



**Active Gauge EthernetIP Gateway
Instruction Manual
Rev -**



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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 Active Gauge EthernetIP Gateway supports an easily configurable network of Televac active gauge and capacitance diaphragm gauge (CDG) controllers through EthernetIP communications. This allows 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 requests, allowing user 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.televac.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	20
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

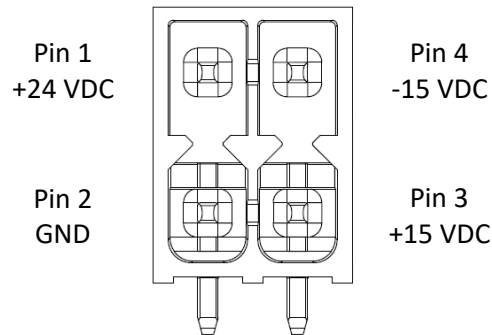
Description	Part Number
Active Gauge EthernetIP Gateway	2-8900-100
MX2A Active Thermocouple Vacuum Gauge	2-8910-1XX
MX4A Convection Active Vacuum Gauge	2-8930-1XX
MX7B Cold Cathode Ionization Active Gauge	2-8940-XXX
Active Gauge RJ45 to DB15 Adapter	1-2403-001
24 VDC CDG RJ45 to DB15 Adapter	1-2403-002
±15 VDC CDG RJ45 to DB15 Adapter	1-2403-003
24 VDC CDG RJ45 to DB9 Adapter	1-2403-004
±15 VDC CDG RJ45 to DB9 Adapter	1-2403-005
Ethernet Cable Cat5e Unshielded 10 ft	1-2401-010
Ethernet Cable Cat5e Unshielded 50 ft	1-2401-050
Ethernet Cable Cat5e Unshielded 100 ft	1-2401-100
Ethernet Cable Cat5e Shielded 10 ft	1-2402-010
Ethernet Cable Cat5e Shielded 50 ft	1-2402-050
Ethernet Cable Cat5e Shielded 100 ft	1-2402-100

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.

1.5 Power Supply

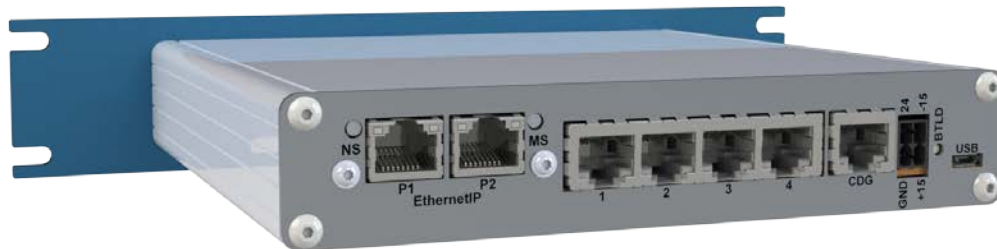
- 1.5.1 The EthernetIP gateway uses a four position terminal block connector for the power input. For ease of setup, the connector mates with a keyed four position spring-cage connector. To install the individual cable connections, simply push the tab and insert the wire into the appropriate position. Please refer to the figure below for electrical connection information. The gateway and attached gauges operate on a 24 VDC +20% and -10% supply.



1.6 Gateway Connections

- 1.6.1 Please refer to the image below, and to sections 1.5, 2.7, 2.9, and 2.10 for more information on the network and connection setup. The RJ45 connectors labeled P1 and P2 are the EthernetIP connections that will run to the PLC or PC. The RJ45 connectors labeled 1 through 4 are the active gauge inputs. These will run through Cat5e Ethernet cables and through an adapter to attach to the active gauges in the network. **All active gauges must be set to separate RS-485 addresses 1 through 4 and run at 38400 baud to communicate with the gateway.** The RJ45 connector labeled CDG will connect to the CDG in the network if one is available. The CDG must be turned on through the appropriate parameter in the ADI table.

