



201 Ethernet I/P

201 Weight Transmitter

Ethernet I/P Interface

Setup Manual

8400-0142-2M Rev D
04/16

203 E. Daugherty, Webb City, MO 64870 USA
Ph: 417-673-4631 • Fax: 417-673-2153
www.cardinalscale.com



Printed in USA

Technical Support: Ph: 866-254-8261 • tech@cardet.com

INTRODUCTION

The 201 Weight Transmitter Ethernet I/P has been designed for the industrial environment where interfacing through an Ethernet I/P 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 Ethernet I/P network. The 201 weight transmitter 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 Ethernet I/P interface. Please read it thoroughly and keep it handy for future reference.

SPECIFICATIONS

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

Network Connections: (1) RJ-45 connector

Diagnostics: Embedded Web Page

COPYRIGHT

All rights reserved. Reproduction or use, without expressed written permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein.

DISCLAIMER

While every precaution has been taken in the preparation of this manual, the Seller assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from use of the information contained herein. All instructions and diagrams have been checked for accuracy and ease of application; however, success and safety in working with tools depend to a great extent upon the individual accuracy, skill and caution. For this reason, the Seller is not able to guarantee the result of any procedure contained herein. Nor can they assume responsibility for any damage to property or injury to persons occasioned from the procedures. Persons engaging the procedures do so entirely at their own risk.

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. The stock No. is 001-000-00315-4.

This page intentionally left blank.

201 ETHERNET I/P

Ethernet I/P Setup Using Keypad

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

WtTP = on to enable Web Server

Port = Web port number

LnT = Web limit access

SoC = oFF to disable Raw Server

EIP = on to enable Ethernet I/P

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

Ord = *1234, 4321, 3412, 2143* byte order for the four bytes of weight data

nbuS = oFF to disable ModbusTCP

To use Ethernet I/P the Ethernet "E n A b L =" prompt must be set to "o n" and the "E , P =" prompt must be set to "o n".

The "F o r =" prompt allows the weight value 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 "o r d =" prompt allows setting the byte order for the weight value. Press **F2** to toggle the selection. Press **F3** to save the setting and advance to the next item.

To save the settings and return to weight display press the **F1** and **F2** keys.

After changing network or Ethernet I/P settings cycle power on the 201 to insure 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

5000 lb G

201
IN1 IN2 IN3 IN4 OUT1 OUT2 OUT3 OUT4

← →
ZERO

↕
TARE

NET
GROSS

← F1

↑ F2

← F3

www.cardinalscale.com

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			

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 Ethernet I/P configuration.

Cardinal Scale Manufacturing Company

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

Enter the 201 configuration and click Submit to update.

After changing network or Ethernet I/P settings cycle power on the 201 to insure that the network is reinitialized.

DATA FORMAT

PLC INPUT DATA

Word #	Value				Style	Type
Word 0	Scale 1 Weight				Hex/Dec	DINT
Word 1	Cmd1 Echo	Cmd0 Echo	DIO Status	Status	Binary	DINT

STATUS BITS

Bit #	Description
Bit 0	MOTION
Bit 1	BELOW ZERO
Bit 2	CENTER OF ZERO
Bit 3	OVER CAPACITY
Bit 4	WEIGHT UNITS 0 = WEIGHING UNIT 1 (PRIMARY UNIT) 1 = WEIGHING UNIT 2 (ALTERNATE UNIT)
Bit 5	WEIGHT MODE 0=GROSS/1=NET
Bit 6	HEARTBEAT
Bit 7	SCALE ERROR
Bit 8 – 15	DIO STATUS BIT
Bit 16	COMMAND GROSS/NET COMPLETE
Bit 17	COMMAND PRINT COMPLETE
Bit 18	COMMAND ZERO COMPLETE
Bit 19	COMMAND PB TARE COMPLETE
Bit 20	COMMAND KB TARE COMPLETE
Bit 21	REQUEST HIGH RESOLUTION ACTIVE
Bit 22	REQUEST FLOW RATE ACTIVE
Bit 23	COMMAND RETURN TO GROSS MODE COMPLETE
Bit 24	SET OUTPUTS COMPLETE
Bit 25 - 31	NOT DEFINED

DIO Status Bits	
Bit 0	IN1
Bit 1	IN2
Bit 2	IN3
Bit 3	IN4
Bit 4	OUT1
Bit 5	OUT2
Bit 6	OUT3
Bit 7	OUT4

PLC OUTPUT DATA

Word #	Value				Style	Type
Word 0	N/A	OUTPUTS	CMD1	CMD0	Binary	DINT
Word 1	Scale Tare Weight				Hex/Dec	DINT

