# I/O expansion modules


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

- Modular expansion option of the WebRTU and any basic modules of the MFW product family with digital and analog inputs and outputs
- Analog channels can be used with current or voltage signal (0 ... 10 V or 0 ... 20 mA)
- Digital channels available as binary value, pulse and operating hours counter
- Coupling to WebRTU via Modbus RTU (RS 485) and gateway module
- Coupling to MFW basic modules via system bus
- Coupling of modules to each other via system bus (2 interfaces per module)
- Easy configuration of the modules via DIP switches
- Pluggable connection terminals

**Datasheet**

28.04.2023

MFW-EM-DB-UK-007

## Functional description

The expansion modules can be used to increase the I/O scope of the WebRTU and the basic modules of the MFW.

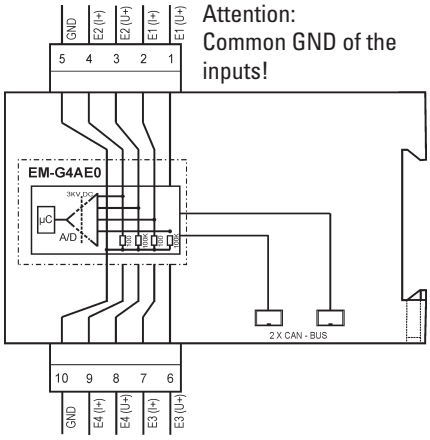
**Gateway module**
The WebRTU can be connected to 1 to 32 gateway modules via Modbus RTU (RS485). These gateway modules already contain 8 digital inputs and have two system bus interfaces for connecting a further maximum of 15 standard expansion modules. Thus, a maximum of 32 x 16 = 512 I/O modules can be connected to a WebRTU. For more information, please refer to the documentation of the WebRTU.

**Expansion modules**
Up to 15 expansion modules can be connected to each MFW basic module. The connection is made via the supplied bus cable to one of the two system bus sockets. The second socket can be used for the connection of a further expansion module. The 2nd generation expansion modules have an accelerated system bus connection. They can therefore only be operated on special basic modules (currently e.g. basic modules with FO connection). In all other specifications, they are identical to the standard modules. These are marked with HS on the front.
The extension modules are supplied with power via the system bus. The gateway module has a separate supply voltage connection. The modules are easily configured via DIP switches.

## Analog modules

The analog modules are available as input or output components.

The input modules implement 4 analog inputs, which have a common GND. The inputs are isolated from the supply voltage. Each input can be switched between current and voltage via DIP switch (0 ... 20 mA or 0 ... 10 V).



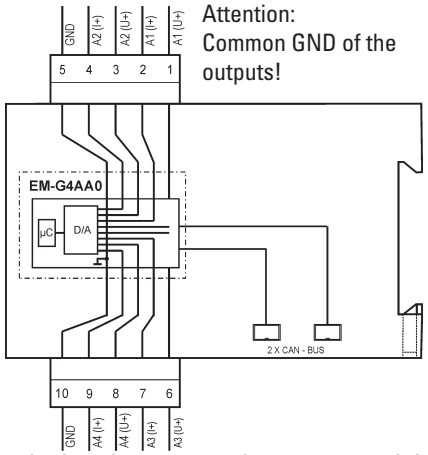

Attention:
Common GND of the inputs!

Terminal assignment analog input module

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

The common GND is equipotential with the power supply.

The connection of 4 ... 20 mA sensors is also possible, because the analog values are not alternated while transmission and therefore also failure states can be displayed.




Attention:
Common GND of the outputs!

