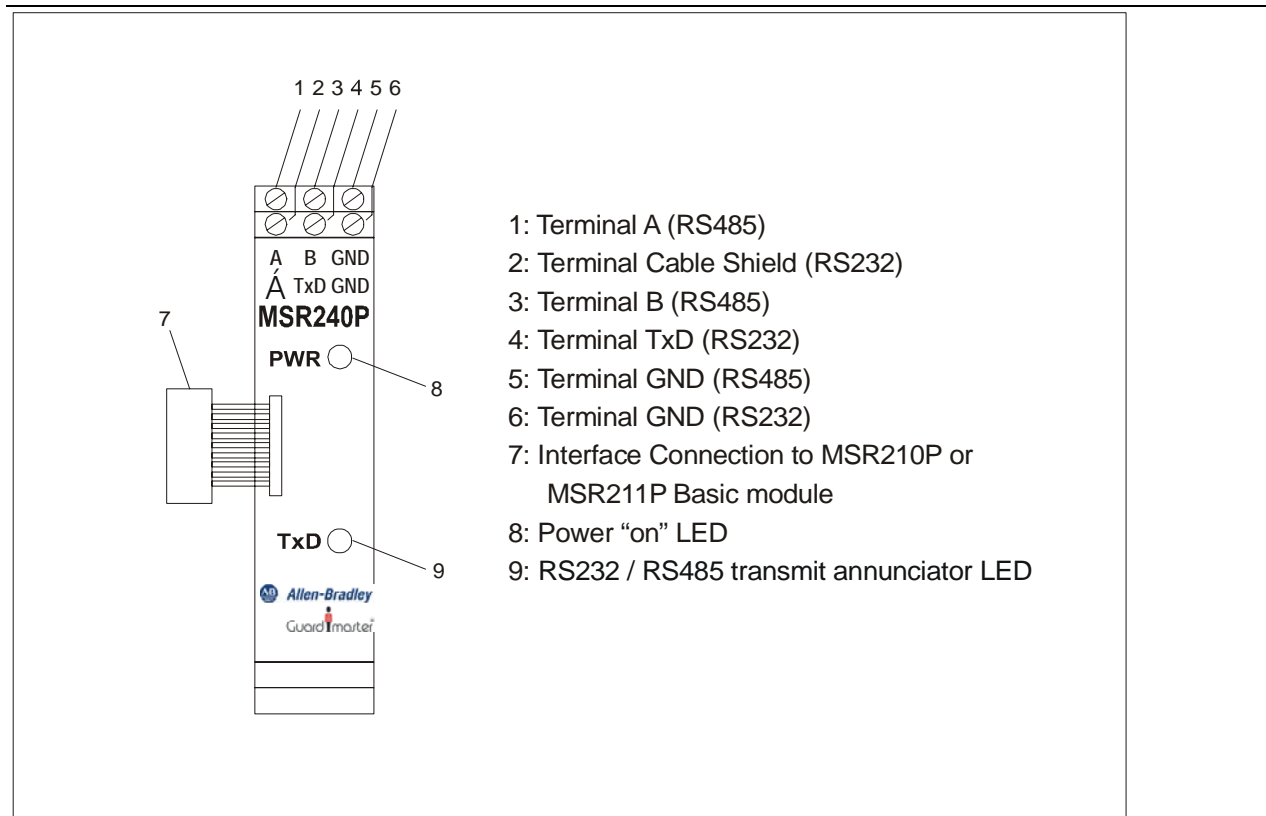# Manual and Protocol Description

Overview

The MSR240 Communication Module serves as an interface between a MSR210 or MSR211 Basic Module and a standard serial data communication line. The MSR240 transmits data relating to the operational status and fault conditions of, and the external electrical circuits monitored by, the MSR200 System. The MSR240 is connected via a 10-core flat cable to an MSR210/211 Basic Module or MSR230 Extension Module. The two processors in the Basic Module exchange data cyclically over a serial system bus (SPI). Data is transferred to the MSR240 via the flat cable