



control solutions

**TERACOM**



# **TDO340** MODBUS RTU relay output module

Revision 1.0 / August 2024

## **USER MANUAL**

[www.teracomsystems.com](http://www.teracomsystems.com)

## 1. Short description

The MODBUS RTU relay output module, model TDO340, is a dependable 4-channel SPST device featuring independent contacts. It fully supports the MODBUS RTU protocol, enabling you to configure relay safety statuses both at startup and in the event of communication loss, ensuring continued system protection. The module is equipped with a watchdog function that detects communication failures and takes prompt action to maintain safety. Additionally, the TDO340 utilizes nonvolatile memory to retain and restore relay states following power outages.

The device can be used as a relay output extension for MODBUS RTU master devices.

## 2. Features

- RS-485 interface supporting up to 63 nodes
- Non-volatile memory for the relays' status
- LED indicator for communication status
- Watchdog functionality for communication loss
- Reinforced isolation of relay contacts
- Built-in 120 ohms termination resistor
- DIN rail mounting
- Firmware update via the interface

## 3. Applications

- AC/DC consumers commutation;
- Industrial process control;

## 4. Specifications

- Physical characteristics  
Dimensions: 52x91x59mm (3-module enclosure)  
Weight: 101g  
Mounting: On 35 mm DIN top-hat rail
- Environmental limits  
Operating temperature range: -20 to 60°C  
Operating relative humidity range: 10 to 90% (non-condensing)  
Storage temperature range: -25 to 65°C  
Storage relative humidity range: 5 to 95% (non-condensing)  
Ingress protection: IP40 (connections IP20)
- Power supply  
Operating voltage range (including -15/+20% according to IEC 62368-1): 5 to 28VDC  
Current consumption: 130mA@5V
- Relay outputs  
Maximum switching current: 3A  
Maximum switching AC voltage: 250V  
Maximum switching DC voltage: 30V  
Rated load: 3A at 250VAC, resistive, 50k cycles  
3A at 30VDC, resistive, 30k cycles  
Isolation: 4000 Vrms coil to contact  
1000 Vrms between open contacts



### Caution!

If TDO340 is used to switch dangerous voltages (over 30V), a skilled person must install the device in rooms with controlled access.

- Interface  
Protocol: Modbus RTU  
Physical layer: RS-485 serial line  
Number of bus transceivers: up to 63  
Bus cable: Twisted, shielded, 2x0.5mm<sup>2</sup>  
Response time ≤ 50ms  
Master response time-out ≥ Response time + Answer time  
The answer time depends on the number of bits and the baud rate.
- Connectors  
Communication: 3.81mm pitch screwless pluggable for 28 to 16 (AWG) / 0.081 to 1.31 (mm<sup>2</sup>) wires  
Relay outputs: 5.08mm pitch screwless pluggable for 26 to 14 (AWG) / 0.2 to 1.5 (mm<sup>2</sup>) wires
- Warranty  
Warranty period: 3 years

## 5. Indicators

The status of the device is shown by "Status" LED:

- If the LED blinks every 1 second, the sensor is working properly;
- If the LED blinks every 3 seconds, there is no communication with the controller;
- If the LED does not blink, there is no power supply.

Each relay has a dedicated LED to show its status. A lit LED means the relay is activated (contacts are closed)

## 6. Pinout

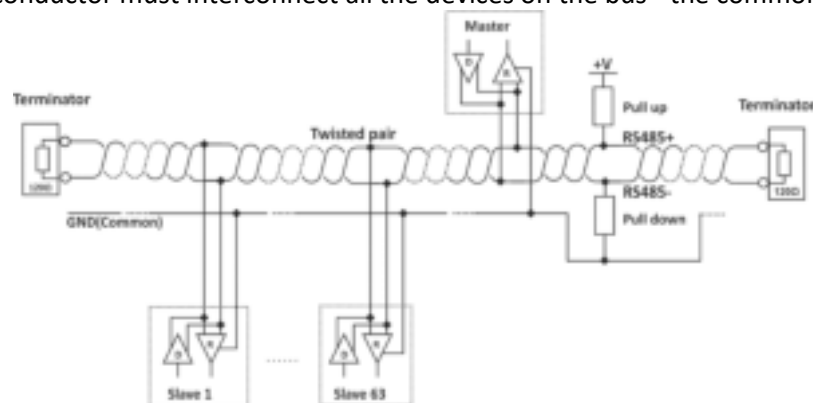
- 5-pins connector
  - 1 +VDD (5 to 28)
  - 2 GND
  - 3 RS485+
  - 4 RS485-
  - 5 Terminator
- 8-pins connector
  - 1-2 Relay 1 NO contacts
  - 3-4 Relay 2 NO contacts
  - 5-6 Relay 3 NO contacts
  - 7-8 Relay 4 NO contacts



