsigned 8	Bit mask 0 -> Input filter n off 1 -> Input filter n on	0
Enabling of debouncing of the inputs 9..16 (only DIM16)	6003	2	unsigned 8	Bit mask 0 -> Input filter n off 1 -> Input filter n on	0
Measurement intervals (ms)	3400	1	Unsigned 16	1 .. 500	1
Pulse width (number of measurement intervals)		3	Unsigned 8	3 .. 11	3

The debouncing can be activated and deactivated by means of object 6003h.

Example input	Input filter off	Input filter on
1	(Index 6003h, sub-index1) = xxxxxxx0	(Index 6003h, sub-index1) = xxxxxxx1
5	(Index 6003h, sub-index1) = xxx0xxxx	(Index 6003h, sub-index1) = xxx1xxxx
8	(Index 6003h, sub-index1) = 0xxxxxxx	(Index 6003h, sub-index1) = 1xxxxxxx
9	(Index 6003h, sub-index2) = xxxxxxx0	(Index 6003h, sub-index2) = xxxxxxx1
13	(Index 6003h, sub-index2) = xxx0xxxx	(Index 6003h, sub-index2) = xxx1xxxx
16	(Index 6003h, sub-index2) = 0xxxxxxx	(Index 6003h, sub-index2) = 1xxxxxxx

The measurement interval (object 3400h sub-ID 1) is a time interval for the reading of the inputs.

The pulse width (object 3400h sub-ID 3) is a minimum number of not modified input values after the change of a state prior to the accepting of the new value. The pulse width is to be considered if the input filter for the debouncing of the respective input is activated via the object: 6003h, sub-ID1.

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The reaction time of debouncing is calculated as follows:

Input filter (object: 6003h, sub-ID1, 2), deactivated for the respective input:

Time constant = measurement interval [ms]

Input filter (object: 6003h, sub-ID1, 2), activated for the respective input:

Time constant = measurement interval [ms] * pulse width

Example: The parameterizing of

Measurement interval = 5 ms -> object 3400h, sub-ID1 = 5

Pulse width = 10 -> object 3400h, sub-ID3 = 10

results in case of

Input filter deactivated for the input -> reaction time = 5 ms

Input filter activated for the input -> reaction time = 5 ms * 10 = 50 ms.

6.5.3 Mode of life LED

The operating states of the FBM are visually indicated by means of the life LED. The function of the life LED can be parameterized via the CAN bus by means of object 2000h.

Meaning	Object (hex)	Sub-index	Type	Admissible input	Preset value
Mode of life LED	2000	1	Unsigned 8	0, 1	0

Two possible indication patterns of operating states can be parameterized by means of object 2000h for FBM states.

	(Index 2000h, sub-index1) = 0	(Index 2000h , sub-index1) = 1
FBM state after voltage on (automatic baud rate recognition)	Flashing at 8 Hz, 1:1	
FBM state „Pre-operational“	Flashing at 0.25 Hz, 1:1	Flashing at 0.25 Hz, 1:1
FBM state „Operational“	„permanently on“	Flashing at 1 Hz, 1:1
FBM state „Stopped“	„permanently off“	Flashing at 0.25 Hz, 7:1 („long-time on“ and „short-time off“)

6.6 PDO mapping

The term PDO mapping stands for „Mapping of application objects in PDOs“. In objects TxPDO (1A00h) this mapping of the objects is established for the transmission PDO TxPDO 1. This mapping is defined in the module and cannot be modified.

6.6.1 Mapped objects DIM08

1st TxPDO: In the DIM08, the inputs, 1 byte, (objects: 6000h, sub-ID 1) are transmitted in the first byte of the 1st transmission PDO.

In case of enabled logic functions (by object 4101h), also object 2500h (logic inputs) is mapped in the 1st PDO as 2nd byte.

Object	Byte	Mapped object	Parameter
1. TxPDO	0	6000h, sub-ID 1	Input 1..8
	1	2500h	Logic input 1..8 (in case of enabling by 4101h)

6.6.2 Mapped object DIM16

1st TxPDO: In the DIM16, the inputs, 2 bytes, (objects: 6000h, sub-ID 1 and sub-ID 2) are transmitted in the first and the second byte of the 1st transmission PDO

In case of enabled logic functions (by object 4101h), also object 2500h (logic inputs) is mapped in the 1st PDO as 3rd byte.

