

# O & M Manual

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# MetriNet Ethernet/IP Communications Manual

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Gas sensors carry a 12 months from date of shipment warranty and are subject to inspection for evidence of misuse, abuse, alteration, improper storage, or extended exposure to excessive gas concentrations. Should inspection indicate that sensors have failed due to any of the above, the warranty shall not apply.

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## Ethernet/IP Option

#### 1.1 General

MetriNet Monitors are available with three digital communication options: Cellular, Modbus-RTU, Modbus-TCP/IP, Ethernet/IP. This manual applies only to instruments supplied with the Ethernet/IP communication option. It is critical to note that Ethernet/IP devices only communicate with other systems running the "Industrial Protocol" of Ethernet. You cannot plug a MetriNet into your office Ethernet and expect to have the instrument talk to your desktop computer.

The discussion of standard Ethernet and Ethernet/IP is vast, and well beyond the ability to discuss here in great detail. The documentation for this option assumes working network knowledge by the user.

#### **1.2 Ethernet/IP Communication**

Ethernet/IP was first introduced in 2001, and is a highly developed and complete protocol for an industrial Ethernet network solution. Intended for automation applications, EtherNet/IP is a member of a family of networks that implement the Common Industrial Protocol (CIP) at its upper layers of the standard ISO/OSI 7-layer model. CIP defines the object structure, specifies the message transfer, provides users with a unified communication architecture, and encompasses a comprehensive suite of services for a variety of manufacturing automation applications which include data, control, safety, and configuration.

In the CIP Protocol, every network device represents itself as a series of objects. Each object is simply a grouping of the related data values in a device. The identity object contains related identity data values called attributes. Attributes for the identity object include the vendor ID, date of manufacture, device serial number and other identity data.

#### 1.3 Ethernet/IP Transmission Details

It should be understood that Ethernet/IP is simply an application layer protocol that is transferred over an Ethernet hardware link. The word "Ethernet" simply refers to the common physical cable, perhaps running to an office PC.

In the OSI model, "Ethernet" is the lower part of the model, the physical transfer method or the hardware. It says nothing about the way information is transferred, which is specified near the top of the OSI model. In the common office network, many different standard communication protocols are operating during normal office use, like IP, TCP, etc. None of these are designed to handle the CIP industrial format, so that interface must be handled by a specific program that recognizes the format. Because of this, an Ethernet/IP device cannot be directly connected to your office network for transferring information.

The data for the protocol is constructed into a specific structure inside a standard TCP/IP Packet. A user application program simply decodes the structure inside the received TCP or UDP packet. The data structure consists of a grouping of data values called Attributes inside other sets of containment data called Objects. There are Ethernet/IP required Objects and application Objects. Required objects are typically - Identity, TCP, and Router. Application objects consist of some defined data types, like a Motor Object, and some user specific data types.

#### 1.4 Cable Connection

The cable used for Ethernet/IP communication should meet the CAT5 standard defined by the Electronic Industries Association and Telecommunications Industry Association. It is readily available in lengths up to 100 ft. (30 m) with plugs on each end.

To install an Ethernet cable in the MetriNet, pass the unterminated cable through the cable gland nearest the location of the RJ45 connector on the Ethernet/IP option board. Provide a slight service loop amount of slack so that the terminated cable will not be pulling directly on the RJ45 connector once installed. Termination of Cat5/5e/6 cables is very easy and can be completed quickly with the commonly available RJ45 crimp tool.

Note that there a reconnection LEDs present on the face of the RJ45 connector, which can be used to verify activity on the interface. Rather than detail their specific use, it is sufficient to just very flashing on these LEDS when the unit is powered up or actively communicating with the network client.



Figure 1 – Ethernet Cable Routing on MetriNet



Figure 2 - RJ45 Crimp Tool

While professional results are optimized with the use of the termination tool and custom cable lengths, patch cord style connection can be completed in some cases by passing the finished RJ45 connectors through the enclosure cable gland. The connector will fit through the plastic part of the cable gland, and the rubber grommet can be slit (some RJ45s may be too big for this.) Once the connector is inside the enclosure, simply plug it into the jack provided on the Ethernet/IP communication board. Be sure to adjust the rubber insert in the cable gland so that the slit is on the bottom and then tighten the gland to seal around the wire.

#### **1.5 Configuring MetriNet for Ethernet Option**

Once the proper power is applied to the MetriNet monitor, select **"Ethr**" in the **^Host Comms** listing of the **OPTIONS** menu to enable Ethernet/IP functionality.

#### 1.6 Configuring fixed IP with BOOTP

The next step in the use of the MetriNet is to sort out how an IP network address will be assigned to the instrument. The MetriNet acquires a dynamic network IP address from the network client/master through the BOOTP service, which is enabled by default for ODVA EIP-CIP conformance.

BOOTP is a very simple software server application that waits for a specific MAC address to appear on the network, and then assigns it a pre-determined IP address that has been set-up by the user. In the most actual applications, BOOTP runs right on the PLC alongside tools like Rockwell's Logix/Studio 5000. For manual fixed settings, this same BOOTP server tool can be easily run on a PC. The current Rockwell version of this tool (recommended) is – "BootP-DHCP Ethernet/IP Commissioning Tool Version 3.02.00"

This tool is available from the Rockwell Automation website for free. For optimum security, only download this tool directly from Rockwell Automation.

While this tool is normally used for dynamic assignment, the MetriNet will remember the last successful assignment made by BOOTP, and it will retain that assignment after cycling instrument power. Therefore, the tool can be used to lock in a fixed IP address assignment, and then the BOOTP service will not actually be required after that first assignment.

In order to use BOOTP properly on a PC, some careful NIC adjustment settings must be made to the PC Ethernet port prior to running the BOOTP service. The PC can only reach IP addresses at the predetermined IP/subnet level, so we must force the PC to a subnet that can reach the existing MetriNet.

 Turn off MetriNet. Connect MetriNet to laptop with direct cable. Set laptop NIC port on a locked IP and subnet to stop DHCP service. In IPV4 properties on your PC's Ethernet connection port, select "Use the following IP Address" and set the PC to fixed IP of -IP Address = 192.168.0.10 Subnet Mask = 255.255.255.0

ධ Home	Control Panel\Network and Internet\Network ← → ∨ ↑ ♥ > Control Panel > Net	rk Connections work and Internet > Network Connections v 🖏 Search N	etwork Connections	
Find a setting	Organize · Disable this network device Bluetooth Network Bluetooth Network Not connected	Diagnose this connection Rename this connection -	Wi-Fi           MCNET 6           Dell Wireless 1560 802	Related settings Change adapter options Change advanced sharing options
Status				Network and Sharing Center
Ethorpot	tatus	X Vetworking Sharing	Internet Protocol Version 4 General	(TCP/IPv4) Properties ×
Dial-up IPv4 Connection -	ctivity: No network access ctivity: No network access	Connect using:	You can get IP settings ass this capability. Otherwise, y for the appropriate IP setti Obtain an IP address	igned automatically if your network supports you need to ask your network administrator ngs. automatically
8º VPN Media Stati Duration: Speed:	2: Enabled 00:01:44 100.0 Mbps	This connection uses the following items:	Ouse the following IP as IP address:	ddress:
> Airplane m Details.		Cos Packet Scheduler     Scheduler     Internet Protocol Version 4 (TCP/IPv4)     Microsoft Network Adapter Multiplexor Protocol	Subnet mask: Default gateway:	255.255.255.0
Activity      Data usage	Sant Peraived	Macrosoft LLDP Protocol Driver      Macrosoft LLDP Protocol Driver      Antermet Protocol Version 6 (TCP/IPv6)      <	Obtain DNS server ad	dress automatically server addresses:
Proxy Packets:	229 0	Install Uninstall Properties Description Transmission Control Protocol/Internet Protocol. The default	Alternate DNS server:	
Propertie	s 🛟Disable Diagnose	wide area network protocol that provides communication across diverse interconnected networks.	Validate settings upor	n exit Advanced

Figure 3 – Force PC to Specific Network Subnet Prior to Running BOOTP

- 2) Once this IP/subnet is set, click OK to save and then close it all out. Turn PC off then back on to place it on the new IP address set in step 1. The PC will now be able to access any network device on 192.168.0.X, as the subnet mask 255.255.255 locks in the first three variables. The default value for the MetriNet is 192.168.0.254, so it can now be reached by the PC.
- 3) Find the Rockwell BOOTP PC application and launch it. Select your Ethernet Adapter as the network interface.



Figure 4 – Launching BOOTP server

4) On next screen, you must create an assignment relationship to match a known MAC ID with a desired IP address. The MAC ID for your MetriNet is written on a label inside the enclosure. For this example, we will use the MAC ID - 00:80:A3:9B:BE:B6 and assign it an IP of 192.168.0.30. Hit OK after this information is filled in, and you will see this entry appear in the bottom half of the window under "Entered Relations."

