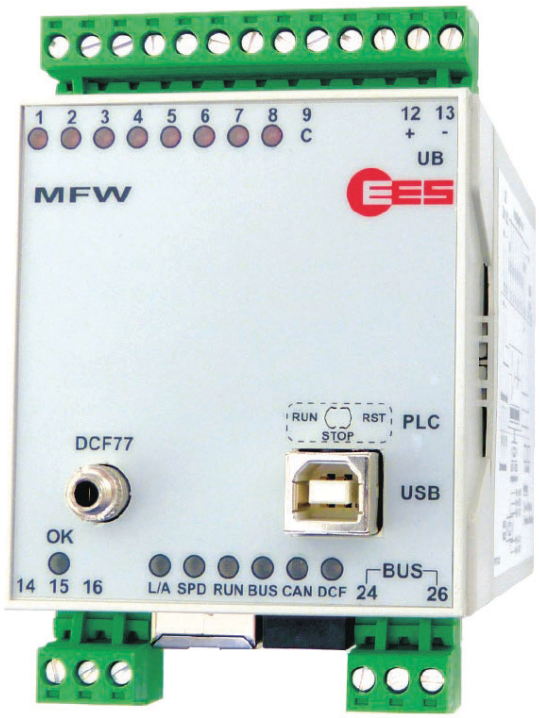
Modular Two-Wire Telecontrol System



Transmission via electrically isolated cables over distances up to 30 km

- Modular expansion up to 32 stations and a maximum of 512 I/O modules
- Easy parameterization of the modules with DIP switches
- The carrier-frequency system guarantees high interference immunity – hamming distance > 6
- Uncomplicated linking to other transmission media such as radio and telephone networks within the framework of the MFW system family as well as connection to third-party-systems over various interfaces and numerous protocols

Data sheet

09.03.2022

MFW-ZD-DB-UK-014

General system description

The two-wire variant of the modular telecontrol system MFW was especially designed for data transmission on electrically isolated two-wire cables. There is no need of laying special cables in the ground. The common, partly existing signal cables can be used for data transmission. Only the maximum loop resistance, which results in the sum of the resistance of each single conductor, has not to be exceeded. The noise immunity of the data transmission on the two-wire line is very high. The cable routing can be done either in line, star or branch system.

In its minimum configuration, the telecontrol system consists of a central station and an outstation. Each station requires at least one basic 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 system bus cable, which is in the scope of supply, to the basic module. Further information about the expansion modules can be found in the separate data sheet of the expansion modules.

The data exchange is coordinated by the master in a polling scheme. In the event of a fault, the system detects the defective communication and reports it optically and via relay contact both in the master and in the respective outstation (OK LED).
If appropriate I/O modules are used, the accessibility of each connected station can additionally be indicated through a binary contact at any point of the two-wire system. If a serial interface is used, this information is also available via this interface. After the cause of the fault has been rectified, normal operation is resumed automatically.

The system configuration is very uncomplicated. All important settings can be made by DIP switches, for example the station address (1 – 31), the module number (0 ... 254), static value/counted value in the case of digital I/O and current/voltage in the case of analog signals etc. Additional parameters for optionally interfaces or functions are optionally done by PC with a parameterisation program.

Soft- PLC

Optionally basic modules can provide an integrated PLC functionality.
The Soft-PLC of the MFW is programmed acc. to the international standard IEC 61131-3. By implementing the popular CoDeSys run time system (Controller Development System) extensive libraries for measuring and controlling processes are availabe for the user.
The realised concept enables the Soft-PLC the access to in- and outputs, archives, diagnosis information and system functions of the MFW. The PLC-Programm can be done in one or more selectable of the IEC 61131-3-standard designated languages:

- Instruction list
- Structured text
- Sequential function chart
- Function block diagram
- Continous function chart
- Ladder diagram

