



201 MODBUSTCP

**201 Weight Transmitter
ModbusTCP/IP Interface
Setup Manual**

INTRODUCTION

The 201 Weight Transmitter MODBUSTCP has been designed for the industrial environment where interfacing through a MODBUS IP network is desired. The 201 can provide the weight reading and control of multiple scale commands. A single RJ-45 connector is provided to connect to the MODBUS TCP/IP network. The 201-MODBUSTCP supports 10/100 Mbit, full or half duplex operation.

The purpose of this manual is to provide you with a guide through setup of the 201 Weight Transmitter MODBUSTCP/IP interface. Please read it thoroughly and keep it available for future reference.

SPECIFICATIONS

Temperature Range: 14° to 104° F (-10° to +40° C)

Network Connections: (1) RJ-45 connector

Diagnostics: On board LED's CS (Chip Select), LK (Link) and ML (Main Line)

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FCC COMPLIANCE STATEMENT

This equipment generates uses, can radiate radio frequency, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference in which case the user will be responsible to take whatever measures necessary to correct the interference.

You may find the booklet "How to Identify and Resolve Radio TV Interference Problems" prepared by the Federal Communications Commission helpful. It is available from the U.S. Government Printing Office, Washington, D.C. 20402, stock No. 001-000-00315-4.

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FreeModbus Library: A portable Modbus implementation for Modbus ASCII/RTU.
Copyright © 2006 Christian Walter <wolti@sil.at>

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201 MODBUS/TCP

Modbus/TCP Setup Using Keypad

1. Press and hold the **F1** and **F2** keys until the 201 enters setup and displays *dAtE*.
2. Press the **F2** key until the display reads *EtHEr* and then press the **F3** key.

EtHEr

EnAbLE = *on* to enable Ethernet

dHCP = *on* for Dynamic IP
oFF to assign Static IP

IP 1 = First 3 digits of IP address

IP 2 = Second 3 digits of IP address

IP 3 = Third 3 digits of IP address

IP 4 = Fourth 3 digits of IP address

nEt 1 = Subnet Mask

nEt 2 = Subnet Mask

nEt 3 = Subnet Mask

nEt 4 = Subnet Mask

gAtE 1 = Gateway

gAtE 2 = Gateway

gAtE 3 = Gateway

gAtE 4 = Gateway

dnS 1 = DNS

dnS 2 = DNS

dnS 3 = DNS

dnS 4 = DNS

HEtP = *on* to enable Web Server

Port = Web port number

Lnk = Web limit access

SoC =

EIP = *oFF*

nbuS = *on* to enable ModbusTCP

For = *FLoAt* for Floating point data type
Int for Integer data type

Ord = *1234, 4321, 3412, 2143*

To use Modbus/TCP the Ethernet `ENABL=` prompt must be set to `on` and the `mbus=` prompt must be set to `on`.

The `FOR=` prompt allows the weight and rate of flow (if enabled) to be sent from the 201 as an integer or float.

Press **F2** to toggle the selection.

If integer is selected the output will have an assumed decimal place. For example, a weight of 10.5 with a calibration having two decimal places will be output as 1050.

Press **F3** to save the setting and advance to the next item.

The `ORD=` prompt allows setting the byte order for the weight and rate of flow (if enabled). The default order "1234" provides the byte order output match the 2XX-Modbus format.

Press **F2** to toggle the selection.

Press **F3** to save the setting and advance to the next item.

After changing network or Modbus settings cycle power on the 201 to make sure that the network is reinitialized.

CONFIGURATION USING WEB PAGE

If the HTTP Web server is enabled (default) then the configuration can be updated using the embedded web page. Enter the IP address of the 201 in the computer's web browser and hit enter. The web browser will show the home page of the 201:

Cardinal Scale Manufacturing Company

Home
Event Counters
Settings
Date/Time
Accumulators
Setup
Weighing Input
Filter
Ethernet
USB
Serial Port
Print Codes
Print Tabs
Digital I/O
Analog I/O
Storage Memory
Check Weigh
Preferences
Flow Rate
Digital Fill Control
Diagnostics
Log file

201 Status

Digital Inputs and Outputs:

Inputs			
1	2	3	4
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Off	Off	Off	Off
Outputs			
1	2	3	4
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/> On	<input type="radio"/> On	<input type="radio"/> On	<input type="radio"/> On
<input checked="" type="radio"/> Off	<input checked="" type="radio"/> Off	<input checked="" type="radio"/> Off	<input checked="" type="radio"/> Off

Analog Input and Outputs:

Input	
ADC Mode:	Current ▾
ADC Input:	0.03 mA
Outputs	
DAC 1 (4 - 20 mA):	4 mA ▾
DAC 2 (0 - 10V):	Gross ▾

Date/Time **10/11/2013 10:47:57**

Storage memory: **formatted capacity 15185M**

USB Device: **Not enabled**

Version: r1.00.07 Aug 29 2013 10:37:37

Log:

10/11/2013 10:43:16 System Check weigh OVER
 10/11/2013 10:43:11 System started

Click on the Ethernet tab to enter the Modbus configuration.

Cardinal Scale Manufacturing Company

Home	Ethernet
Event Counters	Ethernet: <input type="button" value="On"/> ▾
Settings	DHCP: <input type="button" value="On"/> ▾
Date/Time	IP: <input type="text" value="192"/> <input type="text" value="168"/> <input type="text" value="32"/> <input type="text" value="3"/>
Accumulators	Netmask: <input type="text" value="255"/> <input type="text" value="255"/> <input type="text" value="255"/> <input type="text" value="0"/>
Setup	Gateway: <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="0"/>
Weighing Input	DNS: <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="0"/>
Filter	Web server: <input type="button" value="On"/> ▾
Ethernet	Web port: <input type="text" value="80"/>
USB	Web limit access: <input type="button" value="No client IP limits"/> ▾
Serial Port	Allow IP from: <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="0"/>
Print Codes	Allow IP to: <input type="text" value="255"/> <input type="text" value="255"/> <input type="text" value="255"/> <input type="text" value="255"/>
Print Tabs	Raw server: <input type="button" value="Off"/> ▾
Digital I/O	Server port: <input type="text" value="10008"/>
Analog I/O	Server wt: <input type="button" value="Off"/> ▾
Storage Memory	Server print: <input type="button" value="Off"/> ▾
Check Weigh	Ethernet/IP: <input type="button" value="Off"/> ▾
Preferences	EIP Wt format: <input type="button" value="Float"/> ▾
Flow Rate	EIP Byte order: <input type="button" value="4321"/> ▾
Digital Fill Control	Modbus: <input type="button" value="On"/> ▾
Diagnostics	Modbus Wt format: <input type="button" value="Float"/> ▾
Log file	Modbus Byte order: <input type="button" value="1234"/> ▾
	<input type="button" value="Submit"/>

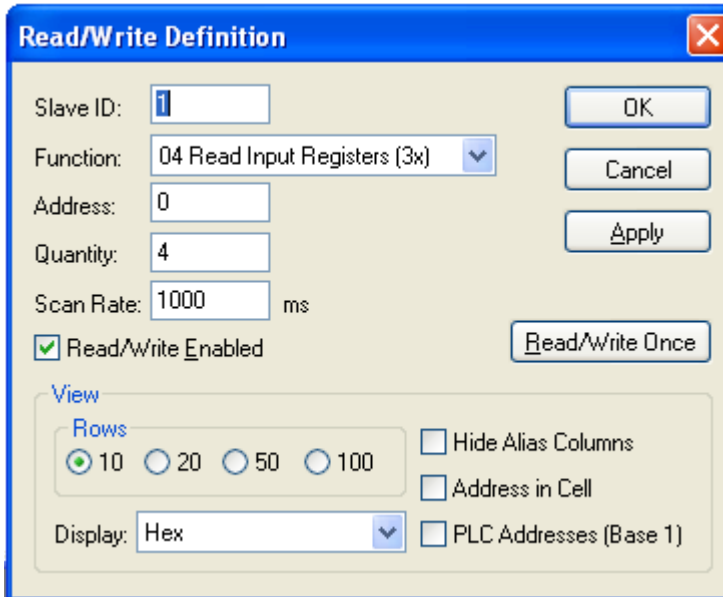
Enter the 201 configuration and click Submit to update.

After changing network or Modbus settings cycle power on the 201 to make sure that the network is reinitialized.

MODULE CONFIGURATION

Configure the PLC to communicate with the remote device and enter the IP address of the module; the Slave ID is set to 1, and the port is 502.