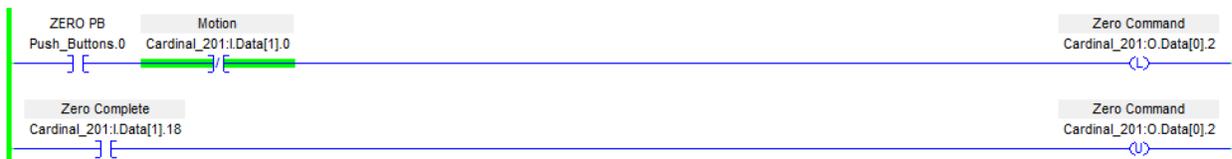
COMMAND BITS

Bit #	Description
Bit 0	COMMAND GROSS/NET
Bit 1	COMMAND PRINT
Bit 2	COMMAND ZERO
Bit 3	COMMAND PB TARE
Bit 4	COMMAND KB TARE REQUIRES TARE WEIGHT VALUE
Bit 5	COMMAND REQUEST HIGH RESOLUTION WEIGHT
Bit 6	COMMAND REQUEST RATE OF FLOW MEASUREMENT
Bit 7	COMMAND RETURN TO GROSS MODE
Bit 8	BIT8 – SET DIGITAL OUTPUTS
Bit 9 – 15	NOT DEFINED
Bit 16	OUT1
Bit 17	OUT2
Bit 18	OUT3
Bit 19	OUT4
Bit 20 - 23	NOT DEFINED
Bit 24 - 31	NOT DEFINED

Command bits that are sent to the 201 are one shot only. The 201 requires the command bit to return to 0 before sending again. The command complete bit returned from the 201 can be used to unlatch the bit indicating the desired operation has been completed by the 201. The 201 will return a scale error bit 7 of the status bits if it cannot process the desired command.

Refer to the error and status codes section of the Model 201 Weight Transmitter Installation and Technical manual (8400-M117-O1) for an explanation of errors.

The following example illustrates how to send a zero command to the 201 and then unlatch the bit when the zero command has been completed. The Motion bit checks for motion on the scale. The 201 will not ZERO, TARE, or PRINT if Motion is present on the scale. Adding the Motion detection will just prevent the 201 from sending an error.

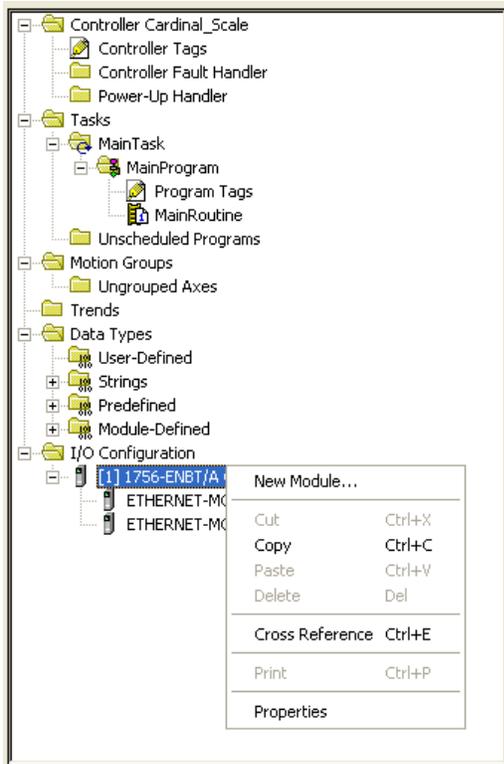


All of the commands bits should be processed like the example for the zero command except for bit 4 and 8. When the KB Tare command is processed it will need a floating point or decimal value copied into Word 1 for the Scale Tare Weight value. Then bit 4 can be processed like the other command bits. Bit 8 requires four bits of outputs to be specified starting at the third byte (bit 16) of Word 0.

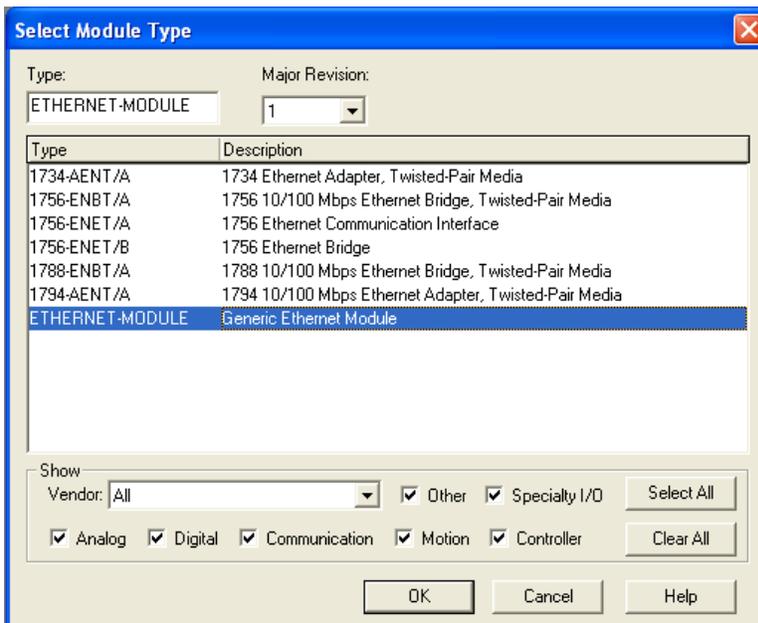
Command bits 5 and 6 will remain active as long as the bit is set in the output word. To return to normal weight mode bits 5 and 6 must be cleared.