Terminal assignment analog output module

## Digital modules

Digital input modules are available in two different variants:

- Digital input module (Standard)
- Pulse-input module (All Inputs are switchable in common between static / pulses)
- Gateway module (I/O and transition module between WebRTU and other expansion modules)

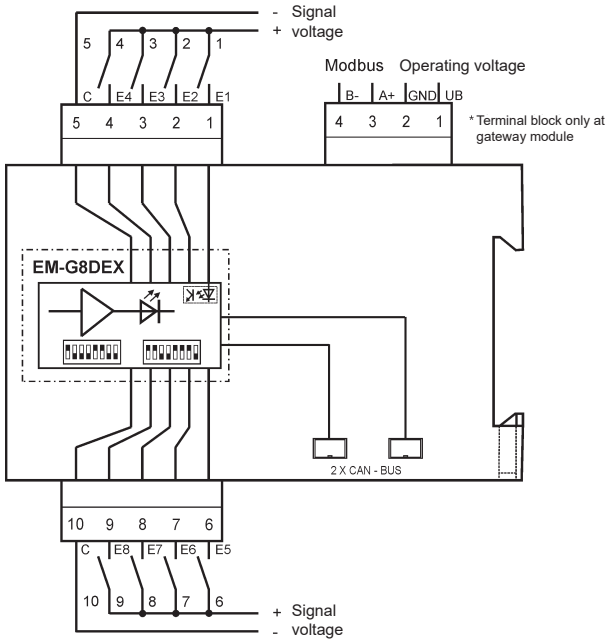
All three modules have 8 inputs, which are configured to one of the following input types by DIP switch:

**Binary input static**
Except for logged values the actual state of the inputs is acquired and transmitted on every data exchange. To transmit a change of state safely, the state has to line up at least until it is being transmitted. With dial-up systems it means that the state must not change while a transmission is ongoing.

**Pulse input**
For transmission of short pulses the first 4 inputs can be configured for safe pulse transmission. Per DIP-switch two counting frequencies and corresponding pulse lengths can be adjusted. With the pulse input module „EM-G8DEX-0-BB-E“all 8 inputs can be configured together as static binary inputs or pulse inputs.

**Operating hour meter**
The inputs DE1 and DE2 of the standard input modules „EM-G8DEX-0-BB-0“ can be used as operating hour meters. The detected operating hours are stored as counter values. The significance of pulses is parameterisable with 0,1 h respectively 1 h. The output of an input configured as operating hour meter can be done as a counter value (Operating hours) and / or as a binary value (Operation state).

**Inverted inputs**
With the inverted input module „EM-G8DEX-0-BB-E“ single inputs can be inverted.
The signals at these inputs are inverted before transmission and displayed through the red operation LED's.




Terminal assignment digital input module

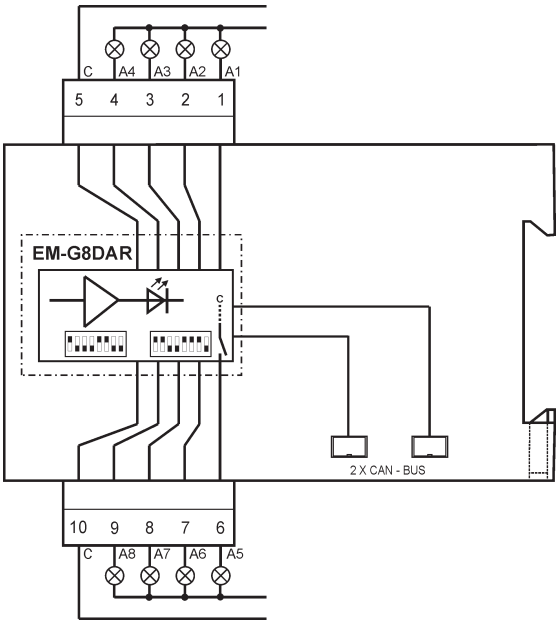
The 8 inputs are realised in 2 groups of 4 inputs with a common root. The 2 inputs groups are potentionally isolated against each other.

The operating voltage of the gateway module must be potential equal to the operating voltage of the WebRTU.

## Relay output module

Relay output modules consist of 8 output relays. These can be used as static binary outputs or pulse outputs. By DIP-switch the outputs A1…A4 can optionally be switched between binary static output or counter value output. In combination with a pulse input module or a master device unit with IEC 60870-5-101/104 interface (output of a pulsed commands) all outputs of the expansion module are configurable as pulsed outputs. The output frequency (pulse width / -pause) is also possible to adapt via DIP-switch to the inputs of a further processing system.