connection, through a driver circuit stage. The MSR240 converts the data into RS232 and RS485 transmission levels with appropriate serial data protocols, so that it can be transferred to an external device (e.g. Display Module) or system (PC or PLC).
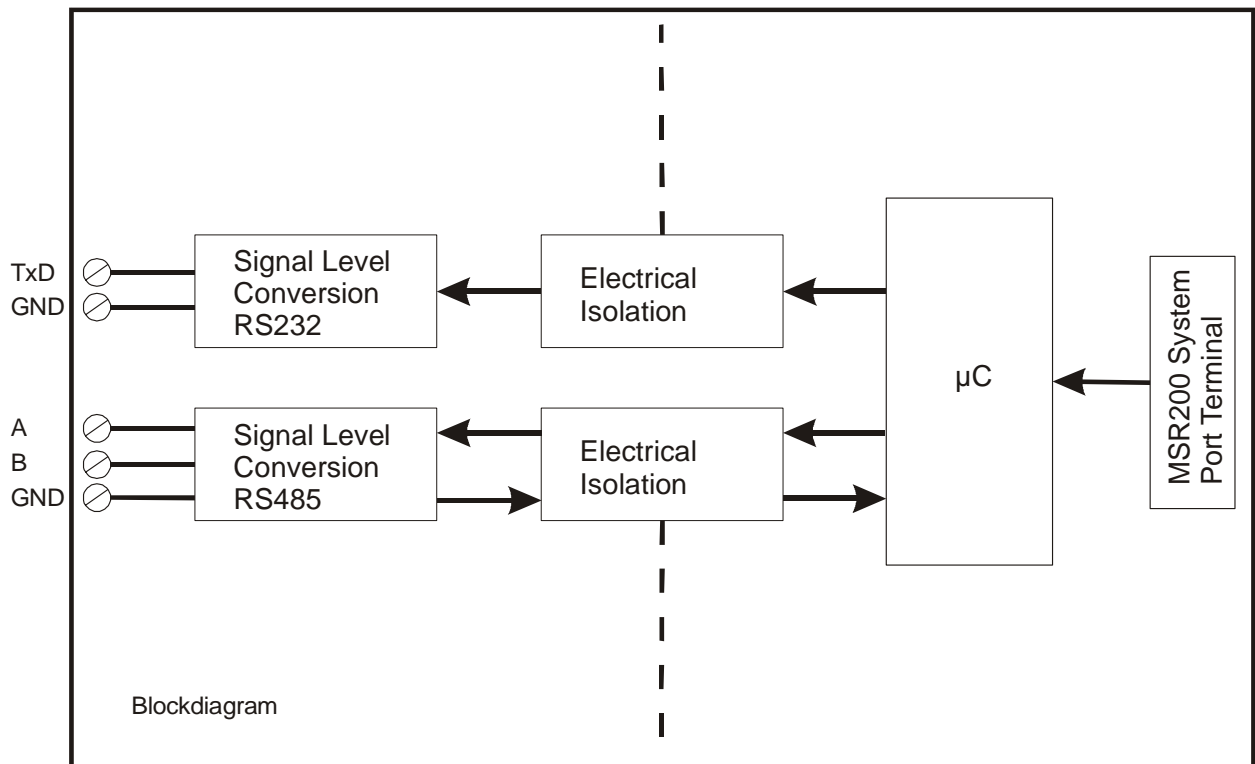
The MSR240 is available in three versions:
- 440R-H123181: with RS232 serial interface
- 440R-H123182: with RS485 serial interface
- 440R-H123183: with RS232 and RS485 serial interfaces

The MSR240 is housed in a 17.5mm wide DIN rail mounting enclosure.
The serial data communication connections are made through one or two 3-way plug-in screw terminal blocks.