CONFIGURE THE PLC USING RSLOGIX5000

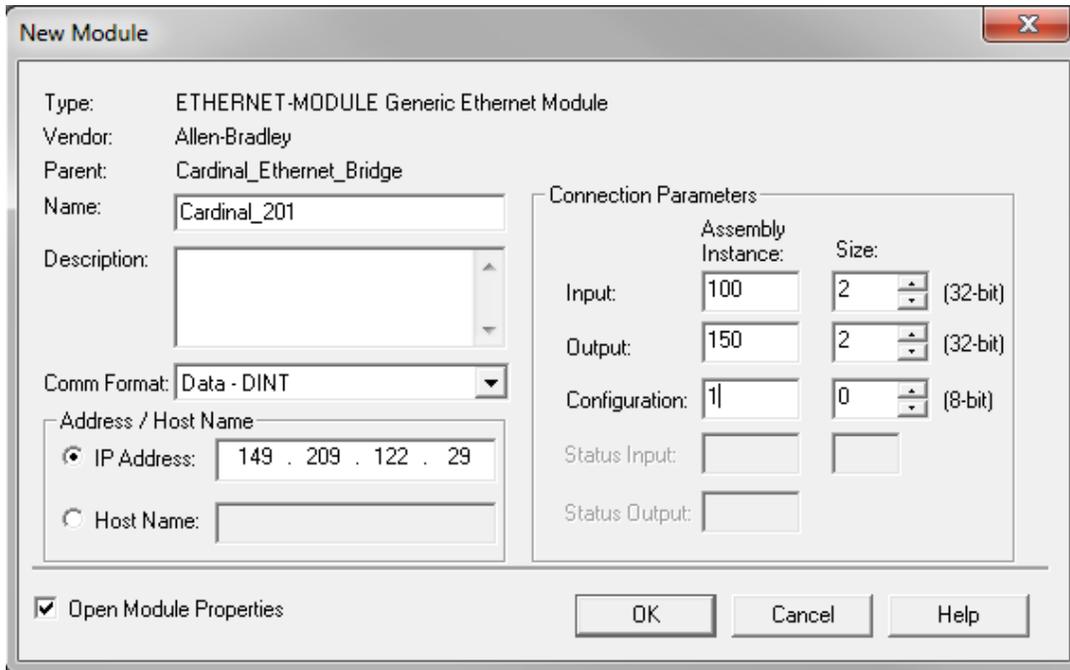
Either create a new project or use an existing, set the program in “Offline” mode. Add the module to the configuration in the PLC. Start by right clicking the Ethernet/IP module/bridge in the I/O configuration, and select “New Module”.



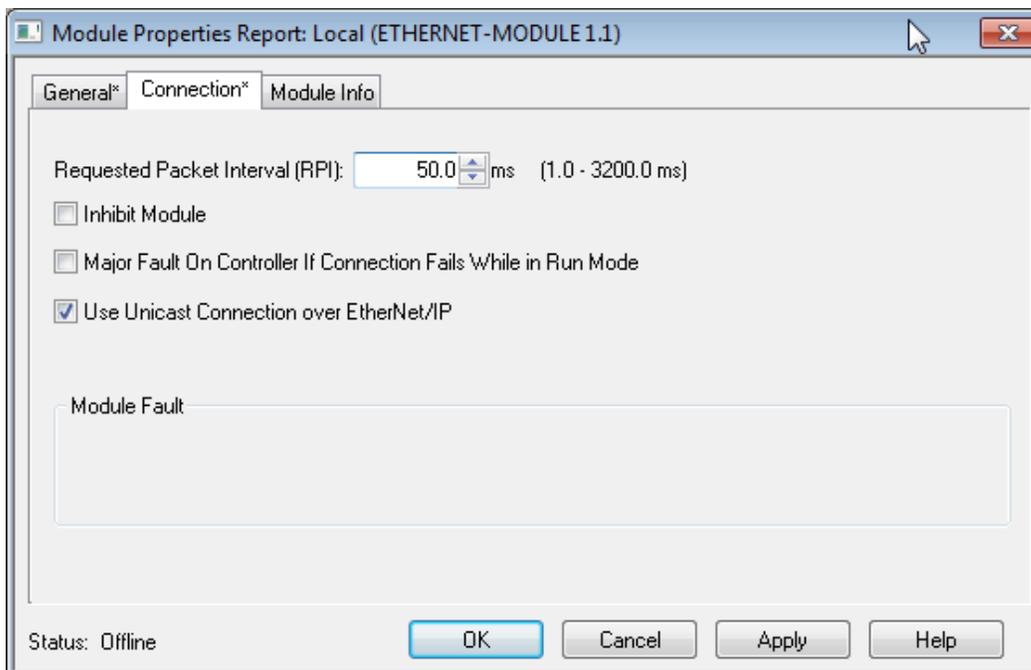
Now a dialog window “Select Module Type” will appear. Select “Generic Ethernet module” and click on OK.