The power input connector accepts a +24 VDC and GND connection, as well as an optional ± 15 VDC input to run to the attached CDG if required. Regardless of the alternate supply, the gateway and attached active gauges require the +24 VDC input to be connected in order to operate. The pushbutton labeled BTLD is to be pressed while powering the gateway to send the unit into bootload mode for the ability to easily update the firmware, and the update occurs over the USB connection.



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	20
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:

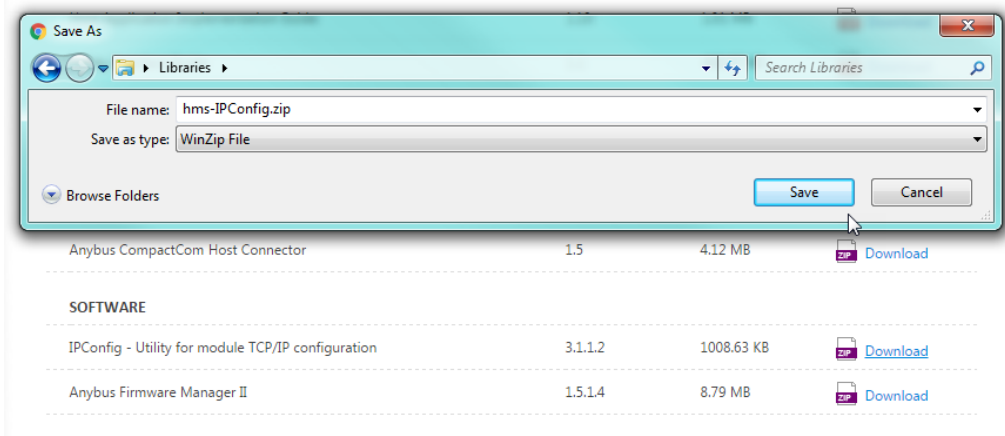
Default IP Address	192.168.0.8
Default Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0

- 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:

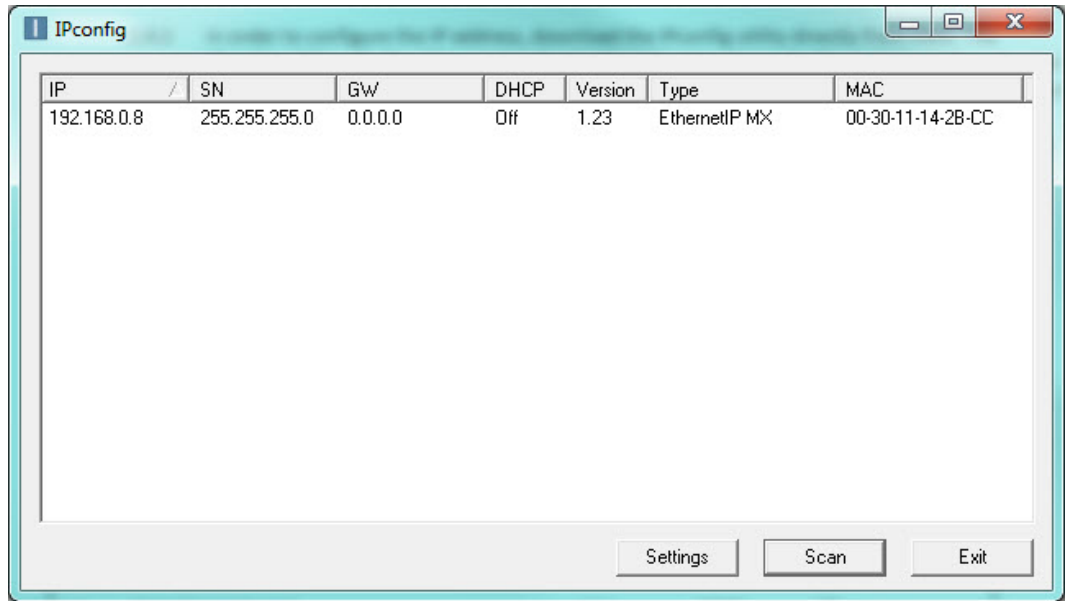
<https://www.anybus.com/support/file-doc-downloads/compactcom-40-series-specific/?ordercode=AB6604>

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.

