

I/O expansion modules

Increasing the number of inputs and outputs
of the MFW basic modules

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1 Applicability

The description applies to the following MFW modules:

Item number	Type
97AXXGAX0BA0	EM-G8DEX-0-BA-0
97AXXGAX0BB0	EM-G8DEX-0-BB-0
97AXXGAX0BE0	EM-G8DEX-0-BE-0
97AXXGAX0BF0	EM-G8DEX-0-BF-0
97AXXGAX0BJ0	EM-G8DEX-0-BJ-0
97AXXGBX0BB0	EM-G8DAL-0-BB-0
97AXXGXC0BX0	EM-G8DAR-0-BX-0
97AXXGEX0BX0	EM-G4AE0-0-BX-0
97AXXGIX0BX0	EM-G4AA0-0-BX-0

2 General notes

2.1 Symbols used

The following symbols are used in this document:



Safety instruction

This symbol marks warnings, prohibitions and directions relating to hazards. It is essential that they are observed and obeyed.



Additional note

This symbol indicates additional information.



Important section

This symbol indicates particularly important information.



Cross-reference

This symbol refers to diagrams and to other locations within the document.

2.2 Terminology

MFW

The MFW modular telecontrol network consists of a central station and up to 31 outstations. Each station requires at least one basic module. Up to 15 expansion modules can be connected to this.

Basic module

The basic modules represent the minimum core of a telecontrol station. They contain at least the following function groups:

- internal modem
- optionally 8 binary inputs or outputs with status LED, or an additional serial interface for protocol coupling
- two CAN bus interfaces for connecting the expansion modules
- watchdog LED and fault signalling contact

The basic modules are obtainable in two versions – master module and outstation module.

Master module

Only one master module, whose type name contains “MF-...”, needs to be present in the system, and is usually used in the central station. It co-ordinates the flow of data.

Outstation module

The outstation module, whose type name contains “UF-...”, is used in the outstations.

Expansion module

Each basic module can be fitted with up to a maximum of 15 expansion modules in order to increase the I/O scope. These are connected via the CAN bus interface.

I/O module

The majority of basic modules contain 8 inputs or outputs. These are referred to as I/O modules. In the same way, the expansion modules contain an I/O module consisting of 8 binary inputs, 8 binary outputs, 4 analog inputs or 4 analog outputs.

Station address

To identify the stations in the MFW system, each outstation module is given a station address (1 - 31). The address 0 is reserved for the master module. Station addresses must be unique.

Module number

Each I/O module is given a module number. The data is exchanged between modules with the same module number. The physical arrangement of the modules within the system (the station address) is of no significance at all here. The input module with number 5, for instance, transmits its data to all the output modules whose number is 5.

2.3 Safety instructions



These operating instructions must be carefully read, understood and followed!



Risk of interference with electronic devices!

When operating the telecontrol system close to devices that are subject to interference, the special regulations for these areas must be observed!



Risk of ignition from electromagnetic fields!

The MFW modules must not be operated in the neighbourhood of inflammable gases or liquids (fuel depots, petrol stations, chemical works, gas containers etc.)!



Risk of damage!

The MFW modules must not be opened or subjected to improper modification!

2.4 Correct and proper usage

The telecontrol system is intended exclusively for the applications described in these operating instructions.

Any other usage can be hazardous and is forbidden. The manufacturer cannot be held liable for the consequences of improper use of the MFW modules or for any application that does not accord with the contents of these operating instructions.

2.5 Functional description


The expansion modules are for enlargement of the number of analogue or digital inputs and outputs of the basic modules of the MFW telecontrol network. They are connected over a bus cable to one of the two CAN bus sockets. The bus cable is part of the scope of delivery of the extension modules. The second socket is for connection of another module or an additional power supply unit or it is used for test purposes.

The power supply of the expansion modules is by the basic modules over the CAN bus. In parallel it is possible to feed the modules by an additional supply unit, for instance type WSN (→ data sheet in our catalogue, column: power supply units). The configuration of the modules is done simply by DIP switches.