## 7. Installation

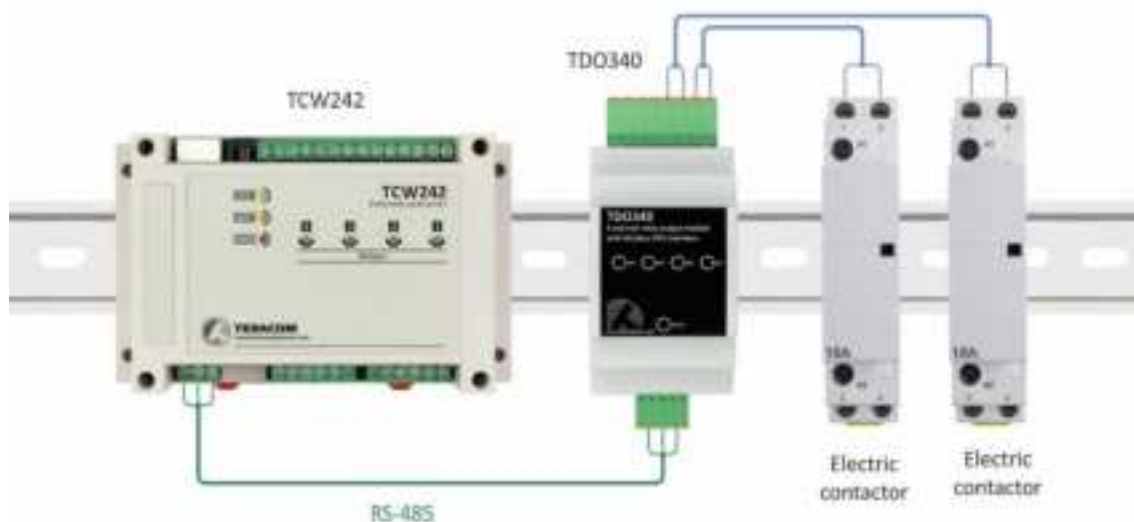
According to modbus.org, the "Two-Wire" MODBUS definition states:

"A MODBUS solution over a serial line should implement a "Two-Wire" electrical interface in accordance with the EIA/TIA-485 standard. On such a "Two-Wire" topology, only one driver can transmit at any time. Additionally, a third conductor must interconnect all the devices on the bus - the common."



A daisy-chain (linear) topology and UTP/FTP cables are strongly recommended for multiple sensors.

For proper operation of the interface, terminators (120 ohms resistors) must be installed at both ends of the bus. The device has a built-in 120-ohm resistor. To terminate the bus, the "RS485-" and "Term" terminals must be shorted.



## 8. Factory default settings

Disconnect the power supply.

Press and hold the “Setup” button.

While holding the button, connect the power supply.

The status LED will turn ON for 3 seconds, then flash for 7 seconds, and finally turn ON again.

Release the button. The device will restart with factory default settings.

## 9. Firmware update

The firmware of the device can be updated by Teracom controller with MODBUS RTU supports or MBRTU-Update software.

To put the sensor in update mode, follow these steps:

Disconnect the sensor from the bus and the power supply.

Press and hold the “Setup” button. While holding the button, reconnect the power supply.

The status LED will turn ON for 3 seconds. During these 3 seconds, release the button and press it 3 times to enter update mode.

In update mode, the status LED will remain ON permanently.