There are 2 groups each of 4 inputs or outputs with a common root that are electrically isolated from one another.




Terminal assignment relay output module

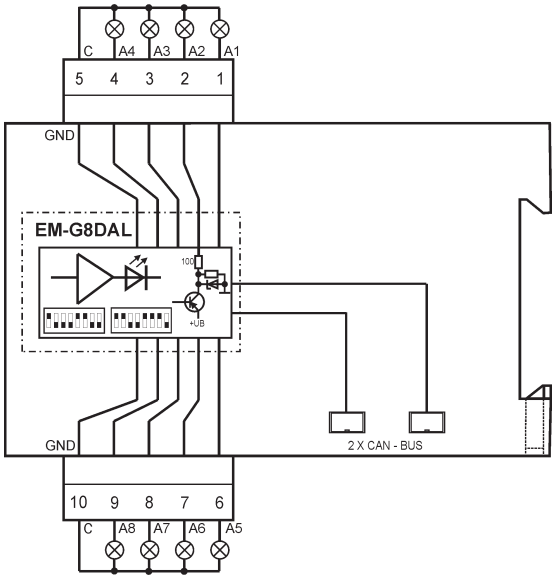
Applications which have frequent switching processes (e.g. counter), we recommend using transistor modules, because the lifetime of relays is electrically and mechanically limited.

## Transistor output module

Transistor-output modules consist of 8 Transistor outputs. These can be used as static binary outputs or pulse outputs. Per DIP-switch the outputs A1 ... A4 are switchable between the operation modes binary static output or counter value output. In combination with a pulse input module or a master device unit with IEC 60870-5-101/104 interface (output of a pulsed commands) all outputs of the expansion module are configurable as pulsed outputs. The output frequency (pulse width / -pause) is also possible to adapt via DIP-switch to the inputs of a further processing system.

All 8 transistor outputs switch against the common GND (Terminal „C“).

**Attention:**
Positive switching PNP transistors

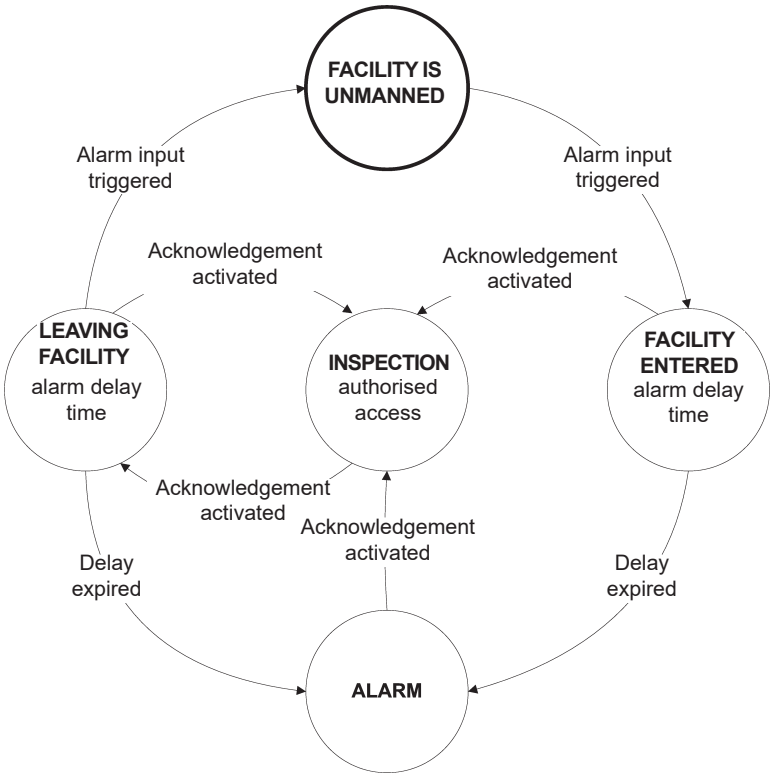



Terminal assignment transistor output module

## Object protection module

The object-protection module is based on the hardware of a digital input module. Mechanical and electrical data are identically. However the function given in the following is realised.