Object	Byte	Mapped object	Parameter
1. TxPDO	0	6000h, sub-ID 1	Input 1..8
	1	6000h, sub-ID 2	Input 9..16
	2	2500h	Logic input 1..8 (in case of enabling by 4101h)

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7 Maintenance and repair

General maintenance instructions are given in the system manual.

7.1 Replacement of the module

In case of a defect, the module electronics are replaced completely. Remove all connected lines and switch off the voltage.

Prior to be removed, the respective module is to be separated from modules probably plugged on the left and on the right, since the single modules are connected with the internal ME bus via a connector.

Subsequently remove the respective module from the rail by means of a suited tool, after using a lever at the bracket on bottom side of the module.

For further information please check the system manual.

7.2 Maintenance in case of an error

Problem	Possible cause	Action
Module does not operate	Contacting of the ME bus is not correct	Check the module
	24V current supply at the power supply module is missing	Check the 24V supply
	Internal module error	Replace the module
Life LED is off	Short-circuit 24 V internal, PTC has switched	Eliminate short-circuit, wait for some seconds
	Life LED is differently programmed	Check the parameterizing
Life LED is on, no input LED in spite of signal	Signal is not available	Check signal at the module
24V signal is available, input LED is on, but signal is processed as 0	Input parameterized with inverted logics	Check the parameterizing
Short input signal is not recognized	Debouncing is active	Check the parameterizing

8 Technical annex: parameterizing via the CAN bus

8.1 CANopen

The description of the implemented structures and functions of the CANopen, such as the mapping of the process data objects (PDO), the service data objects (SDO), the network management (NMT) as well as of the emergency messages is made in a separate document.

8.2 Emergency messages

Internal errors are written in a predefined error field and can be read in the object dictionary (index 1003H). The error field includes the single errors stated in a device, described in the form of error codes, as well as a device-specific additional information in the timely order of their occurring.

The presence of a device error and its type is displayed in a register that can be read by means of the object dictionary 1001H.

The transmission of the device-internal emergency objects is made by means of standardized high-priority messages.

An emergency message is sent once, at the occurring and after the elimination of the error.

Please check the system manual for further information about the error messages.

8.3 Configuration

The function and the configuration parameters are indicated as far as possible in the CANopen object dictionary of the device. The object dictionary is composed of 3 areas:

- Communication profile area as per CiA DS 301
- Standardized device profile area as per CiA DS 401
- Manufacturer-specific profile area

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8.4 DIM08

8.4.1 Communication profile area (parameters corresponding to CiA DS 301)

The following table includes all general parameters that belong to the communication profile area of the CANopen object dictionary (CiA DS 301). The most important parameters/objects are display in bold characters and are explained in detail in the following.