In the next dialog window, RSLogix 5000 will ask for information regarding the communications to the module. First enter a name for the module. This name will create a tag in RSLogix5000, which can be used to access the memory location in the PLCs memory where the data for the module will be stored. With the name entered, click on OK.



In the next dialog box enter a value for the time between each scan of the module, called Request Packet Interval (RPI). A recommended value is 50 ms. Make sure that “Inhibit Module” isn’t checked. Check “Use Unicast Connection over EtherNet/IP” and then click on OK.



Now the module has been added to the I/O configuration in RSLogix5000.

Now go online and download the configuration to the PLC.

1. Select Go Online in the communication menu.
2. A new window will open.
3. Select download.
4. A new window will pop-up with the question if you actually want to download the configuration.
5. Select “Download”.
6. The configuration will now be downloaded to the PLC.

Now it's possible to access the data exchanged by ControlLogix5000 and the module. To do this, open the “Controller Tags” window and go to monitor tags. Three tags named “Cardinal_201_EIP:C”, “Cardinal_201_EIP:I” and ” Cardinal_201_EIP:O” should be visible, representing the three instances configuration, input and output. The configuration instance will be created even if we selected zero as its size. The Cardinal_201_EIP:I tag is data coming from the module and Cardinal_201_EIP:O tag holds data going to the module.

If weight data has decimal point then use the 201 menu configuration for “float” to transfer the first word data as an IEEE-754 float. The second word has binary status bits. The example below is for a displayed weight value of 1000 lb.

Scope: <input type="text" value="Cardinal_Scale"/>		Show...		Show All	
Name	Value	Force Mask	Style	Data Type	
+ Cardinal_201:C	{...}	{...}		AB:ETHERNET_...	
- Cardinal_201:I	{...}	{...}		AB:ETHERNET_...	
- Cardinal_201:I.Data	{...}	{...}	Decimal	DINT[2]	
+ Cardinal_201:I.Data[0]	16#447a_0000		Hex	DINT	
+ Cardinal_201:I.Data[1]	2#0000_0000_0000_0000_0001_0000_0010_0000		Binary	DINT	
- Cardinal_201:O	{...}	{...}		AB:ETHERNET_...	
- Cardinal_201:O.Data	{...}	{...}	Decimal	DINT[2]	
+ Cardinal_201:O.Data[0]	2#0000_0000_0000_0000_0000_0000_0000_0000		Binary	DINT	
+ Cardinal_201:O.Data[1]	0		Decimal	DINT	

Copy the floating point data from the controller tag to a real data type.

Scope: <input type="text" value="MainProgram"/>		Show...		Show All	
Name	Value	Force Mask	Style	Data Type	
Weight_201_Float	1000.0		Float	REAL	

0	COP	Copy File	Source Cardinal_201:I.Data[0]	Dest Weight_201_Float	Length 1
---	-----	-----------	-------------------------------	-----------------------	----------

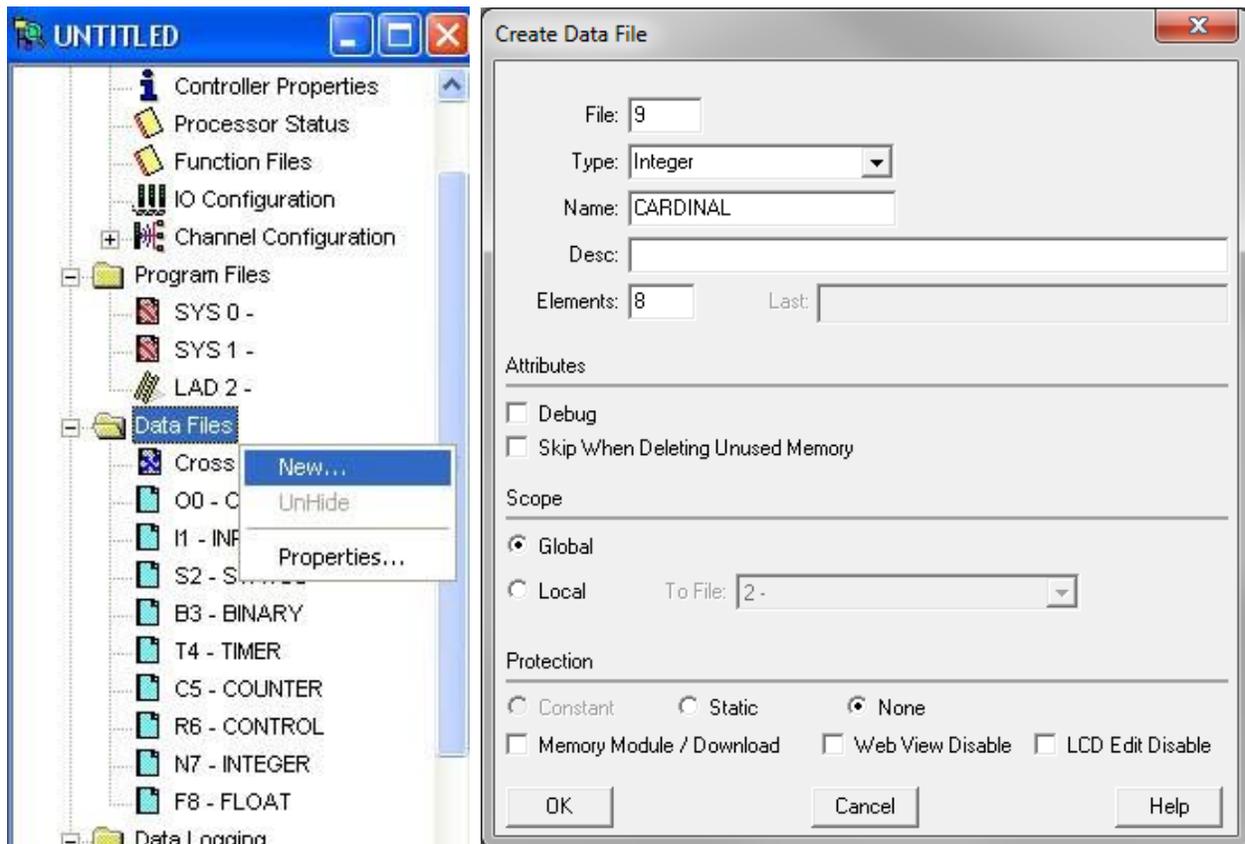
If weight data does not have a decimal point the data can be transferred as a double integer word. The second word has binary status bits.