| | |
|---|---|
| Input 1 ... 4 | optionally as binary or counter value (adjustable by DIP switch) |
| Input 5 | binary input |
| Input 6 | acknowledgement / inspection |
| Input 7 | Alarm input 1 |
| Input 8 | Alarm input 2 |




Status diagram of the object protection functionality

The inputs E7 and E8 serve as alarm inputs ( e.g. a door contact or a movement detector ) in which the alarm input 2 (E8) operation mode can be adjusted per DIP-switch "B8" between operating (NO) and closed-circuit current (NC).
By a key switch attached to the input E6 (acknowledgement / inspection) the authorized inspection of the object can be signaled.
By activation of one of the two alarm inputs the status „FACILITY ENTERED" is triggered and the message „object entered" (E7) is generated. The alarm delay is running. Within the alarm delay time the status „INSPECTION" can be achieved by actuating acknowledgement. If the acknowledgement does not occur, the plant switches to the status „ALARM" after the expiration of the alarm delay time.
The message "Alarm / buglary " (E8) is being triggered.

After leaving the facility by deactivation of the acknowledgement the status „LEAVING FACILITY" is engaged. Is the alarm input deactivated within the arming delay time, the plant engages the status "FACILITY IS UNMANNED ". The message "Facility entered" is deleted. If the alarm input is not deactivated during the arming delay time, the plant switches to the status "ALARM". The message "Alarm / buglary " (E8) is being triggered.

## Technical data

| | |
|---|---|
| Operating and ambient temperature | -20 °C ... +60 °C |
| Air humidity | maximal 95 %, non-condensing |
| Connection terminals of the I/Os | pluggable |
| Cross wire section rigid or flexible | |
| without wire sleeves | 0,2 ... 2,5 $mm^2$ |
| with wire sleeves | 0,25 ... 2,5 $mm^2$ |
| Assembly | on C-DIN rail TS35 acc. to EN60715:2001-09 |
| Housing / protection class | plastic / IP 40 |

## Technical data

| | |
|---|---|
| **Systembus** | |
| Connection | RJ11 on basis of CAN-Bus |
| Distance | max. 10 m |
| | |
| **Digital input module** | |
| Power consumption | max. 1 W |
| Input variant | 8 digital inputs |
| Signal voltage $U_S$ | see table |
| Input resistance | see table |
| max. counting frequency | 5 Hz or 80 Hz switchable *1 |
| min. pulse width / -pause | 100 ms or 5 ms *1 |
| Electrical isolation between signal and supply voltage | 4 $kV_{eff}$ |
| **Gateway module** | |
| Nominal voltage range $U_B$ | 24 V DC |
| Operating voltage range | 20 ... 32 V DC |
| Modbus terminals | Spring-loaded terminals |
| **Transistor output module** | |
| Power consumption | max. 2 W logic + load current |
| Type of transistor outputs | plus switching PNP transistors |
| Load capacity for transistor outputs | max. 50 mA per output |
| Counting frequency | 1 Hz or 10 Hz switchable *1 |
| Pulse width / -pause | 500 ms or 50 ms *1 |
| **Relay output module** | |
| Power consumption | max. 3 W |
| Contact type of relay outputs | 8 x NO |
| Contact loading of the relay outputs*2 | |
| minimum | 1,2 V / 1 mA<br>(suitable for control of LEDs) |
| maximum | 250 V AC / 400 mA<br>250 V AC / 2 A (purely ohmic load)<br>30 V DC / 2 A<br>110 V DC / 0,2 A<br>220 V DC / 0,1 A |
| total current 230 V AC | max. 8 A (purely ohmic load) |
| Counting frequency | 1 Hz or 10 Hz switchable *1 |
| Pulse width / -pause | 500 ms or 50 ms *1 |
| Galvanic isolation between relay contacts and power supply | 4 $kV_{eff}$ |
| | |
| **Analog input module** | |
| Power consumption | max. 2 W |
| Input type | 4 analog inputs (0 ... 10 V or 0 ... 20 mA) |
| Resolution | 12 Bit |
| Accuracy | Error < 0,25 % of final value / 1 year *3 |
| Burden of current input | 100 Ω |
| Input resistance voltage input | 100 kΩ |
| | |
| **Analog output module** | |
| Power consumption | maximum 3,5 W |
| Input type | 4 analog outputs (0 ... 10 V or 0 ... 20 mA) |
| Resolution | 12 Bit |
| Accuracy | Error < 0,5 % of final value / 1 year *3 |