Once the MAC assignment has been entered, it is ready for a BOOTP IP request to come in for assignment. Requests for assignment will appear in the upper window as they come in.

Add Relation	Discove	y History	Clear History
New Entry		×	
Server IP Address:	Unknown		
Client Address (MAC):	00:80:A3:9B:BE:D6		
Client IP Address:	192 . 168 . 0 . 30		
Hostname:			
Description:		-	
ОК	Cancel		

Figure 5 – Setting IP/mask Assignment in BOOTP Server

5) Now, plug the cable from MetriNet into the PC Ethernet port, turn on power to the MetriNet, and wait for BOOTP to detect the request from the MetriNet for an IP address.

The upper "Discovery History Window" will show new IP requests coming in on the Ethernet port, and when the specific MAC ID in our relation shows up, the IP will be automatically assigned per our relation entry and sent to the MetriNet. Note that you may see requests from other devices as they come in, but only the specific MAC ID from the assignment will be acknowledged.

EtherNet/IP Commissioner - C:\Users\Jon\Documents\Q52.	ррс – 🗆 X
File Tools Help	
Add Relation Discovery	listory Clear History
Ethernel Address (MAQ, Type intruinced # IP Address Hestnar 0080A398.8E.06 BOOTP 18:15:03 I 192.168.0.39	e
<	>
Entered Ro	ations
Ethernel Address (MAG) Type IP Address Hostname Description 000eA3988E06 BOOTP 192.160.30	

Figure 6 – Successful Detection of MAC ID and IP Address Assignment in BOOTP Server

Once the assignment has been made and the IP has been sent to the MetriNet, disconnect power to the MetriNet and that IP will be stored in the instrument. The MetriNet stores the very last successful IP address assignment. Then close out all BOOTP server windows.

6) Now, to check that the IP address has been properly saved, apply power to MetriNet again and wait one 1 minute before connecting it to the PC port. Do not launch BOOTP server this time, as you don't need it. During the 1 minute wait, MetriNet will search for a BOOTP server on power up and won't find the service because it is not used here now, and the MetriNet is also not connected to the PC. It will then revert to the stored default – the last successful BOOTP assignment. Connect cable from MetriNet to the PC after that one minute. You can now check the IP connection to the MetriNet at that address by entering a ping command at the Windows OS command prompt, for example ">ping 192.168.0.30." You should see a response as shown below. In addition, you can try an ">arp -a" command to show all current connections and associated MAC addresses. You should see the new IP address of 192.168.0.30 showing up.

Command Prompt					-	a x
Microsoft Windows [Ve (c) 2018 Microsoft Co	ersion 10.0.17134.285] prporation. All rights r	reserved.				
C:\Users\Jon>ping 192	2.168.0.30					
Pinging 192.168.0.30 Reply from 192.168.0. Reply from 192.168.0. Reply from 192.168.0. Reply from 192.168.0. Reply from 192.168.0.	with 32 bytes of data: 30: bytes=32 time<1ms 1 30: bytes=32 time=1ms 1 30: bytes=32 time=1ms 1 30: bytes=32 time=1ms 1	TTL=64 TTL=64 TTL=64 TTL=64				
Ping statistics for 1 Packets: Sent = 4 Approximate round tri Minimum = 0ms. Ma	l92.168.0.30: , Received = 4, Lost = p times in milli-second ximum = 1ms. Average =	0 (0% loss), is: 0ms				
C:\Users\Jon>arp -a						
Interface: 192.168.0.	10 0xd					
Internet Address	Physical Address	Type				
192,168,0,30	00-80-a3-9b-be-d6	dynamic				
192.168.0.255	ff-ff-ff-ff-ff-ff	static				
224.0.0.2	01-00-5e-00-00-02	static				
224.0.0.22	01-00-5e-00-00-16	static				
224.0.0.251	01-00-5e-00-00-fb	static				
224.0.0.252	01-00-5e-00-00-fc	static				
239.255.255.250	01-00-5e-7f-ff-fa	static				
255.255.255.255	ff-ff-ff-ff-ff-ff	static				
Interface: 192.168.1.	149 0x13					
Internet Address	Physical Address	Туре				
192.168.1.1	c0-56-27-c7-c2-6e	dynamic				
192.168.1.115	0c-47-c9-2d-a8-23	dynamic				
192.168.1.170	50-dc-e7-0c-9d-0a	dynamic				
192.168.1.197	74-c2-46-8d-18-80	dynamic				
192.168.1.255	ff-ff-ff-ff-ff-ff	static				
224.0.0.2	01-00-5e-00-00-02	static				
224.0.0.22	01-00-5e-00-00-16	static				
224.0.0.251	01-00-5e-00-00-fb	static				
224.0.0.252	01-00-5e-00-00-fc	static				
239.255.255.250	01-00-5e-7f-ff-fa	static				
255.255.255.255	++-++-++-++-++-++	static				

Figure 7 – PING and ARP Command Tests for IP Address Setting.

Note that the "arp -a" listing still shows this IP as a "dynamic" assignment, as this is the fall-back IP that has been stored in the MetriNet. On power up, the MetriNet will still try and find a BOOTP server for 30 seconds, and then default to this stored value as the fallback. If you do not see your new connection, two troubleshooting notes –

1-You must always be careful to place the new IP address on the proper subnet level so the PC can still reach it with the settings made in step 1. If the PC is on 192.168.0.X, then any assigned IP must be on the X level – and don't place the MetriNet on the same IP as the PC. During BOOTP server assignment, if you place the MetriNet on a vastly different IP like 10.20.120.100, you must repeat step 1 before step 6 above to place the PC at something like 10.20.120.10. This can get tricky, as you can make assignments anywhere, but then the PC must be re-established on that new net to find the new assignment.

2-Remember to wait a minute before the ping test if you verify a connection. The MetriNet runs BOOTP by default, so it will be searching for that server for about 30 seconds on power up, and then will default to the stored IP.

#### 1.7 Loading EDS File

The EDS file will specify many of the parameters for reading and writing the proper registers in the MetriNet. It must first be loaded into server in control of the network. This can vary widely depending on the tools, but here is an example using Rockwell's library "EDS Hardware Installation Tool."

1-Launch the EDS tool and select "Add" to start the EDS Wizard for file addition.

2-Select button for "Register a single file," and browse to the file location for the EDS file "<u>ATI Q52x Transmitter EDS File.eds</u>"

3-Follow though the screens to complete the addition, then exit the tool.

Now, the EDS file that is specific to the MetriNet is part of the Rockwell EDS RSLinx library, and devices can be recognized when connected to the network.

#### 1.8 PLC Object Generic Settings

PLCs handle this Ethernet/IP exchange in a wide variety of configurations, and the basic configuration of a class 1 connection in every PLCs software is different, but there should be a place to enter the following basic information.

Data Type: "INT" or "16-Bit"

Input T->O Assembly Instance: 0x65 or 101 decimal Input T->O Size: 250 words (16-bit) or 500 bytes (8-bit) Output O->T Assembly Instance: 0x66 or 102 decimal Output O->T Size: 5 word (16-bit) or 10 bytes (8-bit) Configuration Assembly Instance: 0x80 or 128 decimal Configuration Size: 0

#### RPI Setting = 1000 mS or higher

This description represents the raw block of data in and out of the MetriNet, and will take everything in 16-bit words (so you must parse out the 32-bit values shown earlier.) The data typing and setting up of variables must all be done manually, based on the values shown below in section 1.9. For more basic tools, like Molex-EIP, that there may be an endian byte-swap occurring on each set of registers, so you may have to byte swap each 16-bit register to recombine the data.

Type: Vendor:	ETHERNET-MODULE Generic Ethern Allen-Bradley	net Module			
Marrenc Name:		- Connection Para	ameters		
Description			Assembly Instance:	Size:	
Descrigion		[nput:	101	250	÷ (16-bit)
		Output:	102	5	÷ (16-bit)
Comm <u>F</u> orma	t Data - INT 💌	Continuation	128	0	- (8-bit)
Address / I	Host Name	Zerngenenn			- (0 )
	ess: 10 , 3 , 2 , 99	<u>Status Input:</u>			
← Host N	ame:	Status Output:			

Figure 8 – Generic Module Input/Output Settings

🗖 Module Properties: LocalENB (ETHER	RNET-MOD	ULE 1.1)		
General Connection Module Info				
Requested Packet Interval (RPI): 1000.0	ins (1.0	) - 3200.0 ms)		
	is while in Fil	In Mode		
Use Scheduled Lonnection over Controlive     Module Fault	21			
Status: Offline	ОК	Cancel	Apply	Help

Figure 9 – Connection/RPI Settings

#### 1.9 PLC Object Settings Parameter Detail, and EDS Files

The following table describes all of the data types used

UINT	Unsigned Integer (16-bit)
UDINT	Unsigned Double Integer (32-bit)
INT	Signed Integer (16-bit)
DINT	Signed Integer (32-bit)

BYTE	Bit String (8-bits)
WORD	Bit String (16-bits)
DWORD	Bit String (32-bits)
LWORD	Bit String (64-bits)

ODVA CIP conforming objects implemented include – 0x01 Identity Object 0x04 Assembly Object, Input 0x04 Assembly Object, Output 0xF5 TCP Object 0xF6 Ethernet Link Object \*These are all broken down below in sections below.