Index (hex)	**Sub-index**	**Name**	**Type**	**Attr.**	**Meaning**	**Contents (hex)**	**Default (hex)**
1000	0	Device type	Unsigned 32	R	Device type	00010191	
1001	0	Error register	Unsigned 8	R	Error register, bit-coded		00
1003		Error field					
	0	Number	Unsigned 8	RW	Number of errors occurred 0...16	0..10	00
	1	1. error field	Unsigned 32	R	Error code + Manuf.specific error field		
	2	2. error field	Unsigned 32	R	Error code + Manuf.specific error field		
	…	…					
	16	16. error field	Unsigned 32	R	Error code + Manuf.specific error field		
1004		Number of PDO			Number of PDO		
	0	Number	Unsigned 32	R	Total	00000001	
	1	Synchronous PDO	Unsigned 32	R	Synchronous PDO	00000000	
	2	Asynchronous PDO	Unsigned 32	R	Asynchronous PDO	00000001	
1008	0	Device name	Vis-String	R	Device name	"EST FBM-DIM08 "	
1009	0	Hardware version	Vis-String	R	Version HW	"Vxxh idxx "	
100A	0	Software version	Vis-String	R	Version SW	"V1.05 "	
100B	0	Node-Id	Unsigned 32	R	CAN address	00000050	
100C	0	Guard time	Unsigned 16	RW	NMT guard time (ms) 0..65535	0000..FFFF	0000
100D	0	Life time factor	Unsigned 8	RW	NMT life time 0..255	00..FF	00
100E	0	Node-guarding Id	Unsigned 32	R	CobId node guard	00000700 + Node-Id	
1012	0	Time stamp Id	Unsigned 32	R	CobId Timestamp	80000100	
1014	0	Emergency Id	Unsigned 32	R	CobId Emergency	40000080 + Node-Id	
1017	0	Heartbeat time	Unsigned 16	RW	Heartbeat guard time (ms) 0..65535	0000..FFFF	0000
1200		SDO parameter			SDO Parameter		
	0	Number	Unsigned 8	R	Number of elements	02	
	1	Client->server Id	Unsigned 32	R	CobId ReciveSDO	00000600+Node-Id	
	2	Server->client Id	Unsigned 32	R	CobId TransmitSDO	00000580+Node-Id	
1400		1.RxPDO			Communication parame-ters 1. RxPDO		
	0	Number	Unsigned 8	R	Number of elements	04	
	1	ID used by PDO	Unsigned 32	R	CobId 1.RxPDO	00000200+Node-Id	

Index (hex)	Sub-index	Name	Type	Attr.	Meaning	Contents (hex)	Default (hex)
	2	Transmission type	Unsigned 8	R		FF	
	3	Inhibit time	Unsigned 16	R	(ms)	0000	
	4	CMS priority group	Unsigned 8	R		03	
1600		1.RxPDO mapping			Mapping parameter 1.RxPDO		
	0	Number	Unsigned 8	R	Number of elements	00	
1800		1.TxPDO			Communication parame-ters 1.TxPDO		
	0	Number	Unsigned 8	R	Number of elements	04	
	1	ID used by PDO	Unsigned 32	R	CobId 1.TxPD	00000180+Node-Id	
	2	Transmission type	Unsigned 8	R		FF	
	3	Inhibit time	Unsigned 16	RW	Time in 0.1 ms (0..2550)	0000…09F6	0000
	4	CMS priority group	Unsigned 8	R		03	
1A00		TxPDO mapping			Mapping parameters 1.TxPDO		
	0	Number	Unsigned 8	R	Number of elements	01 bzw. 02	
	1	1. mapped object	Unsigned 32	R	Inputs 1..8	60000108	
	2	2. mapped object	Unsigned 32	R	Logic input (at enabling by 4101h)	25000108	

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8.4.2 Standardized device profile area (parameters corresponding to CiA DS 401)

The parameters of the DIM08 are summarized in the following table that are part of the standardized device profile area of the CANopen object dictionary (CiA DS 401) and that describe the device function of the module. The data formats, the admissible value areas as well as the default values of the objects are explained in detail in the following.

Index (hex)	Sub-index	Name	Type	Attr.	Meaning	Contents (hex)	Default (hex)
6000		Digital inputs			Digital inputs		
	0	Number	Unsigned 8	R	Number of elements	01	
	1	Inputs 1...8	Unsigned 8	R	Inputs 1...8		00
6002		Polarity			Polarity of inputs		
	0	Number	Unsigned 8	R	Number of elements	01	
	1	Inputs 1...8	Unsigned 8	RW	Bit mask 0 -> Input n not modified 1 -> Input n inverted		00
6003		Input filter			Input filter (debouncing)		
	0	Number	Unsigned 8	R	Number of elements	01	
	1	Inputs 1...8	Unsigned 8	RW	Bit mask 0 -> Input filter n off 1 -> Input filter n on		00
67FE		Error behavior			NMT error behavior in case of communication errors		
	0	Number	Unsigned 8	R	Number of elements	01	
	1	NMT state in case of communication errors	Unsigned 8	RW		00: Pre-operational 01: Not modified 02: Stopped	00

8.4.3 Manufacturer-specific profile area

The additional parameters of the DIM 08 or the DIM 16 are summarized in the following table that describe the manufacturer-specific device functions and that are not mentioned in the standardized device profile area of the CANopen object dictionary. The data formats, admissible value areas as well as default values of the objects are explained in detail in the following.

