

Digital OLTC Voltage Controller TAPCON[®] 250 Implementation of MODBUS (ASCII/RTU) Protocol

Supplement 2072201/02



Table of Contents

1	Introduction.....	1
2	Hardware.....	1
3	Configurable Parameters.....	1
4	Communication Mode.....	2
5	Function Codes.....	2
6	Device Data Points.....	2
6.1	Coils (0X references).....	2
6.2	Input Status (1X references)	3
6.3	Input registers (3X references).....	4
6.4	Holding registers (4X references)	4
7	Examples	4
7.1	Read Input Status (ASCII)	4
7.2	Force Single Coil (ASCII)	4
7.3	Read Input Status (RTU).....	5



NOTE!

Information in this document is subject to change without notice. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose without the express written permission of Maschinenfabrik Reinhausen GmbH.
For further information, contact Reinhausen Mfg.

© 2011 Maschinenfabrik Reinhausen GmbH. All rights reserved.



1 Introduction

This implementation of the MODBUS® communication protocol (ASCII and RTU mode) in the TAPCON® 250 is based on the Modicon MODBUS Protocol Reference Guide, PI-MBUS-300 Rev. J, copyright 1996 by Modicon Inc. MODBUS is a registered trademark of Modicon, Inc.

This document details the implementation subset available in a TAPCON® 250 voltage controller equipped with the optional communications interface module (CI-module).

Refer to the documentation of TAPCON® 250 available at Reinhausen Mfg. or www.tapcon250.com for additional information on the TAPCON® 250 voltage controller.

2 Hardware

Communication interface ports	RS-232 (TX, RX, GND)
	9 pin female sub-d connector
	Pin 2: TxD
	Pin 3: RxD
	Pin 5: GND
	Pin 7: CTS (not necessary)
	Pin 8: RTS (not necessary)
	RS-485 (A, B, GND)
	Pin 1: A (non-inverting)
	Pin 2: B (inverting)
	Pin 3: GND
	RJ45 (optional Ethernet or Modem interface)
	Pin 1: Tx +
	Pin 2: Tx -
	Pin 3: Rx +
	Pin 6: Rx -
	Optical Fiber (850 nm FH-ST connector)

3 Configurable Parameters

Communication port	RS232, RS485, Ethernet/Modem (optional), Optical Fiber (optional); RS232 is default
Address	0..255; 1 is default. address 0 (zero) = broadcast message
Baud rate	9600, 19200, 38400, 57600; 9600 is default.
Send Delay for RS485	0..254ms; 0 is default
Port properties	RTU: 8E1 (8 data bits, even parity, 1 stop bit) default ASCII: 7E1 (7 data bits, even parity, 1 stop bit)

Implementation of MODBUS (ASCII/RTU) Protocol for TAPCON® 250

4 Communication Mode

'ASCII' and 'RTU' and 'RTU over TCP' mode are supported.

Note: If you set the 'interface of the CI-module' to Ethernet in the menu of the TAPCON® 250, you may not set the 'protocol of the CI-module' to MODBUS ASCII, because this is not implemented.

5 Function Codes

The following MODBUS function codes are supported:

2	Read input status
3	Read holding registers
4	Read input registers
5	Force single coil (used for Raise and Lower signal)
6	Preset single register (used for change of reference voltage level)

The following exception codes are implemented:

1	Illegal Function
2	Illegal Data Address
3	Illegal Data Value

6 Device Data Points

6.1 Coils (0X references)

Please note: The coils can only be forced. The actual coil status can not be read. Function code 1 is not implemented!

Input	Unit	Scale	Designation	Range Value	Function Code
0	N/A	N/A	Auto/manual	on: set auto mode off: set manual mode	05
1	N/A	N/A	Raise	on: initiate a raise command off: no effect	05
2	N/A	N/A	Lower	on: initiate a lower command off: no effect	05
3..6	N/A	N/A	reserved	N/A	05
7	N/A	N/A	SI command 1	on: set flag; off: reset flag	05
8			SI command 2	on: set flag; off: reset flag	
9			SI command 3 Each of these commands sets a corresponding flag in the TAPCON. The status of the flags can be used like an input to activate or deactivate a function of the TAPCON.	on: set flag; off: reset flag	
10..22	N/A	N/A	reserved	N/A	05



