



## Telecontrol on control lines



### ZS 16 - Micro telecontrol system

Bi-directional two-wire transmission up to 15 km

- Transmission of commands, messages, measuring and set values
- Modular system configuration up to 16 binary and 4 analogue values in both directions
- Short-circuit proof transistor outputs, adjustable intrinsically safety status
- Easy parameter setting via DIP switch
- High interference immunity of transmission, adjustable transmission rate
- Operation supervision with LED and fault contact
- DIN rail mounting

## Functional description

In large water treatment or industrial plants, railway depots and in building technologies there is often a necessity to transmit only a few messages or commands by saving wires using the existing cable networks. In these cable networks power lines often run in parallel or control lines at different voltage levels in the same cable. Despite interference by for example 50Hz and 16 2/3Hz frequencies or switching pulses, the transmission must be carried out reliably; that means no special demands on the quality of the cable may play a role.

The basic variant of the bi-directional serial transmission system ZS16 is designed for the transmission of 8 messages or commands and consists of 2 ZS 16-8M master modules with 8 digital inputs/outputs each. A DIP switch is installed on the underside of the housing to assign one device the priority "1" and the other device priority "2". A ribbon cable can be installed to extend the system for 16 messages using the expansion module ZS 16-8E/A. In addition it is also possible to transmit 4 measured values each in the ranges of 0 ... 10V and 0 ...20mA with the analogue input or output module (ZS 16-4AE or ZS 16-4AA) either in one or both directions. The degree of the configuration of the system is also set by switch. Each module is housed in a plastic housing and can be snapped onto DIN rails. Red LEDs for status indication of the messages are provided on the front panel, and a green LED is provided as a watchdog to monitor the 2-wire traffic. This display goes out in case of a wire break or short circuit. At the same time the permanently pulled on error signalling relay (in good state) drops off. The outputs are provided with 8 short-circuit proof PNP transistors with free-wheeling diodes so that lamps or solenoid valves and contactors can be controlled directly.

To achieve a high degree of transmission reliability, each data message is secured using a 32 bit CRC code in accordance with ANSI X3 66 protocol. In case of a transmission disturbance the outputs will be restored to their intrinsically safe state. This can be defined using the DIP switch accessible on the underside. The digital input circuits are electrically isolated from the supply voltage and the two-wire circuit. In this way the formation of possible leakage current loops is prevented. The connections for the supply voltage, inputs and two-wire are protected against polarity reversal.

Any standard signal cable is suitable as transmission cable. In the event of severe interference impact on the two-wire line, an effective rejection can be achieved by connecting a resistor in parallel to the two-wire (terminals 2 and 3). Therefore for each delivery two 1 k $\Omega$ , 470  $\Omega$  and 220  $\Omega$  resistors are supplied. The data transmission rate can be set by means of a DIP switch. In order that a signal is securely transmitted, it has to be kept switched on for as long as a transmission cycle lasts.

## DIP switch setting



DIP switches	Significance for the basic module
	ZS 16-8M
1	Selection of priority (1 or 2)
2	Intrinsically safe condition
3, 4	Degree of configuration
5, 6, 7	Baud rate
8	No function

Degree of configuration		
3	4	Meaning
Off	On	only 8 x digital
On	Off	only 16 x digital
Off	Off	Complete configuration

Intrinsically safe condition	
DIP switch 2	Meaning
On	digital outputs on logic „0“ analog outputs on „0“
Off	digital outputs and analog outputs on the last valid value

Baud rate						
DIP switch setting			Baud [kBaud]	Duration of transmission depending on degree of configuration [ms]		
5	6	7		8 digital	16 digital	digital + analog
On	On	Off	1,2	80 ms	160 ms	520 ms
Off	On	Off	2,4	40 ms	80 ms	300 ms
On	Off	Off	9,6	12 ms	22 ms	125 ms
Off	Off	On	19,2	6 ms	12 ms	95 ms