Index (hex)	Sub-index	Name	Type	Attr.	Meaning	Contents (hex)	Default (hex)
2000		Life LED			Mode of life LED		
	0	Number	Unsigned 8	R	Number of elements	01	
	1	Life LED	Unsigned 8	RW	00 or 01		00
2400		Digital inputs			Digital inputs		
	0	Number	Unsigned 8	R	Number of elements	01	
	1	Inputs 1...8	Unsigned 8	R	Inputs 1...8		00
3400		Debouncing			Debouncing of inputs		
	0	Number	Unsigned 8	R	Number of elements	02	
	1	Measurement interval	Unsigned 16	RW	Measurement interval (ms) 1.. 500	0001..01F4	0001
	3	Pulse width	Unsigned 8	RW	Pulse width (measurement interval) 3..11	03..0B	03

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8.5 DIM16

8.5.1 Communication profile area (parameters corresponding to CiA DS 301)

The following table includes all general parameters that belong to the communication profile area of the CANopen object dictionary (CiA DS 301). The most important parameters/objects are display in bold characters and are explained in detail in the following.

Index (hex)	**Sub-index**	**Name**	**Type**	**Attr.**	**Meaning**	**Contents (hex)**	**Default (hex)**
1000	0	Device type	Unsigned 32	R	Device type	00010191	
1001	0	Error register	Unsigned 8	R	Error register, bit-coded		00
1003		Error field					
	0	Number	Unsigned 8	RW	Number of errors occurred 0...16	0..10	00
	1	1. error field	Unsigned 32	R	Number of errors occurred 0...16		
	2	2. error field	Unsigned 32	R	Error code + Manuf.specific error field		
	16	16. error field	Unsigned 32	R	Error code + Manuf.specific error field		
1004		Number of PDO			Number of PDO		
	0	Number	Unsigned 32	R	Total	00000001	
	1	Synchronous PDO	Unsigned 32	R	Synchronous PDO	00000000	
	2	Asynchronous PDO	Unsigned 32	R	Asynchronous PDO	00000001	
1008	0	Device name	Vis-String	R	Device name	"EST FBM-DIM16 "	
1009	0	Hardware version	Vis-String	R	Version HW	"Vxxh idxx "	
100A	0	Software version	Vis-String	R	Version SW	"V1.05 "	
100B	0	Node-Id	Unsigned 32	R	CAN address	00000050	
100C	0	Guard time	Unsigned 16	RW	NMT guard time (ms) 0..65535	0000..FFFF	0000
100D	0	Life time factor	Unsigned 8	RW	NMT life time 0..255	00..FF	00
100E	0	Node-guarding Id	Unsigned 32	R	CobId node guard:	00000700 + Node-Id	
1012	0	Time stamp Id	Unsigned 32	R	CobId time stamp:	80000100	
1014	0	Emergency Id	Unsigned 32	R	CobId emergency:	40000080 + Node-Id	
1017	0	Heartbeat time	Unsigned 16	RW	Heartbeat cycle time (ms) 0..65535	0000..FFFF	0000
1200		SDO parameter			SDO parameter		
	0	Number	Unsigned 8	R	Number of elements	02	
	1	Client->server Id	Unsigned 32	R	CobId ReciveSDO:	00000600+Node-Id	
	2	Server->client Id	Unsigned 32	R	CobId TransmitSDO:	00000580+Node-Id	
1400		1.RxPDO			Communication parame-ters 1.RxPDO		
	0	Number	Unsigned 8	R	Number of elements	04	