#### Identity Object (01HEX – 1 Instance)

The following tables contain the attribute, status, and common services information for the Identity Object. The Identity Object lists specific information on the actual product and the vendor.

Class Attributes (Instance 0)

Attribute ID	Name	Data Type	Data Value	Access Rule				
1	Revision	UINT	1	Get				

## Identity Instance Attributes (Instance 1)

activity instance Attributes (instance 1)							
Attribute ID	Name	Data Type	Data Value	Access Rule			
1	Vendor Number	UINT	1530	Get			
2	Device Type	UINT	2B <sub>HEX</sub>	Get			
3	Product Code Number	UINT	101	Get			
4	Major Revision Minor Revision	USINT USINT	01 01	Get			
5	Status	WORD	See Below	Get			
6	Serial Number	UDINT	NU	Get			
7	Product Name	SHORT STRING32	ATI Q52x	Get			

#### Identity Instance Common Services

Samuina Cada	Implem	ented for	Sanviaa Nama
Service Code	Class Level	Instance Level	Service Name
05 <sub>HEX</sub>	No	Yes	Reset
0E <sub>HEX</sub>	Yes	Yes	Get_Attribute_Single

#### Input Assembly Object (04HEX – 1 Instance)

The Input Assembly Object is a collection of all the measurement information that <u>can be read</u> from the MetriNet. This includes all data from any attached sensor(s.) This is "read only" data that the MetriNet can send out. The data arrangement is detailed below, including the byte size of various data fields.

#### Class Attributes (Instance 0)

Attribute ID	Name	Data Type	Data Value	Access Rule
1	Revision	UINT	2	Get
2	Max Instance	UINT	0x66 (102 decimal)	Get

#### Input Instance Attributes (Instance 101)

Attribute ID	Name	Data Type	Default Data Value	Access Rule
3	Input Data	VARIES	0	Get

#### Input Instance Common Services

Service Code	Implemented for		Sonvice Name
	Class Level	Instance Level	Service Name
0E <sub>HEX</sub>	Yes	Yes	Get_Attribute_Single

#### Input Instance 101 – 500 Bytes

#### System IINFO

Bytes	Data Type	Description
0–1	WORD	Interface Status Flags <sup>1</sup>
2–3	WORD	System Status 1 Flags <sup>2</sup>
4–5	WORD	System Status 2 Flags <sup>2</sup>
6–7	UINT	Number of Sensors
8–9	UINT	IP Address High
10–11	UINT	IP Address Low
12–13	UINT	Subnet Mask High
14–15	UINT	Subnet Mask Low
16–17	UINT	Gateway High
18–19	UINT	Gateway Low

#### Notes on System INFO flag data -

<sup>1,2,3</sup>Flag status as follows for each bit.

Bit	Interface Status Flags	System Status 1 Flags	System Status 2 Flags
0 (LSB)	MB Bridge Status	Sensor 1 Comm Err	Flow Solenoid, 0=close,1=flow
1	MB Bridge Timeout	Sensor 2 Comm Err	Digital Input, 0=OFF,1=ON
2	MB Bridge Fail	Sensor 3 Comm Err	Digital Output, 0=OFF,1=ON
3	NU	Sensor 4 Comm Err	
4	NU	Sensor 5 Comm Err	
5	NU	Sensor 6 Comm Err	
6	NU	Sensor 7 Comm Err	
7	NU	Sensor 8 Comm Err	
8	Active	NU	
9	New Config	NU	