## Technical aata

| | |
|---|---|
| **Analog output modules** | |
| Max. burden output current load | 500 Ω |
| Minimum impedance of voltage output | 1 kΩ |
| **Object protection module** | |
| Power consumption | max. 1 W |
| Signal voltage $U_S$ | see table |
| Input resistance | see table |
| Max. counting frequency | 5 Hz *1 |
| Min. pulse width / -pause | 100 ms *1 |
| Alarm delay time | 0 s ... 4 min (adjustable via DIP-switch) |
| Alert on-delay time | Alert on-delay time + 30 s |
| Galvanic isolation between signal and supply voltage | 4 $kV_{eff}$ |
| **EMC compatibility acc. to** | |
| EN 61000-6-2 | |
| EN 61000-6-4 + A1 | |
| EN 61000-4-2 | |
| EN 61000-4-3 + A1 + A2 | |
| EN 61000-4-4 | |
| EN 61000-4-5 + A1 | |
| EN 61000-4-6 | |
| EN 61000-4-29 | |

Digital input modules are available with various signal voltages $U_S$. The corresponding voltage is defined by the 13th digit of the type identification, e.g. EM-G8DEX-0-BA-0.

| Signal voltage $U_S$ | Voltage key | | | | |
|---|---|---|---|---|---|
| | A | B | E | F | U |
| Nominal voltage | 12 V AC/DC | 24 V AC/DC | 60 V AC/DC | 110 V AC/DC | 220 V AC/DC |
| Maximum input voltage | 24 V | 48 V | 75 V | 130 V | 255 V |
| Input voltage DC | | | | | |
| maximum low state | 5,0 V DC | 9,5 V DC | 12,5 V DC | 22,0 V DC | 58,0 V DC |
| minimum high state | 7,5 V DC | 14,5 V DC | 19,5 V DC | 35,0 V DC | 92,0 V DC |
| Input voltage AC | | | | | |
| maximum low state | 3,5 V AC | 6,5 V AC | 9,0 V AC | 15,0 V AC | 40,0 V AC |
| minimum high state | 10,0 V AC | 19,0 V AC | 25,0 V AC | 45,0 V AC | 120,0 V AC |
| Input resistance | approx. 5 kΩ | 10 kΩ | 22 kΩ | 68 kΩ | 180 kΩ |

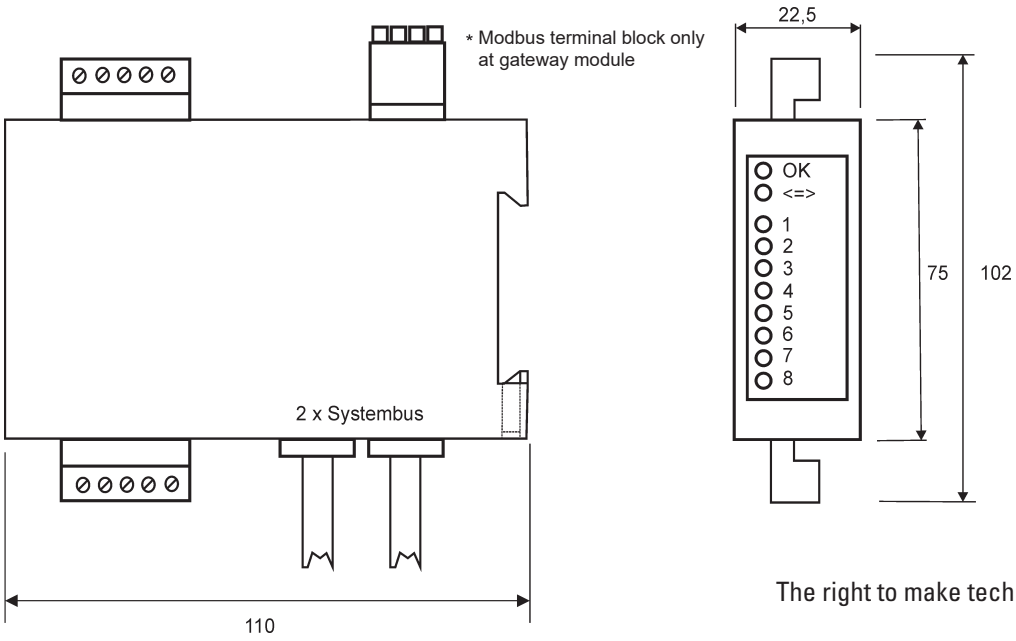
Available signal voltages of the digital input modules