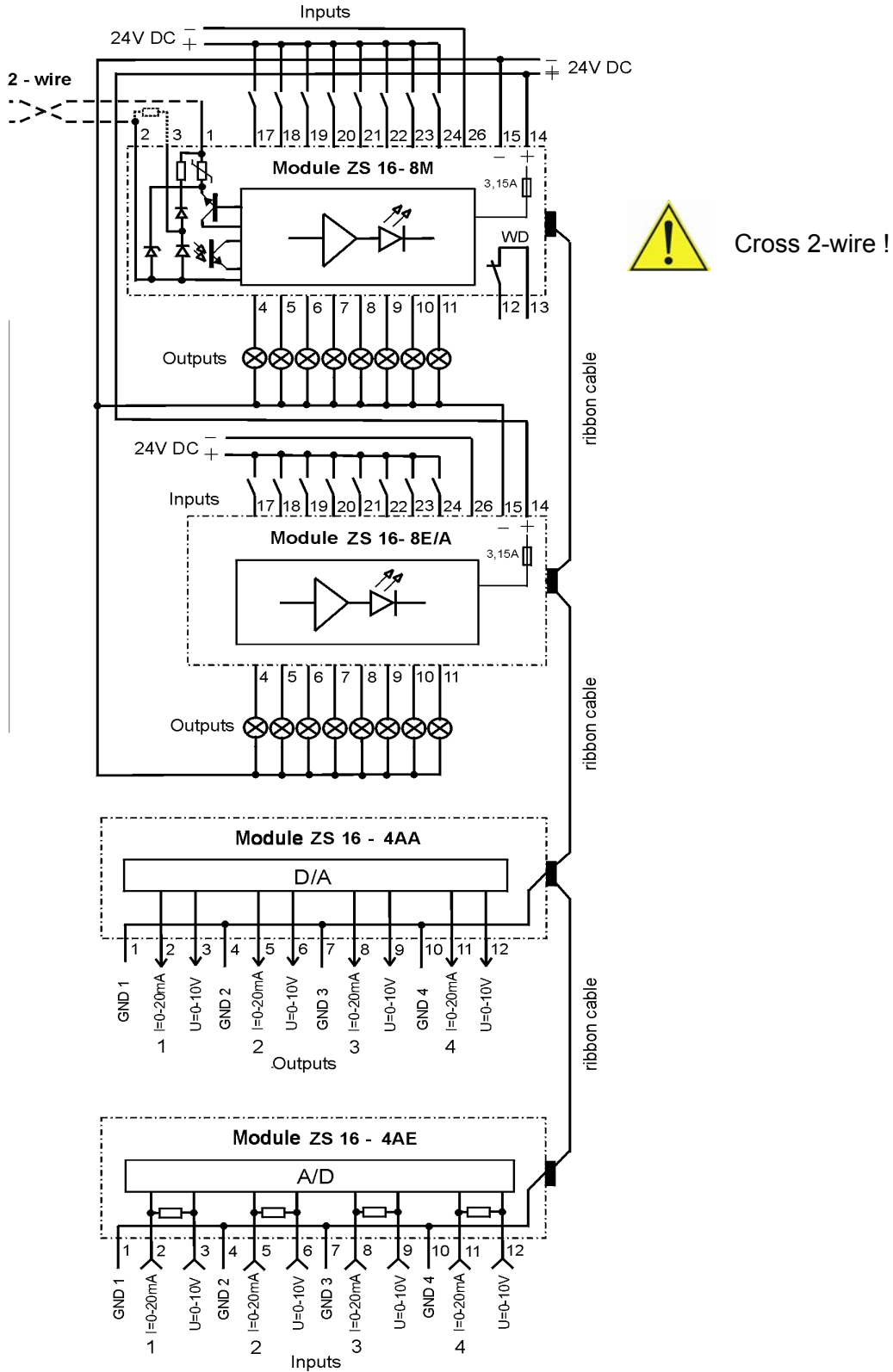


All other DIP-switch settings result in 19,2 kBaud.



The ribbon cable required for extension is included when a whole system is ordered. When upgrading existing systems, the ribbon cable has to be ordered separately, dependent on the degree of configuration.

## Connection diagram of ZS16 module



The right to make technical changes is reserved.

## Technical data

Supply voltage	20 ... 33 V DC rated 24 V
Power consumption	
Basic module ZS 16-8M	approx. 2 W + load current
Digital expansion module	approx. 1 W + load current
Analogue expansion module	approx. 1 W

## Digital I/O

Input voltage	input 16 ... 35 V DC*
Input current	maximum 7 mA each
Switch-on-delay of inputs at least	10 ms
Load capacity of transistor outputs max.	200 mA
Contact loading of error signal relay	250 V AC 4 A; 2 V DC 4 A

## Analogue I/O

Resolution	8 Bit
Accuracy	error < 2 % of final value
Input resistance (voltage)	200 k $\Omega$
Minimum load resistance (voltage)	2 k $\Omega$
Burden of input voltage	250 $\Omega$
Maximum burden of output current	500 $\Omega$

