

Intelligent Alarm Systems ME 30

Data Transmission Systems



EG 316, SG 316

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The Task

Unidirectional transmission of 16 digital process signals through a two-wire circuit. The system can be expanded to transmit 32 process signals.

Field of Application

- Industrial automation
- Building automation
- Remote control systems

System Architecture

The basic system comprises a transmitting module with 16 inputs and a receiving module with 16 outputs. The modules are enclosed in DIN wall-mounted housings with 24 terminal connections and can be fitted onto a 35 x 7.5 mm standard rail in accordance with the DIN EN 500 22 standards. Supply voltage, inputs and outputs and the transmission line are connected through screw-type connectors. Errors are indicated by an LED on the module's faceplate and a floating relaying contact.

The System Concept

Transmission of up to 32 digital signals from point A to point B. Throughout the development of this system great emphasis was put on interference immunity and high degree of availability.

Principle of Operation

The inputs of the transmitting modules are galvanically isolated from the operating voltage and the transmission line. An open input represents a logical '0'. The signal levels are listed overleaf under the heading 'Technical Characteristics'. All inputs have the same reference potential. The HIGH state is indicated by the associated LED on the front panel.

A watchdog timer and an undervoltage monitor constantly check the modules for correct functioning. Faults are signalled by a red fault LED.

The input signals of each module are regrouped into bytes and transmitted serially together with a check byte provided that the input information remains unchanged for at least three transmission cycles.

Data transmission is through a 20mA current loop whose current flow is monitored. The red fault LED on the transmitting unit lights up if the current falls below a predefined threshold value. The rate of data transmission can be adjusted from 150 to 57600 bauds by means of coding switches on the transmitter. The baud rate is set by the user during commissioning taking into account both length and quality of the transmission line and the response characteristics required. It is possible to change the baud rate while the system is running. The receiving module automatically recognizes the transmission rate selected.

Each receiving module provides 16 short circuit-proof transistor outputs which are isolated by optocouplers and have integrated recovery diodes.

The load current is limited to 1 amp for a group of 8 outputs. One output stage can therefore supply a maximum load current of 1 amp if the remaining 7 outputs of this group are on no load. If on the other hand identical loads are connected to all outputs

then one output stage is capable of driving a load of 125 amps max. Each output has an LED assigned to it which indicates whether the output is active or not.

The interface of the receiving module is galvanically isolated from the supply and the outputs.

If faulty data records arrive, the previous information remains valid. However, the transmission of ten incorrect data records in a row has the effect of switching off all outputs and generating a fault message. Incorrect data transmission is indicated by a red fault LED on the receiving module for the duration of the fault.

Missing pulses on the transmission line (e.g., line breakdown or short circuit) are signalled by the fault LED flashing at a frequency of 2 Hz approximately. If a fault has caused the disabling of all outputs, the floating alarm signal is set. The following faults could cause such a situation:

- More than 10 faulty data records received in a row;
- Time limit exceeded at data reception;
- Internal operating voltage (5V) of receiver has fallen below the limit by 10%;
- Watchdog timer tripped.

Technical Characteristics

Transmitting Module SG 316

Supply voltage	24 V DC
Rated voltage	18 V to 33 V
Tolerance	
Current consumption	≤ 60 mA
Input signal level	High: 12 V to 72 V Low: -3 V to 7 V
Rated signalling voltage	24 V ± 20% 48 V ± 20% 60 V ± 20%
Number of inputs	16
Input current	5 mA ± 20%
Electric isolation strength of inputs with respect to the supply voltage	≥ 3750 V AC
Setting	0 to 9
Transmission rate	150 to 57600 bauds
Minimum signal ON time	3.5 ms (57600 bauds) to 470 ms (150 bauds)
Permissible loop resistance	≤ 7 kOhms
Maximum voltage on transmission line	31.5 V

Monitoring and signalling functions:

Supply voltage	green LED
Input signal is active	yellow LED
Faulty two-wire connection or Operational voltage too low or Watchdog tripped	red LED

Receiving Module EG 316

Supply voltage	
Rated voltage	24 V DC
Tolerance	18 V to 33 V
Current consumption if outputs on no load	≤ 60 mA
Output current per output	≤ 125 mA
Number of outputs	16
Maximum signal delay from input of transmitter to output of receiver	7 ms (57600 bauds) to 910 ms (150 bauds)
OFF delay if transmission error	1 s

Monitoring and signalling functions:

Supply voltage	green LED
Time limit exceeded at data reception	
Transmission protocol error	
Check sum error	
Overvoltage	
Watchdog tripped	red LED
Deactivated outputs due to faults	Alarm output, N/O floating contact
Line distance from transmitter to receiver	15 km max, depending on type of cable

Operating Conditions

Climate class	HVF DIN 40040
Ambient temperature	- 25 °C to +55 °C
Permissible humidity	≤ 75%

Electromagnetic Compatibility

Interference immunity	
Static electrical discharge IEC 801-2	6 kV contact discharge 8 kV air discharge
Immunity against rapid transient disturbances acc. to IEC 801-4	
Signal lines	1 kV
Supply lines	1 kV
Immunity against surge voltages of single polarity acc. to IEC 801-5	2 kV
Surge voltage protection acc. to IEC 255-4	1.2/50 µs/5 kV (DIN VDE 0435, Part 303, testing voltage class III)

Permissible mains interruption without system failure ≤ 20 ms

In compliance with the Namur Recommendations NE 21/Part 1, 'Electromagnetic Compatibility, pt. 3.2 (standard requirements), Edition: May 1993

Interference Emission

Limit values and measuring procedures for radio interference by I.S.M. apparatus acc. to EN 550 11 Class B

In compliance with the Namur Recommendations NE 21/Part 1, 'Electromagnetic Compatibility, pt. 3.2 (standard requirements), Edition: May 1993

The protection requirements imposed by the 89/336/EWG guidelines are met.

Safety

Safety requirements for electrical measuring and control apparatus acc. to EN 61010-1 In compliance with Overvoltage category III, Pollution class 2

Mechanical Strength

Class of application: Power stations and general industrial applications acc. to DIN IEC 68

General Characteristics

Housing	Insulating case for wall mounting, 45 mm width, 24 terminals
Protection class	IP 20
Electrical connections	Clamped connectors, single wire, csa = 2.5 mm ² max., fine-strand wire with end splice of 1.5 mm ² max.
Weight of one module	250 g approx.

Option

Mains module	230 V AC
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