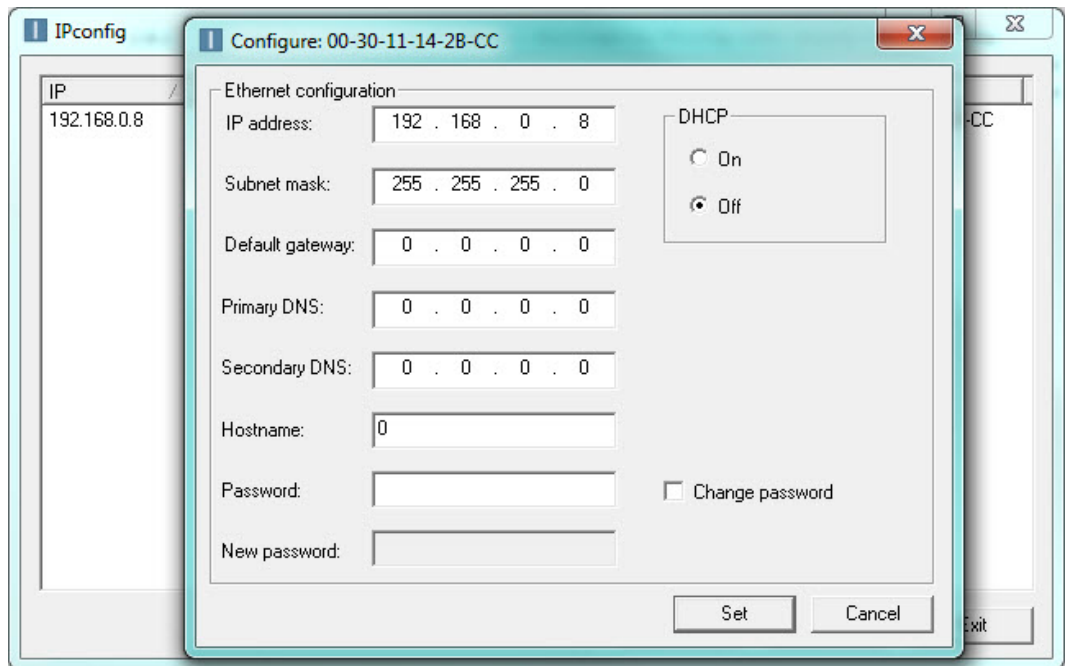
2.4.2.1 Download the application from HMS.



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 active gauge controller data, change any settings available through the serial ports, 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.

2.7 CDG Setup

- 2.7.1 The Active Gauge EthernetIP Gateway supports one CDG per unit. When attached, this gauge is automatically assigned as gauge 5. The CDG can operate on either a 24 VDC supply or a ± 15 VDC supply. Please refer to section 1.5 of this manual for instructions on how to setup the power supply for the desired configuration.

The CDG is not detectable automatically like the active gauges in the network. In order to connect the CDG to the network and set the range, there are two parameters that should be set within the ADI table. The first is the `CDG_Attached` parameter 11. When set to 1, the gateway will read the analog input from the gauge and convert it to a pressure output. The second parameter that will need to be set is the `CDG_Range` parameter 12. The range of the CDG is always set to be four decades wide with the top end of the range being equal to the range parameter setting. The top of the CDG range can be set anywhere between 0.01 and 10000 Torr with a factory default of 1000 Torr, and the pressure conversion is done assuming a linear analog output signal from the gauge.

Due to the nature of EthernetIP formatting, the CDG range must always be entered using 5 digits. This can be accomplished using either leading zeroes, a decimal point, or null characters. Please refer to section 5.3.5 for information on formatting the `CDG_Range` parameter.

2.8 Active Gauge Cable Adapters

- 2.8.1 In order to connect the gateway to the active gauges and CDG, it will be necessary to use RJ45 to DB15 and DB9 adapters. There are five versions of these adapters offered by Televac in order to accomplish this quickly and easily. Each is configured to accommodate either any Televac MX series active gauge, or CDGs that require a DB9 or DB15 connector and operate using +24 VDC or ± 15 VDC. Please refer to section 1.3 for ordering information regarding the required adapters.

