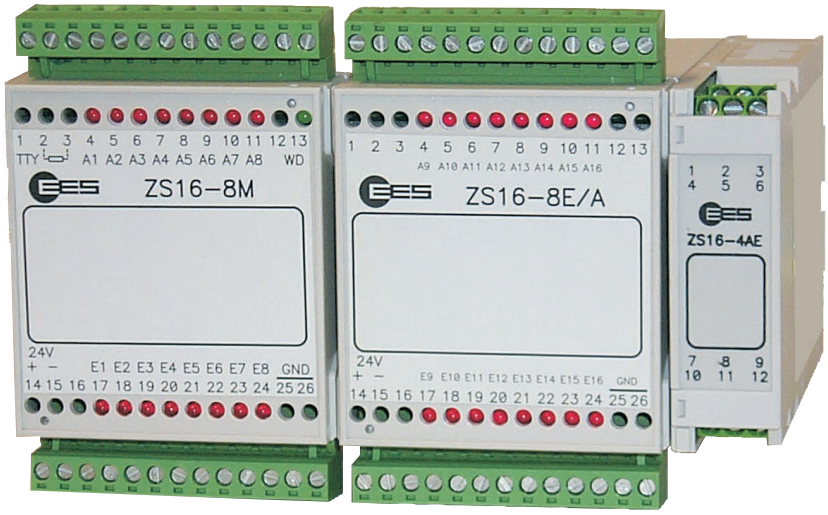
ZS16
Two-wire telecontrol system



Bidirectional two-wire transmission on up to 15 km long control lines

› Transmission of commands, messages, measured values and setpoints
› Modular system design up to 16 binary and 4 analog values in both directions
› Short-circuit-proof transistor outputs, intrinsically safe system states can be set
› High interference immunity of transmission; adjustable transmission rate
› Simple parameterization via DIP switch
› Operation monitoring with LED and fault signal contact
› DIN-rail mounting

Datasheet

22.05.2023

FW-ZS16-DB-UK-005

Functional description

In widely branched water and industrial plants, railroad operations and in building services, there is often a need to transmit only a few messages or even commands via existing control cables in a wire-saving manner. In these cable networks, parallel power lines or control lines at other voltage levels often run in the same cable.
The transmission must be reliable despite interference from, for example, 50 Hz, 16 2/3 Hz or switching pulses.
This means that the quality of the cable must not be subject to any special requirements.

System structure
The ZS16 consists of 2 basic modules ZS16-GM8DE/8DA with 8 digital inputs and outputs each for bidirectional transmission of 8 messages or commands. The outputs have short-circuit proof PNP transistors with freewheeling diodes, so that incandescent lamps, solenoid valves or contactors can be controlled directly. The connections for the supply voltage, inputs and two-wire are protected against polarity reversal.

To expand the I/O range, these basic modules can be supplemented with expansion modules.
The following modules are available for this purpose, which can be used a maximum of once per station:

- ZS16-EM8DE/8DA 8 digital inputs and 8 transistor outputs
- ZS16-EM4AE 4 analog inputs (respectively 0 ...10 V or 0 ... 20 mA)
- ZS16-EM4AA 4 analog outputs (respectively 0 ...10 V or 0 ... 20 mA)

The modules are connected via ribbon cables, the structure of which depends on the degree of expansion of the station. The possible degree of expansion of the stations and the associated connection cables can be found on the next page.

On the front side of the basic modules there are red LEDs for status indication of the inputs and outputs and a green LED for indication of the operating status. In the event of a device error, power failure or faulty transmission, this green LED goes out and a fault signal contact (WD) closes.

The parameterization of the basic modules is done via DIP switches, which are located in the bottom side of the housing.

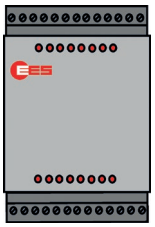
Data transmission
Any common signal cable is suitable as a transmission line. In case of strong interference coupling on the two-wire line, an effective suppression can be achieved by connecting a resistor in parallel to the two-wire (terminals 2 and 3). Therefore, two 1kΩ, 470Ω and 220Ω resistors are included in each delivery. The data transmission rate can be adjusted by means of DIP switches. For a signal to be transmitted reliably, it must be present at least as long as a transmission cycle lasts. Pulses with a pulse duration or pause shorter than the transmission than the transmission cycle, are not transmitted reliably.

To achieve high transmission security, each data telegram is secured with a 32-bit CRC code in accordance with the ANSI X3.66 protocol. In the event of a transmission fault, the outputs are set to the intrinsically safe state. This can be defined via DIP-switches.