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11         NU         NU           12         NU         NU           13         NU         NU           14         NU         NU           15         NU         NU           Sensor 1 MEASURE           Bytes         Data Type         Description           20-23         DINT         S1 Main Value           24-27         DINT         S1 Main Value           32-35         DINT         S1 Raw Value           32-35         DINT         S1 Temperature           36-37         INT         S1 Output Value           38-39         WORD         S1 Status 1           40-41         WORD         S1 Status 2           42-43         INT         S1 ID           Sensor 2 MEASURE           Bytes         Data Type         Description           44-47         DINT         S2 Units           52-55         DINT         S2 Raw Value           56-59         DINT         S2 Temperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           Genescription	10	NU	NU	
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13         NU         NU           14         NU         NU           15         NU         NU           15         NU         NU           15         NU         NU           Sensor 1 MEASURE           Bytes         Data Type         Description           20-23         DINT         S1 Main Value           24-27         DINT         S1 Units           28-31         DINT         S1 Raw Value           32-35         DINT         S1 Temperature           36-37         INT         S1 Couput Value           38-39         WORD         S1 Status 1           40-41         WORD         S1 Status 2           42-43         INT         S1 ID           Sensor 2 MEASURE           Bytes         Data Type         Description           44-47         DINT         S2 Units           52-55         DINT         S2 Raw Value           52-55         DINT         S2 Raw Value           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 1 <td< td=""><td>12</td><td>NU</td><td>NU</td><td></td></td<>	12	NU	NU	
14         NU         NU           15         NU         NU           Sensor 1 MEASURE         Sensor 1 MEASURE           Bytes         Data Type         Description           20-23         DINT         S1 Main Value           24-27         DINT         S1 Main Value           32-35         DINT         S1 Temperature           36-37         INT         S1 Output Value           38-39         WORD         S1 Status 1           40-41         WORD         S1 Status 2           42-43         INT         S1 ID           Sensor 2 MEASURE           Bytes         Data Type         Description           44-47         DINT         S2 Units           52-55         DINT         S2 Raw Value           56-59         DINT         S2 Raw Value           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S3 Output Value           72-75         DINT         S3 Main Value           72-75         DINT         S3 Coutput Value           80-83	13	NU	NU	
NU         NU           Bytes         Data Type         Description           20-23         DINT         S1 Main Value           24-27         DINT         S1 Main Value           32-33         DINT         S1 Raw Value           32-35         DINT         S1 Context           36-37         INT         S1 Output Value           38-39         WORD         S1 Status 1           40-41         WORD         S1 Status 1           40-41         WORD         S1 Status 1           40-41         WORD         S1 Status 1           44-47         DINT         S2 Main Value           52-55         DINT         S2 Raw Value           56-59         DINT         S2 Contput Value           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S3 Units           72-75         DINT         S3 Temperature           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           80-83         DINT         S3 Temperature	14	NU	NU	
Bytes         Data Type         Description           20-23         DINT         S1 Main Value           24-27         DINT         S1 Main Value           24-27         DINT         S1 Main Value           32-35         DINT         S1 Temperature           36-37         INT         S1 Output Value           38-39         WORD         S1 Status 1           40-41         WORD         S1 Status 2           42-43         INT         S1 ID           Sensor 2 MEASURE           Bytes         Data Type         Description           44-47         DINT         S2 Main Value           452-55         DINT         S2 Main Value           52-55         DINT         S2 Main Value           52-55         DINT         S2 Main Value           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASUEE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75<	15	NU	NU	
Bytes         Data Type         Description           20-23         DINT         S1 Main Value           24-27         DINT         S1 Main Value           28-31         DINT         S1 Raw Value           32-35         DINT         S1 Temperature           36-37         INT         S1 Output Value           38-39         WORD         S1 Status 1           40-41         WORD         S1 Status 2           42-43         INT         S1 ID           Sensor 2 MEASURE           Bytes         Data Type         Description           44-47         DINT         S2 Main Value           452-55         DINT         S2 Raw Value           56-59         DINT         S2 Raw Value           56-59         DINT         S2 Comperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S3 Main Value           72-75         DINT         S3 Raw Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value			Sensor 1 MEASU	IRE
20-23         DINT         S1 Main Value           24-27         DINT         S1 Units           28-31         DINT         S1 Raw Value           32-35         DINT         S1 Temperature           36-37         INT         S1 Output Value           38-39         WORD         S1 Status 1           40-41         WORD         S1 Status 2           42-43         INT         S1 ID           Sensor 2 MEASURE           Bytes         Data Type         Description           44-47         DINT         S2 Main Value           44-47         DINT         S2 Units           52-55         DINT         S2 Raw Value           56-59         DINT         S2 Output Value           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           Geneor 3 MEASURE           Bytes         Data Type         Description           68-67         INT         S3 Main Value           72-75         DINT         S3 Main Value           72-75         DINT         S3 Couput Value           80-83         DINT         S3 Raw Value           80-84 <td></td> <td>Bytes</td> <td>Data Type</td> <td>Description</td>		Bytes	Data Type	Description
24-27         DINT         S1 Units           28-31         DINT         S1 Raw Value           32-35         DINT         S1 Temperature           36-37         INT         S1 Output Value           38-39         WORD         S1 Status 1           40-41         WORD         S1 Status 2           42-43         INT         S1 ID           Sensor 2 MEASURE           Bytes         Data Type         Description           44-47         DINT         S2 Main Value           48-51         DINT         S2 Main Value           52-55         DINT         S2 Raw Value           56-59         DINT         S2 Temperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S3 Main Value           72-75         DINT         S3 Main Value           72-75         DINT         S3 Temperature           80-83         DINT         S3 Coutput Value           80-845         INT         S3 Output Value           86-87         WORD         S3 Status 1 <td></td> <td>20-23</td> <td>DINT</td> <td>S1 Main Value</td>		20-23	DINT	S1 Main Value
28-31         DINT         S1 Raw Value           32-35         DINT         S1 Temperature           36-37         INT         S1 Output Value           38-39         WORD         S1 Status 1           40-41         WORD         S1 Status 2           42-43         INT         S1 ID           Sensor 2 MEASURE           Bytes         Data Type         Description           44-47         DINT         S2 Main Value           48-51         DINT         S2 Raw Value           52-55         DINT         S2 Raw Value           56-59         DINT         S2 Temperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASURE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           76-79         DINT         S3 Coutput Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87 </td <td></td> <td>24-27</td> <td>DINT</td> <td>S1 Units</td>		24-27	DINT	S1 Units
32-35         DINT         S1 Temperature           36-37         INT         S1 Output Value           38-39         WORD         S1 Status 1           40-41         WORD         S1 Status 2           42-43         INT         S1 ID           Sensor 2 MEASURE           Bytes         Data Type         Description           44-47         DINT         S2 Main Value           48-51         DINT         S2 Main Value           52-55         DINT         S2 Raw Value           56-59         DINT         S2 Temperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S3 Main Value           72-75         DINT         S3 Main Value           72-75         DINT         S3 Raw Value           80-83         DINT         S3 Raw Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2		28-31	DINT	S1 Raw Value
36-37         INT         S1 Output Value           38-39         WORD         S1 Status 1           40-41         WORD         S1 Status 2           42-43         INT         S1 ID           Sensor 2 MEASURE           Bytes         Data Type         Description           44-47         DINT         S2 Main Value           48-51         DINT         S2 Main Value           52-55         DINT         S2 Raw Value           56-59         DINT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASURE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75         DINT         S3 Raw Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S4 Units           100-103		32-35	DINT	S1 Temperature
38-39         WORD         S1 Status 1           40-41         WORD         S1 Status 2           42-43         INT         S1 ID           Sensor 2 MEASURE           Bytes         Data Type         Description           44-47         DINT         S2 Main Value           48-51         DINT         S2 Raw Value           52-55         DINT         S2 Temperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASURE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75         DINT         S3 Main Value           76-79         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S4 Main Value           96-99         DINT         S4 Main Value           96-99		36-37	INT	S1 Output Value
40-41         WORD         S1 Status 2           42-43         INT         S1 ID           Sensor 2 MEASURE         Description           44-47         DINT         S2 Main Value           48-51         DINT         S2 Units           52-55         DINT         S2 Temperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S3 Main Value           72-75         DINT         S3 Main Value           72-75         DINT         S3 Main Value           76-79         DINT         S3 Main Value           76-79         DINT         S3 Raw Value           80-83         DINT         S3 Status 1           86-87         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE         Bytes         Data Type         Description           92-95         DINT         S4 Main Value           80-83         INT         S3 Output Value           86-87         WORD         S3 Status 2           90-91         INT		38-39	WORD	S1 Status 1
42-43         INT         S1 ID           Sensor 2 MEASURE           Bytes         Data Type         Description           44-47         DINT         S2 Main Value           48-51         DINT         S2 Units           52-55         DINT         S2 Raw Value           56-59         DINT         S2 Temperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASURE         Bytes         Data Type         Description           68-71         DINT         S3 Main Value         72-75           72-75         DINT         S3 Raw Value         80-83           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S4 Main Value           96-99         DINT         S4 Main Value           96-99         DINT         S4 Raw Value           100-103		40-41	WORD	S1 Status 2
Sensor 2 MEASURE           Bytes         Data Type         Description           44-47         DINT         S2 Main Value           48-51         DINT         S2 Cunits           52-55         DINT         S2 Raw Value           56-59         DINT         S2 Temperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASURE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75         DINT         S3 Main Value           80-83         DINT         S3 Raw Value           80-83         DINT         S3 Cutput Value           84-85         INT         S3 Output Value           84-85         INT         S3 Output Value           80-83         DINT         S3 ID           Sensor 4 MEASURE         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Main Value           96-99         DINT		42-43	INT	S1 ID
Bytes         Data Type         Description           44-47         DINT         S2 Main Value           48-51         DINT         S2 Units           52-55         DINT         S2 Raw Value           56-59         DINT         S2 Temperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASURE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75         DINT         S3 Units           76-79         DINT         S3 Raw Value           80-83         DINT         S3 Output Value           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Main Value           96-99			Sensor 2 MEASU	IRE
44-47         DINT         S2 Main Value           48-51         DINT         S2 Units           52-55         DINT         S2 Raw Value           56-59         DINT         S2 Temperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASURE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75         DINT         S3 Raw Value           80-83         DINT         S3 Raw Value           80-83         DINT         S3 Comportance           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Raw Value           100-103		Bytes	Data Type	Description
48-51         DINT         S2 Units           52-55         DINT         S2 Raw Value           56-59         DINT         S2 Temperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASURE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75         DINT         S3 Units           76-79         DINT         S3 Comperature           84-85         INT         S3 Output Value           80-83         DINT         S3 Status 1           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Raw Value           104-107         <		44-47	DINT	S2 Main Value
52-55         DINT         S2 Raw Value           56-59         DINT         S2 Temperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASURE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75         DINT         S3 Units           76-79         DINT         S3 Raw Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Raw Value           104-107         DINT         S4 Raw Value           104-107         DINT         S4 Output Value           104-107		48-51	DINT	S2 Units
56-59         DINT         S2 Temperature           60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASURE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75         DINT         S3 Units           76-79         DINT         S3 Raw Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Raw Value           104-107         DINT         S4 Raw Value           104-107         DINT         S4 Output Value           104-107         DINT         S4 Output Value           104-107		52–55	DINT	S2 Raw Value
60-61         INT         S2 Output Value           62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASURE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75         DINT         S3 Cutput Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Main Value           96-99         DINT         S4 Raw Value           100-103         DINT         S4 Raw Value           104-107         DINT         S4 Cutput Value           104-107         DINT         S4 Status 1           112-113         WORD         S4 Status 2           114-		56–59	DINT	S2 Temperature
62-63         WORD         S2 Status 1           64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASURE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75         DINT         S3 Raw Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Main Value           96-99         DINT         S4 Raw Value           100-103         DINT         S4 Raw Value           104-107         DINT         S4 Temperature           108-109         INT         S4 Status 1           112-113         WORD         S4 Status 2           114-115         INT         S4 ID		60-61	INT	S2 Output Value
64-65         WORD         S2 Status 2           66-67         INT         S2 ID           Sensor 3 MEASURE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75         DINT         S3 Raw Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Main Value           96-99         DINT         S4 Raw Value           100-103         DINT         S4 Raw Value           104-107         DINT         S4 Raw Value           104-107         DINT         S4 Raw Value           108-109         INT         S4 Output Value           108-109         INT         S4 Status 1           112-113         WORD         S4 Status 2           114-11		62-63	WORD	S2 Status 1
66-67         INT         S2 ID           Sensor 3 MEASURE           Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75         DINT         S3 Raw Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Main Value           96-99         DINT         S4 Raw Value           100-103         DINT         S4 Raw Value           104-107         DINT         S4 Raw Value           104-107         DINT         S4 Status 1           108-109         INT         S4 Status 1           112-113         WORD         S4 Status 2           114-115         INT         S4 ID		64-65	WORD	S2 Status 2
Sensor 3 MEASUREBytesData TypeDescription68-71DINTS3 Main Value72-75DINTS3 Units76-79DINTS3 Raw Value80-83DINTS3 Temperature84-85INTS3 Output Value86-87WORDS3 Status 188-89WORDS3 Status 290-91INTS3 IDSensor 4 MEASUREBytesData TypeDescription92-95DINTS4 Main Value96-99DINTS4 Raw Value100-103DINTS4 Raw Value104-107DINTS4 Cutput Value108-109INTS4 Status 1112-113WORDS4 Status 2114-115INTS4 ID		66-67	INT	S2 ID
Bytes         Data Type         Description           68-71         DINT         S3 Main Value           72-75         DINT         S3 Units           76-79         DINT         S3 Raw Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Units           100-103         DINT         S4 Raw Value           104-107         DINT         S4 Temperature           108-109         INT         S4 Output Value           110-111         WORD         S4 Status 1           112-113         WORD         S4 Status 2           114-115         INT         S4 ID			Sensor 3 MEASU	IRE
Bytes         Dikt Type         Discription           68-71         DINT         S3 Main Value           72-75         DINT         S3 Units           76-79         DINT         S3 Raw Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Units           100-103         DINT         S4 Raw Value           104-107         DINT         S4 Temperature           108-109         INT         S4 Output Value           110-111         WORD         S4 Status 1           112-113         WORD         S4 Status 2           114-115         INT         S4 ID		Bytes	Data Type	Description
72-75         DINT         S3 Units           76-79         DINT         S3 Raw Value           80-83         DINT         S3 Raw Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Raw Value           100-103         DINT         S4 Raw Value           104-107         DINT         S4 Temperature           108-109         INT         S4 Output Value           110-111         WORD         S4 Status 1           112-113         WORD         S4 ID		68-71		S3 Main Value
76-79         DINT         S3 Raw Value           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Raw Value           100-103         DINT         S4 Raw Value           104-107         DINT         S4 Output Value           108-109         INT         S4 Status 1           110-111         WORD         S4 Status 2           114-115         INT         S4 ID		72-75	DINT	S3 Units
No.10         Dint         Solution take           80-83         DINT         S3 Temperature           84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Units           100-103         DINT         S4 Raw Value           104-107         DINT         S4 Temperature           108-109         INT         S4 Output Value           110-111         WORD         S4 Status 1           112-113         WORD         S4 Status 2           114-115         INT         S4 ID		76–79	DINT	S3 Raw Value
84-85         INT         S3 Output Value           86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Units           100–103         DINT         S4 Raw Value           104–107         DINT         S4 Output Value           108-109         INT         S4 Output Value           110-111         WORD         S4 Status 1           112-113         WORD         S4 Status 2           114-115         INT         S4 ID		80-83	DINT	S3 Temperature
86-87         WORD         S3 Status 1           88-89         WORD         S3 Status 2           90-91         INT         S3 ID           Sensor 4 MEASURE           Bytes         Data Type         Description           92-95         DINT         S4 Main Value           96-99         DINT         S4 Units           100–103         DINT         S4 Raw Value           104–107         DINT         S4 Temperature           108-109         INT         S4 Output Value           110-111         WORD         S4 Status 1           112-113         WORD         S4 Status 2           114-115         INT         S4 ID		84-85	INT	S3 Output Value
88-89WORDS3 Status 290-91INTS3 IDSensor 4 MEASUREBytesData TypeDescription92-95DINTS4 Main Value96-99DINTS4 Units100–103DINTS4 Raw Value104–107DINTS4 Temperature108-109INTS4 Output Value110-111WORDS4 Status 1112-113WORDS4 Status 2114-115INTS4 ID		86-87	WORD	S3 Status 1
90-91INTS3 IDSensor 4 MEASUREBytesData TypeDescription92-95DINTS4 Main Value96-99DINTS4 Units100–103DINTS4 Raw Value104–107DINTS4 Temperature108-109INTS4 Output Value110-111WORDS4 Status 1112-113WORDS4 Status 2114-115INTS4 ID		88-89	WORD	S3 Status 2
Sensor 4 MEASUREBytesData TypeDescription92-95DINTS4 Main Value96-99DINTS4 Units100–103DINTS4 Raw Value104–107DINTS4 Temperature108-109INTS4 Output Value110-111WORDS4 Status 1112-113WORDS4 Status 2114-115INTS4 ID		90-91	INT	S3 ID
BytesData TypeDescription92-95DINTS4 Main Value96-99DINTS4 Units100–103DINTS4 Raw Value104–107DINTS4 Temperature108-109INTS4 Output Value110-111WORDS4 Status 1112-113WORDS4 Status 2114-115INTS4 ID			Sensor 4 MEASU	IRE
92-95DINTS4 Main Value96-99DINTS4 Units100-103DINTS4 Raw Value104-107DINTS4 Temperature108-109INTS4 Output Value110-111WORDS4 Status 1112-113WORDS4 Status 2114-115INTS4 ID		Bytes	Data Type	Description
96-99         DINT         S4 Units           100–103         DINT         S4 Raw Value           104–107         DINT         S4 Temperature           108-109         INT         S4 Output Value           110-111         WORD         S4 Status 1           112-113         WORD         S4 Status 2           114-115         INT         S4 ID		92-95	DINT	S4 Main Value
100–103         DINT         S4 Raw Value           104–107         DINT         S4 Temperature           108-109         INT         S4 Output Value           110-111         WORD         S4 Status 1           112-113         WORD         S4 Status 2           114-115         INT         S4 ID		96-99	DINT	S4 Units
104–107         DINT         S4 Temperature           108-109         INT         S4 Output Value           110-111         WORD         S4 Status 1           112-113         WORD         S4 Status 2           114-115         INT         S4 ID		100–103	DINT	S4 Raw Value
108-109         INT         S4 Output Value           110-111         WORD         S4 Status 1           112-113         WORD         S4 Status 2           114-115         INT         S4 ID		104–107	DINT	S4 Temperature
110-111         WORD         S4 Status 1           112-113         WORD         S4 Status 2           114-115         INT         S4 ID		108-109	INT	S4 Output Value
112-113         WORD         S4 Status 2           114-115         INT         S4 ID		110-111	WORD	S4 Status 1
114-115 INT S4 ID		112-113	WORD	S4 Status 2
		114-115	INT	S4 ID