1: Terminal A (RS485)
2: Terminal Cable Shield (RS232)
3: Terminal B (RS485)
4: Terminal TxD (RS232)
5: Terminal GND (RS485)
6: Terminal GND (RS232)
7: Interface Connection to MSR210P or
    MSR211P Basic module
8: Power "on" LED
9: RS232 / RS485 transmit annunciator LED

Blockdiagram

The following data relating to the MSR200 System is transmitted:
- Configuration and device status
- Connected input module types and their order of connection
- Fault diagnostic information

RS232 Interface Description

Data blocks are transmitted continuously through the RS232 interface, at intervals of approximately 1 sec. The MSR240 is intended to transmit data to an MSR245 Display Module, or to a PC. The Baud rate is fixed at 4800

The RS232 protocol uses a 16-byte data block, structured as follows:

1 **Start byte:** 02

2 **Device status:**
Bit 0: = 1: Unit ready for start. / = 0: Not ready / busy
Bit 1: = 1: Stop signal. / = 0: Inputs OK
Bit 2: = 1: Cross-fault. / = 0: No cross-fault
Bit 3: = 1: Auto start. / = 0: Manual start
Bit 4: = 1: Relay energised. / = 0: Relay de-energised
Bit 5: = 1: Feedback loop dynamic. / = 0: Feedback loop static
Bit 6: = 1: Feedback loop open if unit is "Ready"
Bit 7: = 1

3 **Fault diagnostics:**
Bit 0: = 1: System bus (SPI) failure. / = 0: ….OK
Bit 1: = 1: Oscillator failure. / = 0: ….OK
Bit 2: = 1: Relay transistor failure. / = 0: ….OK
Bit 3: = 1: Relay contact failure. / = 0: ….OK
Bit 4: = 1: Feedback circuit fault. / = 0: ….OK
Bit 5: = 1: Y40 circuit failure. / = 0: ….OK
Bit 6: = 1: Bus termination plug missing. / = 0: ….OK
Bit 7: = 1

4 - 14 Input modules: activation and wiring:
Bit 0: = 1: Emergency stop (or failure): Input 1
Bit 1: = 1: Emergency stop (or failure): Input 2
Bit 2: = 1: MSR220 Module. / = 0: MSR221 Module
Bit 3: = 1 0 1
Bit 4: = 0 1 1
        1- 2- 3-channel detection: Input 2
Bit 5: = 1 0 1
Bit 6: = 0 1 1
        1- 2- 3-channel detection: Input 1
Bit 7: = 1