The extension modules register themselves independently at the basic module and are thus immediately available. If an extension module fails, this is recognized by the basic module and treated as error (→ operating instruction of the used basic modules). If the expansion module is removed consciously, the basic module must be interrupted from the power supply. Hereby it is ensured that the removed extension module is cancelled from the table of the connected modules. If this would not be done, the module would be recognized as “out of order” and would be registered as distorted. At restarting all connected extension modules register themselves again.

3 Assembly and installation

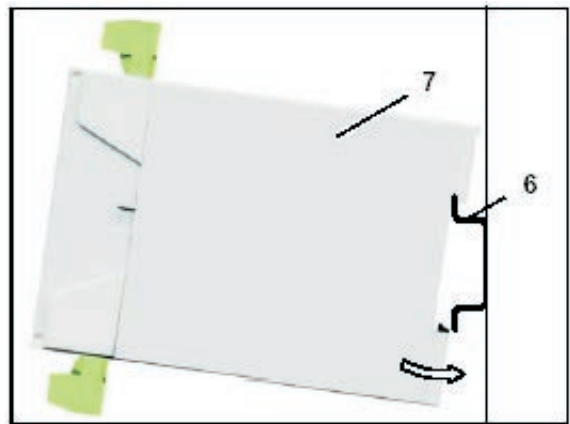
1. Unpack all the telecontrol system's modules, and check them for transport damage. Report any transport damage immediately to the responsible carrier.

 Please check that the delivery is complete. The delivery can include master and outstation modules, expansion modules and other accessories.


2. Select mounting locations for the individual stations.

3. Module configuration (--> section covering „Configuring the expansion modules“)

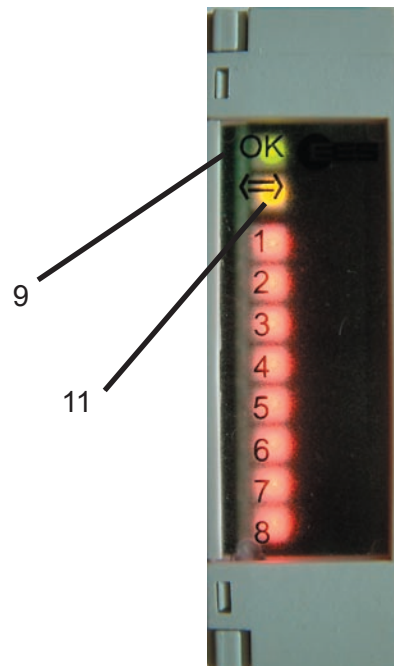
4. Click the expansion modules [7] next to the basic modules onto the rail [6] and connect them with the sockets of the basic modules by using the bus cable supplied.



5. Connect the input and output leads.

 The length of the input and output leads should not exceed a maximum of 3 m.

- ✓ OK-LED (green) [9] lights up and the CAN-Bus LED (yellow) [11] flashes. The expansion module is ready for operation.




4 Configuring the expansion modules

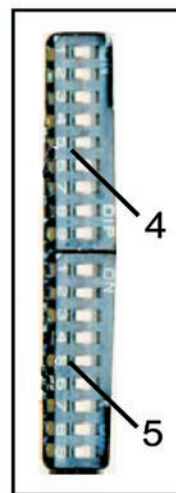
4.1 General principles

Data within the telecontrol system is exchanged on the basis of module numbers.

A module number is assigned to every basic or expansion module that contains an I/O module. The data is exchanged between modules with the same module number. The physical arrangement of the modules within the system (the station address) is of no significance at all here. The input module with number 5, for instance, transmits its data to all the output modules for which the module number has also been set to 5. More than one output module can have the same module number. An input module number, however, can only be used once within one system.

All the important settings can be made with the aid of DIP switches. These include, for instance, the station address (1 – 31), the module number (0 ... 254), selection between static and counter values in the case of digital I/O or between current and voltage in the case of analog signals and so forth. DIP switches A and B [4, 5] are located on the sidewall of the expansion modules.