We recommend not to run pulse inputs with alternating voltage, but only with direct voltage.

If not otherwise noted, the given information for alternating voltage are refering to a sinusoidal alternating voltage with a frequency of 50/60 Hz and an ambient temperature of 25 °C.

*1 Other values on request
*2 We would be happy to supply you with more precise specifications on request.
*3 For greatest accuracy an annual calibration service is available.

## Dimensional drawing




Measurements in mm

The right to make technical changes is reserved

## Order descriptions

| Article number | Type | Short description |
|---|---|---|
| **WebRTU Gateway module** | | |
| 97WXXGAX0BB0 | EW-G8DEX-0-BB-0 | Gateway module, 8 DI, signal voltage 24 V |
| **Standard expansion modules** | | |
| 97AXXGAX0BA0 | EM-G8DEX-0-BA-0 | 8 DI, signal voltage 12 V |
| 97AXXGAX0BB0 | EM-G8DEX-0-BB-0 | 8 DI, signal voltage 24 V |
| 97AXXGAX0BE0 | EM-G8DEX-0-BE-0 | 8 DI, signal voltage 60 V |
| 97AXXGAX0BF0 | EM-G8DEX-0-BF-0 | 8 DI, signal voltage 110 V |
| 97AXXGAX0BU0 | EM-G8DEX-0-BU-0 | 8 DI, signal voltage 220 V |
| 97AXXGAX0BBE | EM-G8DEX-0-BB-E | 8 DI (static/pulse), signal voltage 24 V |
| 97AXXGBX0BB0 | EM-G8DAL-0-BB-0 | 8 transistor outputs |
| 97AXXGCX0BX0 | EM-G8DAR-0-BX-0 | 8 relay outputs |
| 97AXXGEX0BX0 | EM-G4AE0-0-BX-0 | 4 analog inputs 0 ... 20 mA or 0...10 V |
| 97AXXGIX0BX0 | EM-G4AA0-0-BX-0 | 4 analog outputs 0 ... 20 mA or 0...10 V |
| 97AXXGAX0BB2 | EM-G8DEX-0-BB-2 | Object protection module, 8 DI, signal voltage 24 V |
| 97WXXGAX0BB0 | EW-G8DEX-0-BB-0 | Gateway module, 8 DI, signal voltage 24 V |
| **Expansion modules of the 2nd generation (currently only for MFW Optical fiber)** | | |
| 97AXXGAXBBB3 | EM-G8DEX-B-BB-3 | 8 DI, signal voltage 24 V |
| 97AXXGAXBBE3 | EM-G8DEX-B-BE-3 | 8 DI, signal voltage 60V |
| 97AXXGAXBBF3 | EM-G8DEX-B-BF-3 | 8 DI, signal voltage 110V |
| 97AXXGAXBBU3 | EM-G8DEX-B-BU-3 | 8 DI, signal voltage 230V |
| 97AXXGCXBBX3 | EM-G8DAR-B-BX-3 | 8 relay outputs |
| 97AXXGEXBBX3 | EM-G4AE0-B-BX-3 | 4 analog inputs 0 ... 20 mA or 0...10 V |
| 97AXXGIXBBX3 | EM-G4AA0-B-BX-3 | 4 analog outputs 0 ... 20 mA or 0...10 V |

## Contact

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