Zelio Logic smart relays

Communication

Modbus slave communication protocol

524131

Modbus communication module

Presentation

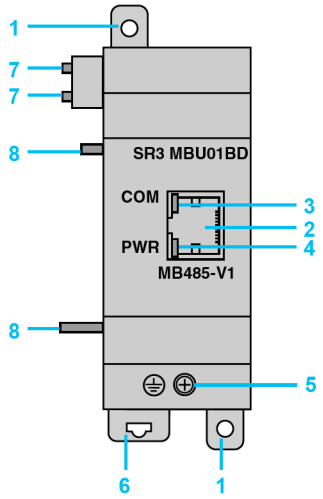
The Modbus communication protocol is of the master/slave type.
Two exchange methods are possible:
- ■ Request/reply:
  - □ The request from the master is addressed to a specific slave.
  - □ The master waits for the reply to be returned by the slave polled.
- ■ Distribution:
  - □ The master distributes a request to all the slave stations on the bus. These stations execute the instruction without sending a reply.

Zelio Logic modular smart relays are connected to the Modbus network via the Modbus slave communication module. This module is a slave that is not electrically isolated.
The Modbus slave communication module must be connected to an SR3 B●●●BD modular smart relay, with a ⎓ 24 V supply.

Configuration

The Modbus network slave communication module can be configured:
- ■ independently, using the buttons on the smart relay *(1)*.
- ■ on a PC, using "Zelio Soft 2" software, see page 9.

When using a PC, programming can be performed either in LADDER language or in function block diagram (FBD) language, see pages 10 to 13.



Description

Modbus slave communication module **SR3 MBU01BD** comprises:

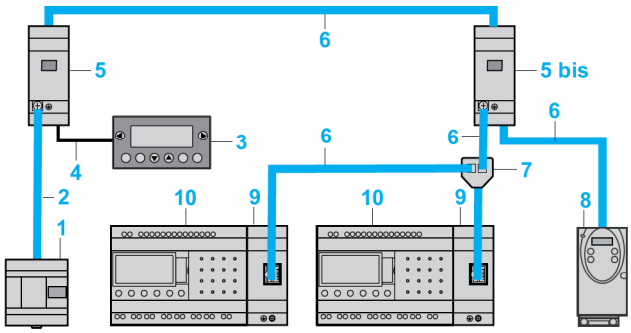
1. Two retractable fixing lugs
2. A Modbus network connection (RJ45 screened female connector).
3. A communication LED (COM).
4. A "Power on" LED (PWR).
5. A screw terminal block for the protective earth connection.
6. A spring for clip-on mounting on a 35 mm mounting rail.
7. Two locating pegs.
8. Two locating pegs for clip-on fixing.

(1) Programming from the front panel and buttons on the smart relay is only possible in LADDER language.

Connection examples

Example 1

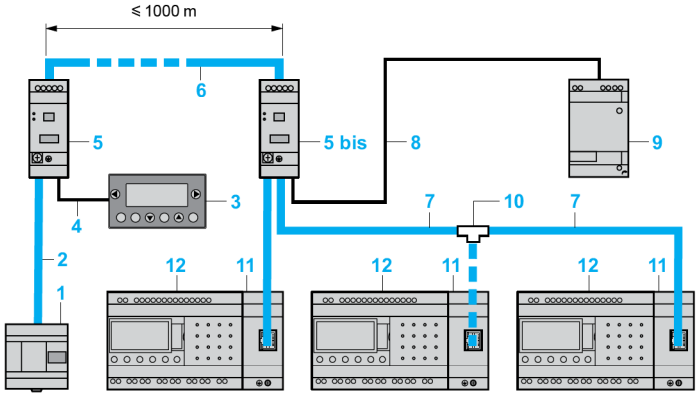
1 Twido master.
2 Modbus network (cable TWD XCA RJP03)
3 Slave display unit XUBT N401.
4 Connecting cable XBT Z938.
5 Junction box TWD XCA T3RJ (polarisation and line end adapter activated).
5 bis Junction box TWD XCA T3RJ (no polarisation but line end adapter activated).
6 Modbus network (cables VW3 A8 306R●●).
7 T-junction VW3 A8 306TF●●.
8 ATV 31 variable speed controller.
9 Modbus communication module SR3 MBU01BD.
10 Modular smart relay SR3 B●●●BD.