Scope: <input type="text" value="Cardinal_Scale"/>		Shgw...		Show All	
Name	Value	Force Mask	Style	Data Type	
+ Cardinal_201:C	{...}	{...}		AB:ETHERNET_...	
- Cardinal_201:I	{...}	{...}		AB:ETHERNET_...	
- Cardinal_201:I.Data	{...}	{...}	Decimal	DINT[2]	
+ Cardinal_201:I.Data[0]	1000		Decimal	DINT	
+ Cardinal_201:I.Data[1]	2#0000_0000_0000_0000_0001_0000_0010_0000		Binary	DINT	
- Cardinal_201:O	{...}	{...}		AB:ETHERNET_...	
- Cardinal_201:O.Data	{...}	{...}	Decimal	DINT[2]	
+ Cardinal_201:O.Data[0]	2#0000_0000_0000_0000_0000_0000_0000_0000		Binary	DINT	
+ Cardinal_201:O.Data[1]	0		Decimal	DINT	

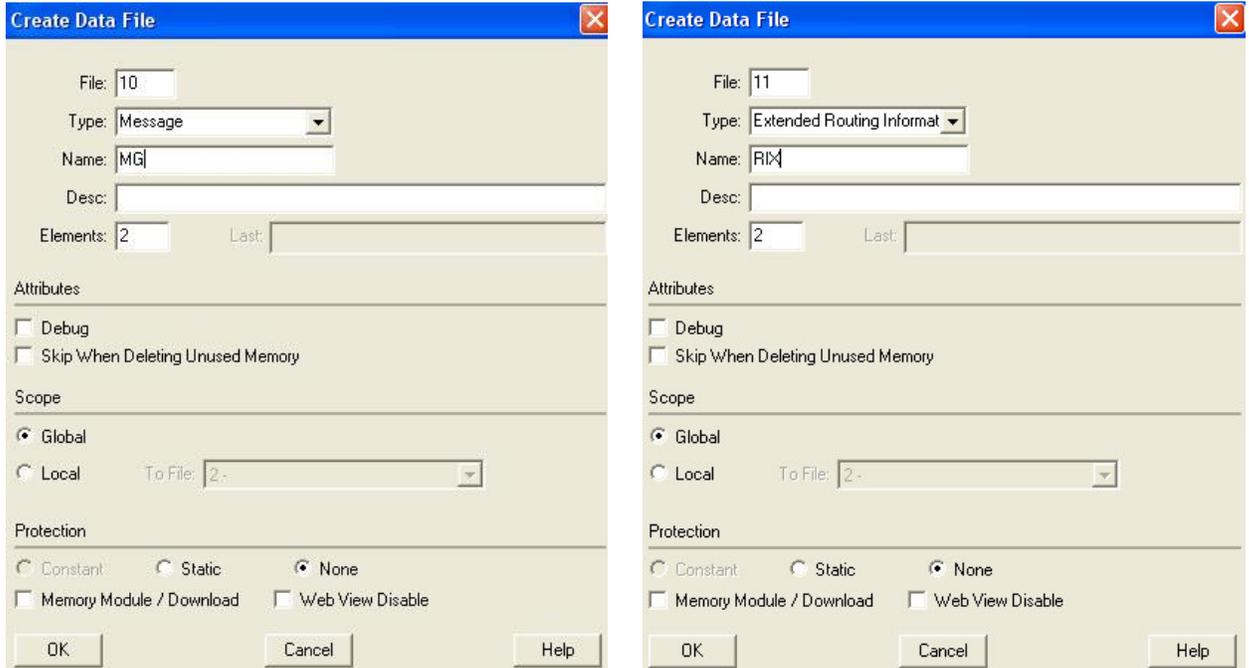
MICROLOGIX SETUP

Communicating to the 201 Weight Transmitter is done through a CIP Generic (MSG) message instruction. The data format is set to Float in the 201 weight transmitter. The MSG instruction is a control block for storing the instruction parameters and configuration setup screen. The Ethernet CIP Generic command consists of a Service Code; the object Class, Instance and Attribute, and the Send Receive Data.