15 **Control byte:** XOR – conjunction of Bytes 2 through 14

16 **End byte:** 03

RS485 Interface Description

Data relating to the MSR200 System is transmitted via the RS485 channel only in response to a command characters string received by the MSR240:
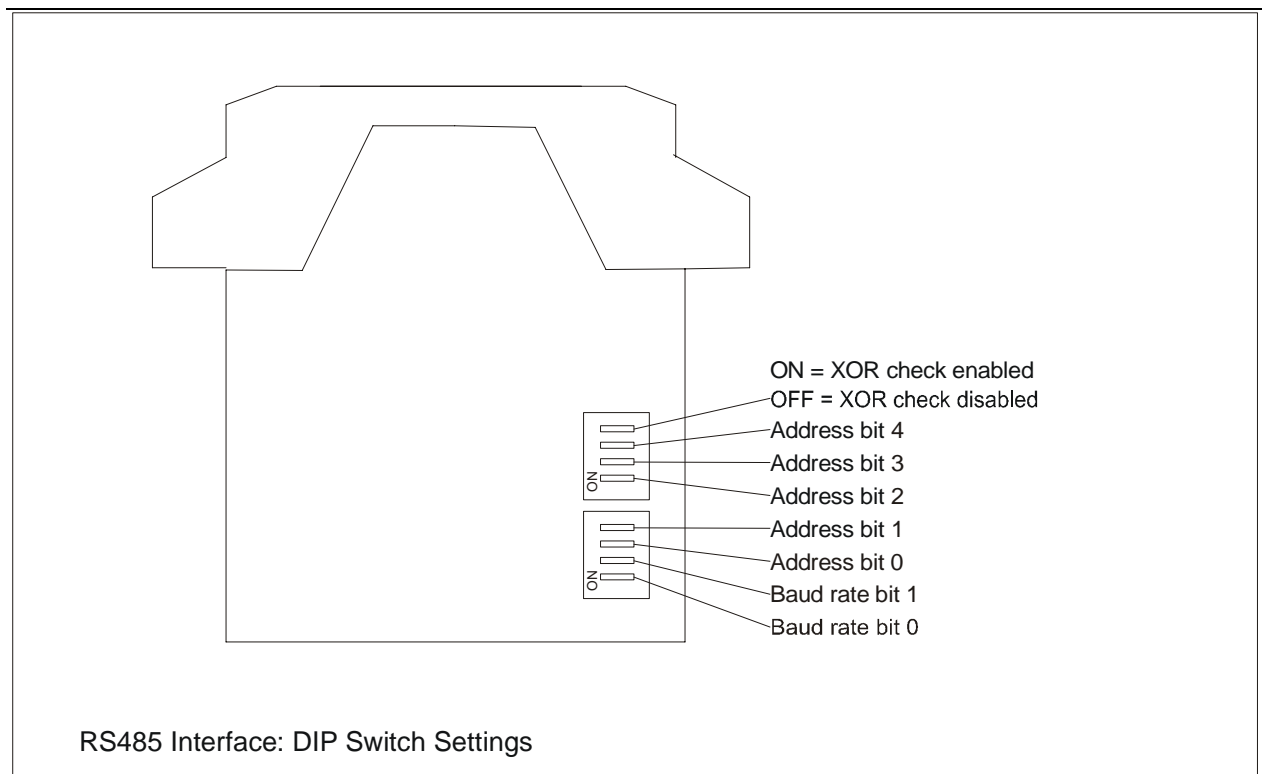
Character 1   Start byte =   2
Character 2   Address1 =   48..51 (0..3) [Address x 10]
Character 3   Address0 =   48..57 (0..9) [Address x 1]
Character 4   Function =   49 (1) [1 = Function: send character]
Character (5)   XOR-linkage of Address1, Address0 and Function (optional)
Character 5 (6)   End byte = 3

Addresses in the range 0 to 31 can be set via five DIP switches. Addresses below 10 must start with a zero.

Function setting is fixed at 49 (1) and is the code to send data.

Baud rate can be selected via two DIP switches from the following values:
- 2400 baud   Bit 0 = OFF   Bit 1 = OFF
- 4800 baud   Bit 0 = OFF   Bit 1 = ON
- 9600 baud   Bit 0 = ON   Bit 1 = OFF
- 19200 baud   Bit 0 = ON   Bit 1 = ON

ON = XOR check enabled
OFF = XOR check disabled
Address bit 4
Address bit 3
Address bit 2
Address bit 1
Address bit 0
Baud rate bit 1
Baud rate bit 0

RS485 Interface: DIP Switch Settings

Baud rate setting (RS485)

Baud rate	Bit 0	Bit 1
2400	OFF	OFF
4800	OFF	ON
9600	ON	OFF
19200	ON	ON

Address setting (RS485)