 Module numbers 251 ...254 are reserved for the output of station errors.



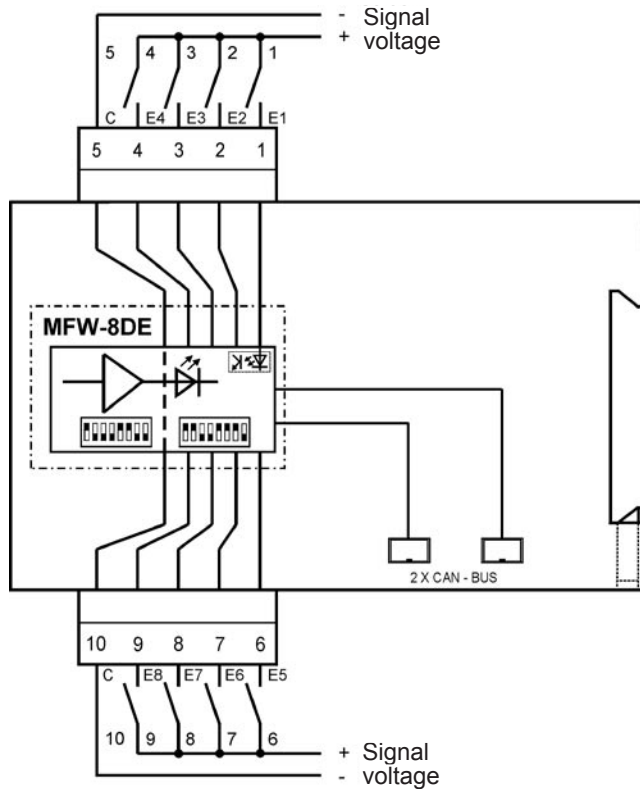
4.2 Digital modules

The digital modules can be obtained in three versions:

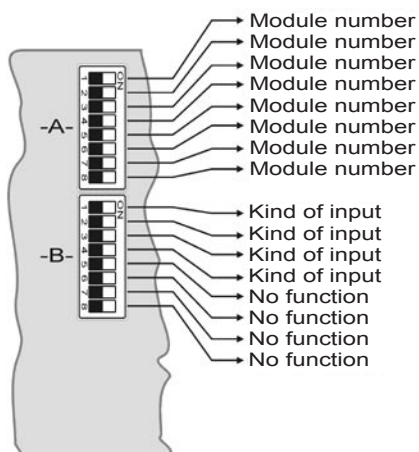
- 8 digital inputs
- 8 relay outputs
- 8 transistor outputs

There are 2 groups each of 4 inputs and outputs with a common root that are electrically isolated from one another. The exceptions are the transistor outputs; all those 8 outputs have the same GND. The first 4 inputs or outputs of each module can be optionally switched as binary or counter value. By output modules it is possible to switch between two count rates and the given impulse lengths.

4.2.1 Digital inputs



Meaning	Values
Module number of the I/O module	0 – 250
Kind of input 1 - 4	Binary or counter



Kind of input:
(Binary or counter)



Channel 1 & 2 as counter input



Channel 2 & 4 as counter input

Addressing: (example for module numbers)