Sensor 5 MEASORE			
Bytes	Data Type	Description	
116-119	DINT	S5 Main Value	
120-123	DINT	S5 Units	
124–127	DINT	S5 Raw Value	
128–131	DINT	S5 Temperature	
132-133	INT	S5 Output Value	
134-135	WORD	S5 Status 1	
136-137	WORD	S5 Status 2	
138-139	INT	S5 ID	

#### Sensor 5 MEASURE

#### Sensor 6 MEASURE

Bytes	Data Type	Description
140-143	DINT	S6 Main Value
144-147	DINT	S6 Units
148–151	DINT	S6 Raw Value
152–155	DINT	S6 Temperature
156-157	INT	S6 Output Value
158-159	WORD	S6 Status 1
160-161	WORD	S6 Status 2
162-163	INT	S6 ID

#### Sensor 7 MEASURE

Bytes	Data Type	Description
164-167	DINT	S7 Main Value
168-171	DINT	S7 Units
172–175	DINT	S7 Raw Value
176–179	DINT	S7 Temperature
180-181	INT	S7 Output Value
182-183	WORD	S7 Status 1
184-185	WORD	S7 Status 2
186-187	INT	S7 ID

#### Sensor 8 MEASURE

Bytes	Data Type	Description
188-191	DINT	S8 Main Value <sup>1</sup>
192-195	DINT	S8 Units <sup>2</sup>
196–199	DINT	S8 Raw Value <sup>1</sup>
200–203	DINT	S8 Temperature <sup>1</sup>
204-205	INT	S8 Output Value <sup>3</sup>
206-207	WORD	S8 Status 1⁵
208-209	WORD	S8 Status 2⁵
210-211	INT	S8 ID <sup>4</sup>

#### Notes on MEASURE data -

<sup>1</sup>Main Value, Raw Value, are Temperature are all 32 bit integers, displayed with an implied fixed-decimal point 0.000 resolution.

So, 14.00 pH will show as 14000, which means 14.000 pH. 2000 uS conductivity will show as 2000000, meaning 2000.000 uS. 25C will show as 25000 meaning 25.000.

<sup>2</sup>Units are stored as packed ASCII hi/lo bytes.

<sup>3</sup> Output Value is also displayed with implied 0.000 resolution. The MetriNet has no actual hardware level output for these voltages. So, these are virtual values, like the alarm setpoints, that could be used to feed some other process digitally.

<sup>4</sup> ID not implemented at this time.