Address	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4
31	OFF	OFF	OFF	OFF	OFF
30	ON	OFF	OFF	OFF	OFF
29	OFF	ON	OFF	OFF	OFF
28	ON	ON	OFF	OFF	OFF
27	OFF	OFF	ON	OFF	OFF
26	ON	OFF	ON	OFF	OFF
25	OFF	ON	ON	OFF	OFF
24	ON	ON	ON	OFF	OFF
23	OFF	OFF	OFF	ON	OFF
22	ON	OFF	OFF	ON	OFF
21	OFF	ON	OFF	ON	OFF
20	ON	ON	OFF	ON	OFF
19	OFF	OFF	ON	ON	OFF
18	ON	OFF	ON	ON	OFF
17	OFF	ON	ON	ON	OFF
16	ON	ON	ON	ON	OFF
15	OFF	OFF	OFF	OFF	ON
14	ON	OFF	OFF	OFF	ON
13	OFF	ON	OFF	OFF	ON
12	ON	ON	OFF	OFF	ON
11	OFF	OFF	ON	OFF	ON
10	ON	OFF	ON	OFF	ON
9	OFF	ON	ON	OFF	ON
8	ON	ON	ON	OFF	ON
7	OFF	OFF	OFF	ON	ON
6	ON	OFF	OFF	ON	ON
5	OFF	ON	OFF	ON	ON
4	ON	ON	OFF	ON	ON
3	OFF	OFF	ON	ON	ON
2	ON	OFF	ON	ON	ON
1	OFF	ON	ON	ON	ON
0	ON	ON	ON	ON	ON

Via RS485 following protocol is transmitted:

1. Start byte: 02

2. Address: Address (0..31 dec)

3. Device Status: bit0: 1: device ready for start / 0: not ready for start (or already busy)

bit1: 1: Stop signal, 0: all Inputs OK

      bit2: 1: Cross fault, 0: No cross fault

      bit3: 1: auto start, 0: monitored Start

      bit4: 1: relay energised / 0: de-energised

      bit5: 1: EDM dynamic / 0: Feedback loop static

      bit6: 1: Feedback loop open if unit is ready

      bit7: 1

4. Input Status of Modules 1-3:

      bit0: Stop signal Base Module Input 1

      bit1: Stop signal Base Module Input 2

      bit2: Stop signal EW1 Input1

      bit3: Stop signal EW1 Input2

      bit4: Stop signal EW2 Input1

      bit5: Stop signal EW2 Input2

      bit6: Crossfault on input signal lines

      bit7: 1

5. Input Status of Modules 4-6:

      bit0: Stop signal EW3 Input1

      bit1: Stop signal EW3 Input2

      bit2: Stop signal EW4 Input1

      bit3: Stop signal EW4 Input2

      bit4: Stop signal EW5 Input1

      bit5: Stop signal EW5 Input2

      bit6: internal failure

      bit7: 1

6. Input Status of Modules 7-9:

      bit0: Stop signal EW6 Input1

      bit1: Stop signal EW6 Input2

      bit2: Stop signal EW7 Input1

      bit3: Stop signal EW7 Input2

      bit4: Stop signal EW8 Input1

      bit5: Stop signal EW8 Input2

      bit6: unused

      bit7: 1

7. Input Status of Modules 10-11:

      bit0: Stop signal EW9 Input1

      bit1: Stop signal EW9 Input2

      bit2: Stop signal EW10 Input1

      bit3: Stop signal EW10 Input2

      bit4: unused

      bit5: unused

      bit6: unused

      bit7: 1

8. XOR-Check: XOR-connection of Bytes 2 - 7 (optional)

9. (8.) End byte: 03

Specifications:

Operating voltage:	24 V_{DC}, supplied from MSR210P / MSR211P Basic Module
Power consumption:	Approx. 2W
Ambient temperature:	-5°C to +55°C
Storage temperature:	-25°C to +70°C
Protection class (per DIN VDE 0470-1):	Terminals: IP20. Enclosure: IP40
Terminals	Plug-in screw terminal blocks, box clamp type
Wire cross section	2.5 mm^2 (max.)
Control circuit voltage	24 V_{DC} (nominal)

Specifications RS232:

Baudrate 4800
Databits: 8
Parity: none
Stopbits: 1
Flowcontrol: none

Specifications RS485:

Baudrate 2400/ 4800/ 9600/ 19200
Databits: 8
Parity: none
Stopbits: 1
Flowcontrol: none