MX200 EthernetIP Vacuum Controller
Instruction Manual
Rev C

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1. Description, Specifications, and Part Numbers

1.1 Description

1.1.1 EthernetIP is an increasingly popular industrial network communication standard compatible with Rockwell Automation Allen-Bradley programmable logic controllers (PLCs) and PCs. The EthernetIP version of the Televac® MX200 Vacuum Controller supports EthernetIP communications, allowing the users to interface directly with supported PLCs and PCs, including the ability to acquire vacuum data and adjust settings from a convenient, remote location without complicated conversion tools.

The Televac® EthernetIP implementation supports Class 3 acyclic request, allowing users to utilize the EthernetIP interface as a serial port replacement. The Televac® EthernetIP implementation also supports a Class 1 cyclic output, transmitted at a rate settable by the user. The EthernetIP communications module includes indicator LEDs that show network and module status, as well as port activity. The EthernetIP communications module also includes a built-in web server that can host a password protected website, which allows users to change network settings and access all available commands from the network.

The EthernetIP communications module is designed around an industry recognized HMS Anybus CompactCom module, which handles the network interface. The module has been pre-certified by HMS to provide EthernetIP network conformance.

The Televac® brand of The Fredericks Company was created in 1935 and is an industry leader in vacuum measurement technology. Our team of engineers and application specialists deliver broad practical knowledge and experience across a wide range of markets and application areas. In keeping with the company's history of outstanding customer support, Televac® provides the insight and guidance needed to take design concepts to reality in a cost-effective manner. For more information, visit our website at www.fredericks company.com.

1.2 EthernetIP Specifications

Connectors	2 X RJ45
Ports	10 / 100 Mbit, half or full duplex
DHCP	Enable or disable

Class 1 Connections	
Connection Type	Point-to-point, Multicast
Target to Originator (Read) Instance ID	100
Data Size	40
Originator to Target (Write) Instance ID	150
Data Size	4
Configuration Instance	3
Supported Simultaneous Connections	4
Requested Packet Interval	1 to 3200 ms
Trigger Types	Cyclic, Change of State
Priorities	Low, High, Scheduled, Urgent

Class 3 Connections	
Service	0xE (get), 0x10 (set)
Class	0xA2
Instance	See ADI table for desired variable
Value Attribute	5
Supported Simultaneous Connections	6
Requested Packet Interval	100 to 10000 ms
Connection Type	Point-to-point
Trigger Type	Application
Priority	Low

1.3 MX200 Part Numbers

Description	**Part Number**
MX200 Base Unit EthernetIP/USB	2-7900-037
Power Supply Module for MX200 EthernetIP/USB	2-6200-313
EthernetIP/USB Communications Module	2-6200-314
Quad Relay Module	2-6200-411
1E Piezo Diaphragm Module	2-6200-220
1F Piezo Diaphragm Module	2-6200-244
2A Dual Thermocouple Module	2-6200-186
4A Dual Convection Module	2-6200-415
7B Penning Magnetron Cold Cathode Module	2-6200-227
7E/F/FC/FCS Double Inverted Magnetron Cold Cathode Module	2-6200-285
Dual Capacitance Diaphragm Module (24 V DC)	2-6200-451
Dual Capacitance Diaphragm Module (15 V DC)	2-6200-452

1.4 Installation Information

1.4.1 The EthernetIP module is compatible with Windows operating systems 7 and 10. IPv6 addressing and networking is not supported at this time. Refer to Televac® application notes 3017 and 3018 for more installation information.

2. Network Information

2.1 Port Details

2.1.1 The EthernetIP module has two ports available. The ports use RJ45 connectors linked with a switch so that either port may be selected for use. The interface supports 10 / 100 Mbit, half or full duplex operations, which can be configured either manually or automatically. Units are shipped with port configuration set to automatic. The recommended cable to use for networking is a cat5e straight-through Ethernet cable.

2.2 Class 1 Connections

Connection Type	Point-to-point, Multicast
Target to Originator (Read) Instance ID	100
Data Size	40
Originator to Target (Write) Instance ID	150
Data Size	4
Configuration Instance	3
Supported Simultaneous Connections	4
Maximum Input Connection Size	1448 bytes with Large_Forward_Open 509 bytes with Forward_Open
Maximum Output Connection Size	1448 bytes with Large_Forward_Open 505 bytes with Forward_Open
Supported Requested Packet Interval	1 to 3200 ms
Target (Module) to Originator (Master) Connection Type	Point-to-point, Multicast, Null
Originator (Master) to Target (Module) Connection Type	Point-to-point, Null
Trigger Types	Cyclic, Change of State
Priorities	Low, High, Scheduled, Urgent

2.3 Class 3 Connections

Service	0xE (get), 0x10 (set)
Class	0xA2
Instance	See ADI table in section 6.1 for desired variable
Data Value Attribute	5
Supported Simultaneous Connections	6
Requested Packet Interval	100 to 10000 ms
Target (Module) to Originator (Master) Connection Type	Point-to-point
Originator (Master) to Target (Module) Connection Type	Point-to-point
Connection Type	Point-to-point
Trigger Type	Application
Supported Connection Size	1448 bytes
Priority	Low

2.4 DHCP and Configuring the IP Address

2.4.1 The user can enable or disable DHCP mode for the EthernetIP communications module. Standard units are shipped with DHCP mode disabled unless explicitly requested otherwise. This simplifies the process for users to assign their own IP addresses, subnet masks, and gateways. Unit IP addresses must be set individually, as multiple default addresses on the same network will cause network conflicts. Default values for the EthernetIP communications module are the following:

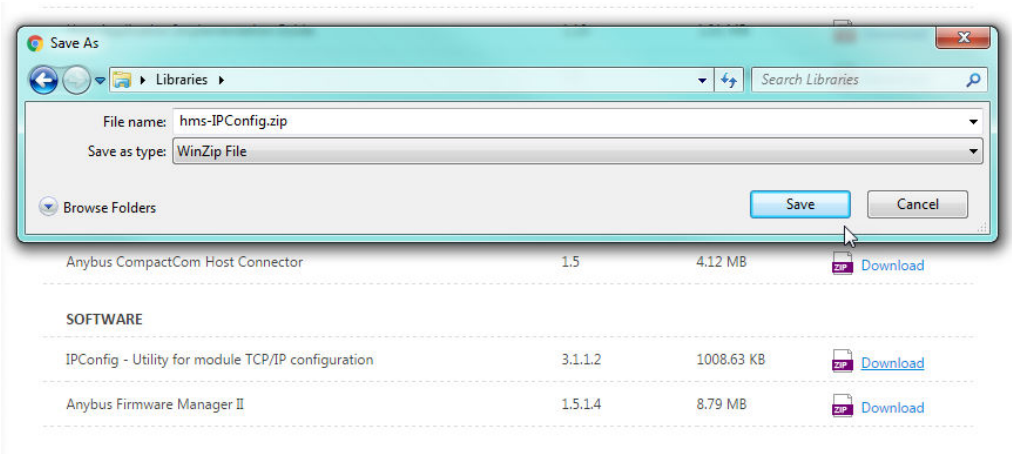
Default IP Address	192.168.0.8
Default Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0

2.4.2 In order to configure the IP address, download the free IPconfig utility directly from HMS. The IPconfig utility allows users to change the network settings for the module. Follow the link and see the steps below for downloading and using Ipconfig:

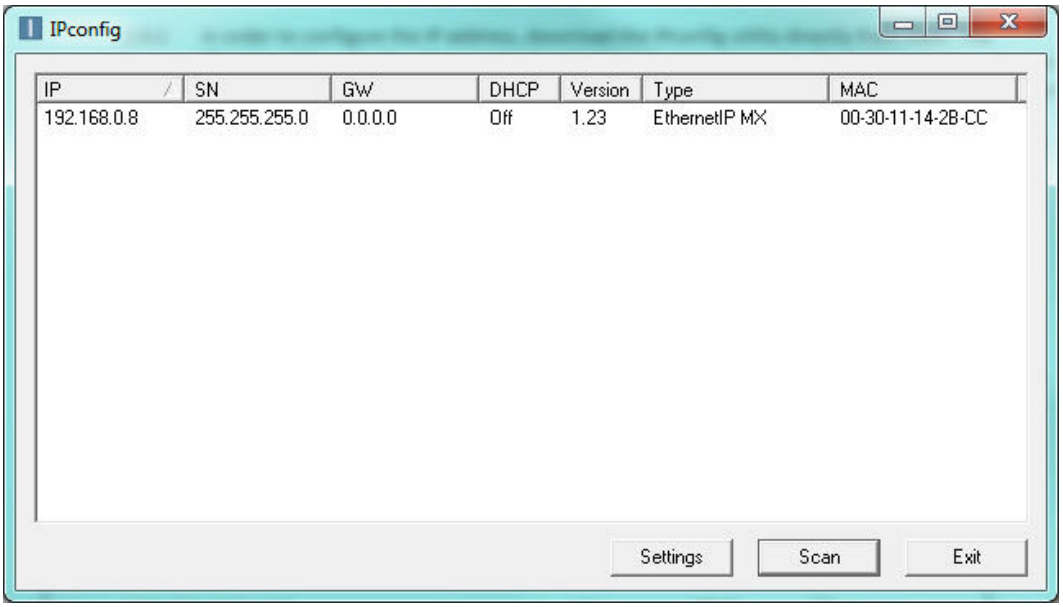
https://www.anybus.com/support/file-doc-downloads/compactcom-40-series-specific/?ordercode=AB6604

After an IP address has been set, or if the unit has DHCP mode enabled, settings can be modified through the web server as described in Section 2.5. Refer to Televac® application note 3017 for more information on setup and troubleshooting.

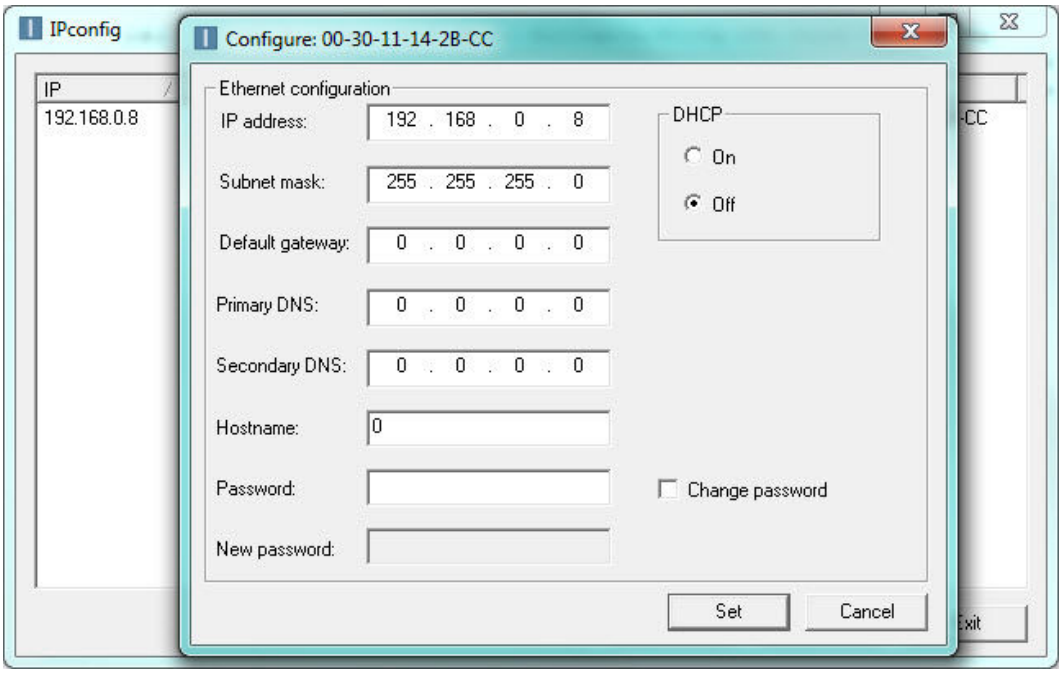
2.4.2.1 Download the application from HMS.