<sup>5</sup> Status Flags are as follows -

Bit	Status 1	Status 2
0 (LSB)	ALARM_A	EE_INIT_FAIL
1	ALARM_B	MAIN_UNITS_HI
2	ALARM_C	MAIN_UNITS_LO
3	ALARM_D	MAIN_INPUT_ERR
4	ALARM_E	TC_UNITS_HI
5	ENTRY_OUT_OF_RANGE	TC_UNITS_LO
6	ENTRY_ACCEPTED	TC_INPUT_ERR
7	ENTRY_FAIL	CAL_MAIN_SLOPE_HI
8	MAIN_CAL_PASS	CAL_MAIN_SLOPE_LO
9	MAIN_CAL_FAIL	CAL_MAIN_ZERO_HI
10	TC_CAL_PASS	CAL_MAIN_OFFSET_HI
11	TC_CAL_FAIL	MAIN_UNSTABLE
12	TC_F	CAL_TC_OFFSET_HI
13	SENSOR_LOCK	TC_UNSTABLE
14	NU	NU
15	NU	NU

#### Sensor 1 INFO

Bytes	Data Type	Description
212-213	INT	S1 Slope
214-215	INT	S1 Offset
216–217	INT	S1 Delay
218–219	INT	S1 Alarm A
220-221	INT	S1 Alarm B
222-223	INT	S1 Slope Alarm
224-225	INT	S1 Timer Limit
226-227	INT	S1 Vout HI
228-229	INT	S1 Vout LO
230-231	INT	S1 TC Mode
232-239	LWORD	S1 Tag1
240-247	LWORD	S1 Tag2

Sensor 2 INFO				
Bytes	Data Type	Description		
248-249	INT	S2 Slope		
250-251	INT	S2 Offset		
252–253	INT	S2 Delay		
254–255	INT	S2 Alarm A		
256-257	INT	S2 Alarm B		
258-259	INT	S2 Slope Alarm		
260-261	INT	S2 Timer Limit		
262-263	INT	S2 Vout HI		
264-265	INT	S2 Vout LO		
266-267	INT	S2 TC Mode		
268-275	LWORD	S2 Tag1		
276-283	LWORD	S2 Tag2		

#### Sensor 3 INFO

Bytes	Data Type	Description
284-285	INT	S3 Slope
286-287	INT	S3 Offset
288-289	INT	S3 Delay
290-291	INT	S3 Alarm A
292-293	INT	S3 Alarm B
294-295	INT	S3 Slope Alarm
296-297	INT	S3 Timer Limit
298-299	INT	S3 Vout HI
300-301	INT	S3 Vout LO
302-303	INT	S3 TC Mode
304-311	LWORD	S3 Tag1
312-319	LWORD	S3 Tag2

#### Sensor 4 INFO

Bytes	Data Type	Description
320-321	INT	S4 Slope
322-323	INT	S4 Offset
324-325	INT	S4 Delay
326-327	INT	S4 Alarm A
328-329	INT	S4 Alarm B
330-331	INT	S4 Slope Alarm
332-333	INT	S4 Timer Limit
334-335	INT	S4 Vout HI
336-337	INT	S4 Vout LO
338-339	INT	S4 TC Mode
340-347	LWORD	S4 Tag1
348-355	LWORD	S4 Tag2

Sensor 5 INFO				
Bytes	Data Type	Description		
356-357	INT	S5 Slope		
358-359	INT	S5 Offset		
360-361	INT	S5 Delay		
362-363	INT	S5 Alarm A		
364-365	INT	S5 Alarm B		
366-367	INT	S5 Slope Alarm		
368-369	INT	S5 Timer Limit		
370-371	INT	S5 Vout HI		
372-373	INT	S5 Vout LO		
374-375	INT	S5 TC Mode		
376-383	LWORD	S5 Tag1		
384-391	LWORD	S5 Tag2		

#### Sensor 6 INFO

Bytes	Data Type	Description
392-393	INT	S6 Slope
394-395	INT	S6 Offset
396-397	INT	S6 Delay
398-399	INT	S6 Alarm A
400-401	INT	S6 Alarm B
402-403	INT	S6 Slope Alarm
404-405	INT	S6 Timer Limit
406-407	INT	S6 Vout HI
408-409	INT	S6 Vout LO
410-411	INT	S6 TC Mode
412-419	LWORD	S6 Tag1
420-427	LWORD	S6 Tag2

#### Sensor 7 INFO

Bytes	Data Type	Description
428-429	INT	S7 Slope
430-431	INT	S7 Offset
432-433	INT	S7 Delay
434-435	INT	S7 Alarm A
436-437	INT	S7Alarm B
438-439	INT	S7 Slope Alarm
440-441	INT	S7 Timer Limit
442-443	INT	S7 Vout HI
444-445	INT	S7 Vout LO
446-447	INT	S7 TC Mode
448-455	LWORD	S7 Tag1
456-463	LWORD	S7 Tag2

Sensor 8 INFO				
Bytes	Data Type	Description		
464-465	INT	S8 Slope		
466-467	INT	S8 Offset		
468-469	INT	S8 Delay		
470-471	INT	S8 Alarm A		
472-473	INT	S8Alarm B		
474-475	INT	S8 Slope Alarm		
476-477	INT	S8 Timer Limit		
478-479	INT	S8 Vout HI		
480-481	INT	S8 Vout LO		
482-483	INT	S8 TC Mode		
484-491	LWORD	S8 Tag1		
492-499	LWORD	S8 Tag2		

#### 0

#### Notes on INFO data -

Format for INFO data is as follows (assumes Q32P pH sensor) -

Value	Field	Meaning
1000	Slope	100.0%
50	Offset	5.0 mVDC
10	Delay	1.0 minutes
700	Alarm A	7.00 pH setpoint
800	Alarm B	8.00 pH setpoint
800	Slope Alarm	80.0% low alarm
1000	Timer Limit	?
1400	Vout HI	14.00 pH = 2.5 VDC (virtual)
0	Vout LO	0.00 pH = 0 VDC (virtual)
0	TC Mode	?
10	Tag1	
11	Tag2	

#### Output Assembly Object (04HEX – 1 Instance)

The Output Assembly Object is a collection of all the information that can be written to the MetriNet. As the MetriNet has a fully interactive user interface with an LCD and keypad, it is expected that the vast majority of changes made to the sensors and system will be performed by trained technicians at that user interface on the actual MetriNet. While making changes digitally at the network level are possible, these "blind" calibration attempts over the network are not recommended. Network changes to the system ignore the typical sensor visual inspection process that occurs during typical calibration or adjustment. For example, sensors should always be removed, inspected, and then cleaned before calibration in solutions. This is pretty standard GMP procedure.

Even so, a secure password-protected write-window is provided to allow the user to change the majority of the parameters that are seen in the Input Assembly Object. To enter data to change these values, all values are entered through a 5-register window with specific codes to tell the system which sensor the operation is targeting So, this is the "write only" data window. The data arrangement is detailed below, including byte size of various fields. Using the EDS file for the MetriNet, all of the data information can be immediately setup automatically in the network master/client.

Class Allindites (instance v)					
Attribute ID	Name	Data Type	Data Value	Access Rule	
1	Revision	UINT	2	Get	
2	Max Instance	UINT	0x66 (102 decimal)	Get	

Class Attributes	(Instance 0)	
	_	

#### **Output Instance Attributes (Instance 102) Default Data Value** Attribute ID Data Type Access Rule Name UINT 3 Output Data 0 Get/Set

Service Code	Implem fo	Service Name	
	Class Level	Instance Level	
0E <sub>HEX</sub>	Yes	Yes	Get_Attribute_Single
10 <sub>HEX</sub>	No	Yes	Set_Attribute_Single

#### Output Instance 102 – 10 Bytes

Bytes	Data Type	Description
0-1	UNIT	Run/Idle Code (1)
2–3	UINT	Sensor number 1-8
4–5	UINT	Function Code
6–7	UINT	Data Entry
8–9	UINT	Lock Code

#### Output (Write to MetriNet) Example Using Molex-EIP Tool -

To change MetriNet delay setting in S1 to 2.0, send the following data in the EIP message.

Code = 0x16 Set\_Attribute\_Single. Class = 0x04 Instance = 0x66, 102 Attribute = 3 Data = **01 00 01 00 13 A4 14 00 00 00** 

```
Where...

00 01 = 1, Run Code is 1, always

00 01 = 1, Sensor #1*

A4 13 = 42003*, Special location code for delay setting on sensor #1

00 14 = Data value of 20, decimal (per M-Node manual, interpreted as 2.0)

00 00 = Lock code. If lock disabled, enter 0.
```

See screenshot using Molex EIP tool below.

\*Writing data to the MetriNet system is done by referencing a coded table that controls the variable identified fro that change. All writable data is passed though the same "window," which can provide added security for any changes by utilizing the user lock codes on the MetriNet if desired.



Figure 10 –Output Assembly Object Command Example with EIP\_Tool

Once this message is sent, the S1 delay setting will be updated to 2.0 on the MetriNet.

The special codes for writing individual registers in the MetriNet come from specific Modbus register locations in the unit.