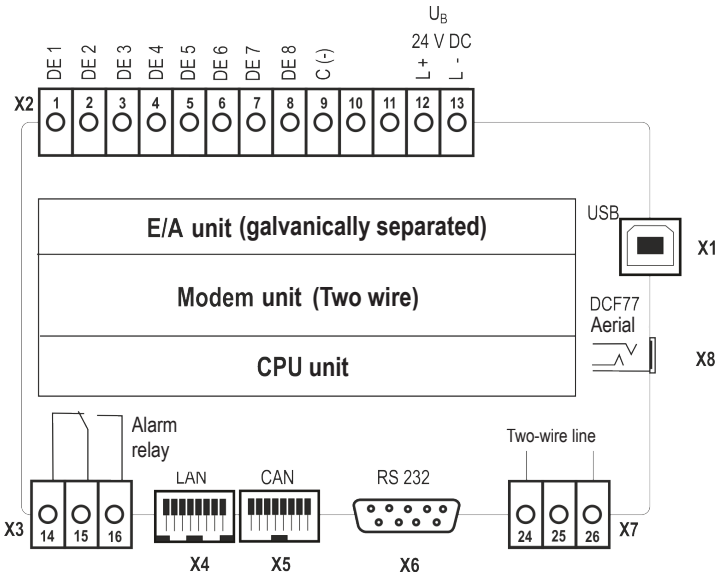
As amendment to the IEC language standard defined modules and extensive libraries the MFW provides additional functions for solutions of typical telecontrol requirements, e.g media dependent diagnosis (e.g. field reception strength) or the dispatch and reception of SMS in modules with GSM/GRPS-modem.

Furthermore information about the PLC functionality of the MFW can be taken from the separate MFW functional description of the “Programmable logic controller”.

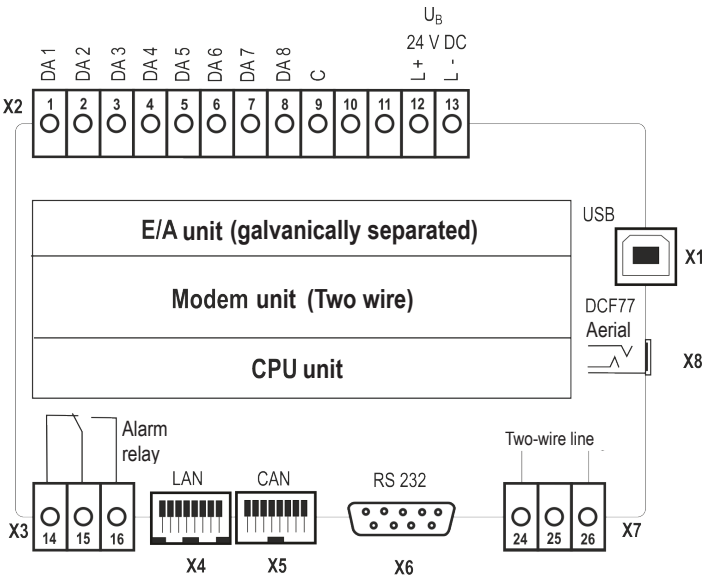
Encryption of the data transmission

Data transmission between the individual MFW stations can optionally be encrypted using the AES-128 method. This procedure works with pre-shared keys. Separate keys can be defined between the central station and the outstations individually. Own keys or keys generated in the parameterisation programme can be used and transferred to and saved in the units during parameterisation. For security reasons, it is not possible to read out the keys from the devices. The storage and management of the keys on the parameterization PC is secured via user administration and passwords in the parameterization program.