Index (hex)	Sub-index	Name	Type	Attr.	Meaning	Contents (hex)	Default (hex)
	1	ID used by PDO	Unsigned 32	R	CobId 1.RxPDO	00000200+Node-Id	
	2	Transmission type	Unsigned 8	R		FF	
	3	Inhibit time	Unsigned 16	R		0000	
	4	CMS priority group	Unsigned 8	R		03	
1600		1.RxPDO mapping			Mapping parameters 1.RxPDO		
	0	Number	Unsigned 8	R	Number of elements	00	
1800		1.TxPDO			Communication parame-ters 1.TxPDO		
	0	Number	Unsigned 8	R	Number of elements	04	
	1	ID used by PDO	Unsigned 32	R	CobId 1.TxPDO	00000180+Node-Id	
	2	Transmission type	Unsigned 8	R		FF	
	3	Inhibit time	Unsigned 16	RW	Time in 0.1 ms (0..2550)	0000…09F6	0000
	4	CMS priority group	Unsigned 8	R		03	
1A00		TxPDO mapping			Mapping parameters 1.TxPDO		
	0	Number	Unsigned 8	R	Number of elements	02 or 03	
	1	1. mapped object	Unsigned 32	R	Inputs 1..8	60000108	
	2	2. mapped object	Unsigned 32	R	Inputs 9..16	60000208	
	3	3. mapped object	Unsigned 32	R	Logic inputs (at enabling by 4101h)	25000108	

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8.5.2 Standardized device profile area (parameters corresponding to CiA DS 401)

The parameters of the DIM16 are summarized in the following table that are part of the standardized device profile area of the CANopen object dictionary (CiA DS 401) and that describe the device function of the module. The data formats, the admissible value areas as well as the default values of the objects are explained in detail in the following.

Index (hex)	Sub-index	Name	Type	Attr.	Meaning	Contents (hex)	Default (hex)
6000		Digital inputs			Digital inputs		
	0	Number	Unsigned 8	R	Number of elements	02	
	1	Inputs 1...8	Unsigned 8	R	Inputs 1...8		00
	2	Inputs 9...16	Unsigned 8	R	Inputs 9...16		00
6002		Polarity			Polarity of inputs		
	0	Number	Unsigned 8	R	Number of elements	02	
	1	Inputs 1...8	Unsigned 8	RW	Bit mask 0 -> Input n not modified 1 -> Input n inverted		00
	2	Inputs 9...16	Unsigned 8	RW	Bit mask 0 -> Input n not modified 1 -> Input n inverted		00
6003		Input filter			Input filter (debouncing)		
	0	Number	Unsigned 8	R	Number of elements	02	
	1	Inputs 1...8	Unsigned 8	RW	Bit mask 0 -> Input filter n off 1 -> Input filter n on		00
	2	Inputs 9...16	Unsigned 8	RW	Bit mask 0 -> Input filter n off 1 -> Input filter n ein		00
67FE		Error behavior			NMT error behavior in case of communication errors		
	0	Number	Unsigned 8	R	Number of elements	01	
	1	NMT state in case of communication errors	Unsigned 8	RW		00: Pre-operational 01: Not modified 02: Stopped	00

8.5.3 Manufacturer-specific profile area

The additional parameters of the DIM 08 or the DIM 16 are summarized in the following table that describe the manufacturer-specific device functions and that are not mentioned in the standardized device profile area of the CANopen object dictionary. The data formats, admissible value areas as well as default values of the objects are explained in detail in the following.

Index (hex)	Sub-index	Name	Type	Attr.	Meaning	Contents (hex)	Default (hex)
2000		Life-LED			Mode of life LED		
	0	Number	Unsigned 8	R	Number of elements	01	
	1	Life-LED	Unsigned 8	RW	00 or 01		00
2400		Digital inputs			Digital inputs		
	0	Number	Unsigned 8	R	Number of elements	02	
	1	Inputs 1...8	Unsigned 8	R	Inputs 1...8		00
	2	Inputs 9...16	Unsigned 8	R	Inputs 9...16		00
3400		Debbouncing			Debouncing of inputs		
	0	Number	Unsigned 8	R	Number of elements	02	
	1	Measurement interval	Unsigned 16	RW	Measurement intervals (ms) 1.. 500	0001..01F4	0001
	3	Pulse width	Unsigned 8	RW	Pulse width (measurement intervals) 3..11	03..0B	03

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