Structure of the stations

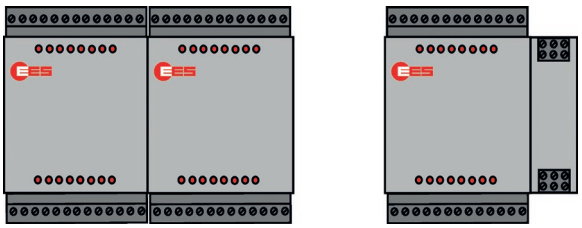
A station can have a design according to the following variants. The matching station must always have a corresponding complementary design.

Variant 1: Basic module



In- and outputs
8 DE and 8 DA

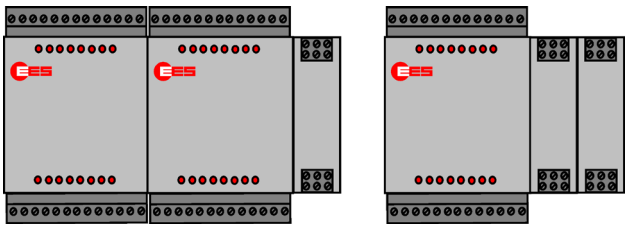
Variant 2: Basic module and one extension module



Possible I/O design
- 16 DE, 16 DA
- 8 DE, 8 DA and 4 AE
- 8 DE, 8 DA and 4 AA

Connection cable
92ZS16VK1E

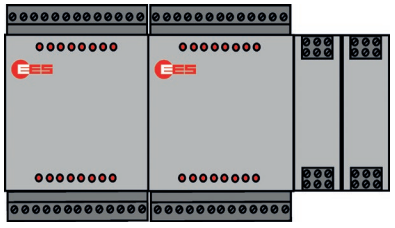
Variant 3: Basic module and 2 extension modules



Possible I/O design
- 16 DE, 16 DA and 4 AE
- 16 DE, 16 DA and 4 AA
- 8 DE, 8 DA, 4 AE and 4 AA

Connection cable
92ZS16VK2E

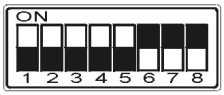
Variant 4: Basic module and 3 extension modules



In- and outputs
- 16 DE, 16 DA, 4 AE and 4 AA

Connection cable
92ZS16VK3E

DIP-switch settings



DIP-switch of the ZS16-G8DE/8DA	
1	Operating mode
2	Intrinsically safe state
3, 4	Expansion degree
5, 6	Baud rate
7, 8	Without function

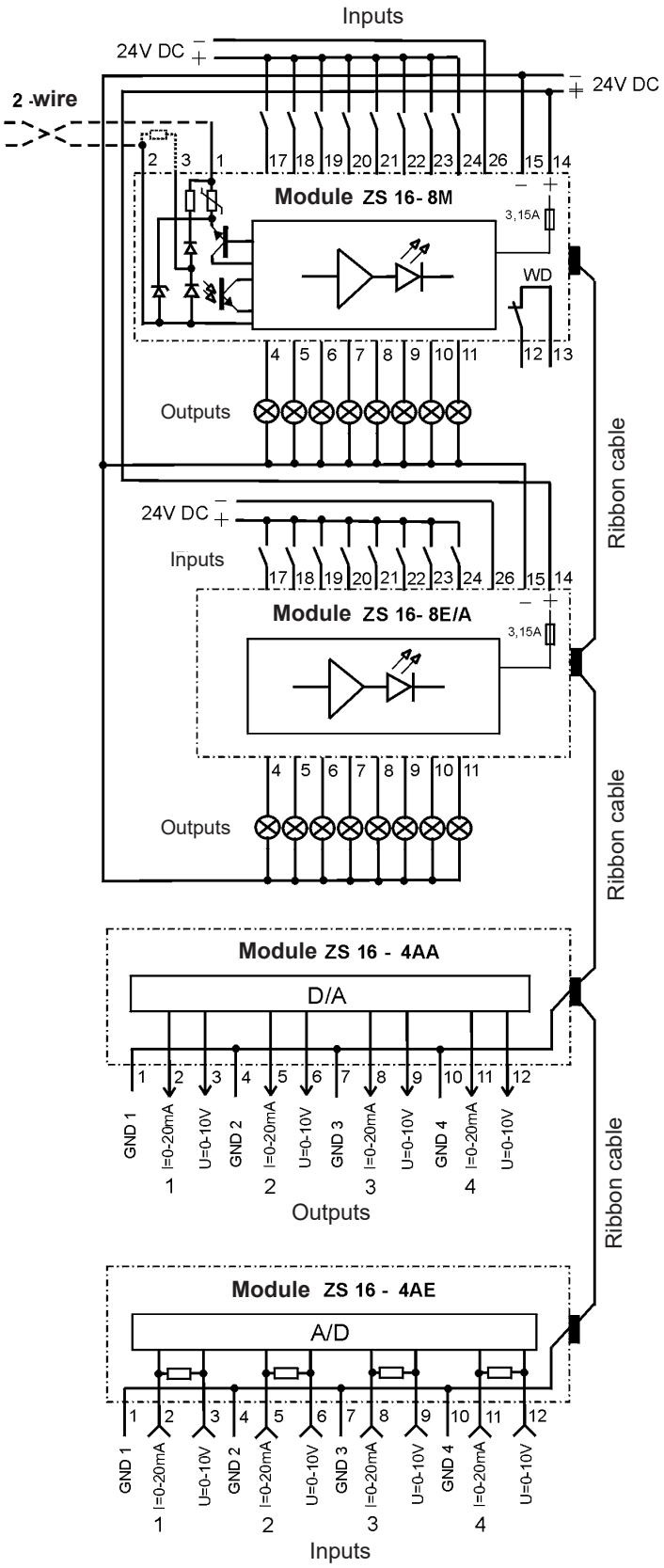
Operating mode	
DIP-switch 1	Meaning
On	Master
Off	Slave
One station is to be set as master and the remote station as slave.	