Snsr 1	Snsr 2	Snsr 3	Snsr 4	Snsr 5	Snsr 6	Snsr 7	Snsr 8	Sensor	Data Format
Reg	Data								
42003	42021	42039	42057	42075	42093	42111	42129	Delay	10=1.0min
42004	42022	42040	42058	42076	42094	42112	42130	<sup>1</sup> Alarm A	(sensor dependent)
42005	42023	42041	42059	42077	42095	42113	42131	<sup>1</sup> Alarm B	(sensor dependent)
42006	42024	42042	42060	42078	42096	42114	42132	Slp Alarm	80=80%
42007	42025	42043	42061	42079	42097	42115	42133	Tmr Limit	90=90 days
42008	42026	42044	42062	42080	42098	42116	42134	<sup>1,2</sup> VoutHI	(sensor dependent)
42009	42027	42045	42063	42081	42099	42117	42135	<sup>1,2</sup> VoutLO	(sensor dependent)
42010	42028	42046	42064	42082	42100	42118	42136	TcMode	0 = F, 1 = C
42011	42029	42047	42065	42083	42101	42119	42137	<sup>3</sup> Tag1	0x70,0x48="p","H"
42012	42030	42048	42066	42084	42102	42120	42138	<sup>3</sup> Tag2	
42013	42031	42049	42067	42085	42103	42121	42139	<sup>3</sup> Tag3	
42014	42032	42050	42068	42086	42104	42122	42140	<sup>3</sup> Tag4	
42015	42033	42051	42069	42087	42105	42123	42141	<sup>3</sup> Tag5	
42016	42034	42052	42070	42088	42106	42124	42142	<sup>3</sup> Tag6	
42017	42035	42053	42071	42089	42107	42125	42143	<sup>3</sup> Tag7	
42018	42036	42054	42072	42090	42108	42126	42144	<sup>3</sup> Tag8	

Figure 11 – Special Write-Codes for MetriNet Variable Changes

#### Notes on Table data –

- <sup>1</sup> Sensor dependent variable. The formatting of these variables are based on the specific data value from that sensor. See the M-Node sensor manual for details.
- <sup>2</sup> There are no analog voltage outputs of the bussed MetriNet system. However, the scaled 0-2.5V value from the sensor can be used to simplify the creation of the scale value for other purposes.
- <sup>3</sup> The Tag values are compressed ASCII characters stored in the sensor, and together they create a 16 character string for unique sensor identification. The user may change these to whatever they desire. For a Tag entry of 0x70 0x48 (hex 70, 48,) you would store the characters "pH."

#### TCP Object (F5HEX – 1 Instance)

The following tables contain the attribute and common services information for the TCP Object

	Class Attributes (Instance 0)					
Attribute ID	Name	Data Type	Data Value	Access Rule		
1	Revision	UINT	1	Get		

Attribute ID	Name	Data Type	Default Data Value	Access Rule	
1	Status <sup>1</sup>	DWORD	0x00010000	Get	
2	Configuration Capability	DWORD	0x00110000	Get	
3	Configuration Control <sup>3</sup>	DWORD	0x00010000	Get	
4	Physical Link Object⁴ <b>Structure</b> oft Path Size Path	UINT Array Of WORD	2 0xF620 0x0124	Get	
5	Interface Configuration <sup>5</sup> Structure of: IP Address Network Mask Gateway Address Name Server Name Server 2 Domain Name Size Domain Name	UDINT UDINT UDINT UDINT UINT STRING	0x00FEC0A8 0xFF00FFFF 0x00000000 0x00000000 0x00000000	Get	
6	Host Name <sup>6</sup> Structure ofE Host Name Size Host Name	UINT STRING	0x0000	Get	

#### TCP Instance Attributes (Instance 1)

#### TCP Instance Common Services

Service Code	Imple	Instance Level	
	Class Level	Instance Level	
0E <sub>HEX</sub>	Yes	Yes	Get_Attribute_Single



Figure 12 – TCP Object Query Example with EIP\_Tool

#### Ethernet Link Object (F6HEX – 1 Instance)

The following tables contain the attribute and common services information for the Ethernet Link Object

		Class Attribute	S	
Attribute ID	Name	Data Type	Data Value	Access Rule
1	Revision	UINT	3	Get

Link Instance Attributes					
Attribute ID	Name	Data Type	Default Data Value	Access Rule	
1	Interface Speed <sup>7</sup>	UDINT	0x00640000	Get	
2	Interface Flags <sup>8</sup>	DWORD	0x000F0000	Get	
3	Physical Address <sup>9</sup>	USINT Array[6]	0x80009BA3D6BE	Get	

	Link Instand	ce Common Services	
Service Code	Imple: f	Service Name	
	Class Level	Instance Level	
0E <sub>HEX</sub>	Yes	Yes	Get_Attribute_Single

Station : 192.168.0	0.254 Communications O UCMM © Connected	O Unconnected_send	Options About	molex	
Status : Ok			View Log	one company > a world of innovation	
	List Identity Explicite Message Class 0x01 Identity	0x06 Connection Manager 0x47 D	LR 0x48 QoS 0xF5 TCP/IP 0xF6 Ethernet		
	,,				
	Instance 1 V Get_Attribut	ie_All			
	Interface Speed (attr 1)	Interface Counters (attr 4)		Interface Type (attr 7) - Optional	
	Col Marketon - La	In Octets :	Out Octets :	O Unknown interface tupe	
	Get_Attribute 10 Mbps	In Ucast Packets :	Out Ucast Packets :	The I/F is internal to the device	
		In NUcast Packets :	Out NUcast Packets :	O Twisted-pair	
	Interface Flags (attr 2)	In Discards :	Out Discards :		
et Params	Link Status	In Errors :	Out Errors :	Get_Attribute	
	Half/Full Duplex	In Links .		Interface State (attr 8) - Ontional	
	Negotiation Status	In Unknown Protos			
	Auto-negotiation in progress     Auto-negotiation and record detection failed	Get_Attribute	Get_and_Clear	Unknown interface state     The interface is enabled	
	Auto-negotiation and speed detection railed     Auto-negotiation failed but detected speed			O The interface is disabled	
	Successfully negotiated speed and duplex	Media Counters (attr 5)		<ul> <li>The interface is testing</li> </ul>	
	<ul> <li>Auto-negotiation not attempted</li> </ul>	Alignment Errors :	Late Collisions :	Get_Attribute	
	Manual Setting / Requires Reset	FCS Errors :	Excessive Collisions :		
	Local Hardware Fault	Single Collisions :	MAC Transmit Errors :	Admin State (attr 9) - Optional	
		Multiple Collisions :	Carrier Sense Errors :	C Enable the interface	
	Get_Attribute 0x000000C (12)	SQE Test Errors :	Frame Too Long :	O Disable the interface	
	Physical Adress (attr 3)	Deferred Trans :	MAC Receive Errors :	Get_Attribute	
	Get_Attribute 00 - 80 - A3 - 9B - BE - D6	Get_Attribute	Get_and_Clear	Set_Attribute	
	Interface Control (attr6)			Interface Label (attr 10) - Conditional	
	Control Bits Forced Interface	speed : Get_Attribute			
	Forced Duplex Mode Mb	ps Set_Attribute		Get Attribute	
				Oct_Acobote	

Figure 13 – Ethernet Link Object Query Example with EIP\_Tool

#### Message Router Object (02HEX)

\*\*\*No supported services or attributes\*\*\*

## Connection Manager Object (06нех)

\*\*\*No supported services or attributes\*\*\*

#### 1.10 Optional Tool Examples: RSLinx Classic

The primary method of setup for the MetriNet at this time is a Genetic Module" and is simply entered into most PLCs using the I/O settings found in section 1.8. Those main T->0 and O->T settings are then byte parsed into the needed final values. The EDS file if often not even needed for this type of installation.

A brief setup with RSLinx Classic using an OPC server is shown next, which will verify operation of the interface. While these screenshots are specific to Rockwell tools, the same set-up steps are part of other platforms that support Ethernet/IP. RSLinx Classic is chosen here as its very common for Ethernet/IP, and it is the foundation communication driver component for RSLogix Studio 5000. In addition, using the OPC server function allows all of this testing to be done without a PLC. This all runs on a single computer, with only the MetriNet connected to the PC Ethernet port. So, this test can also be used as a quick field test of Ethernet/IP adapter devices off the main network.

Before running this step, confirm that -

1-The proper EDS file has been properly loaded.

2-The MetriNet has already been configured with the proper IP address to match the network requirements. Turn on MetriNet but do not connect it to PC port yet.

3-For RSLinx Classic, this example assumes the user has a version other than the "Lite" version, as that version does not allow an OPC server connection. The "single node", "OEM", and "gateway" versions all can run an OPC server.



To begin, launch RSLinx Classic, and configure/add the Ethernet/IP Driver.

#### Figure 14 – RSLinx Classic

Add the driver to the system. You will need to select the active PC Ethernet port as part of the process. It will immediately begin running. Close this window.

🗞 RSLinx Classic Single-Node - [RSWho - 1]		- ø ×
File Edit View Communications Station	DDE/OPC Security Window Help	_ & ×
🖻 🚠 🎜 🖲 🛍 🖉 🕺		
Autobrowse Refresh 🔁 💁 🏢 Not Brow	wsing	
	P     P       Linx     AB_ETHIP-1       Gatewa     Ethernet	
	Configure Drivers ? ×	
	Available Driver Types: Close	
	EtherNet/IP Driver  Add New Help	
	Configured Drivers:	
	Name and Description Status	
	AB_ETHIP-1 A-B Ethernet RUNNING Running Configure	
	Startup	
	Start	
	Stop	
	Delete	
J For Help, press F1	1	01/13/19 01:21 PM

Figure 15 – Adding Ethernet/IP Driver

Connect MetriNet to the Ethernet port, and you should quickly see the node appear under the drive that was just added.