2.9 Network Initialization

- 2.9.1 The network of gauges can be initialized either through the Identify Gauges Connected parameter 20 or through a power cycle. The network will need to be refreshed any time any gauges are added or removed, including changing the CDG status. If possible, it is highly recommended to power cycle the gateway in order to reset the network.

Upon power up, there will be an eight second delay built into the network initialization in order to give all of the gauges enough time to turn on and begin communicating. The front LED will flash until this process is complete. The gateway will then identify each gauge attached, a process that could take up to an additional twelve seconds depending on the configuration. Once the initialization is complete, the unit is ready to receive Class 1 and Class 3 connections.

The gauges in the network will need to be set to RS-485 address 1 through 4, in no particular order. The back panel of the gateway has labels for these addresses in order to help keep track of the attached gauges. All units in the network will also need to be set to 38400 baud.

2.10 Bootloader

- 2.10.1 In order to easily update the gateway should it be necessary, a bootloader is designed to load updated software through the USB port. To enter the bootload mode, push the switch in the back of the unit where it is labeled "BTLD" while the power is off, and then turn the power on. Once the unit is powered, the button may be released. To ensure that the unit has correctly entered bootload mode, verify that the LED on the front panel is off. Refer to Televac AN3024 for further instructions on how to bootload the unit. If at any point bootload mode is entered accidentally, power cycle the unit leaving the bootload switch in the normal state. USB communications are designed to run at 115200 baud and are not adjustable.

3. ADI Table

3.1 ADI Description

3.1.1 The Active Gauge EthernetIP Gateway 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 applicable active gauge Instruction Manual for command formats and complete descriptions.

