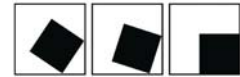




E•FBM

Power Supply Modules NT02, NT03

Technical Manual



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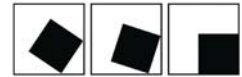
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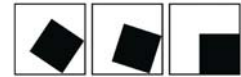
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1 Introduction

Together with the technical data, this documentation includes general information and instructions regarding the intended use of the power supply modules NT02 and NT03 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.

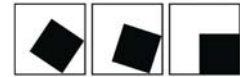
ECKELMANN AG shall assume no liability for misaction and damage to Eckelmann products or products of third supplies caused by the non-observance of the information included in this manual.

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

The power supply module is required for the power supply of the various connected modules. The power supply modules differ as far as the provided voltages are concerned.

The power supply module is primarily supplied with a nominal field voltage of 24 Volt and generates electrically isolated 5 Volt.

The supply is provided to the connected modules via the ME bus connection. Also the field voltage (24 Volt) is supplied to the ME bus via a protective circuit.

The respective connections make the connection of the internal CAN bus of the system with an external controller possible.

2.1 Module variants, options

This manual is valid for the following module variants.

2.1.1 Variants of the NT02

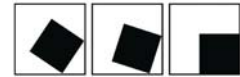
	Order number	Power supply module 24V / 2A and 5V / 1.5A
NT02	FBMNT02001	With screw-type terminal connection
	FBMNT02005	With COMBICON connection plug

2.1.2 Variants of the NT03

	Order number	Power supply module 24V / 2A and 5V / 3A
NT03	FBMNT03001	With screw-type terminal connection
	FBMNT03005	With COMBICON connection plug

2.1.3 Accessories

Order number	Accessories for	
FBMSTS402	FBMNT02005 FBMNT03005	Set of matching plugs for COMBICON connection, 2 plugs screw-type terminal (Phoenix Contact MSTB 2.5/ 4-ST KMGY, no. 1946312)
FBMSTF402	FBMNT02005 FBMNT03005	Set of matching plugs for COMBICON connection, 2 plugs spring-force terminal (Phoenix Contact FKCT 2.5/ 4-ST KMGY, no. 1921900)
KLZCP0001	FBMNT02005 FBMNT03005	Coding section (Phoenix Contact CP-MSTB, no. 1734634) for COMBICON terminal (packing unit=100) Coding element (Phoenix Contact CR-MSTB, no. 1734401) for COMBICON hous- ing (packing unit=100)
FMIC5A012V	FBMNT02001 FBMNT03001 FBMNT02005 FBMNT03005	Plug fuse Microfuse 5A, 125V, manufacturer Wickmann no. 303-1500-042



2.1.4 Characteristic feature of the NT02/NT03



- Voltage supply module for a function node
- Power supply module available in 2 power classes: NT02 for typically 7 connected modules, NT03 for typically 15 connected modules
- Providing of the internal voltage supply of the connected modules via the internal bus
- Transfer module for the CAN bus with connectable bus termination in case of multi-line module structure
- Indicator LED for 24V external
- Indicator LED for 5V internal
- Screw-type terminal connection, variant with pluggable terminals available
- Small module housing width 22.5mm

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

2.2 Voltage converter

An externally supplied nominal field voltage of 24 Volt is connected with the ME bus and is supplied to a DC/DC converter. The field voltage to be externally connected is decoupled by means of a radio interference suppression reactor (filter circuit) in order to meet the directives of the electromagnetic compatibility.

Core of the assembly is a DC/DC converter. The converter generates a stabilized supply voltage of 5 V from the 24V voltage for the ME bus.

An input filter provides the necessary EMC characteristics.

The logic and system voltage is supplied to the internal ME bus.

2.3 Protective circuit

The module is short-circuit-proof and protected against polarity reversal. A short-circuit or the overloading of the internal 24V supply on the ME bus is detected and the supply is interrupted.

The 5V supply is protected by the internal protective circuit of the DC/DC converter.



Each external connection is protected against each external connection up to an electrical strength of ± 32 V. This protection is effective in case of a wrong connection of the module and is only available if an **automatic circuit breaker 6A type B** is installed in the infeed that probably reacts.

2.3.1 Parallel connections of power supply modules



Only one power supply module is possible per ME bus. A series connection (parallel connection) of several power supply modules on the same ME bus is not permitted.