Use Modbus function code 04 (0x04) Read Input Registers to read data starting at address 0. The register data in the response message are packed as two bytes per register so a quantity of 4 is required. Here is an example of the setup to read the input registers:



Here is the data that was captured:

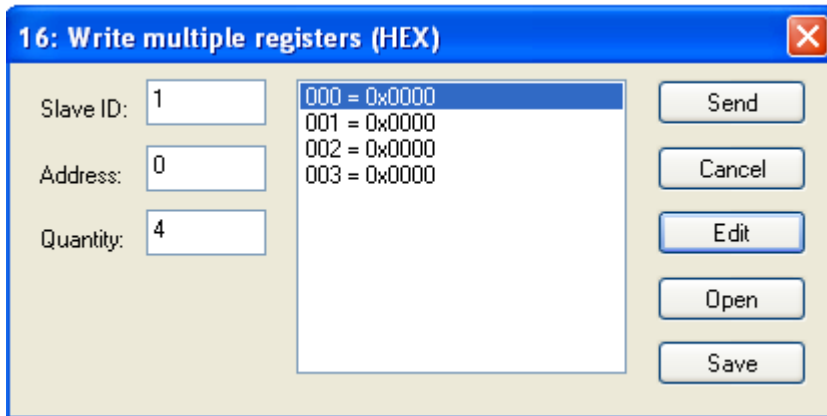
	Alias	
0		00000
0		0x0040
1		0x1C46
2		0x0000
3		0x0000

Input:

The weight data begins at Data[0] and uses two words to produce the floating point data. The example above was with a weight reading of 10000 lbs

Float = (461C400)

Use Modbus function code 16 (0x10) Write Multiple Registers to write a block of data starting at address 0.



COMMUNICATIONS

Data Sent from the 201 to the PLC

Float point weight. Byte 3	Float point weight. Byte 2	Word0
Float point weight. Byte 1	Float point weight. Byte 0	Word1
DIO status	Weight status. See bit definitions below	Word2
Flow Rate. Byte 1	Flow Rate. Byte 0	Word3
Flow Rate. Byte 3	Flow Rate. Byte 2	Word4

Data Sent from the PLC to the 201

Cmd1. See definition below	Cmd0. See definition below	Word0
N/A	Digital Output Bits	Word1
Float point value for Cmd. Byte 3	Float point value for Cmd. Byte 2	Word2
Float point value for Cmd. Byte 1	Float point value for Cmd. Byte 0	Word3
N/A	N/A	Word4

WEIGHT STATUS (Data[4])

Bit 0	Motion
Bit 1	Below Zero
Bit 2	Center of Zero
Bit 3	Over Capacity
Bit 4	Weigh Units 0=unit1 (lb)/1=unit2 (kg)
Bit 5	Weigh Mode 0 = gross, 1 = net
Bit 6	Not defined
Bit 7	Scale Error. The indicator has failed to communicate for at least 3 seconds, data is invalid.

DIO STATUS (Data[5])

Bit 0	IN1	0=OFF / 1=ON
Bit 1	IN2	0=OFF / 1=ON
Bit 2	IN3	0=OFF / 1=ON
Bit 3	IN4	0=OFF / 1=ON
Bit 4	OUT1	0=OFF / 1=ON
Bit 5	OUT2	0=OFF / 1=ON
Bit 6	OUT3	0=OFF / 1=ON
Bit 7	OUT4	0=OFF / 1=ON

COMMANDS

CMD0 and CMD1 combined make the command word. Command words are broken into command bits for PLC ease of programming. To invoke a command set the bit to one. The PLC should continue to send a command until the command is returned by the indicator. If the indicator cannot perform a command the returned command will include Bit 7.

201 to PLC

The Output Address Format is:

Address	Description																
Byte 0	Scale 1 weight 0																
Byte 1	Scale 1 weight 1																
Byte 2	Scale 1 weight 2																
Byte 3	Scale 1 weight 3																
Byte 4	Scale 1 status byte may contain combinations of the following: <table border="1" data-bbox="418 768 1138 1129"> <tbody> <tr> <td>Bit 0</td> <td>Motion</td> </tr> <tr> <td>Bit 1</td> <td>Below Zero</td> </tr> <tr> <td>Bit 2</td> <td>Center of Zero</td> </tr> <tr> <td>Bit 3</td> <td>Over Capacity</td> </tr> <tr> <td>Bit 4</td> <td>Weigh Units 0=unit1 (lb)/1=unit2 (kg)</td> </tr> <tr> <td>Bit 5</td> <td>Weigh Mode 0 = gross, 1 = net</td> </tr> <tr> <td>Bit 6</td> <td>Not defined</td> </tr> <tr> <td>Bit 7</td> <td>Weight Error</td> </tr> </tbody> </table>	Bit 0	Motion	Bit 1	Below Zero	Bit 2	Center of Zero	Bit 3	Over Capacity	Bit 4	Weigh Units 0=unit1 (lb)/1=unit2 (kg)	Bit 5	Weigh Mode 0 = gross, 1 = net	Bit 6	Not defined	Bit 7	Weight Error
Bit 0	Motion																
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Bit 7	Weight Error																
Byte 5	DIO status byte <table border="1" data-bbox="386 1188 1331 1367"> <tbody> <tr> <td>Bit 0</td> <td>IN1</td> <td>Bit 4</td> <td>OUT1</td> </tr> <tr> <td>Bit 1</td> <td>IN2</td> <td>Bit 5</td> <td>OUT2</td> </tr> <tr> <td>Bit 2</td> <td>IN3</td> <td>Bit 6</td> <td>OUT3</td> </tr> <tr> <td>Bit 3</td> <td>IN4</td> <td>Bit 7</td> <td>OUT4</td> </tr> </tbody> </table>	Bit 0	IN1	Bit 4	OUT1	Bit 1	IN2	Bit 5	OUT2	Bit 2	IN3	Bit 6	OUT3	Bit 3	IN4	Bit 7	OUT4
Bit 0	IN1	Bit 4	OUT1														
Bit 1	IN2	Bit 5	OUT2														
Bit 2	IN3	Bit 6	OUT3														
Bit 3	IN4	Bit 7	OUT4														
Byte 6	Flow rate 0 (if flow rate enabled, zero if disabled)																
Byte 7	Flow rate 1 (if flow rate enabled, zero if disabled)																
Byte 8	Flow rate 2 (if flow rate enabled, zero if disabled)																
Byte 9	Flow rate 3 (if flow rate enabled, zero if disabled)																

PLC to 201

The Input Address Format is:

Address	Description																
Byte 0	Scale 1 command byte: <table border="1" data-bbox="477 338 1166 695"> <tr> <td>Bit 0</td> <td>Gross/Net</td> </tr> <tr> <td>Bit 1</td> <td>Not defined</td> </tr> <tr> <td>Bit 2</td> <td>Zero Scale</td> </tr> <tr> <td>Bit 3</td> <td>PB Tare</td> </tr> <tr> <td>Bit 4</td> <td>KB Tare (value in bytes 4,5,6,7)</td> </tr> <tr> <td>Bit 5</td> <td>Request High Resolution Weight</td> </tr> <tr> <td>Bit 6</td> <td>Set Outputs (value in byte 2)</td> </tr> <tr> <td>Bit 7</td> <td>Not defined</td> </tr> </table>	Bit 0	Gross/Net	Bit 1	Not defined	Bit 2	Zero Scale	Bit 3	PB Tare	Bit 4	KB Tare (value in bytes 4,5,6,7)	Bit 5	Request High Resolution Weight	Bit 6	Set Outputs (value in byte 2)	Bit 7	Not defined
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Bit 2	Zero Scale																
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Bit 4	KB Tare (value in bytes 4,5,6,7)																
Bit 5	Request High Resolution Weight																
Bit 6	Set Outputs (value in byte 2)																
Bit 7	Not defined																
Byte 1	Not used																
Byte 2	Bit 0 = OUT1 Bit 1 = OUT2 Bit 3 = OUT3 Bit 4 = OUT4																
Byte 3	Not used																
Byte 4	Input tare byte 0																
Byte 5	Input tare byte 1																
Byte 6	Input tare byte 2																
Byte 7	Input tare byte 3																
Byte 8	Not used																
Byte 9	Not used																



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Cardinal Scale Mfg. Co.

102 E. Daugherty, Webb City, MO 64870 USA

Ph: 417-673-4631 or 1-800-641-2008

Fax: 417-673-2153

www.cardinalscale.com

Technical Support: 1-866-254-8261

E-mail: tech@cardet.com