Modul 0



Modul 4

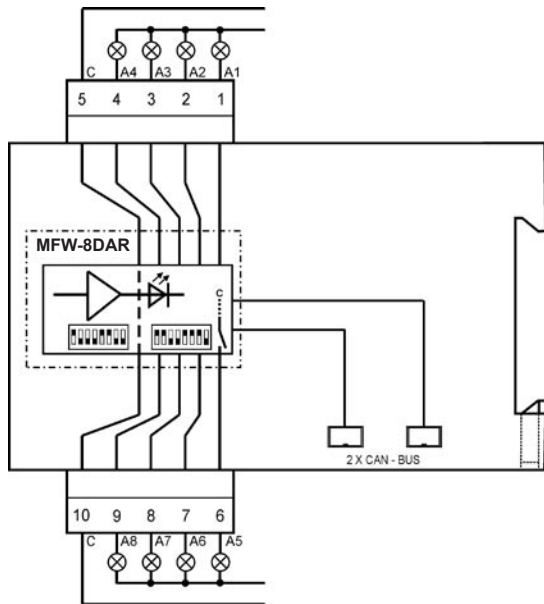


Modul 10

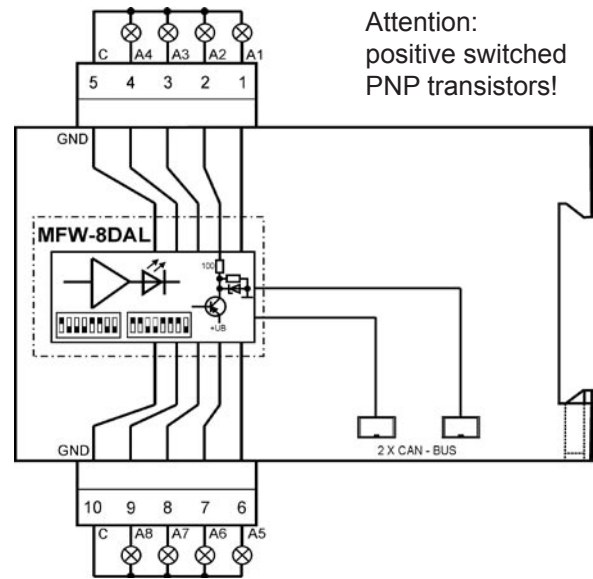
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Modules from the MFW product family

4.2.2 Digital outputs

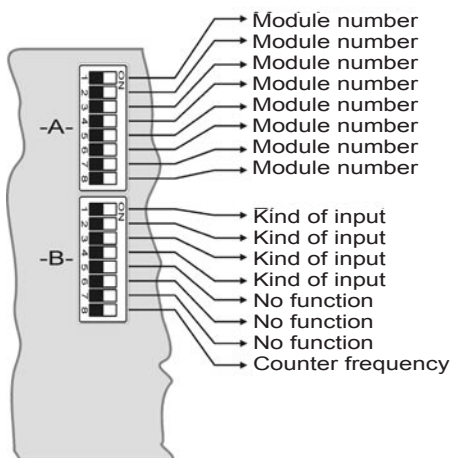


C - Connection point of common potential (selective + or -)



C - Internal ground (GND)

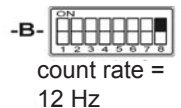
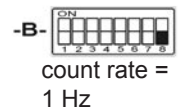
Meaning	Values
Module number of the I/O module	0 – 254
Kind of output 1 - 4	Binary or counter
count rate	1 Hz / 12 Hz



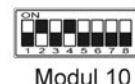
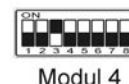
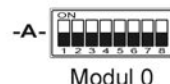
Kind of output:
(Binary or counter)



Count rate:



Addressing: (example for module numbers)



Other count rates on request.

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4.2.3 Digital output modules in systems with IEC interface

In MFW systems, whose master is equipped with IEC 60870-5-101 interface, pulse and continuous commands can be read out over the output modules. If switch B5 is set to position „On“, the use of continuous commands as well as pulse commands is possible on all outputs. In this case the count pulse output on this module is not possible any more. A pulse width valid for all outputs in the range 40 ms to 120 s can be adjusted with switch B1 – B4.