2.4.2.2 Launch the application and find the Televac® EthernetIP device.



2.4.2.3 Modify the settings.



2.5 Web Server

2.5.1 The EthernetIP communications module comes with a built-in web server that can host a password protected web page. With this feature, the user can remotely update all network and module settings, view all MX200 channel data, change any MX200 settings available through the serial port, and view all current EthernetIP networking session statistics. To use the web page, type the IP address into a web browser and enter the username and password. This feature can be disabled during factory programming upon request.

2.5.2 Passwords for the web server can be set either by the factory or by the user. All passwords are saved in a file called web_accs.cfg loaded into the firmware of the module. Passwords can be modified, created, or deleted by using a File Transfer Protocol to modify the configuration file. The default username and password are factory set to 'Admin' and 'admin', unless otherwise requested.

2.6 EDS Information

2.6.1 For ease of integration and use with a PLC, an Electronic Data Sheet (EDS) file is provided by The Fredericks Company for use with the EthernetIP communications module. An EDS file contains information about the EthernetIP device on the network so that it may be easily identified and connected to from the PLC. By downloading the file to the PLC, the controller will have all of the important identification and connection information about the MX EthernetIP module.

The EDS file contains all of the MX EthernetIP device identification information, as well as all parameter data information and link paths. The Assembly section of the EDS file contains information on the available Class 1 cyclic connections, and the Params section contains information on all of the available Class 3 acyclic connections, including description, value, read/write information, and a link path. Please refer to Televac® Application Note 3016 for information on how to download an EDS to a Rockwell Automation Allen-Bradley CompactLogix PLC.

3. ADI Table

3.1 ADI Description

3.1.1 The MX200 EthernetIP module utilizes Application Data Instances within the Application Data Object to transfer information to and from the unit. Every parameter in the unit is represented by a data instance within the data object, and has nine attributes that hold information about the parameter. The nine attributes are described in the table below:

Attribute #	Name	Access	Type	Value/Description
1	Name	Get	SHORT_STRING	Parameter name (including length)
2	Data Type	Get	USINT	Data type of instance value
3	Number of Elements	Get	USINT	Number of elements in the data type
4	Descriptor	Get	USINT	Bit field describing the access rights for this instance; 0 (Get) = Get Access, 1 (Set) = Set Access
5	Value	Get/Set	See Attr. #2	Instance value
6	Max Value	Get	See Attr. #2	Maximum parameter value
7	Min Value	Get	See Attr. #2	Minimum parameter value
8	Default Value	Get	See Attr. #2	The default parameter value
9	Number of Sub Elements	Get	USINT	Number of sub elements in the ADI, default value is 1

3.1.4 In order to access information about a parameter, a specific attribute of a specific data instance will need to be requested with a Class 3 connection request. The table in section 3.2 describes the available data instances, and provides some important attribute values for convenience. As an example, in order to request the value of the Logic Firmware, the PLC programmer would set up a Class 3 request to attribute five (the value attribute) of instance two (the Logic Firmware parameter) in the class A2 object (the Application Data Instance Object). The EthernetIP module will return the firmware value to the programmer in the form of six UINT8 characters.