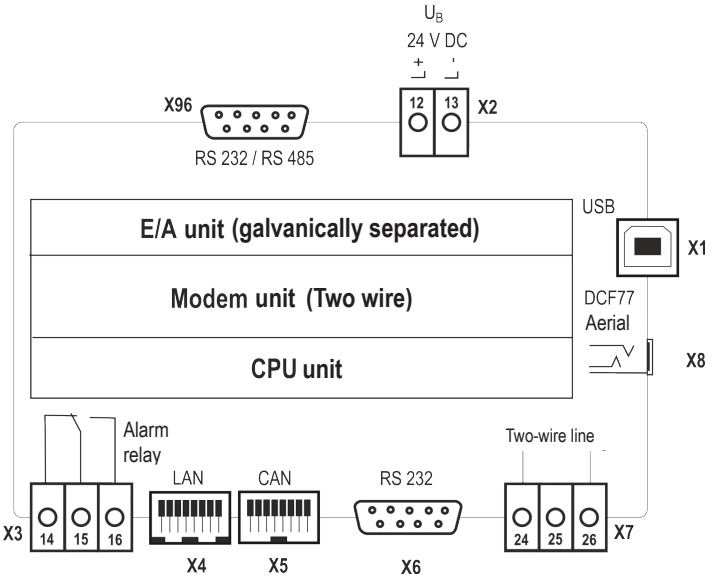
Terminal assignment



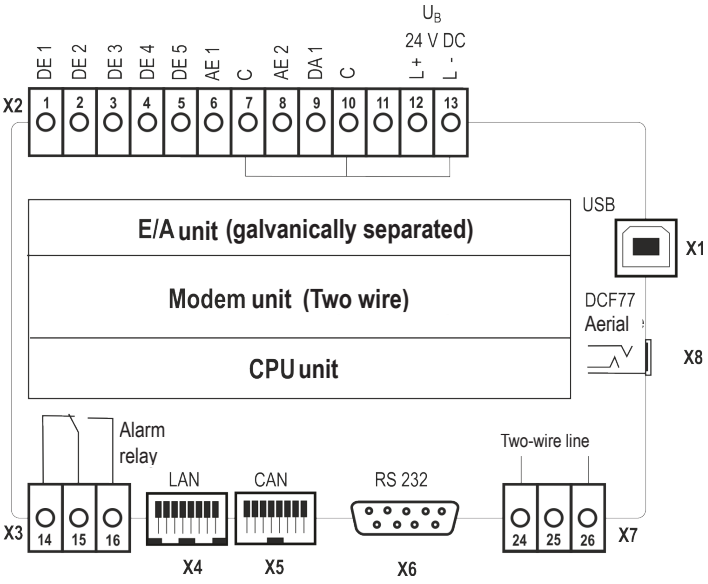
Basic module with 8 digital inputs



Basic module with 8 output relays

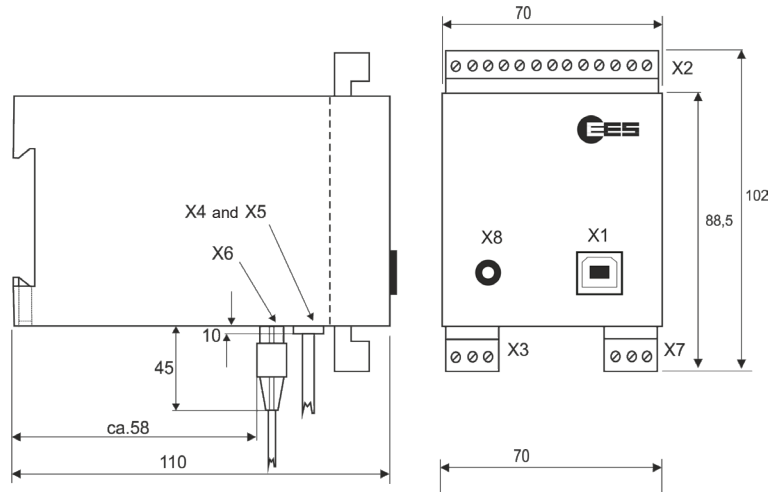


Basic module with protocol interface

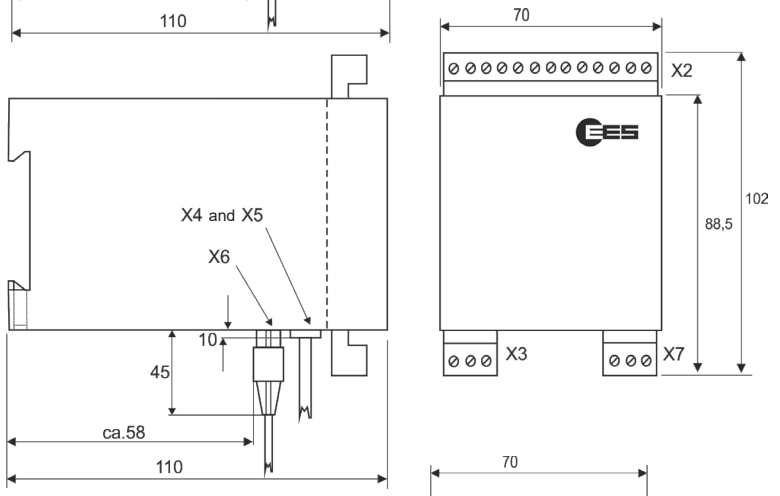


Basic module with 5 DI, 2 AI and 1 transistor output

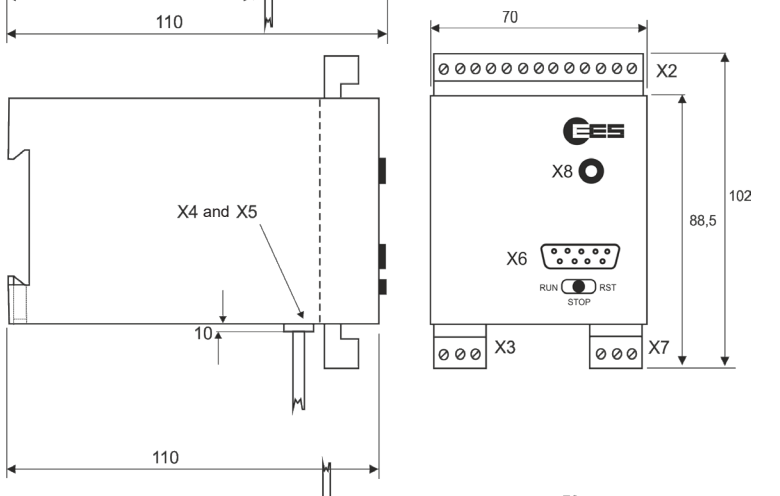
Dimensional drawing



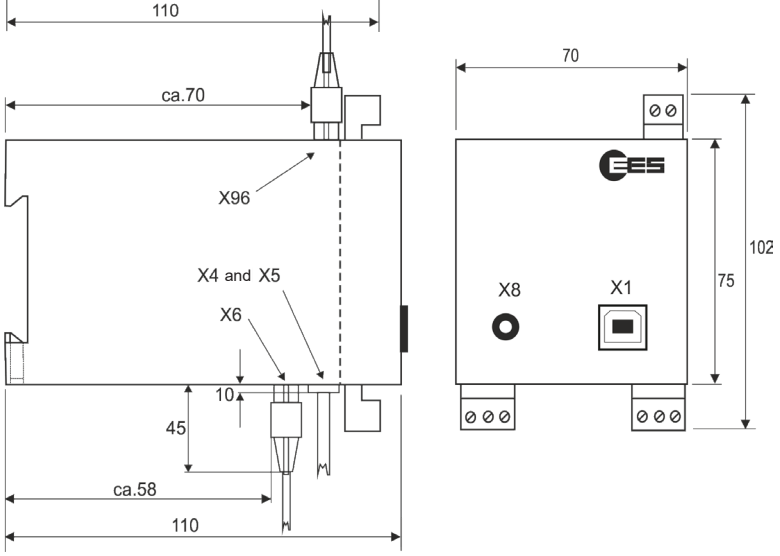
Basic module with
8 digital inputs or outputs



Basic module with
5 DI, 2 AI and 1 transistor output



Basic module with
8 digital inputs and PLC functionality



Basic module with
protocol interface

Technical data

General Data	
Assembly	on DIN-railTS35 acc. to EN60715:2001-09
Housing / Protection class	ABS / IP 40
Connection terminals	pluggable
Wire cross section rigid or flexible	
without wire sleeve	0.2 .....2.5 mm^2
with wire sleeve	0.25....2.5 mm^2
Operating and ambient temperature	-20°C ... + 60°C
Air humidity	95% maximum, non-condensing
Operating voltage	
Nominal operating voltage U_B	24 V DC
Operating voltage range	20 ... 32 V DC
Two-wire modem	
Attenuation of the two-wire cable	40 dB maximum
Loop resistance	1 MΩ maximum
Impedance	600 Ω
Transmission voltage	switchable 2 V_{PP} / 9,5 V_{PP} at 680 Ω
Isolation voltage between	
Two-wire and supply voltage	
Two-wire and I/O's	4 kV_{eff}
Basic module with 8 DI	
Power consumption (only basic module)	approx. 2.5 W
Signal voltage U_S	
Nominal voltage	24 V AC/DC