2.4 Fuse replacement

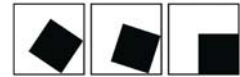
The 24V supply is protected by an externally accessible plug fuse. The fuse can be **removed** and replaced easily by means of pliers.



Chapter Maintenance and repair gives instructions regarding the fuse replacement.

2.5 Outputs

The p.c. board is designed for permanent load of all voltages with the respective maximum current.



2.6 LED per voltage

The states of the voltage supply are indicated by two red LED in the upper part of the module. A red LED is provided as indicator for each output voltage (24V DC and 5V DC). The LED makes an optical checking of the state of the respective voltage supply of the LED possible. The LED are on if the corresponding voltage is available.

2.7 Connection of CAN bus

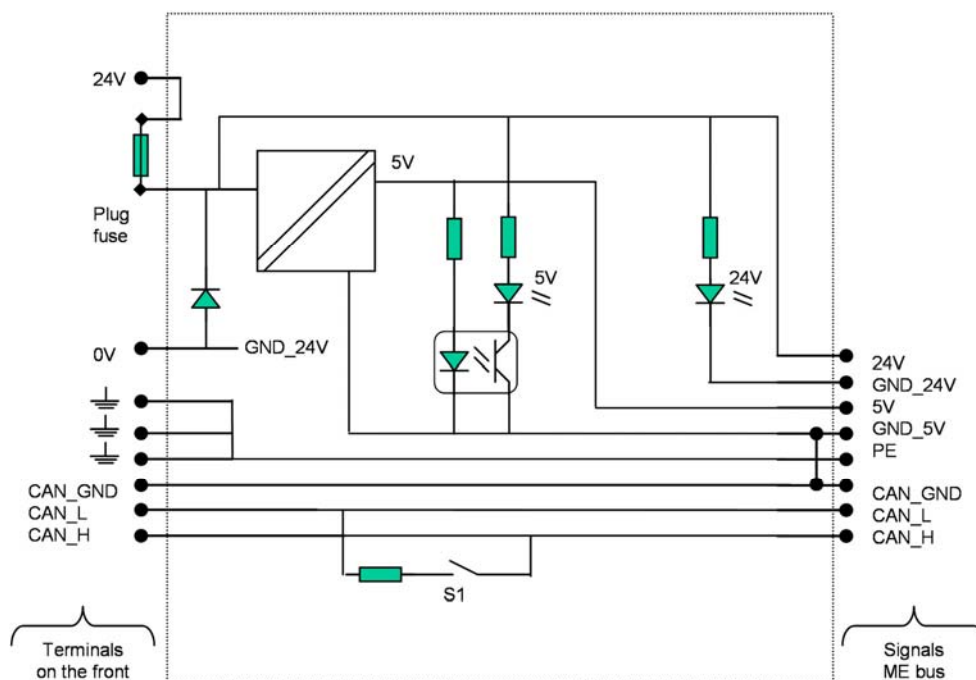
The external CAN bus is connected with the module. The CAN bus is further connected internally with the connected modules via the ME bus of the module.

The CAN bus can be terminated internally by activating the DIP switch.

2.8 Electrical isolation

The 5V DC block for the supply of the circuit logic of the various modules is electrically isolated from the 24V DC field voltage (isolating voltage 500 V).

2.9 Schematic diagram NT02/03



3 Technical data

General data	
Use	Supply modules of the E*FBM series
Indication	1 LED per voltage output.
Connection system	COMBICON connector system with screw-type terminals or spring-force plugs optionally direct screw-type terminals
Weight	150 g
Installation height	min. 180mm
Dimensions (H x W x D)	99 mm x 22.5 mm x 114.5 mm The dimensions are valid for the screw-type terminals and the COMBICON connection plugs without matching plugs

Supply	
Supply voltage: 24V DC input	typ. 24V DC external supply min. 18V DC, max. 32V DC
5V DC output to ME bus	typ. 5.0 V DC, min. 4.75 V DC, max. 5.25 V DC on ME bus
24V DC output to ME bus	typ. 24 V DC, min. 18 V DC, max. 32 V DC on ME bus

Power input and output current NT02	
Power input at max. output current: 24V DC – input at 18V DC	max. 2.8 A
24V DC – input at 24V DC	max. 2.6 A
24V DC – input at 32V DC	max. 2.5 A
Output current	
5V DC – output on the ME bus	max. 2.0 A
24V DC – output on the ME bus	max. 2.0 A
Power loss	max. 75 W