3.2 ADI Table

3.2.1 See the general MX200 Instruction Manual for command formats and complete descriptions.

Instance	Name	Data Type	Array Length	Access	Data Format	Data Description
2	Logic Firmware	SHORT_STRING	6	Get	XXXXXX	Logic firmware version
3	Display Firmware	SHORT_STRING	6	Get	XXXXXX	Display firmware version
4	Pressure Units	SHORT_STRING	2	Get/Set	XX	Measurement units: PA = Pascal, TR = Torr, MB = mbar, TD = Torr decimal, MT = mTorr
6	Cold Cathode Mode	SHORT_STRING	1	Get/Set	A	Cold cathode mode: 1 = auto, 2 = self
8	Cold Cathode On Value	SHORT_STRING	2	Get/Set	BB	Cold cathode switch point value: BB = 01 to 50
10	Cold Cathode Odd Even Value	SHORT_STRING	2	Get/Set	CD	Cold cathode status odd and even (on/off) C = odd, D = even, 0 = off, 1 = on
12	Channel Types	SHORT_STRING	60	Get	XX=YY … XX=YY	XX = channel number, YY = sensor type
14	Set Point Status	SHORT_STRING	48	Get	XX=YY … XX=YY	Set point XX status YY: ON = on, OF = off, 00 = no set point connected
15	Connected Channels	SHORT_STRING	30	Get	01 02 03 …	Channel numbers connected to the unit (unconnected channels read '00')
16	Return to Measurement Screen	SHORT_STRING	1	Set	M	Go to measurement screen: M=0
17	Restore Global Defaults	SHORT_STRING	1	Set	D	Restore Global Setup defaults: D = 0
18	Serial Number	SHORT_STRING	6	Get	NNNNNN	Six digit serial number of the unit NNNNNN = 000000 to 999999
20	Restore Setup Ch1 Defaults	SHORT_STRING	2	Set	XX	Restore Ch1 setup defaults: XX = 00
21	Restore Setup Ch2 Defaults	SHORT_STRING	2	Set	XX	Restore Ch2 setup defaults: XX = 00
22	Restore Setup Ch3 Defaults	SHORT_STRING	2	Set	XX	Restore Ch3 setup defaults: XX = 00
23	Restore Setup Ch4 Defaults	SHORT_STRING	2	Set	XX	Restore Ch4 setup defaults: XX = 00
24	Restore Setup Ch5 Defaults	SHORT_STRING	2	Set	XX	Restore Ch5 setup defaults: XX = 00
25	Restore Setup Ch6 Defaults	SHORT_STRING	2	Set	XX	Restore Ch6 setup defaults: XX = 00
26	Restore Setup Ch7 Defaults	SHORT_STRING	2	Set	XX	Restore Ch7 setup defaults: XX = 00
27	Restore Setup Ch8 Defaults	SHORT_STRING	2	Set	XX	Restore Ch8 setup defaults: XX = 00
28	Restore Setup Ch9 Defaults	SHORT_STRING	2	Set	XX	Restore Ch9 setup defaults: XX = 00
29	Restore Setup Ch10 Defaults	SHORT_STRING	2	Set	XX	Restore Ch10 setup defaults: XX = 00
30	Restore Set Point 1 Defaults	SHORT_STRING	1	Set	X	Restore SP1 defaults: X = 0
31	Restore Set Point 2 Defaults	SHORT_STRING	1	Set	X	Restore SP2 defaults: X = 0
32	Restore Set Point 3 Defaults	SHORT_STRING	1	Set	X	Restore SP3 defaults: X = 0
33	Restore Set Point 4 Defaults	SHORT_STRING	1	Set	X	Restore SP4 defaults: X = 0
34	Restore Set Point 5 Defaults	SHORT_STRING	1	Set	X	Restore SP5 defaults: X = 0
35	Restore Set Point 6 Defaults	SHORT_STRING	1	Set	X	Restore SP6 defaults: X = 0
36	Restore Set Point 7 Defaults	SHORT_STRING	1	Set	X	Restore SP7 defaults: X = 0
37	Restore Set Point 8 Defaults	SHORT_STRING	1	Set	X	Restore SP8 defaults: X = 0
40	Restore Calibration Ch1 Defaults	SHORT_STRING	2	Set	XX	Restore Ch1 calibration defaults: XX = 00
41	Restore Calibration Ch2 Defaults	SHORT_STRING	2	Set	XX	Restore Ch2 calibration defaults: XX = 00
42	Restore Calibration Ch3 Defaults	SHORT_STRING	2	Set	XX	Restore Ch3 calibration defaults: XX = 00
43	Restore Calibration Ch4 Defaults	SHORT_STRING	2	Set	XX	Restore Ch4 calibration defaults: XX = 00
44	Restore Calibration Ch5 Defaults	SHORT_STRING	2	Set	XX	Restore Ch5 calibration defaults: XX = 00
45	Restore Calibration Ch6 Defaults	SHORT_STRING	2	Set	XX	Restore Ch6 calibration defaults: XX = 00
46	Restore Calibration Ch7 Defaults	SHORT_STRING	2	Set	XX	Restore Ch7 calibration defaults: XX = 00
47	Restore Calibration Ch8 Defaults	SHORT_STRING	2	Set	XX	Restore Ch8 calibration defaults: XX = 00
48	Restore Calibration Ch9 Defaults	SHORT_STRING	2	Set	XX	Restore Ch9 calibration defaults: XX = 00
49	Restore Calibration Ch10 Defaults	SHORT_STRING	2	Set	XX	Restore Ch10 calibration defaults: XX = 00
50	Baud Rate	SHORT_STRING	4	Get/Set	XXXX	Baud rate: XXXX = 0096 = 9600, 0192 = 19200, 0384 =38400, 0576 = 57600, 1152 = 115200
51	RS485 Address	SHORT_STRING	2	Get/Set	XX	RS-485 address: XX = 00 to 99
52	Communication Type	SHORT_STRING	1	Get/Set	N	Communication type N: 1 = RS-232, 2 = RS-485, 3 = USB, 4 = EthernetIP
99	Error Checking	SHORT_STRING	8	Get	NNNNNNNN	Displays error received, or "OK" for no error (see section 8.6 for errors)