Maximum voltage	48 V
Minimum voltage for High-Level	14.5 V DC / 19.0 V AC
Maximum voltage for Low-Level	9.5 V DC / 6.5 V AC
Input resistance	approx. 10 kΩ
Maximum counting frequency	10 Hz *1
Minimum pulse width	50 ms *1
Galvanic isolation between Signal- and supply voltage	4 kV_{eff}
Basic module with 8 relay outputs	
Power consuption (only basic module)	3.5 W maximum
Load on relay outputs*2	
Minimum	1.2 V / 1 mA (suitable for triggering LEDs)
Maximum	250 V AC / 400 mA 250 V AC / 2 A (pure ohmic load) 30 V DC / 2 A 110 V DC / 0,2 A 220 V DC / 0,1 A
Total current 230 V AC	8 A maximum (pure ohmic load)
Counting frequency	12 Hz
Pulse width / Pause	40 ms
Galvanic isolation between signal- and supply voltage	4 kV_{eff}

Technical data

Basic modules with protocol interface	
Power consumption (only basic module)	2.5 W maximum
Basic module with 5 DI, 2 AI, 1 DO	
Power consumption (only basic module)	2.5 W maximum + load current of the transistor output
Digital inputs	
Signal voltage U_S	
Nominal voltage	24 V DC
Maximum voltage	48 V DC
Minimum voltage for High-Level	7.0 V DC
Maximum voltage for Low-Level	2.2 V DC
Input resistance	ca. 100 kΩ
Maximum counting frequency	10 Hz *1
Minimum pulse width /-pause	50 ms *1
Analog inputs	
Measurement range	0 … 20 mA
Resolution	10 Bit
Deviation	< 0.5% from end value of measuring range
Burden of input current	approx. 100 Ohm
Transistor output	
Load	approx. 200 mA
Galvanic isolation between	
Output and supply voltage	none!
Signal and supply voltage	none!