**Important:** The sensor can be updated only if it is the sole device on the bus.

## 10. Modbus address table

Register name	R/W	FC	Decimal address		Data size	Default	Valid values
			PDU	Logical			
Holding registers							
RS-485 address	R/W	3, 6, 16	10	40011	uint16	1	1 to 247
Baud rate *	R/W	3, 6, 16	11	40012	uint16	19200	2400, 4800, 9600, 19200, 38400, 57600
Parity, data, stop bits *	R/W	3, 6, 16	12	40013	uint16	1	1=E81, 2=O81, 3=N81
Device code	R	3	14	40015	uint16		0x00DF
FW version	R	3	15	40016	uint16		
Vendor URL	R	3	18	40019	64 bytes UTF-8		teracomsystems.com
Unsigned integer test value	R	3	91	40092	uint16		999(0x03E7)
All relay outputs, binary	R/W	3	100	40101	uint16		0b0000000000000000 to 0b0000000000001111
Relay 1 output, binary	R/W	3	101	40102	uint16		0b0000000000000000 to 0b0000000000000001
Relay 2 output, binary	R/W	3	102	40103	uint16		0b0000000000000000 to 0b0000000000000001
Relay 3 output, binary	R/W	3	103	40104	uint16		0b0000000000000000 to 0b0000000000000001
Relay 4 output, binary	R/W	3	104	40105	uint16		0b0000000000000000 to 0b0000000000000001
Relays after power on	R/W	3	200	40201	uint16	0	0 - all relays will return to the last successfully set states 1 - all relays will be activated 2 - all relays will be deactivated 3 - relays will follow settings in registers 201 to 204
Relay 1 after power on	R/W	3	201	40202	uint16	0	0 - relay will return to the last successfully set state 1 - relay will be activated 2 - relay will be deactivated
Relay 2 after power on	R/W	3	202	40203	uint16	0	0 - relay will return to the last successfully set state 1 - relay will be activated

							2 - relay will be deactivated
Relay 3 after power on	R/W	3	203	40204	uint16	0	0 - relay will return to the last successfully set state 1 - relay will be activated 2 - relay will be deactivated
Relay 4 after power on	R/W	3	204	40205	uint16	0	0 - relay will return to the last successfully set state 1 - relay will be activated 2 - relay will be deactivated
Relay1 behavior in case of no communication with the device for a period longer than the Timeout (set in register 305)	R/W	3	301	40302	uint16	0	0 - relay will remain in its last state; no changes 1 - relay will be activated 2 - relay will be deactivated 3 - relay will be switched to the opposite state for the duration set in register 306; The pulse can be used to reset another device.
Relay2 behavior in case of no communication with the device for a period longer than the Timeout (set in register 305)	R/W	3	302	40303	uint16	0	0 - relay will remain in its last state; no changes 1 - relay will be activated 2 - relay will be deactivated 3 - relay will be switched to the opposite state for the duration set in register 306; The pulse can be used to reset another device.
Relay3 behavior in case of no communication with the device for a period longer than the Timeout (set in register 305)	R/W	3	303	40304	uint16	0	0 - relay will remain in its last state; no changes 1 - relay will be activated 2 - relay will be deactivated 3 - relay will be switched to the opposite state for the duration set in register 306; The pulse can be used to reset another device.
Relay4 behavior in case of no communication with the device for a period longer than the Timeout (set in register 305)	R/W	3	304	40305	uint16	0	0 - relay will remain in its last state; no changes 1 - relay will be activated 2 - relay will be deactivated 3 - relay will be switched to the opposite state for the duration set in register 306; The pulse can be used to reset another device.
Timeout of no communication with the device over MODBUS RTU	R/W	3	305	40306	uint16	0	0 - Infinity communication timeout 1 to 65535 - timeout in seconds
Watch-dog pulse period	R/W	3	306	40307	uint16	1	1 to 255 - pulse period in seconds
Discret outputs							

Relay 1	R/W	1, 5	1	2	bit	0	0 or 1
Relay 2	R/W	1, 5	2	3	bit	0	0 or 1
Relay 3	R/W	1, 5	3	4	bit	0	0 or 1
Relay 4	R/W	1, 5	4	5	bit	0	0 or 1

The shown logic decimal addresses are calculated with offsets 1 (discrete outputs) and 40001 (holding registers).

PDU address – the actual address used in a Modbus Protocol Data unit, transmitted over the bus;

\* The settings will take effect after restarting the device by power off, power on.

## 11. Recycling

Recycle all applicable material.



Do not dispose of in the regular household refuse. 