Instance	Name	Data Type	Array Length	Access	Data Format	Data Description
101	Pressure Ch1	REAL	1	Get/PD_READ	BBBB	Ch1 pressure output, REAL as 4 hex bytes
201	Pressure Ch2	REAL	1	Get/PD_READ	BBBB	Ch2 pressure output, REAL as 4 hex bytes
301	Pressure Ch3	REAL	1	Get/PD_READ	BBBB	Ch3 pressure output, REAL as 4 hex bytes
401	Pressure Ch4	REAL	1	Get/PD_READ	BBBB	Ch4 pressure output, REAL as 4 hex bytes
501	Pressure Ch5	REAL	1	Get/PD_READ	BBBB	Ch5 pressure output, REAL as 4 hex bytes
601	Pressure Ch6	REAL	1	Get/PD_READ	BBBB	Ch6 pressure output, REAL as 4 hex bytes
701	Pressure Ch7	REAL	1	Get/PD_READ	BBBB	Ch7 pressure output, REAL as 4 hex bytes
801	Pressure Ch8	REAL	1	Get/PD_READ	BBBB	Ch8 pressure output, REAL as 4 hex bytes
901	Pressure Ch9	REAL	1	Get/PD_READ	BBBB	Ch9 pressure output, REAL as 4 hex bytes
1001	Pressure Ch10	REAL	1	Get/PD_READ	BBBB	Ch10 pressure output, REAL as 4 hex bytes
11	Output Real	REAL	4	PD_WRITE	BBBB	Send 4 arbitrary hex bytes to begin Class 1 connection
102	Calibration 1 Ch1	SHORT_STRING	3	Get/Set	Baa	Calibration point 1 for Ch1: B = 0 or 1 (negative/positive), aa = 00 to 99
202	Calibration 1 Ch2	SHORT_STRING	3	Get/Set	Baa	Calibration point 1 for Ch2: B = 0 or 1 (negative/positive), aa = 00 to 99
302	Calibration 1 Ch3	SHORT_STRING	3	Get/Set	Baa	Calibration point 1 for Ch3: B = 0 or 1 (negative/positive), aa = 00 to 99
402	Calibration 1 Ch4	SHORT_STRING	3	Get/Set	Baa	Calibration point 1 for Ch4: B = 0 or 1 (negative/positive), aa = 00 to 99
502	Calibration 1 Ch5	SHORT_STRING	3	Get/Set	Baa	Calibration point 1 for Ch5: B = 0 or 1 (negative/positive), aa = 00 to 99
602	Calibration 1 Ch6	SHORT_STRING	3	Get/Set	Baa	Calibration point 1 for Ch6: B = 0 or 1 (negative/positive), aa = 00 to 99
702	Calibration 1 Ch7	SHORT_STRING	3	Get/Set	Baa	Calibration point 1 for Ch7: B = 0 or 1 (negative/positive), aa = 00 to 99
802	Calibration 1 Ch8	SHORT_STRING	3	Get/Set	Baa	Calibration point 1 for Ch8: B = 0 or 1 (negative/positive), aa = 00 to 99
902	Calibration 1 Ch9	SHORT_STRING	3	Get/Set	Baa	Calibration point 1 for Ch9: B = 0 or 1 (negative/positive), aa = 00 to 99
1002	Calibration 1 Ch10	SHORT_STRING	3	Get/Set	Baa	Calibration point 1 for Ch10: B = 0 or 1 (negative/positive), aa = 00 to 99
104	Calibration 2 Ch1	SHORT_STRING	3	Get/Set	Baa	Calibration point 2 for Ch1: B = 0 or 1 (negative/positive), aa = 00 to 99
204	Calibration 2 Ch2	SHORT_STRING	3	Get/Set	Baa	Calibration point 2 for Ch2: B = 0 or 1 (negative/positive), aa = 00 to 99
304	Calibration 2 Ch3	SHORT_STRING	3	Get/Set	Baa	Calibration point 2 for Ch3: B = 0 or 1 (negative/positive), aa = 00 to 99
404	Calibration 2 Ch4	SHORT_STRING	3	Get/Set	Baa	Calibration point 2 for Ch4: B = 0 or 1 (negative/positive), aa = 00 to 99
504	Calibration 2 Ch5	SHORT_STRING	3	Get/Set	Baa	Calibration point 2 for Ch5: B = 0 or 1 (negative/positive), aa = 00 to 99
604	Calibration 2 Ch6	SHORT_STRING	3	Get/Set	Baa	Calibration point 2 for Ch6: B = 0 or 1 (negative/positive), aa = 00 to 99
704	Calibration 2 Ch7	SHORT_STRING	3	Get/Set	Baa	Calibration point 2 for Ch7: B = 0 or 1 (negative/positive), aa = 00 to 99
804	Calibration 2 Ch8	SHORT_STRING	3	Get/Set	Baa	Calibration point 2 for Ch8: B = 0 or 1 (negative/positive), aa = 00 to 99
904	Calibration 2 Ch9	SHORT_STRING	3	Get/Set	Baa	Calibration point 2 for Ch9: B = 0 or 1 (negative/positive), aa = 00 to 99
1004	Calibration 2 Ch10	SHORT_STRING	3	Get/Set	Baa	Calibration point 2 for Ch10: B = 0 or 1 (negative/positive), aa = 00 to 99