Instance	Name	Data Type	Array Length	Access	Data Format	Data Description
1	Firmware Unit 1	SHORT_STRING	6	Get	XXXXXX	Unit 1 firmware version YYMMDD
2	Firmware Unit 2	SHORT_STRING	6	Get	XXXXXX	Unit 2 firmware version YYMMDD
3	Firmware Unit 3	SHORT_STRING	6	Get	XXXXXX	Unit 3 firmware version YYMMDD
4	Firmware Unit 4	SHORT_STRING	6	Get	XXXXXX	Unit 4 firmware version YYMMDD
6	Pressure Units Unit 1	SHORT_STRING	2	Get/Set	UU	Pressure units: UU = TR = Torr PA = Pascal MB = milliBar
7	Pressure Units Unit 2	SHORT_STRING	2	Get/Set	UU	
8	Pressure Units Unit 3	SHORT_STRING	2	Get/Set	UU	
9	Pressure Units Unit 4	SHORT_STRING	2	Get/Set	UU	
11	CDG Attached	SHORT_STRING	1	Get/Set	X	Set to 1 if attached, 0 if not attached
12	CDG Range	SHORT_STRING	5	Get/Set	XXXXX	CDG full-scale value between 0.01 to 10000 See section 5.3.5 for full description
15	Serial Number Unit 1	SHORT_STRING	6	Get/Set	XXXXXX	Serial number for Unit 1
16	Serial Number Unit 2	SHORT_STRING	6	Get/Set	XXXXXX	Serial number for Unit 2
17	Serial Number Unit 3	SHORT_STRING	6	Get/Set	XXXXXX	Serial number for Unit 3
18	Serial Number Unit 4	SHORT_STRING	6	Get/Set	XXXXXX	Serial number for Unit 4
20	Identify Gauges Connected	SHORT_STRING	1	Set	X	Re-identify the gauges in the network
21	Unit 1 Identity	SHORT_STRING	4	Get	XXXX	Identity of attached unit 1
22	Unit 2 Identity	SHORT_STRING	4	Get	XXXX	Identity of attached unit 2
23	Unit 3 Identity	SHORT_STRING	4	Get	XXXX	Identity of attached unit 3
24	Unit 4 Identity	SHORT_STRING	4	Get	XXXX	Identity of attached unit 4
30	Restore Set Point 1 Unit 1	SHORT_STRING	1	Set	X	Factory reset set point 1 for Unit 1
31	Restore Set Point 2 Unit 1	SHORT_STRING	1	Set	X	Factory reset set point 2 for Unit 1
32	Restore Set Point 1 Unit 2	SHORT_STRING	1	Set	X	Factory reset set point 1 for Unit 2
33	Restore Set Point 2 Unit 2	SHORT_STRING	1	Set	X	Factory reset set point 2 for Unit 2
34	Restore Set Point 1 Unit 3	SHORT_STRING	1	Set	X	Factory reset set point 1 for Unit 3
35	Restore Set Point 2 Unit 3	SHORT_STRING	1	Set	X	Factory reset set point 2 for Unit 3
36	Restore Set Point 1 Unit 4	SHORT_STRING	1	Set	X	Factory reset set point 1 for Unit 4
37	Restore Set Point 2 Unit 4	SHORT_STRING	1	Set	X	Factory reset set point 2 for Unit 4
40	Restore Calibration Unit 1	SHORT_STRING	1	Set	X	Factory reset all calibration for Unit 1
41	Restore Calibration Unit 2	SHORT_STRING	1	Set	X	Factory reset all calibration for Unit 2
42	Restore Calibration Unit 3	SHORT_STRING	1	Set	X	Factory reset all calibration for Unit 3
43	Restore Calibration Unit 4	SHORT_STRING	1	Set	X	Factory reset all calibration for Unit 4
50	Baud Rate Unit 1	SHORT_STRING	4	Get/Set	BBBB	Baud rate: BBBB = 0096 = 9600 0192 = 19200, 0384 = 38400 0576 = 57600, 1152 = 115200
51	Baud Rate Unit 2	SHORT_STRING	4	Get/Set	BBBB	
52	Baud Rate Unit 3	SHORT_STRING	4	Get/Set	BBBB	
53	Baud Rate Unit 4	SHORT_STRING	4	Get/Set	BBBB	
55	RS-485 Address Unit 1	SHORT_STRING	1	Get/Set	X	RS-485 address for Unit 1: 0 to F
56	RS-485 Address Unit 2	SHORT_STRING	1	Get/Set	X	RS-485 address for Unit 2: 0 to F
57	RS-485 Address Unit 3	SHORT_STRING	1	Get/Set	X	RS-485 address for Unit 3: 0 to F
58	RS-485 Address Unit 4	SHORT_STRING	1	Get/Set	X	RS-485 address for Unit 4: 0 to F
99	Error Checking	SHORT_STRING	8	Get	NNNNNNNN	Displays error received, or "OK" for no error (see section 8.6 for errors)
101	Pressure Unit 1	REAL	1	Get/PD_READ	PPPP	Unit 1 pressure output, REAL as 4 hex bytes
201	Pressure Unit 2	REAL	1	Get/PD_READ	PPPP	Unit 2 pressure output, REAL as 4 hex bytes
301	Pressure Unit 3	REAL	1	Get/PD_READ	PPPP	Unit 3 pressure output, REAL as 4 hex bytes
401	Pressure Unit 4	REAL	1	Get/PD_READ	PPPP	Unit 4 pressure output, REAL as 4 hex bytes
501	Pressure Unit 5	REAL	1	Get/PD_READ	PPPP	Unit 5 pressure output, REAL as 4 hex bytes
11	Output Real	REAL	4	PD_WRITE	PPPP	Send 4 arbitrary hex bytes to begin Class 1 connection