EMC compatibility according to
EN 61000-6-2:2016
EN 61000-6-4:2007 + A1:2011
EN 61000-4-2:2009
EN 61000-4-3:2006 + A1:2008 + A2:2010
EN 61000-4-4:2012
EN 61000-4-5:2014 + A1:2017
EN 61000-4-6:2014
EN 61000-4-29:2001

*1 We recommend not to run pulse inputs with alternating voltage, but only with direct voltage.
*2 We would be happy to supply you with more precise specifications on request.

If not otherwise noted, the given information for alternating voltage are refering to a sinusoidal alternating voltage with a frequency of 50/60 Hz.

The specification of the expansion modules can be taken from the separate datasheet of the expansion modules.

Subject to technical changes

Order identification

Master modules

Article number	Type	Options / Process coupling
97BZAGANBBB0	MF-ZDM12-G8DEX-DIA-B-BB-0	AES128 / 8 DI 24 V
97BZAGCNBBX0	MF-ZDM12-G8DAR-DIA-B-BX-0	AES128 / 8 Relay outputs
97BZA7JNBBX0	MF-ZDM12-7PMIP-DIA-B-BX-0	AES128 / RS232-RS485 switchable / Modbus RTU/TCP
97BZA3MN0BX0	MF-ZDM12-3PPDP-DIA-0-BX-0	Profibus-DP
97BZA1WNABX0	MF-ZDM12-1P10M-DIA-A-BX-0	AES128 / IEC 60870-5-101/104
97GZA1WNABX0	MP-ZDM12-1P10M-DIA-A-BX-0	AES128 / PLC / IEC 60870-5-101/104

Substation modules

Article number	Type	Options / Process coupling
97HZAGANBBB0	UF-ZDM12-G8DEX-DIA-B-BB-0	AES128 / 8 DI 24 V
97HZAGCNBBX0	UF-ZDM12-G8DAR-DIA-B-BX-0	AES128 / 8 Relay outputs
97HZAGPN0BB0	UF-ZDM12-G6D2A-DIA-0-BB-0	5 DI 24 V, 2 AI (0 … 20 mA), 1 DO
97MZA1JNABX0	UP-ZDM12-1PMIP-DIA-A-BX-0	PLC / RS232 / Modbus RTU/TCP
97MZA3JNABX0	UP-ZDM12-3PMIP-DIA-A-BX-0	PLC / RS485 / Modbus RTU/TCP
97MZAGANABB0	UP-ZDM12-G8DEX-DIA-A-BB-0	AES128 / PLC / 8 DI 24 V
97HZA7JNBBX0	UF-ZDM12-7PMIP-DIA-B-BX-0	AES128 / RS232-RS485 switchable / Modbus RTU/TCP

Abbreviations used for the options:
AES128- Encryption
PLC- Soft-PLC

Expansion modules
Please find more information in our seperate datasheet.

MFW - The telecontrol system for almost all kinds of media!

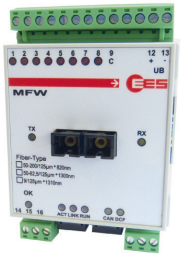
The product family of the MFW is so flexibly designed that the system is suitable for data transmission on different medias. Active principles, I/O's and interfaces are all the same for all medias. Only the modem variant and media specific transmission methods are changing.

Two-wire and powerline telecontrol system

- Modular expansion up to 32 stations
- Potentially isolated wires up to 30 km respectively live wires and cable shields
- High immunity against interferences through carrier frequency method

Radio telecontrol system

- Modular expansion up to 32 stations
- Integrated routing and diagnostic functions
- 35/70-cm-ISM-Band for registration and cost-free transmission for distances up to 10 km
- Time slot radio (0.1 - 1 W)
- 1:24 data radio (0.1 - 1 W)



Optical fibre telecontrol system

- Uni- or bidirektional point-to-point transmission on optical fibres
- Multimode (50/125 µm and 62.5/125 µm)
- Singlemode (9/125 µm)

Telecontrol system for IP based networks

- Modular expansion up to 32 stations or stand-alone outstations (decentralised peripheral stations)
- Transmission over
  - Ethernet
  - public DSL-connections
  - GSM (GPRS/LTE)

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

Contact

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