Intrinsically safe state	
DIP-Schalter 2	Meaning
On	Digital outputs to logical "0" Analog outputs to "0"
Off	Digital and analog outputs remain at the last valid value

Expansion degree		
DIP-switch		Meaning
3	4	
Off	On	Only 8 x digital
On	Off	Only 16 x digital
Off	Off	Expansion with analog modules or full expansion
On	On	Undefined

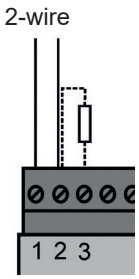
Baud rate					
DIP-switch		Baud rate [kBaud]	Duration of a transmission cycle depending on the degree of expansion [ms]		
5	6		8 digital	16 digital	digital + analog
On	On	1,2	80	160	520
Off	On	2,4	40	80	300
On	Off	9,6	12	22	125
Off	Off	19,2	6	12	95

Terminal assignments



Cross two wires!

The delivery includes 3 resistors. In the event of strong coupling of interference on the two-wire line, effective suppression can be achieved by inserting one of these resistors at terminals 2 and 3 on a trial basis.



Ribbon connecting cables may only be connected or removed when the operating voltage is switched off.

Subject to technical change

Technical data

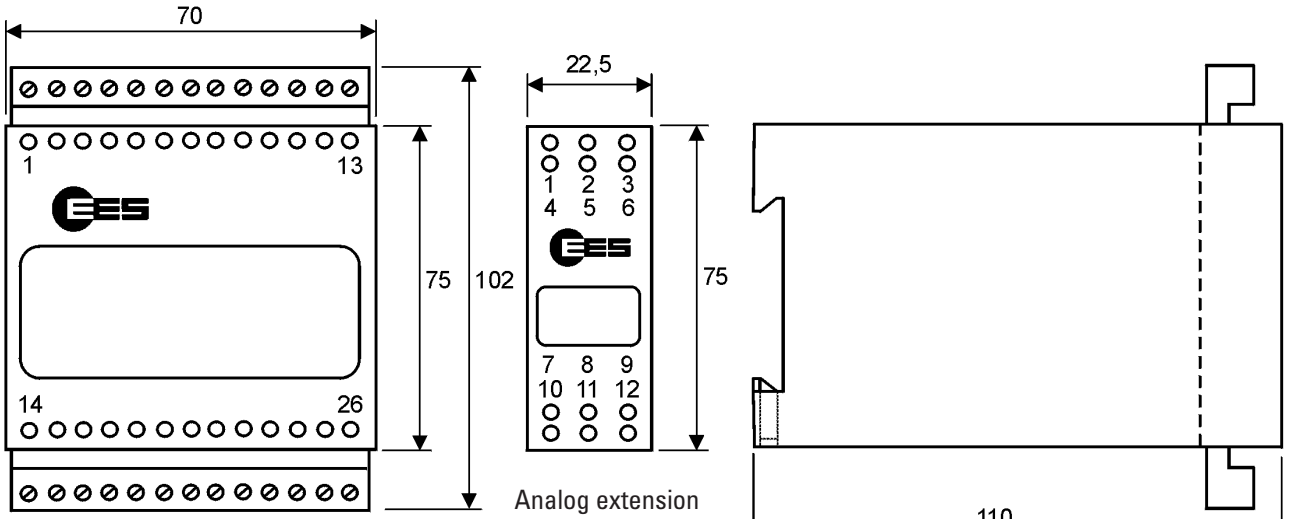
Electrical data	
Operating voltage	20 ... 33 V DC nominal 24 V
Power consumption	
Basic module	approx. 2 W + load current
Extension module digital	approx. 1 W + load current
Extension module analog	approx. 1W
Digital I/O	
Input voltage	16 ... 35 V DC*
Input current	7 mA maximum each
Input response delay	at least 10 ms
Load capacity of the transistor outputs	maximum 200 mA
Contact rating of the fault signal relay	250 V AC 4A / 24 V DC 4A
Analog I/O	
Resolution	8 Bit
Accuracy	Error < 2% of the end value
Input resistance (voltage)	200 kΩ
Minimal load resistance (voltage)	2 k
Current input load	250 Ω
Maximum current output load	500 Ω
Galvanic isolation	
Digital inputs against operating voltage and the two-wire circuit	4 kV_{eff}
Operating voltage against the two-wire circuit	1,5 kV_{eff}
EM compatibility	
Interference immunity	DIN EN 61000-4-2:2001-12 DIN EN 61000-4-3:2008-06 DIN EN 61000-4-4:2005-07 DIN EN 61000-4-5:2007-06 DIN EN 61000-4-6:2008-04 DIN EN 61000-4-29:2001-10
Interference radiation	DIN EN 61000-6-4:2007-09 DIN EN 55011:2007-11
Signal transmission	
Two-wire voltage	33 V / 25 mA
Loop resistance	maximum 10 kΩ
Transmission rate	1,2 up to 19,2 kBaud see table Factory setting: 9,6 kBaud
Cycling time	10 ... 900 ms see table