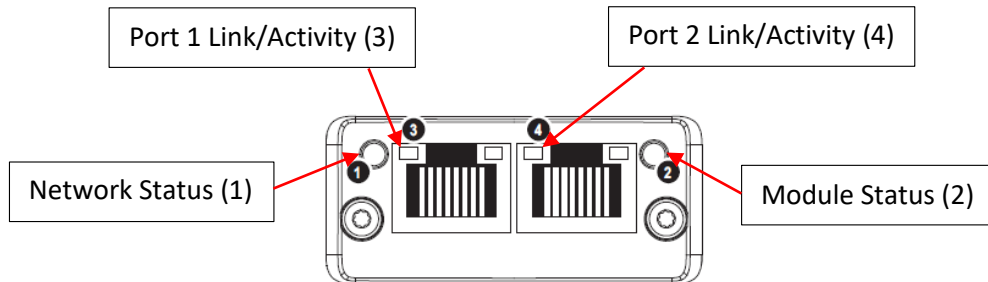
Instance	Name	Data Type	Array Length	Access	Data Format	Data Description
102	Calibration 1 Unit 1	SHORT_STRING	4	Get/Set	Baaa	Calibration point 1: B = 0 or 1 (negative/positive) aaa = 000 to 500 for MX2A/4A aa = 00 to 99 for MX7B (last digit ignored)
202	Calibration 1 Unit 2	SHORT_STRING	4	Get/Set	Baaa	
302	Calibration 1 Unit 3	SHORT_STRING	4	Get/Set	Baaa	
402	Calibration 1 Unit 4	SHORT_STRING	4	Get/Set	Baaa	
104	Calibration 2 Unit 1	SHORT_STRING	4	Get/Set	Baaa	Calibration point 2: B = 0 or 1 (negative/positive) aaa = 000 to 500 for MX2A/4A aa = 00 to 99 for MX7B (last digit ignored)
204	Calibration 2 Unit 2	SHORT_STRING	4	Get/Set	Baaa	
304	Calibration 2 Unit 3	SHORT_STRING	4	Get/Set	Baaa	
404	Calibration 2 Unit 4	SHORT_STRING	4	Get/Set	Baaa	
106	Calibration 3 Unit 1	SHORT_STRING	4	Get/Set	Baaa	Calibration point 3: B = 0 or 1 (negative/positive) aaa = 000 to 500 for MX2A/4A aa = 00 to 99 for MX7B (last digit ignored)
206	Calibration 3 Unit 2	SHORT_STRING	4	Get/Set	Baaa	
306	Calibration 3 Unit 3	SHORT_STRING	4	Get/Set	Baaa	
406	Calibration 3 Unit 4	SHORT_STRING	4	Get/Set	Baaa	
108	Calibration 4 Unit 1	SHORT_STRING	4	Get/Set	Baaa	Calibration point 4: B = 0 or 1 (negative/positive) aaa = 000 to 500 for MX2A/4A aa = 00 to 99 for MX7B (last digit ignored) See section 5.3.2 for full description
208	Calibration 4 Unit 2	SHORT_STRING	4	Get/Set	Baaa	
308	Calibration 4 Unit 3	SHORT_STRING	4	Get/Set	Baaa	
408	Calibration 4 Unit 4	SHORT_STRING	4	Get/Set	Baaa	
110	Analog Output Adjustment Unit 1	SHORT_STRING	3	Get/Set	Baa	Analog output adjustment: B = 0 or 1 (negative/positive) aa = 00 to 99 (MX7B only)
210	Analog Output Adjustment Unit 2	SHORT_STRING	3	Get/Set	Baa	
310	Analog Output Adjustment Unit 3	SHORT_STRING	3	Get/Set	Baa	
410	Analog Output Adjustment Unit 4	SHORT_STRING	3	Get/Set	Baa	
116	Analog Output Unit 1	SHORT_STRING	7	Get/Set	Fyzzabb	analog output format: F = 1 or 2 or 3 (lin/log/lin-by-decade) yzz = high value abb = low value See section 5.3.3 for full description