B1	B2	B3	B4	pulse time
Off	Off	Off	Off	40 ms
Off	Off	Off	On	120 ms
Off	Off	On	Off	280 ms
Off	Off	On	On	600 ms
Off	On	Off	Off	1 s
Off	On	Off	On	1,5 s
Off	On	On	Off	2 s
Off	On	On	On	3 s
On	Off	Off	Off	5 s
On	Off	Off	On	8 s
On	Off	On	Off	10 s
On	Off	On	On	15 s
On	On	Off	Off	20 s
On	On	Off	On	30 s
On	On	On	Off	60 s
On	On	On	On	120 s

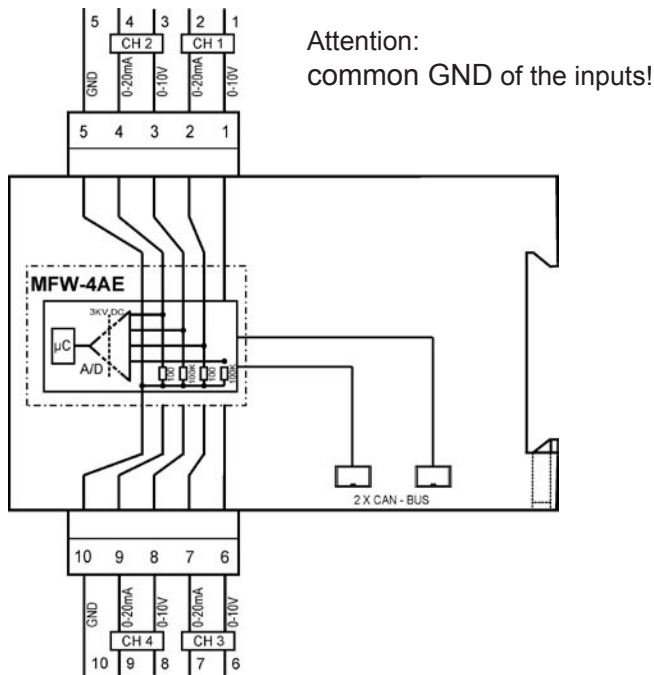
Modules from the MFW product family

4.3 Analogue modules

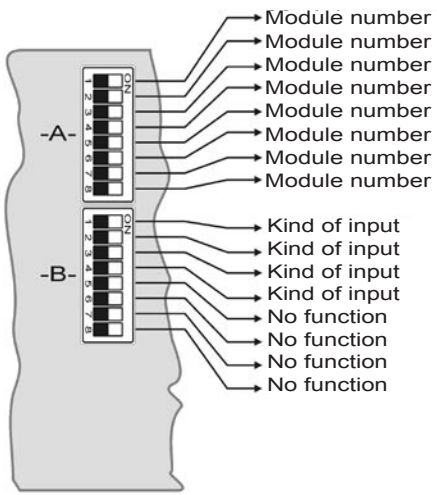
The analogue modules are available as input or output components.

4.3.1 Analogue inputs

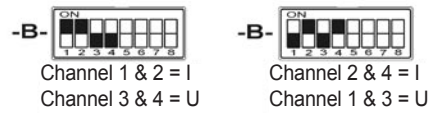
The input modules contain 4 analogue inputs, that have a common GND. The inputs are electrically isolated from the power supply. Each input can be switched between current and voltage by DIP switch (0 (4) ... 20 mA or 0...10 V).



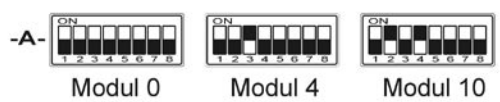
Meaning	Values
Module number of the I/O module	0 – 250
Current or voltage input may be set for each channel	Current / voltage



Kind of input:
(Current / voltage)



Addressing: (example for module numbers)