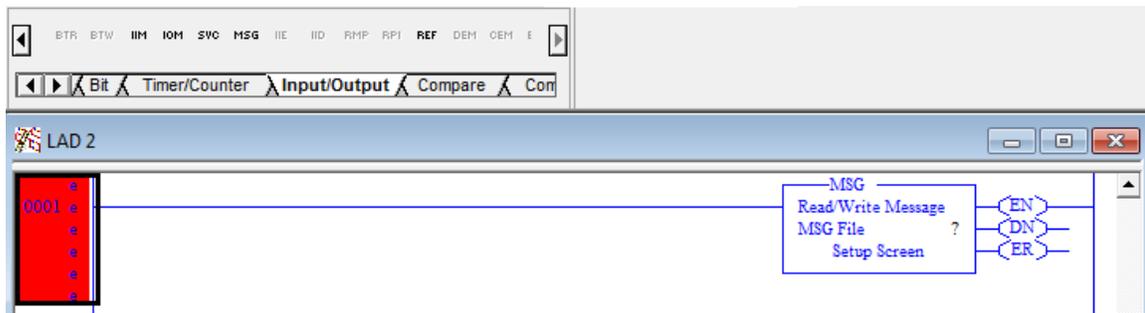
First, 4 data files will need to be created for the MSG instruction. Data files can be created by right clicking on Data Files and selecting New. Two integer files will be needed to store the data to and from the 201. Create one for 8 elements from the 201 and one containing 8 elements that will be sent to the 201.



Next, create a data file for Message Type that contains 2 elements, one to control the Read Instruction and one for the Write Instruction. Create a data file for Extended Routing Information with 2 elements to store the information from the message instruction.



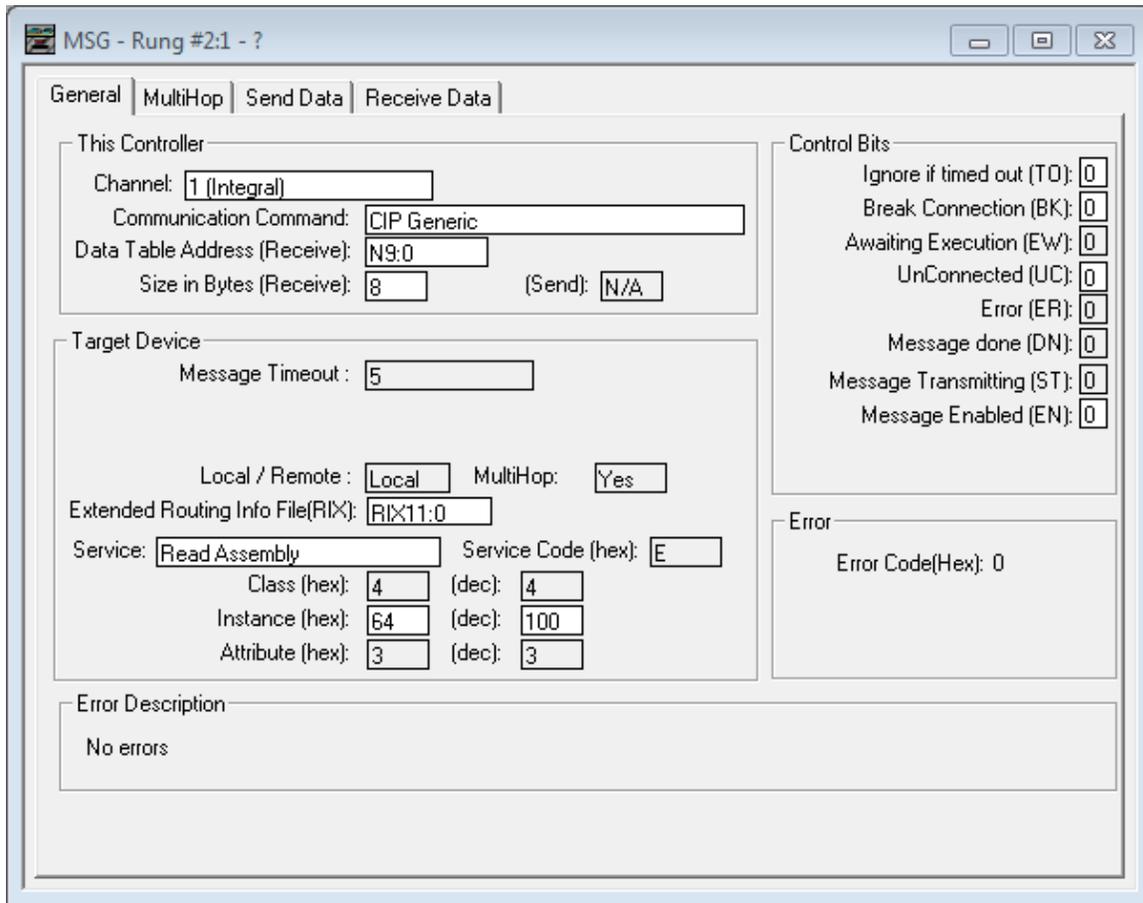
Add the MSG instruction, found under the Input/Output tab.