216	Analog Output Unit 2	SHORT_STRING	7	Get/Set	Fyzzabb	
316	Analog Output Unit 3	SHORT_STRING	7	Get/Set	Fyzzabb	
416	Analog Output Unit 4	SHORT_STRING	7	Get/Set	Fyzzabb	
118	Gas Type Unit 1	SHORT_STRING	2	Get/Set	GG	Gas type: GG = N2 = Nitrogen/Air AR = Argon, H2 = Hydrogen HE = Helium, NE = Neon KR = Krypton, C2 = Carbon Dioxide
218	Gas Type Unit 2	SHORT_STRING	2	Get/Set	GG	
318	Gas Type Unit 3	SHORT_STRING	2	Get/Set	GG	
418	Gas Type Unit 4	SHORT_STRING	2	Get/Set	GG	
120	Set Point 1 Unit 1	SHORT_STRING	10	Get/Set	ppseePPSEE	Set point on/off value for set points 1 and 2: MX2A/4A (last two digits ignored) ppse = lower pressure ON value PPSE = higher pressure OFF value MX7B ppsee = lower pressure ON value PPSEE = higher pressure OFF value See section 5.3.4 for full description
220	Set Point 2 Unit 1	SHORT_STRING	10	Get/Set	ppseePPSEE	
320	Set Point 1 Unit 2	SHORT_STRING	10	Get/Set	ppseePPSEE	
420	Set Point 2 Unit 2	SHORT_STRING	10	Get/Set	ppseePPSEE	
520	Set Point 1 Unit 3	SHORT_STRING	10	Get/Set	ppseePPSEE	
620	Set Point 2 Unit 3	SHORT_STRING	10	Get/Set	ppseePPSEE	
720	Set Point 1 Unit 4	SHORT_STRING	10	Get/Set	ppseePPSEE	
820	Set Point 2 Unit 4	SHORT_STRING	10	Get/Set	ppseePPSEE	
122	Resolution Unit 1	SHORT_STRING	2	Get/Set	RR	Resolution for pressure reading: RR = HI or LO
222	Resolution Unit 2	SHORT_STRING	2	Get/Set	RR	
322	Resolution Unit 3	SHORT_STRING	2	Get/Set	RR	
422	Resolution Unit 4	SHORT_STRING	2	Get/Set	RR	
124	Sensor Voltage Control Unit 1	SHORT_STRING	1	Get/Set	X	Sensor voltage control for the MX7B: X = 1, set through menu X = 2, set through control pins
224	Sensor Voltage Control Unit 2	SHORT_STRING	1	Get/Set	X	
324	Sensor Voltage Control Unit 3	SHORT_STRING	1	Get/Set	X	
424	Sensor Voltage Control Unit 4	SHORT_STRING	1	Get/Set	X	
126	High Voltage On/Off Unit 1	SHORT_STRING	1	Get/Set	Y	High voltage toggle for the MX7B: Y = 1, high voltage turns on Y = 0, high voltage turns off
226	High Voltage On/Off Unit 2	SHORT_STRING	1	Get/Set	Y	
326	High Voltage On/Off Unit 3	SHORT_STRING	1	Get/Set	Y	
426	High Voltage On/Off Unit 4	SHORT_STRING	1	Get/Set	Y	