THE SO OPERATING INSTRUCTIONS

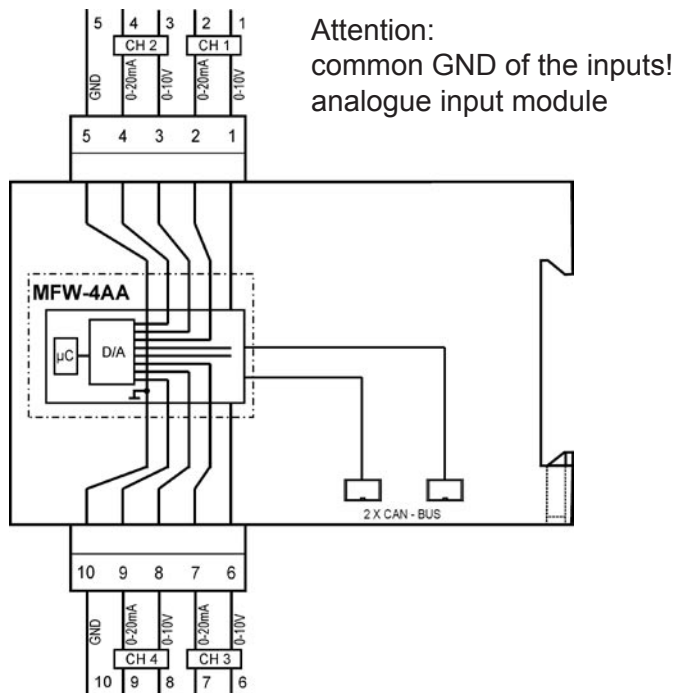
Modules from the MFW product family

4.3.2 Analogue outputs

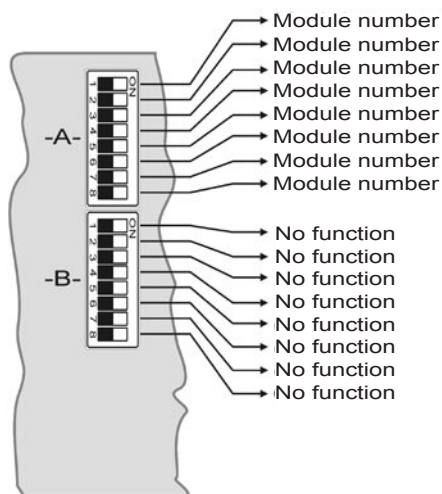
The output modules include 4 short-circuit proof analogue current and voltage outputs (0 (4) ... 20mA or 0...10V), for which no auxiliary voltage is required.



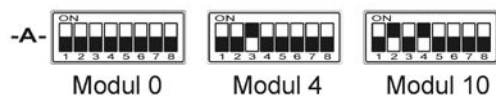
The common GND is equipotential with the power supply.



Meaning	Values
Module number of the I/O module	0 – 250

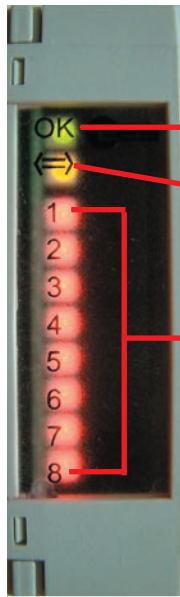


Addressing: (example for module numbers)



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5 Control lamps



- 9 OK control lamp
- 10 Control lamps
Digital inputs or outputs light up if a signal is present.
- 11 Control lamp CAN-Bus
flashes if the module exchanges data with the basic module.

6 Technical data

General Data

Operating and ambient temperature	-20 °C ... +60 °C
Air humidity	maximum 95 %, non-condensing
Connection terminals	nominal cross section 2.5 mm ²
Housing / protection class	Plastic / IP 40

Digital input module

Power consumption	max. 1 W
Signal voltage	see table
Input resistance	see table
Electrical isolation between signal and supply voltage	4 kV _{eff}

Digital output module

Power consumption	
With relay outputs	max. 3 W
With transistor outputs	max. 2 W logic + load current
Contact loading of the relay outputs*	
minimum	1.2 V / 1 mA (suitable for control of LED)
maximum	250 V AC / 400 mA 250 V AC / 2 A (purely ohmic load) 30 V DC / 2 A 110 V DC / 0.2 A 220 V DC / 0.1 A
Total 230 V AC current (purely ohmic load)	8 A
Load capacity at transistor outputs	max. 50 mA per output
count rate	switchable between 1 Hz or 12 Hz **
pulse width / pause	500 ms or 40 ms **
electrical isolation between relay contacts and power supply	4 kV _{eff} (not for transistor outputs!)