6.2 Input Status (1X references)

Input	Unit	Scale	Designation	Range Value	Function Code
0	N/A	N/A	status manual/auto	0: manual 1: auto	02
1	N/A	N/A	reserved	N/A	N/A
2	N/A	N/A	reserved	N/A	N/A
3	N/A	N/A	Reference Voltage level 1	0: Voltage level off 1: Voltage level on Only one voltage level can be active at the same time.	02
4			Alternate Voltage level 2		
5			Alternate Voltage level 3		
6			Alternate Voltage level 4 Indication for selected voltage level.		
7	N/A	N/A	SI command 1	N/A	N/A
8			SI command 2		
9			SI command 3		
10	N/A	N/A	operation counter circuit status	0: open 1: closed	02
11	N/A	N/A	parallel control	0: off 1: on	02
12	N/A	N/A	error parallel control	0: no error 1: error	02
13	N/A	N/A	Status remote/local	0: remote 1: local	02
14	N/A	N/A	overvoltage	0: no overvoltage 1: overvoltage	02
15	N/A	N/A	undervoltage	0: no undervoltage 1: undervoltage	02
16	N/A	N/A	overcurrent	0: no overcurrent 1: overcurrent	02
17	N/A	N/A	reserved	N/A	N/A
18	N/A	N/A	function monitoring 15 min	0: inactive 1: active	02
19	N/A	N/A	raise input	0: inactive 1: active	02
20	N/A	N/A	lower input	0: inactive 1: active	02
21	N/A	N/A	auto inhibit	0: inactive 1: active	02
22	N/A	N/A	neutral position indication	0: inactive 1: active	02
23	N/A	N/A	switch status	0: inactive 1: active	02
24	N/A	N/A	power flow direction	0: forward 1: reverse	02
25..26	N/A	N/A	reserved	N/A	N/A
27	N/A	N/A	user programmable alarm	0: inactive 1: active	02
28..29	N/A	N/A	reserved	N/A	N/A
30	N/A	N/A	Hunting alarm	0: inactive 1: active	02

Implementation of MODBUS (ASCII/RTU) Protocol for TAPCON® 250

6.3 Input registers (3X references)

Input	Unit	Scale	Designation	Range Value	Function Code
0	N/A	1	tap position	-50...140 (50L...140R)	04
1	Volts	10	measured voltage	0...65535	04
2	%	10	voltage deviation	-32768...32767	04
3	%	100	active current (100% = 200mA)	-32768...32767	04
4	%	100	reactive current (100% = 200mA)	-32768...32767	04
5	%	100	apparent current (100% = 200mA)	-32768...32767	04
6..22	N/A	N/A	reserved	N/A	N/A

6.4 Holding registers (4X references)

Input	Unit	Scale	Designation	Range Value	Function Code
0	Volts	10	voltage level	1000...1350	03, 06
1..5	N/A	N/A	reserved	N/A	N/A
6	N/A	N/A	parallel operation method	0: off 1: circulating curr 2: master 3: follower 4: auto synchron. 5: XPA	03, 06
7	N/A	N/A	paralleling group	0: off 1: group 1 2: group 2	03, 06
8..16	N/A	N/A	reserved	N/A	N/A



7 Examples

7.1 Read Input Status (ASCII)

:01020000001DE0 (3A 30 31 30 32 30 30 30 30 30 30 31 44 45 30 0D 0A)
 --> Read Input Status request Slave 1 Start 0 Count 29

:01020409200000D0 (3A 30 31 30 32 30 34 30 39 32 30 30 30 30 30 44 30 0D 0A)
 <-- Read Input Status response Slave 1 Length 4
 DI 7- 0 0000 1001
 DI 15- 8 0010 0000
 DI 23-16 0000 0000
 DI 31-24 0000 0000

7.2 Force Single Coil (ASCII)

:01050002FF00F9 (3A 30 31 30 35 30 30 30 32 46 46 30 30 46 39 0D 0A)
 --> Force Single Coil request Slave 1 PtAdrs 2 On