Instance	Name	Data Type	Array Length	Access	Data Format	Data Description
106	Calibration 3 Ch1	SHORT_STRING	3	Get/Set	Baa	Calibration point 3 for Ch1: B = 0 or 1 (negative/positive), aa = 00 to 99
206	Calibration 3 Ch2	SHORT_STRING	3	Get/Set	Baa	Calibration point 3 for Ch2: B = 0 or 1 (negative/positive), aa = 00 to 99
306	Calibration 3 Ch3	SHORT_STRING	3	Get/Set	Baa	Calibration point 3 for Ch3: B = 0 or 1 (negative/positive), aa = 00 to 99
406	Calibration 3 Ch4	SHORT_STRING	3	Get/Set	Baa	Calibration point 3 for Ch4: B = 0 or 1 (negative/positive), aa = 00 to 99
506	Calibration 3 Ch5	SHORT_STRING	3	Get/Set	Baa	Calibration point 3 for Ch5: B = 0 or 1 (negative/positive), aa = 00 to 99
606	Calibration 3 Ch6	SHORT_STRING	3	Get/Set	Baa	Calibration point 3 for Ch6: B = 0 or 1 (negative/positive), aa = 00 to 99
706	Calibration 3 Ch7	SHORT_STRING	3	Get/Set	Baa	Calibration point 3 for Ch7: B = 0 or 1 (negative/positive), aa = 00 to 99
806	Calibration 3 Ch8	SHORT_STRING	3	Get/Set	Baa	Calibration point 3 for Ch8: B = 0 or 1 (negative/positive), aa = 00 to 99
906	Calibration 3 Ch9	SHORT_STRING	3	Get/Set	Baa	Calibration point 3 for Ch9: B = 0 or 1 (negative/positive), aa = 00 to 99
1006	Calibration 3 Ch10	SHORT_STRING	3	Get/Set	Baa	Calibration point 3 for Ch10: B = 0 or 1 (negative/positive), aa = 00 to 99
108	Calibration 4 Ch1	SHORT_STRING	3	Get/Set	Baa	Calibration point 4 for Ch1: B = 0 or 1 (negative/positive), aa = 00 to 99
208	Calibration 4 Ch2	SHORT_STRING	3	Get/Set	Baa	Calibration point 4 for Ch2: B = 0 or 1 (negative/positive), aa = 00 to 99
308	Calibration 4 Ch3	SHORT_STRING	3	Get/Set	Baa	Calibration point 4 for Ch3: B = 0 or 1 (negative/positive), aa = 00 to 99
408	Calibration 4 Ch4	SHORT_STRING	3	Get/Set	Baa	Calibration point 4 for Ch4: B = 0 or 1 (negative/positive), aa = 00 to 99
508	Calibration 4 Ch5	SHORT_STRING	3	Get/Set	Baa	Calibration point 4 for Ch5: B = 0 or 1 (negative/positive), aa = 00 to 99
608	Calibration 4 Ch6	SHORT_STRING	3	Get/Set	Baa	Calibration point 4 for Ch6: B = 0 or 1 (negative/positive), aa = 00 to 99
708	Calibration 4 Ch7	SHORT_STRING	3	Get/Set	Baa	Calibration point 4 for Ch7: B = 0 or 1 (negative/positive), aa = 00 to 99
808	Calibration 4 Ch8	SHORT_STRING	3	Get/Set	Baa	Calibration point 4 for Ch8: B = 0 or 1 (negative/positive), aa = 00 to 99
908	Calibration 4 Ch9	SHORT_STRING	3	Get/Set	Baa	Calibration point 4 for Ch9: B = 0 or 1 (negative/positive), aa = 00 to 99
1008	Calibration 4 Ch10	SHORT_STRING	3	Get/Set	Baa	Calibration point 4 for Ch10: B = 0 or 1 (negative/positive), aa = 00 to 99
110	Calibration 5 Ch1	SHORT_STRING	3	Get/Set	Baa	Calibration point 5 for Ch1: B = 0 or 1 (negative/positive), aa = 00 to 99
210	Calibration 5 Ch2	SHORT_STRING	3	Get/Set	Baa	Calibration point 5 for Ch2: B = 0 or 1 (negative/positive), aa = 00 to 99
310	Calibration 5 Ch3	SHORT_STRING	3	Get/Set	Baa	Calibration point 5 for Ch3: B = 0 or 1 (negative/positive), aa = 00 to 99
410	Calibration 5 Ch4	SHORT_STRING	3	Get/Set	Baa	Calibration point 5 for Ch4: B = 0 or 1 (negative/positive), aa = 00 to 99
510	Calibration 5 Ch5	SHORT_STRING	3	Get/Set	Baa	Calibration point 5 for Ch5: B = 0 or 1 (negative/positive), aa = 00 to 99
610	Calibration 5 Ch6	SHORT_STRING	3	Get/Set	Baa	Calibration point 5 for Ch6: B = 0 or 1 (negative/positive), aa = 00 to 99
710	Calibration 5 Ch7	SHORT_STRING	3	Get/Set	Baa	Calibration point 5 for Ch7: B = 0 or 1 (negative/positive), aa = 00 to 99
810	Calibration 5 Ch8	SHORT_STRING	3	Get/Set	Baa	Calibration point 5 for Ch8: B = 0 or 1 (negative/positive), aa = 00 to 99
910	Calibration 5 Ch9	SHORT_STRING	3	Get/Set	Baa	Calibration point 5 for Ch9: B = 0 or 1 (negative/positive), aa = 00 to 99
1010	Calibration 5 Ch10	SHORT_STRING	3	Get/Set	Baa	Calibration point 5 for Ch10: B = 0 or 1 (negative/positive), aa = 00 to 99