Total length of cables between Twido and ATV 31: ⩽ 30 m

Example 2

1 Twido master.
2 Modbus network (cable TWD XCA RJP03)
3 Slave display unit XUBT N401.
4 Connecting cable XBT Z938.
5 Junction box TWD XCA ISO (polarisation and line end adapter activated).
5 bis Junction box TWD XCA ISO (no polarisation but line end adapter activated).
6 Modbus network (cables TSX CSA ●00).
7 Modbus network (cables VW3 A8 306R●●).
8 Supply cable ⎓ 24 V.
9 Regulated power supply from the Phaseo Modular range.
10 T-junction 170XTS04100.
11 Modbus communication module SR3 MBU01BD.
12 Modular smart relay SR3 B●●●BD.



Function description

■ The Modbus slave communication module is connected to a 2-wire or 4-wire Modbus network *(1)*.
■ The maximum length of the network between the two TWD XCAISO T-junctions is 1000 m (9600 bauds max., AWG 26).
■ A maximum of 32 slaves can be connected to the Modbus network, or a maximum of 247 slaves with repeaters.
■ Line end adapters must be fitted to both ends of the line (1 nF/10 V, 120 Ω /0.25 W in series).
■ The line must be polarised (470 Ω /0.25 W resistors) *(2)*.
■ The connection cable and its RJ45 male connectors must be screened.
■ The ⏚ terminal on the module must be connected directly to the protective earth at one point on the bus.

(1) Please refer to installation instructions supplied with the product.
(2) The polarisation resistors must be managed by the master.

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Environment characteristics			
Type			**SR3 MBU01BD**
Product certifications			UL, CSA, GL, C-TICK, GOST
Conformity with the low voltage directive	Conforming to 2006/95/EC		EN (IEC) 61131-2 (open equipment)
Conformity with the EMC directive	Conforming to 2004/108/EC		EN (IEC) 61131-2 (Zone B) EN (IEC) 61000-6-2, EN (IEC) 61000-6-3 (1) and EN (IEC) 61000-6-4
Degree of protection	Conforming to IEC/EN 60529		IP 20 (terminal block) IP 40 (front panel)
Overvoltage category	Conforming to IEC/EN 60664-1		3
Degree of pollution	Conforming to IEC/EN 61131-2		2
Ambient air temperature around the device Conforming to IEC/EN 60068-2-1 and IEC/EN 60068-2-2	Operation	**°C**	- 20...+ 55 (+ 40 in non-ventilated enclosure)
	Storage	**°C**	- 40... + 70
Max. relative humidity	Conforming to IEC/EN 60068-2-30		95% without condensation or dripping water
Maximum operating altitude	Operation	**m**	2000
	Transport	**m**	3048
Mechanical resistance	Immunity to vibration		IEC/EN 60068-2-6, test Fc
	Immunity to mechanical shock		IEC/EN 60068-2-27, test Ea
Resistance to electrostatic discharge	Immunity to electrostatic discharge		IEC/EN 61000-4-2, level 3
Resistance to HF interference(immunity)	Immunity to electromagnetic radiated fields		IEC/EN 61000-4-3
	Immunity to fast transients in bursts		IEC/EN 61000-4-4, level 3
	Immunity to shock waves		IEC/EN 61000-4-5
	Radio frequency in common mode		IEC/EN 61000-4-6, level 3
	Voltage dips and breaks (∿)		IEC/EN 61000-4-11
	Immunity to damped oscillation waves		IEC/EN 61000-4-12
Conducted and radiated emissions	Conforming to EN 55022/11 (Group 1)		Class B *(1)*
Earthing			Yes (please refer to installation instructions supplied with the product).

(1) Except for the configuration SR3 B●●●BD + SR3 MBU01BD + SR3 XT43BD class A (class B: use in a metal enclosure).