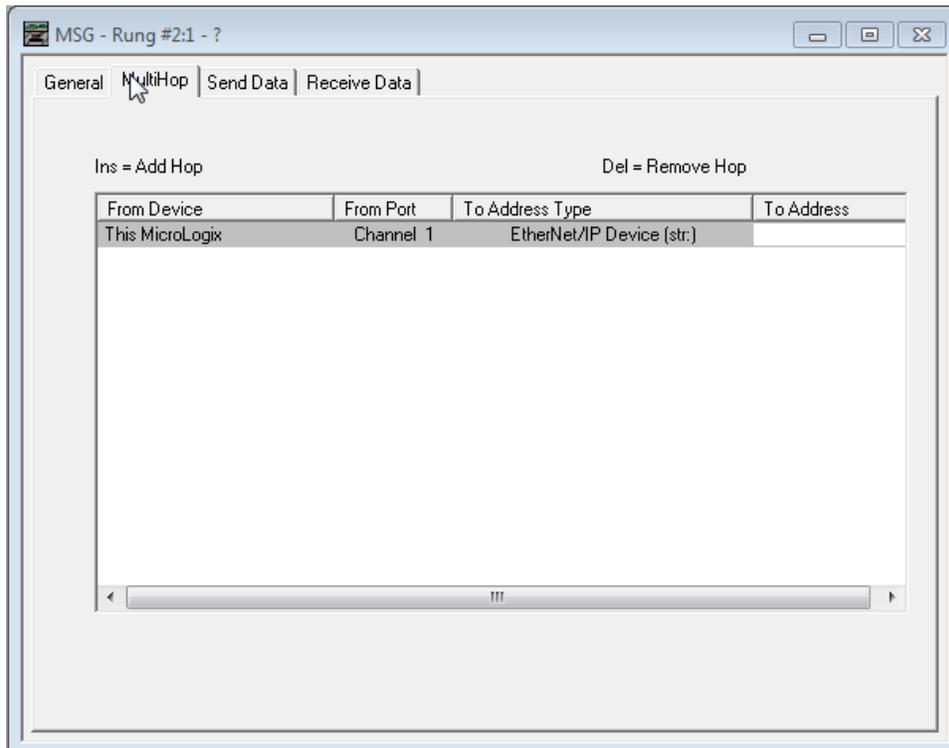
Select the Setup Screen inside the MSG box. Select Channel 1 for the controller. Use the pull down menu to select “CIP Generic” under the Communication Command.

Type in the Integer Data Table Address that will be used to store the data read from the 201, along with the size which is 8 bytes. Under the Extended Routing Info, put in the data table created for the Extended Routing Information. Each MSG instruction must have its own Extended Routing Info File (RIX).

Under Service, select Read Assembly. Class will be 4, Instance 64 hex and Attribute 3.

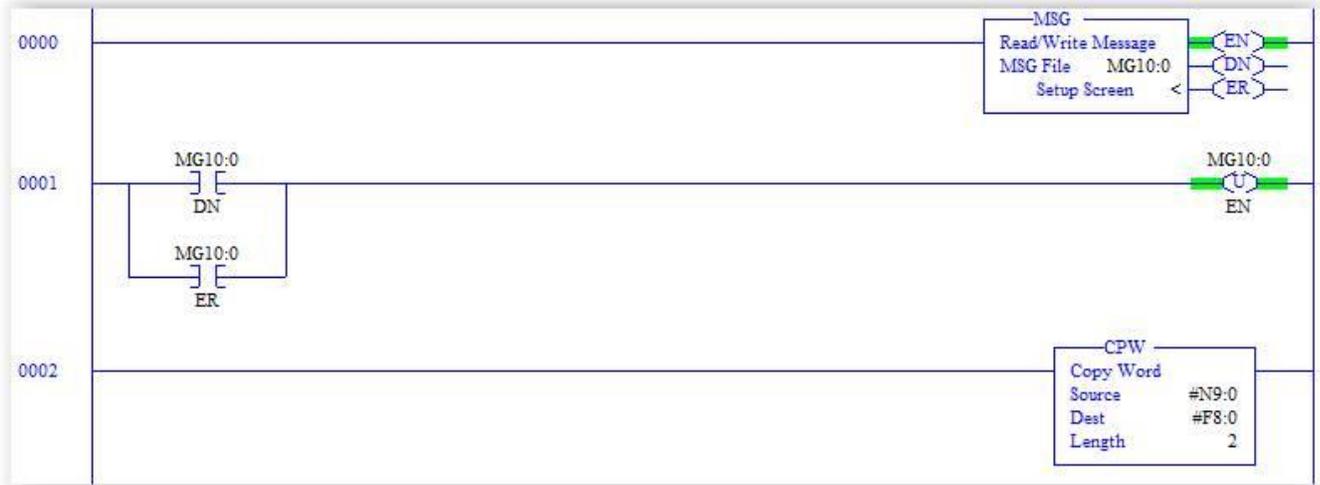


Next, select the “MultiHop” tab. In this tab, enter the IP address of the 201 Weight Transmitter.