Instance	Name	Data Type	Array Length	Access	Data Format	Data Description
114	Channel Display Ch1	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 on the measurement screen: XX=00 (Set), XX=ON or OF (Get)
214	Channel Display Ch2	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 on the measurement screen: XX=00 (Set), XX=ON or OF (Get)
314	Channel Display Ch3	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 on the measurement screen: XX=00 (Set), XX=ON or OF (Get)
414	Channel Display Ch4	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 on the measurement screen: XX=00 (Set), XX=ON or OF (Get)
514	Channel Display Ch5	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 on the measurement screen: XX=00 (Set), XX=ON or OF (Get)
614	Channel Display Ch6	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 on the measurement screen: XX=00 (Set), XX=ON or OF (Get)
714	Channel Display Ch7	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 on the measurement screen: XX=00 (Set), XX=ON or OF (Get)
814	Channel Display Ch8	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 on the measurement screen: XX=00 (Set), XX=ON or OF (Get)
914	Channel Display Ch9	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 on the measurement screen: XX=00 (Set), XX=ON or OF (Get)
1014	Channel Display Ch10	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 on the measurement screen: XX=00 (Set), XX=ON or OF (Get)
116	Analog Output Ch1	SHORT_STRING	7	Get/Set	FbaaBAA	Ch1 analog output format: F = 1 or 2 (lin/log), baa = high value, BAA = low value
216	Analog Output Ch2	SHORT_STRING	7	Get/Set	FbaaBAA	Ch2 analog output format: F = 1 or 2 (lin/log), baa = high value, BAA = low value
316	Analog Output Ch3	SHORT_STRING	7	Get/Set	FbaaBAA	Ch3 analog output format: F = 1 or 2 (lin/log), baa = high value, BAA = low value
416	Analog Output Ch4	SHORT_STRING	7	Get/Set	FbaaBAA	Ch4 analog output format: F = 1 or 2 (lin/log), baa = high value, BAA = low value
516	Analog Output Ch5	SHORT_STRING	7	Get/Set	FbaaBAA	Ch5 analog output format: F = 1 or 2 (lin/log), baa = high value, BAA = low value
616	Analog Output Ch6	SHORT_STRING	7	Get/Set	FbaaBAA	Ch6 analog output format: F = 1 or 2 (lin/log), baa = high value, BAA = low value
716	Analog Output Ch7	SHORT_STRING	7	Get/Set	FbaaBAA	Ch7 analog output format: F = 1 or 2 (lin/log), baa = high value, BAA = low value
816	Analog Output Ch8	SHORT_STRING	7	Get/Set	FbaaBAA	Ch8 analog output format: F = 1 or 2 (lin/log), baa = high value, BAA = low value
916	Analog Output Ch9	SHORT_STRING	7	Get/Set	FbaaBAA	Ch9 analog output format: F = 1 or 2 (lin/log), baa = high value, BAA = low value
1016	Analog Output Ch10	SHORT_STRING	7	Get/Set	FbaaBAA	Ch10 analog output format: F = 1 or 2 (lin/log), baa = high value, BAA = low value
118	Gas Type Ch1	SHORT_STRING	2	Get/Set	GG	Gas type setting for channel 1
218	Gas Type Ch2	SHORT_STRING	2	Get/Set	GG	Gas type setting for channel 2
318	Gas Type Ch3	SHORT_STRING	2	Get/Set	GG	Gas type setting for channel 3
418	Gas Type Ch4	SHORT_STRING	2	Get/Set	GG	Gas type setting for channel 4
518	Gas Type Ch5	SHORT_STRING	2	Get/Set	GG	Gas type setting for channel 5
618	Gas Type Ch6	SHORT_STRING	2	Get/Set	GG	Gas type setting for channel 6
718	Gas Type Ch7	SHORT_STRING	2	Get/Set	GG	Gas type setting for channel 7
818	Gas Type Ch8	SHORT_STRING	2	Get/Set	GG	Gas type setting for channel 8
918	Gas Type Ch9	SHORT_STRING	2	Get/Set	GG	Gas type setting for channel 9
1018	Gas Type Ch10	SHORT_STRING	2	Get/Set	GG	Gas type setting for channel 10

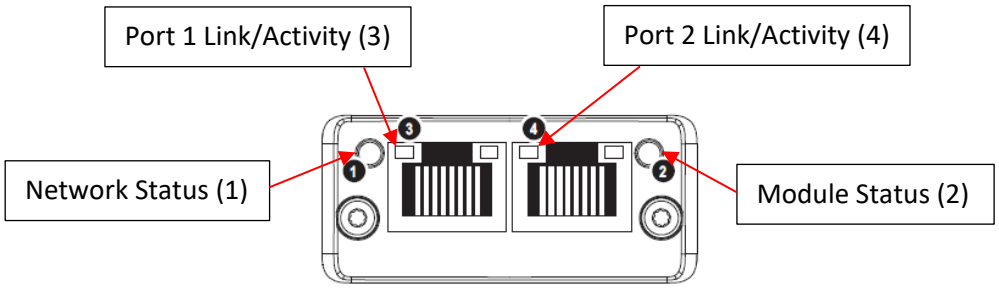
Instance	Name	Data Type	Array Length	Access	Data Format	Data Description
120	Set Point 1	SHORT_STRING	12	Get/Set	ppseePPSEEZZ	Set point 1 settings:
						on = ppsee, off = PPSEE, channel = ZZ
220	Set Point 2	SHORT_STRING	12	Get/Set	ppseePPSEEZZ	Set point 1 settings:
						on = ppsee, off = PPSEE, channel = ZZ
320	Set Point 3	SHORT_STRING	12	Get/Set	ppseePPSEEZZ	Set point 1 settings:
						on = ppsee, off = PPSEE, channel = ZZ
420	Set Point 4	SHORT_STRING	12	Get/Set	ppseePPSEEZZ	Set point 1 settings:
						on = ppsee, off = PPSEE, channel = ZZ
520	Set Point 5	SHORT_STRING	12	Get/Set	ppseePPSEEZZ	Set point 1 settings:
						on = ppsee, off = PPSEE, channel = ZZ
620	Set Point 6	SHORT_STRING	12	Get/Set	ppseePPSEEZZ	Set point 1 settings:
						on = ppsee, off = PPSEE, channel = ZZ
720	Set Point 7	SHORT_STRING	12	Get/Set	ppseePPSEEZZ	Set point 1 settings:
						on = ppsee, off = PPSEE, channel = ZZ
820	Set Point 8	SHORT_STRING	12	Get/Set	ppseePPSEEZZ	Set point 1 settings:
						on = ppsee, off = PPSEE, channel = ZZ
122	Resolution Ch1	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 resolution:
						XX = 00 (Set), XX = HI or LO (Get)
222	Resolution Ch2	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 resolution:
						XX = 00 (Set), XX = HI or LO (Get)
322	Resolution Ch3	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 resolution:
						XX = 00 (Set), XX = HI or LO (Get)
422	Resolution Ch4	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 resolution:
						XX = 00 (Set), XX = HI or LO (Get)
522	Resolution Ch5	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 resolution:
						XX = 00 (Set), XX = HI or LO (Get)
622	Resolution Ch6	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 resolution:
						XX = 00 (Set), XX = HI or LO (Get)
722	Resolution Ch7	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 resolution:
						XX = 00 (Set), XX = HI or LO (Get)
822	Resolution Ch8	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 resolution:
						XX = 00 (Set), XX = HI or LO (Get)
922	Resolution Ch9	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 resolution:
						XX = 00 (Set), XX = HI or LO (Get)
1022	Resolution Ch10	SHORT_STRING	2	Get/Set	XX	Toggle Ch1 resolution:
						XX = 00 (Set), XX = HI or LO (Get)

See the MX200 Instruction Manual for more details on command and output formats.