Power input and output current NT03	
Power input at max. output current: 24V DC input at 18V DC	max. 3.2 A
24V DC input at 24V DC	max. 2.9 A
24V DC input at 32V DC	max. 2.7 A
Output current	
5V DC output on the ME bus	max. 3.0 A
24V DC output on the ME bus	max. 2.0 A
Power loss	max. 83 W



Fusing	
Recovery	Up to max. 32 V are possible at the connecting terminals
Fusing: 24V DC output on the ME bus 5V DC output on the ME bus	Fuse on the front Short-circuit-proof via DC/DC converter
Protection	5V DC and 24V DC supply on the ME bus are short-circuit-proof and protected against polarity reversal. Supply is protected against polarity reversal.
Electrical isolation between 5V DC output 24V DC input	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.

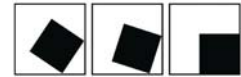
4.3 ESD protection



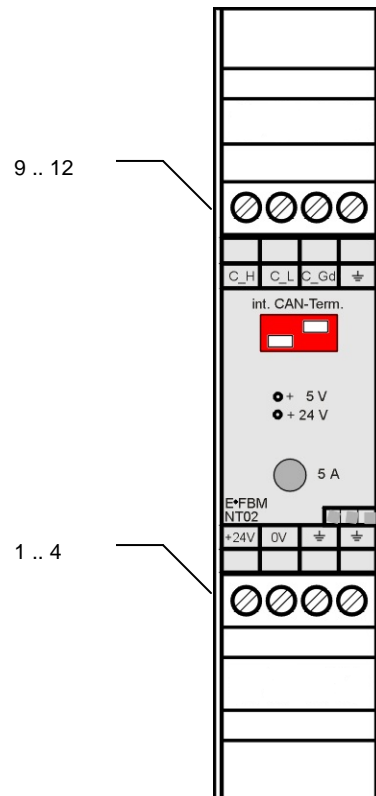
When handling the module, always take suited ESD protective measures, such as bracelets, conductive supports and suited packing material.

Make the following checks:

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

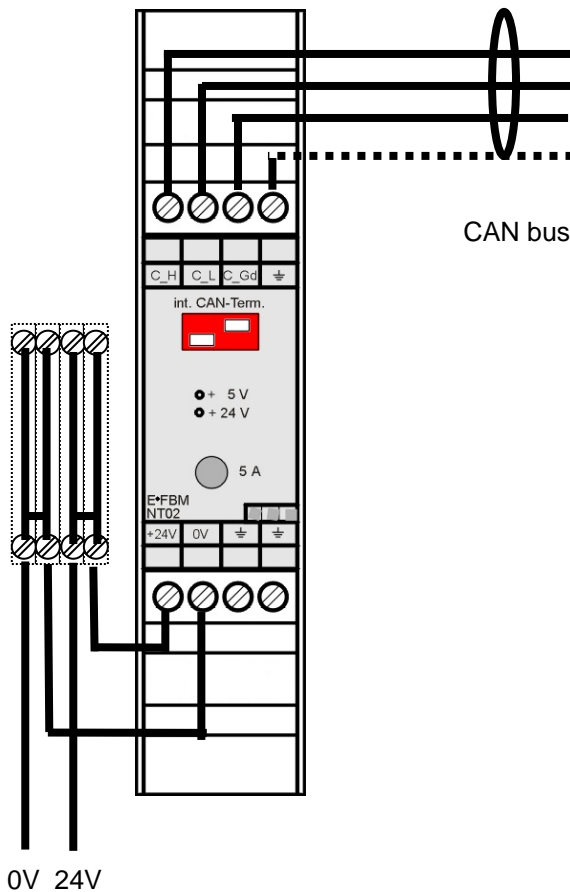


4.4 Terminal markings NT02, NT03



Terminal	Marking	Signal	Comment
1	+24V	Voltage supply	
2	0V	Reference potential voltage supply	
9	C_H	CAN high	
10	C_L	CAN low	
11	C_Gd	CAN signal mass	
12, 3, 4	⏏	CAN screen potential , shielding	Terminals internally bridged
	S1	Switch for connection of CAN bus	On = termination with 120 Ohm between C_H and C_L
	S2	No function	

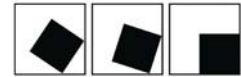
4.5 Example of connection NT02



The example shows the connection possibilities of 24V via the terminal with the power supply module.