:01050002FF00F9 (3A 30 31 30 35 30 30 30 32 46 46 30 30 46 39 0D 0A)
 <-- Force Single Coil response Slave 1 PtAdrs 2 On

7.3 Read Input Status (RTU)

01 02 00 00 00 0A F8 0D
 --> Read Input Status request Slave 1 Start 0 Count 10

01 02 02 09 00 BF E8
 <-- Read Input Status response Slave 1 Length 2
 DI 7- 0 0000 1001
 DI 15- 8 0000 0000

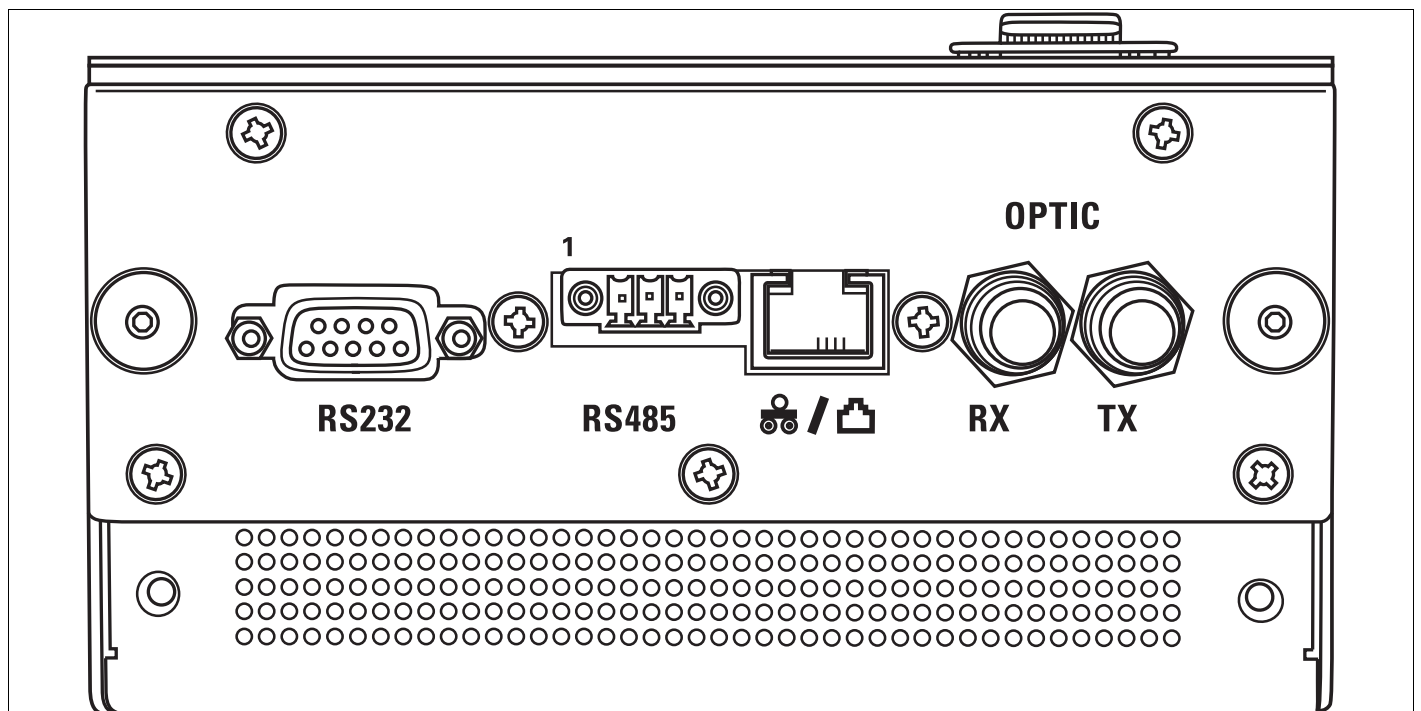


Figure 1 TAPCON® 250 with CI-module - Top view

www.reinhausen.com/rm/en/
www.tapcon250.com

Reinhausen Manufacturing Inc.
2549 North 9th Avenue
Humboldt, Tennessee 38343, USA

Phone: (+1)731/784-7681
Fax: (+1)731/784-7682
E-Mail: reinhausen@bestlhc.com