See the applicable MX Active Gauge 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 EthernetIP Interface Description

- 5.1.1 Using the EthernetIP communications module, the Gateway 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-485 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 respective MX active gauge user manual for a full description of data and settings commands available through the serial port, and for response times for requested data.

5.2 CDG Communications

- 5.2.1 The only connections to the CDG supported within the gateway are power and analog output. Therefore, the only communication available to the CDG is the converted pressure reading, and the only settings available to the CDG are the range and whether or not the CDG is attached.

5.3 Data Format and Array Length Errors

- 5.3.1 Due to the differences in the communication formats between some of the active gauges, some of the data formats and array lengths in the ADI table could be different (See 5.3.2-4 for examples). When this occurs, the **value entered for the parameter must be as many characters as the array length specified for that parameter**. The excess characters will simply be ignored, but due to the nature of EthernetIP communications, the input must match the specified array length, or an error will occur when trying to execute a connection. In the event that the value of a parameter requested is less than the array length of the parameter in the ADI table, the excess space in the array will be filled with null characters.
- 5.3.2 **Calibration Parameter**
 - 5.3.2.1 The pressure calibration parameter for the MX2A and MX4A can be set anywhere between -500 to +500, whereas the calibration parameter for the MX7B can be set anywhere between -99 to +99. This results in a calibration parameter syntax of either Baaa or Baa depending on the gauge. In order to match the specified array length, the user will always need to send a fourth digit, and the gateway will ignore it if it is not needed.
- 5.3.3 **Analog Output Parameter**
 - 5.3.3.1 **NOTE:** The analog output parameter adjustment on the MX2A and MX4A is only available through the menu of the unit, and is not available through digital communications.
 - 5.3.3.2 The three different formats that the analog output can be set to are linear, logarithmic, and linear by decade. The analog output format parameter in the ADI table has a Fyzzabb syntax for specifying the choice between the three, as well as specifying the high and low value of the output range. The logarithmic format requires the high and low ends of the range to be set, so the full command syntax must be used. The linear format only requires that the high value of the range be set, therefore the last three digits of the parameter entered will be ignored but must still be entered (ex. "Fyzz****"). The linear by decade format only requires that the format be specified without any part of the range being set, therefore the last six digits of the parameter entered will be ignored but must still be entered (ex. "F*****").

5.3.4 Set Point Parameter

5.3.4.1 The set point parameter is assigned using specific pressure values for the on and off points of the set point on the associated gauge. When using an MX2A or MX4A, the pressure value is assigned as “ppse” as opposed to the MX7B where it is assigned as “ppsee”. Because of this, the set point parameter for a MX2A or MX4A gauge is assigned as “ppsePPSE**” with the last two digits being ignored but still included in the command. In order to match the specified array length, the user will always need to send the last two digits, and the gateway will ignore them if they are not needed.

5.3.5 CDG Range Parameter

5.3.5.1 The CDG range parameter requires that 5 digits be sent in order to properly fill the character array and avoid a connection error. Unlike the other parameters, the CDG range conversion will not be able to ignore extra characters added to the end of the range value. To achieve the proper formatting, the gateway will accept leading zeroes, a decimal point, or null characters. For example, to set the CDG range to 1 Torr, the user could enter any of the following:

- “00001”: The leading zeroes will not affect the value of the range
- “1.000”: The trailing zeroes will not affect the value of the range
- “1 0x00 0x00 0x00 0x00”: The null characters will not affect the value of the range

5.4 Error Codes

5.4.1 **NOTE:** Please refer to the applicable active gauge manual for a full list of error codes and explanations for each unit.

5.4.2 0N0001

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

5.4.3 0N000X

5.4.3.1 Specific command error: refer to the applicable active gauge manual for error description.

5.4.4 E

5.4.4.1 The attached unit does not support this command.

5.5 Front Panel LED Indication

5.5.1 In order to quickly identify network concerns and to verify current operational status, the EthernetIP Gateway includes a red-green status indication LED on the front panel. During the initial power up of the unit, the LED will blink green to show that the unit is on and identifying the gauges attached to the network.

Once the network is established and the gateway is communicating with the attached gauges, the green LED will remain on. A green light indicates that the gateway is powered and functioning properly with all of the identified gauges. If an error occurs while trying to communicate with any gauge on the network, the LED will turn red signaling that the gateway received no response from the gauge. The LED will remain red until successful communication occurs. For example, if only one gauge is attached, or if all gauges are exhibiting issues with communication, the LED will remain in a red state. If any gauge is still operating and communicating properly, the LED will return to a green state while communicating with that gauge, and then return to a red state if the initial error continues to occur.

6. Certifications

6.1 EMC

- 6.1.1 CE Certified to EN61326-1:2013
- 6.1.2 Certified to FCC Part 15, Subpart B
- 6.1.3 Certified to ICES-003, Issue 6
- 6.1.4 CE Certified to EN55011:2016/A1:2017

6.2 Safety

- 6.2.1 Certified to UL61010-1
- 6.2.2 CE Certified to EN61010-1
- 6.2.3 Certified to CAN/CSA C22.2 No. 61010-1-12

6.3 RoHS

- 6.3.1 The EthernetIP Gateway 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
-	General release	GD	5/18/18		