Double click and Open the Channel Configuration. On the Channel 1 tab, make sure there is an IP address on the MicroLogix. If there is not, uncheck the BOOTP Enable box. This will allow an IP address to be put into the MicroLogix.

This message instruction should now read the 8 input bytes and place them in the N9:0 data table address. To transfer the floating point weight reading from N9:0 to a floating point data type add a CPW instruction.



To read continuously from the 201 the MG10:0/EN bit will have to be unlatched after the MG10:0/DN is complete. This will retrigger the MSG instruction to start the read from the 201 again. ORing the MG10:0/ER bit will discard a message transfer error and unlatch the enable bit, thus retriggering the transfer.

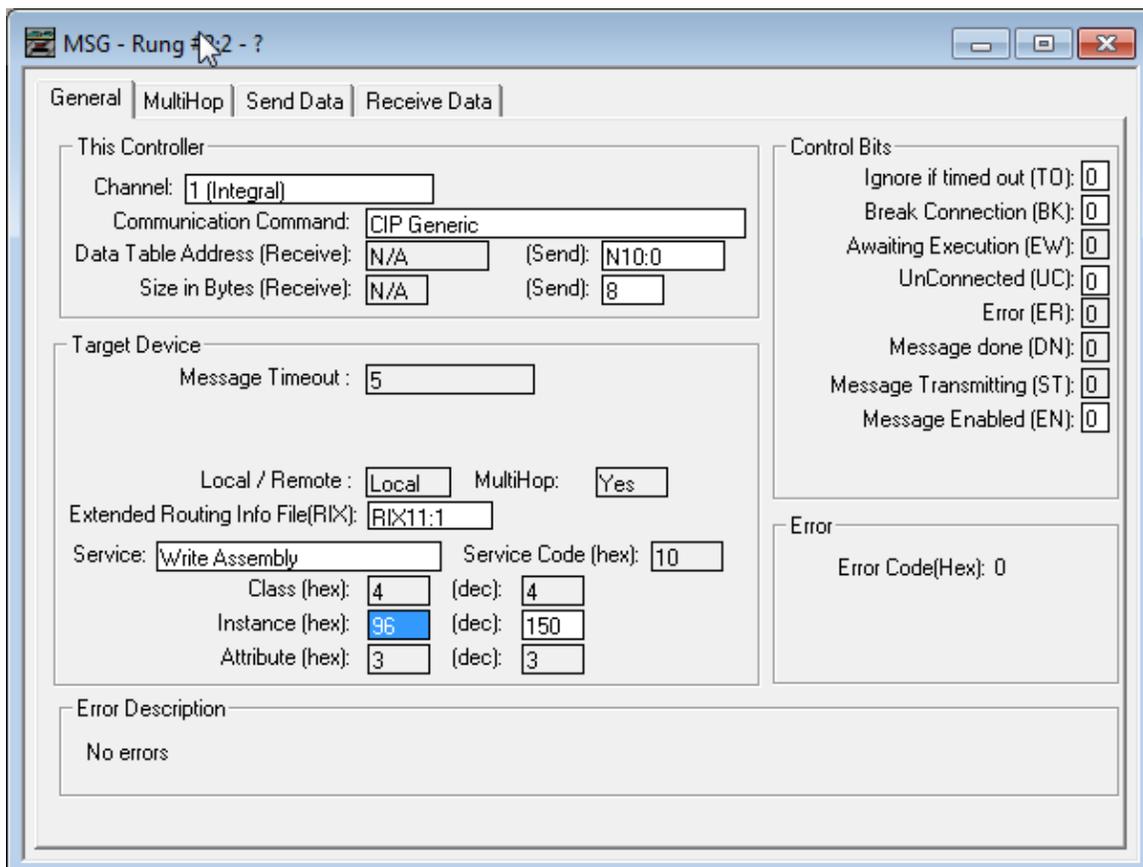
Save the program and download to the MicroLogix.

Going online into Remote Run, the data from the MSG instruction can now be read under the "Receive Data" tab. The first four bytes of data contain the weight reading and when copied to F8:0 will display the floating point weight value. Change the byte order setting in the 201 *ordz* to 4321 to make the weight reading display correctly.

Now, in order to write the output data to the 201, add a MSG message instruction again. Under the “General” tab, the Service will now be a Write Assembly.



Set the Send data size, along with the Send data table address. In this example, a size of 8 with N10:0 is being used. The RIX file should be different than the file used for the Read Assembly. The Service is now Write Assembly; Class 4, with the Instance being 96 (hex) and Attribute 3.



Next, select the “MultiHop” tab and type in the IP address of the 201. Under the “Send Data” tab will be the data that gets sent from N10:0 to the 201.

