SPARK
Drives & Automation

MODBUS RELAY CONTROLLER

Control an 8 Channel relay card using only 2 wires D+ and D- of RS485.

MODBUS based Relay Controller – MRC is a very useful module for any Automation Panel builder and Machine manufacturer. MRC module helps to increase the number of relays in the panel without increasing the PLC outputs. Hence manufacturer can benefit with cost savings. As Relays are low speed devices, user won't feel a lag due to controlling them via MODBUS. Generally relay switching time will be ~ 10ms, controlling them via MODBUS will cause an additional communication time of ~ 8ms for a baud rate of 9600bps. If baud rate is increased to 19200 bps, then MODBUS communication time would only be ~4ms.

Features

- ✓ Standard 24V operation.
- ✓ Configuration using MODBUS.
- ✓ Can be interfaced easily PLC or HMI using MODBUS.
- ✓ Relay coil protection diodes are in-built.

MRC module is designed with a high performance microcontroller, RS232 & RS485 for MODBUS RTU and a robust relay driver. Our module functions as a MODBUS RTU Slave, which receives Relay On/Off Command over MODBUS and controls each Relay accordingly. This module has a RS232 and a RS485 ports. Module configuration (Slave ID, Baud Rate, etc.,) can be done using RS232 and outputs can be controlled via RS232/RS485.

This comes as 2 individual cards, one control module and another relay card which can be easily connected using 1:1 FRC Cable provided along with the product. Relay coil voltage is also fed from the module.

Mechanical Characteristics

Operating temperature	:	0...+65 (°C)
Size (l*b*h)	:	100*45*50 mm
Housing	:	DIN Rail ABS Plastic Enclosure
Weight	:	70grams.

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Connector Info – Control Card

Pin numbers mentioned are from left to right.

TOP SIDE CONNECTOR

PIN#	CONNECTION
SUPPLY CONNECTION	
24+	24V DC Supply
24-	Ground 0V
DIGITAL INPUT**	
DIP1	Digital Input1
DIP2	Digital Input2
RS485 INTERFACE	
D+	RS485 D+
D-	RS485 D-
RS232 INTERFACE	
Tx	RS232 Tx
Rx	RS232 Rx
GND	Ground – 0V
Res	Reserve / Unused

BOTTOM SIDE CONNECTOR

PIN#	CONNECTION
TRIGGER CONNECTOR	
TRIG	To be connected with Relay card using 10 pin 1:1 FRC cable

** - User can connect 24V PNP sensor to this input pins.

Connector Info – Relay Card

Pin numbers mentioned are from left to right.

TOP SIDE CONNECTOR

PIN#	CONNECTION
RELAY1 TERMINALS	
24+	Relay1 NC
24-	Relay1 COM
	Relay1 NO
RELAY2 TERMINALS	
24+	Relay2 NC
24-	Relay2 COM
	Relay2 NO
RELAY3 TERMINALS	
24+	Relay3 NC
24-	Relay3 COM
	Relay3 NO
RELAY4 TERMINALS	
24+	Relay4 NC
24-	Relay4 COM
	Relay4 NO
In same sequence, the pin connections continues for RELAY6 to RELAY8	

BOTTOM SIDE CONNECTOR

PIN#	CONNECTION
TRIGGER CONNECTOR	
TRIG	To be connected with Relay card using 10 pin 1:1 FRC cable

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Communication Parameters for RS-485 & RS-232:

Parameter	RS232	RS485	
		Default	Configurable
Protocol	MODBUS – RTU Slave (Hex)	MODBUS – RTU Slave (Hex)	No
Slave Number	1	1	Yes
Baud Rate	9600	9600	Yes
Data bits	8	8	No
Parity	None	None	No
Stop Bits	2	2	Yes
Retry Count	2	2	No
Time Out	1000ms	1000ms	No

NOTE: The Slave Number for RS232 is always "1", cannot be changed. To change Slave number for RS485 refer the Register Section below.

Register Set

Control & Status Register:

Hex Address	Function	Type	Port
0001H	Relays ON Register	Write	RS232 & RS485
0002H	Relays OFF Register	Write	
0003H	Relays Status Register	Read	
0004H	Digital Input Status Register	Read	

Configuration Registers:

Hex Address	Function	Type	Port
07D0H	Slave Address of RS485	Read / Write	RS232 only
07D1H	Baud Rate of RS485	Read / Write	
07D2H	Stop Bits of RS485	Read / Write	

Changing the Slave Address of Module:

This module has two communication ports RS232 and RS485. The Slave address for RS232 is fixed as 01 and cannot be changed. For updating the slave address for RS485, the New Slave address can be written to address (07D0H) via RS232 port. The last changed Slave address will be retained until next change.

Functions of Control Registers:

- 0001H - Relay ON Register: This is a 16-bit Write only register. By writing to this register, relays can be Switched ON. The current On/Off Status of relays can be read from Status register. For example, If PLC writes 0001H in this register, then Relay1 is turned ON. Again if PLC writes 0006H, Relay2 and Relay3 are turned ON along with Relay1.
- 0002H - Relay OFF Register: This is a 16-bit Write only register. By writing to this register, relays can be Switched OFF. The current On/Off Status of relays can be read from Status register. For example, If PLC writes 0001H in this register, then Relay1 is turned OFF. Again if PLC writes 0006H, Relay2 and Relay3 are turned OFF.

- 0003H – Relay Status Register: This is a 16-bit Read only register. This register value indicates the Current Relay ON/OFF Status of Relay1 to Relay8.
  Eg: If the value of this register is 008AH, it indicates Relay8, Relay4 and Relay2 are in ON State and all other Relays are in OFF state.
- 0004H – Digital Input Status Register: This is a 16-bit Read only register. This register value indicates the Digital Inputs HIGH/LOW Status.
  Eg: If the value of this register is 0001H, it indicates DIP1 is in ON State and DIP2 is in OFF state.

Functions of RS485 Configuration Registers:

- 07D0H (42001) – Slave Address of RS485: This register has default '1'. The values written to this register will change the Slave Address of RS485 com-port and this will retained until next change. This register can read by either RS232 & RS485 and write by RS232 only.
- 07D1H (42002) – Baud Rate of RS485: This register has default '0'. The values written to this register with the corresponding Baud Rate of RS485 which is shown in below and this will retained until next change. This register can read by either RS232 & RS485 and write by RS232 only.
  - ➔ '0' – 9600 bps(Default)
  - ➔ '1' – 14400 bps
  - ➔ '2' – 19200 bps
  - ➔ '3' – 38400 bps
- 07D2H (42003) – Stop Bits of RS485: This register has default '0'. The values written to this register with the corresponding Stop Bits of RS485 which is shown in below and this will retained until next change. This register can read by either RS232 & RS485 and write by RS232 only.
  - ➔ '0' – 2 Stop Bits(Default)
  - ➔ '1' – 1 Stop Bits

Configurator Tool for MODBUS Relay Controller:

PC based Configurator tool is available for Module configuration (Salve ID, Baud rate, Stop bits etc.,).

Each Relay can be controlled independently using it.

This greatly reduces the initial testing efforts and time.

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