Modules from the MFW product family

Analogue input modules

Power consumption	max. 2 W
resolution	12 bit
Accuracy	error < 0.25% of final value / 1 year ***
Input current load	100 Ω
Input resistance at voltage input	100 kΩ

Analogue output modules

Power consumption	max. 3.5 W
resolution	12 bit
Accuracy	error < 0.5% of final value / 1 year ***
Maximum output current load	500 Ω
Minimum load resistance (voltage)	1 kΩ to infinite

Digital input modules are available with various signal voltages. The corresponding voltage is defined by the 13th digit of the type identification.

Type	Rate voltage	Voltage range limit	Input resistance
EM-G8DEX-0-BA-0	12V AC/DC	9V – 24V AC/DC	approx. 5kΩ
EM-G8DEX-0-BB-0	24V AC/DC	16V – 48V AC/DC	10 kΩ
EM-G8DEX-0-BE-0	60V AC/DC	35V – 75V AC/DC	22 kΩ
EM-G8DEX-0-BF-0	110V AC/DC	75V – 130V AC/DC	68 kΩ
EM-G8DEX-0-BJ-0	220V AC/DC	180V – 255V AC/DC	180 kΩ

* We would be happy to supply you with more precise specifications on request.

** Other values on request

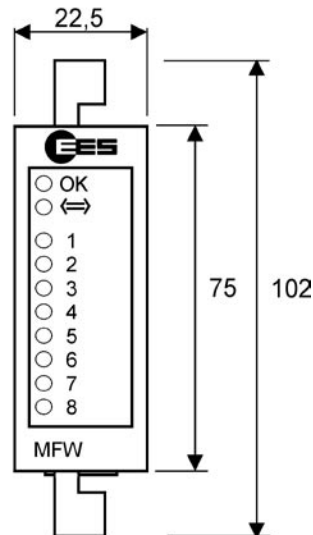
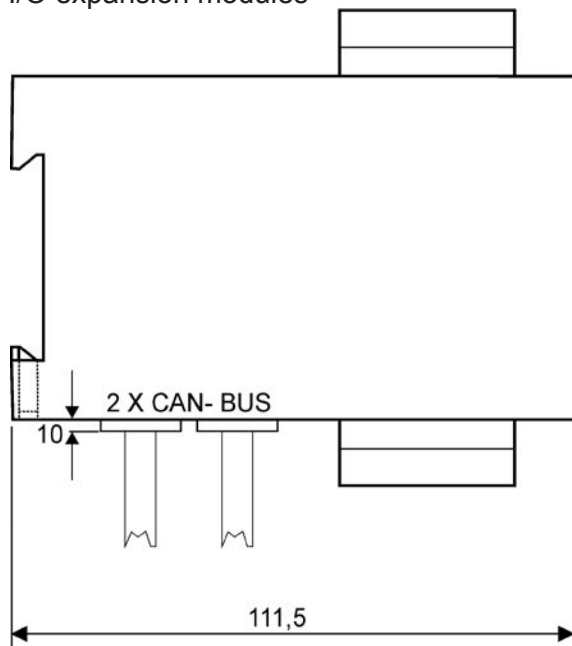
*** For greatest accuracy an annual calibration service is available.

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I/O expansion modules

Dimensional drawing

I/O expansion modules



Dimensions in mm

The right to make technical changes is reserved

Order identification

EM-G8DEX-0-BB-0	expansion module 8 digital inputs
EM-G8DAR-0-BX-0	expansion module 8 relay outputs
EM-G8DAL-0-BB-0	expansion module 8 transistor outputs
EM-G4AE0-0-BX-0	expansion module 4 analogue inputs 0 (4) ... 20 mA or 0...10 V
EM-G4AA0-0-BX-0	expansion module 4 analogue outputs 0 (4) ... 20 mA or 0...10 V

7 Accessories

- ▶ Only accessories approved by the manufacturer may be connected to the MFW module.

Further accessories and more detailed information may be found in the appropriate product sections in the catalogue.



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