Zelio Logic smart relays
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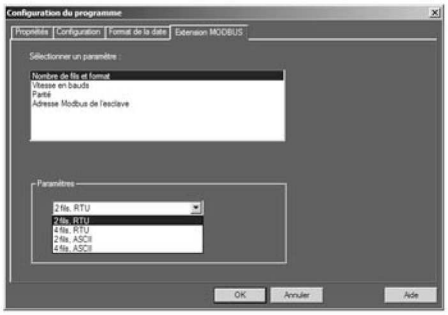

Software workshop parameter entry window

Parameter entry

Parameters can be entered either using "Zelio Soft 2" software, or directly using the buttons on the Zelio Logic smart relay *(1)*.
When the "RUN" instruction is given, the Zelio Logic smart relay initialises the Modbus network slave communication module in a configuration previously defined in the basic program.

The Modbus slave communication module has 4 parameters:
- number of UART wires and format of the frames on the Modbus network,
- transmission speed,
- parity,
- network address of the Modbus module.

The default parameter settings are as follows: 2-wire, RTU, 19 200 bauds, even parity, address n° 1.

Parameter entry	Options
Number of wires	2 or 4
Frame format	RTU or ASCII
Transmission speed in bauds	1200, 2400, 4800, 9600, 19 200, 28 800, 38 400, 57 600
Parity	None, even, odd
Network address	1 to 247

Addressing of Modbus exchanges

LADDER programming

In LADDER mode, the 4 data words (16 bits) to be exchanged cannot be accessed by the application. Transfers with the master are implicit and are effected in a way that is totally transparent.

Modbus exchanges	Code	Number of words
Image of smart relay I/O	Read 03	4
Clock words	Read/Write 16, 06 or 03	4
Status words	Read 03	1

Function block diagram (FBD) programming

In FBD mode, the 4 input data words (16 bits) (J1XT1 to J4XT1) and the 4 output data words (O1XT1 to O4XT1) can be accessed by the application. Dedicated function blocks make it possible to:
- break down a 'complete' type input (16 bits) into 16 separate "bit" type outputs.
  - example: break down a J1XT1 to J4XT1 type input and copy these status values to discrete outputs.
- make up a 'complete' type output (16 bits) from 16 separate "bit" type inputs.
  - example: transfer the status value of the discrete inputs or the status of a function to an O1XT1 to O4XT1 type output.

Modbus exchanges	Code	Number of words
Input words	Read/Write 16, 06 or 03	4
Output words	Read 03	4
Clock words	Read/Write 16, 06 or 03	4
Status words	Read 03	1

(1) Programming from the front panel and buttons on the smart relay is only possible in LADDER language.

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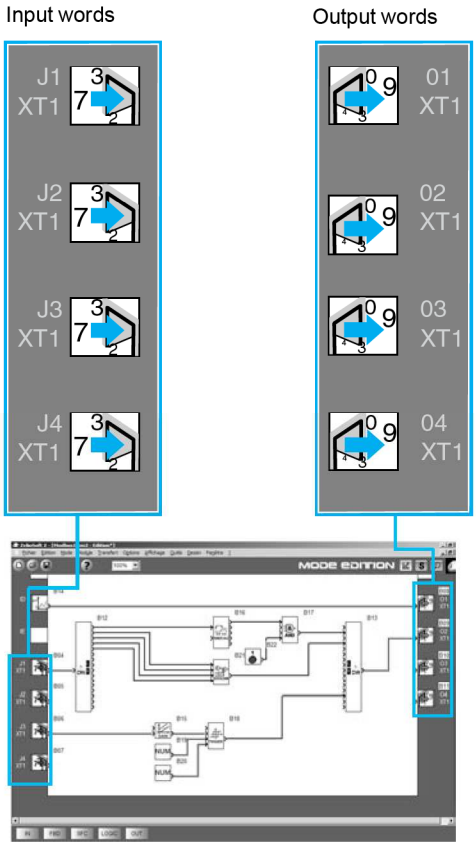

FDB program Editing window

Presentation, description : pages 34 and 35
Characteristics : page 36
References : page 42
Dimensions, mounting : page 43