* Other values on request.

General data	
Operating and ambient temperature	-20°C ... + 60°C with condensation
Storing temperature	-20°C ... + 70°C without condensation
Permissible relative air humidity	maximum 75% annual average (Gr. H DIN 40040)
Terminal assignments	pluggable
Conductor cross section rigid or flexible	
without ferrules	0,2 ... 2,5 mm²
with ferrules	0,25 ... 2,5 mm²
Housing	ABS (flammability class UL 94 V0)
Protection class	IP 40
Mounting	C-DIN rail TS35 acc. to DIN EN 60715:2001-09
Weight	0,3 kg

Unless otherwise specified, the specifications for AC voltage refer to a sinusoidal AC voltage with a frequency of 50/60 Hz. AC voltage with a frequency of 50/60 Hz and all data refer to an ambient temperature of 25 °C.

Dimensional drawing



Digital basic- and extension module

Analog extension module

Subject to technical changes.

Measurements in mm

Order description

Article number	Type	Short description
92ZS168M0B	ZS16-GM8DE/8DA	Basic module with 8 digital inputs 24 V DC and 8 transistor outputs
92ZS168EAB	ZS16-EM8DE/8DA	Extension module with 8 digital inputs 24 V DC and 8 transistor outputs DC
92ZS164AEB	ZS16-EM4AE	Extension modules 4 analog inputs 0 ... 20 mA or 0 ... 10 V
92ZS164AAB	ZS16-EM4AA	Extension modules 4 analog outputs 0 ... 20 mA or 0 ... 10 V

Order codes

Article number	Type	Short description
92ZS16VK1E	ZS16-VBK2	Connecting cable basic module + 1 extension module
92ZS16VK2E	ZS16-VBK3	Connecting cable basic module + 2 extension modules
92ZS16VK3E	ZS16-VBK4	Connecting cable basic module + 3 extension modules

The flat ribbon connecting cables required for connecting the expansion modules must be ordered depending on the degree of expansion (number of expansion modules to be connected per basic module) (see also page 3).

Do you have more complex tasks?

The MFW product family is designed to be flexible so that the system is suitable for data transmission on different media. Operating principles, I/Os and interfaces are the same for all media. Only modem variant and media-specific transmission methods change.

Two-wire- or powerline telecontrol system

- Modular expansion up to 32 stations
- Potential-free lines up to 30 km resp. power lines and cable shields
- High interference immunity due to carrier frequency method

Optical fiber telecontrol system

- Very fast uni- or bidirectional point-to-point connections on fiber optic cables
- Multi mode (50/125 µm)
- Single mode (9/125 µm)

Telecontrol system for IP-based networks

- Modular expansion up to 32 stations or autonomous substations (decentralized peripheral station)
- Transmission via
  - Ethernet
  - Public DSL connections
  - GSM (GPRS/LTE 4G networks)

Further information on the transmission systems can be found in the respective media-specific data sheets of the MFW product family.

Contact

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