## Electrical isolation

digital inputs between	
supply voltage and two-wire circuit	4 kV <sub>eff</sub>
supply voltage between	
two-wire circuit	1 kV <sub>eff</sub>

## Signal transmission

Two-wire voltage	33 V / 25 mA
Loop resistance max.	10 k $\Omega$
Transmission rate	1,2 to 19,2 kBaud - see table
	Standard 9,6 kBaud
Cycle time	6 ... 520 ms see table

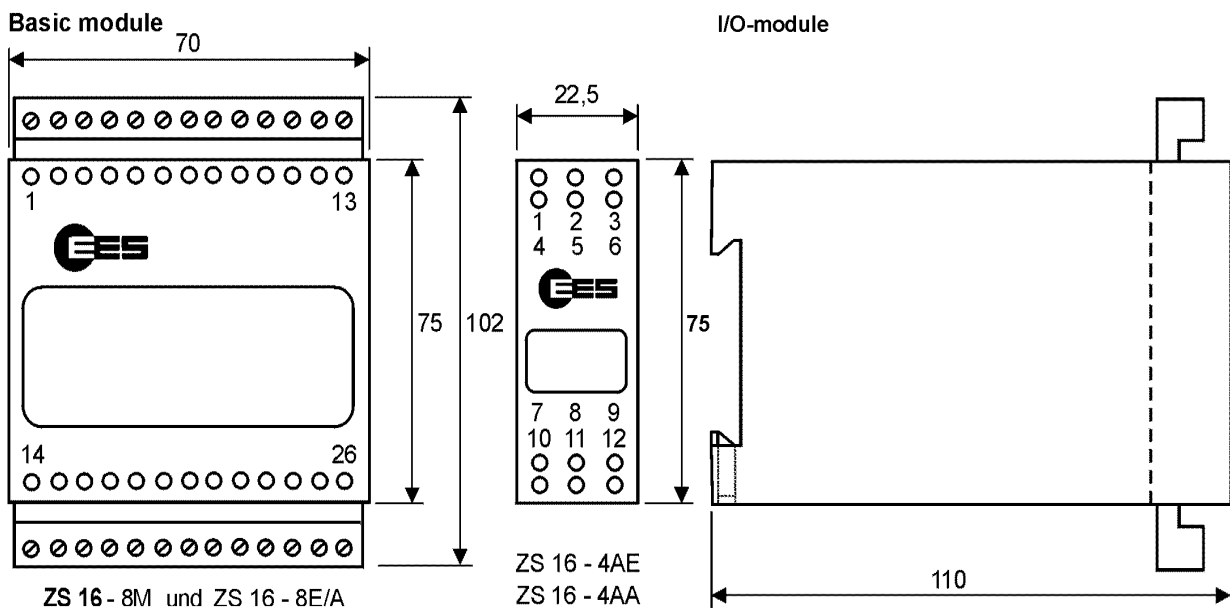
## General Data

Operating and ambient temperature	-20°C ... + 60°C without condensation
Storage temperature	-20°C ... + 70°C without condensation
Relative humidity	maximum 75% mean (Group F DIN 40040)
Connection terminals	pluggable
Wire cross section rigid or flexible	
without wire sleeve	0.2 .....2.5 mm <sup>2</sup>
with wire sleeve	0.25....2.5 mm <sup>2</sup>
Housing / protection class	Plastic / IP 40
Weight	0.3 kg

\* Other values on request

# ZS 16 - Micro telecontrol system

## Dimensional drawing



Dimensions in mm

The right to make technical changes is reserved.

## Order identification

ZS 16-8M	basic module with 8 digital inputs and outputs
ZS 16-8E/A	expansion module with 8 digital inputs and outputs
ZS16-4AE	expansion module with 4 analogue inputs
ZS 16-4AA	expansion module with 4 analogue outputs

## Do you already know our MFW-telecontrol system for twin wire ?

The modular twin-wire telecontrol system for complex requests:

- Telecontrolling on potential seperated wires up to 30 km
- Modular extension up to 32 stations and a maximum of 512 I/O-modules
- Easy parameter setting via DIP switches
- High interference immunity because of carrier frequency procedure, Hamming distance > 6
- Easy couplings to third party systems (e.g. PC, PLC or PCS) via various interfaces and protocols.



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