The connection of the external CAN bus is made via the connections of the power supply module.

The example shows switch S1 in position S1 = On, i.e. the CAN bus is terminated in the power supply module.



5 Start-up

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

The two LED in the upper part of the module are on as soon as the voltage supply is switched on.

6 Programming and parameterizing

6.1 Switch position S1

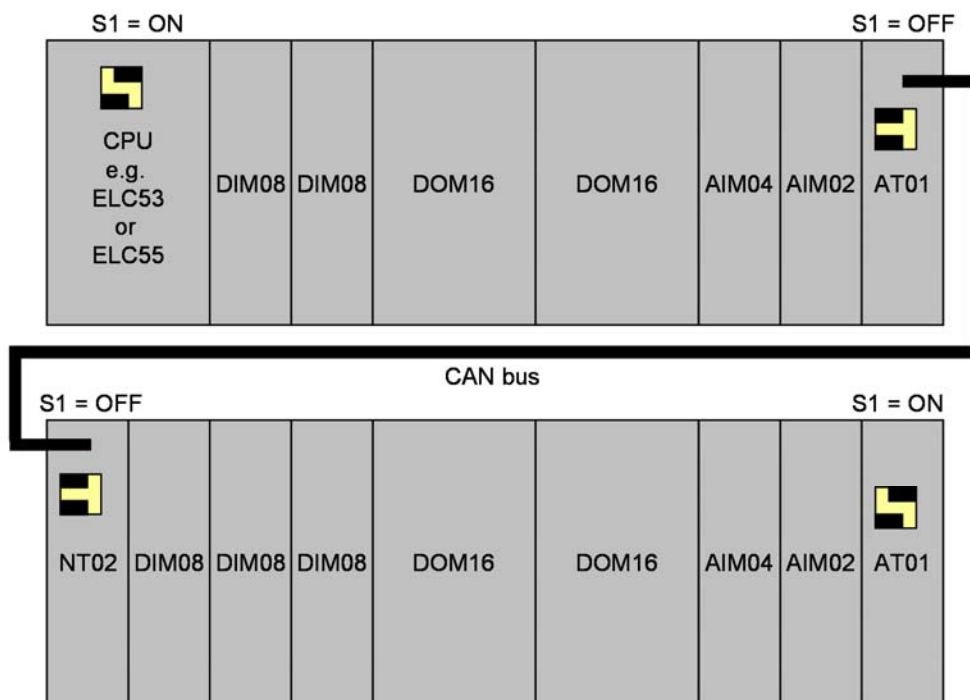
The internal CAN bus requires a terminal resistance at the its beginning and at the end. The adding of the terminal resistance is made by setting the switch to S1 = ON. In this case, a resistance of 120 Ohm is switched between the lines CAN_H and CAN_L.



The termination is required if the power supply module is arranged at the beginning or the end of a CAN bus and only one additional CAN card of the bus has a termination of its own.

Switch S1=OFF is to be set, if another Can bus device (e.g. the controller) has already terminated the CAN bus or if the power supply module (e.g. in a multi-line system structure) is arranged in the middle of the bus.

Example for a multi-line system structure of field bus modules



6.2 Switch position S2

Switch S2 has no function.



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.

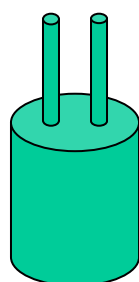
Subsequently remove the respective module from the rail by means of a suited tool, after using a lever at the bracket on bottom side of the module.

For further information please check the system manual.

7.2 Fuse replacement



The module electronics are protected by a plug fuse Microfuse 5A, 125V (manufacturer Wickmann, no. 303-1500-042).



This fuse is plugged from the front and is kept by its two connection wires.

The fuse can be replaced easily by pulling it (do not turn!) with a suited tool.

7.3 Maintenance in case of an error

Problem	Possible cause	Action
LED 24V is off	24V current supply at the power supply module is missing	Check 24V supply Check the fuse
	Internal short-circuit in the module	Check or replace the module
LED 5V is off	Internal short-circuit in the module	Check or replace the module Check the fuse
CAN bus does not operate correctly	Switch position S1 is not correct	Check switch position S1