4. Network LED Description

4.1 Network LEDs Overview

4.1.1 There are four network status LEDs on the EthernetIP communications module. They are for the network status, module status, port 1 link/activity, and port 2 link/activity. The LEDs are arranged as shown below.



4.2 Network Status LED

4.2.1 The network status LED gives current information about the status of the connection between the module and the network. Below is a table describing the different LED states.

Off	No power or no IP address
Green	Online, one or more connections established (CIP Class 1 or 3)
Flashing Green	Online, no connections established
Red	Duplicate IP address, FATAL error
Flashing Red	One or more connections timed out (CIP Class 1 or 3)

4.3 Module Status LED

4.3.1 The module status LED gives current information about the operational status of the module. Below is a table describing the different LED states.

Off	No power
Green	Controlled by a Scanner in Run state
Flashing Green	Not configured, or Scanner in Idle state
Red	Major fault (EXCEPTION state, FATAL error, etc.)
Flashing Red	Recoverable fault(s). Module is configured, but stored parameters differ from currently used parameters.

4.4 Link/Activity LED

4.4.1 The link/activity LED gives current information about the status of the network link and data transfer information for each port. Below is a table describing the different LED states.

Off	No link, no activity
Green	Link (100 Mbit/s) established
Flickering Green	Activity (100 Mbit/s)
Yellow	Link (10 Mbit/s) established
Flickering Yellow	Activity (10 Mbit/s)

5. Digital Communications

5.1 READ THIS FIRST - Important Note on Establishing Communication

5.1.1 NOTE THAT COMMANDS THAT SAVE OR CHANGE VALUES STORED IN MEMORY CAN ONLY BE USED WHEN THE MX200 IS IN THE MEASUREMENT SCREEN. If the MX200 is not in the measurement screen, an error code of 0N0000 will be returned when any communications are attempted. All other commands can be accessed from any a screen. ALSO NOTE THAT ONLY THE SELECTED MODE OF COMMUNICATION WILL BE FUNCTIONAL.

5.2 EthernetIP Interface Description

5.2.1 Using the EthernetIP communications module, the MX200 can communicate with a PLC on an EthernetIP network. The module is designed as a full serial port replacement, so any command that is accessible via RS-232 is also available through the EthernetIP network. See the ADI table in section 3.2 for the application data instance numbers and read/write access. Please refer to the MX200 user manual for a full description of data and settings commands available through the serial port, and for response times for requested data.

NOTE: The unit must be set to EIP in order to communicate with the unit.

5.3 Error Codes

5.3.1 **0N0000**

5.3.1.1 The unit is not in the measurement screen so communication cannot be used.

5.3.2 **0N0001**

5.3.2.1 Command error: an invalid character was sent for the command or an invalid number after the character.

5.3.3 **0N0002**

5.3.3.1 Out of range error: an out of range value was received following a command.

5.3.4 **0N0003**

5.3.4.1 Set point value error: an invalid or out of range number was sent after the W7 command.

5.3.5 **0N0004**

5.3.5.1 Calibration value error: an invalid or out of range number was sent after the WC1, WC2, WC3, or WC4 commands.

5.3.6 **0N0005**

5.3.6.1 Gas error: invalid gas characters sent after the *0W6 command.

5.3.7 **0N0006**

5.3.7.1 Leak rate error: channel 1 pressure is higher than 1 Torr, the leak rate is already on or off, or an unsupported module type is set to channel 1.

5.3.8 **-1**

5.3.8.1 Ready: the sensor is ready to use.

5.3.8.1.1 Note: this command applies to cold cathodes, which require input from another sensor or source to begin functioning.

5.3.9 **-2**

5.3.9.1 Over: the sensor is running overpressure or overcurrent.

5.3.9.1.1 Note: when this command applies to rough vacuum gauges, the sensor is running in overpressure. This occurs when the sensor is active above the range specified, which is outside of the usable range.

5.3.9.1.2 Note: when this command applies to cold cathodes, the sensor is running in overcurrent. This occurs when the sensor is active above the range specified, which causes the unit to limit the sensor to avoid damage.

5.3.10 **-3**

5.3.10.1 Off: the cold cathode is in manual mode and is set to off.

5.3.11 **-99**

5.3.11.1 Not attached/no sensor: no sensor is connected to the unit.

6. Certifications

6.1 CE

6.1.1 Certified to EN61326-1:2006.

6.2 UL

6.2.1 Certified to UL61010-1.

6.3 RoHS

6.3.1 The EthernetIP communication module is compliant with the Restriction of Hazardous Substances Directive 2002/95/EC (RoHS).

6.4 REACH

6.4.1 REACH Compliant.

7. Revision History

Revision	Description	Initials	Date	Approval	Date
1.00	General release	GD	01/09/17	AO	01/09/17
A	Changed formatting and EIP data types, changed rev to letter	SO	05/31/17	AO	05/31/17
B	Updated MX200 module part numbers	JL	09/06/23	SO	09/06/23