The icon is part of the MetriNet EDS file. Right clicking on node on right side of screen and selecting "Device Properties" will show the information from the node. The node is active now.

RSLinx Classic Single-Node - [RSWho - 1]		- a ×
File Edit View Communications Station DDE	OPC Security Window Help	_ 8 ×
🗃 🚠 🎜 🖲 💼 🙋 🕅		
Autobrowse Refresh 🗈 🔹 🎆 Browsing - no	de 192.168.0.30 found	
Image: Constraint of the second s	de 132 168.0.30 found           192, 168.0.30           ATI MetriNet           Device Name, ATI MetriNet           Verdor:         1530           Product Type, 143           Product Code, 110           Revrision:         1001           Seital Number, A3048ADE           EDS File Name:           ØFA0028006E010           EDS File Name:           OFA0028006E010           EDS File Name:           OFE002800E010	
For Help, press F1	3	01/13/19 09:12 PM

Figure 16 – New Node Added Successfully to Driver Application.

Close Properties pop-up. Now, a Topic must be added to give the OPC server access to the node. Select DDE/OPC and then "Add Topic." Select node from below Ethernet/IP driver on right, and create new Topic called Q46.



Figure 17 – Creating DDE/OPC Topic

On Data Collection tab, select "Device with EDS Parameters" and hit "apply" to update Q46 topic. Then select Done.

Autobrowse Refresh	de 192.168.0.30 found		
문화 Workstation, XPSLAP 한 출 Linx Goteways, Ethernet 는 옱 AB ETHIP-1, Ethernet 니 @ 192.168.0.30, ATI MetriNet, ATI MetriNet	192.166.0.30 ATI MetriNet	? X	
	Project: Default		
	MetriNet	Processor Type:     ▼       □ Data Collection MC     Copy5000       □ Poled Message     PLC3       □ Unsolicited Message     PLC3       □ Unsolicited Message     PLC3       □ Unsolicited Message     PLC3       □ Cache Lung PLC5750     □       □ SLC 500-     ▼       □ Communications Time Out (Secs)     ▼       □ Use Symbols	
	New Clone	Delete Apply Done Help	

Figure 18 – Processor Selection for PC-based OPC Topic

Minimize this RSlinx window now (don't close it though) and launch the Rockwell OPC Test Client utility, which will start the OPC test server. First, via the menus, connect server to RSLinx OPC server, and add a simple Group called "Test." Set up an item next.

KSI - OPC Test Client - [~RSLinx OPC Server]								- a ×
🐮 File Server Group Item Log View	Window Help							- 8 ×
Test (Actual Rate: 1000)	ItemID	Sub Value	Sub Quality	Sub Updates	Update Rate	Run. Avg		
		[	Add New ODC Item				×	
			Items to be Added		Attributes		~	
			4:101:3,arr16		Aubures	Trans 1	OK	
					Access Path:	MetriNet	Cancel	
					Item Name:	4:101:3,arr16		
					Active:	V	Add Item	
					Arrav.		Validate	
					Access Rights:		Item Properties	
			Datatype: Native		vray Filter:  *	Access: All	Items 💌	
			E-RSLinx OPC Sen MetriNet - Offline You can add items usi before adding them. Fi	ver (Node: <local>) ng this dialog. Click o leculs will be displaye</local>	RSLin <	vx OPC Server (Node: <lu u wish to check your items a</lu 	> spainst the server	
Event								
Server Information Message - ~RSLinx OPC Serv Group add (Group) Test #(Item) 0	ver Started		21:17:09 21:17:17					
Ready								

Figure 19 – RSLinx OPC Test Client

Click to highlight "Offline" under Q46, add the item as shown. The entered "Item Name" is the CIP direct path to Class 4, Instance 101, Attribute 3, and the added "arr16" indicates that we expect an array of 16-bit values. Select "Add Item" then "OK" and the following data should appear on the screen.

🛃 RSI - OPC Test Client - [~RSLinx OPC Server]							- 0	×
Tile Server Group Item Log View W	/indow Help							- 8
Test (Actual Rate: 1000)	ItemID	Sub Value	Sub Quality	Sub Updates	Update Rate	Run. Avg		
	● 4:101:3,arr16	0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 2, 15128, 8224, 30035, 0, 0, 0, 14000	), 182, 1, 0, 0, 0, Good	44	1	0.146843		
Event		Time						
Server Information Message - ~RSLinx OPC Server Group add (Group) Test #(Item) 0 Item added (Item) 4:101:3,arr16	Started	21:17:09 21:17:17 21:18:27						
Ready								

Figure 20 – OPC Running On Active Node Data

Note the data, this example is run with one single S1 Q32C2 M-Node attached, so all other sensor data beyond it will be zero. This is an array of 16-bit words.

The data is a string of bytes starting with the info structure (Input Assembly Object) which was shown on page 16-17. Here, we will look only at the System info, and then the info for S1 -

	System Info			
Bytes	Data Type	Description		
0–1	WORD	Interface Status Flags		
2–3	WORD	System Status 1 Flags		
4–5	WORD	System Status 2 Flags		
6–7	UINT	Number of Sensors		
8–9	UINT	IP Address High		
10–11	UINT	IP Address Low		
12–13	UINT	Subnet Mask High		
14–15	UINT	Subnet Mask Low		
16–17	UINT	Gateway High		
18–19	UINT	Gateway Low		

The data in Figure 20 is then starts with the following string of decimal values - 0,0,0,1,0,0,0,0,0,0,2,15128,8224,30035,0,0,0,14000,182,1,0,0,...

#### Parsing SYSTEM INFO Data -

- 0 = Byte 0-1, Q52 diagnostic bits
- 0 = Byte 2-3, System Status 1 Flags
- 0 = Byte 4-5, System Status 2 Flags
- 1 = Byte 6-7, Number of sensors connected
- 0 = Byte 8-9, NU
- 0 = Byte 10-11, NU
- 0 = Byte 12-13, NU
- 0 = Byte 14-15, NU
- 0 = Byte 16-17, NU
- 0 = Byte 18-19, NU

#### Sensor 1 MEASURE

Bytes	Data Type	Description	
20-23	DINT	S1 Main Value	
24-27	DINT S1 Units		
28-31	DINT	S1 Raw Value	
32-35	DINT	S1 Temperature	
36-37	INT	S1 Output Value	
38-39	WORD	S1 Status 1	
40-41	WORD	S1 Status 2	
42-43	INT	S2 ID	

#### Parsing S1 Sensor MEASURE Data -

2 =	Byte 20-21, S1 MainValue high byte (0x0002)
15128 =	Byte 22-23, S1 MainValue low byte (0x3b18)
8224 =	Byte 24-25, S1 Units high byte (0x2020)
30035 =	Byte 26-27, S1 Units low bye (0x7553)
0 =	Byte 28-29, S1 RawValue high byte (0x0000)
0 =	Byte 30-31, S1 RawValue low byte (0x0000)
0 =	Byte 32-33, S1 Temperature high byte (0x0000)
14000 =	Byte 34-35, S1 Temperature low byte (0x36b0)
182 =	Byte 36-37, S1 Output Value (0.182 VDC)
1 =	Byte 38-39, S1 Status Flags 1 (0x0001)
0 =	Byte 40-41, S1 Status Flags 2 (0x0000)
0 =	Byte 42-43, S1 ID (0x0000) NU
The value	es above in red are 32 bit INT type. So, combine them to get total value.
MainValu	e = 0x00023b18 = 1462000, or 146.200 uS (implied 0.000 dp)
1.1.1.1.1	

 MainValue =
 0x00023b18 = 1462000, or 146.200 uS (implied 0.000 dp)

 Units =
 0x20207553 = \_ u S (ASCII text)

 RawValue =
 0x0000000 = 0, or 0.000 nA

Temperature = 0x000036b0 = 14000, or 14.000C

## WATER QUALITY MONITORS

**Dissolved Oxygen Free Chlorine Combined Chlorine Total Chlorine Residual Chlorine Dioxide** Potassium Permanganate **Dissolved Ozone** pH/ORP Conductivity Hydrogen Peroxide **Peracetic Acid Dissolved Sulfide Residual Sulfite** Fluoride **Dissolved Ammonia** Turbidity **Suspended Solids** Sludge Blanket Level MetriNet Distribution Monitor

## **GAS DETECTION PRODUCTS**

NH <sub>3</sub>	Ammonia
СО	Carbon Monoxide
H <sub>2</sub>	Hydrogen
NO	Nitric Oxide
<b>O</b> 2	Oxygen
СО	CI2 Phosgene
Br <sub>2</sub>	Bromine
	Chlorine
	Chlorine Dioxide
F <sub>2</sub>	Fluorine
2	lodine
Hx	Acid Gases
$C_2H_4O$	Ethylene Oxide
C <sub>2</sub> H <sub>6</sub> O	Alcohol
<b>O</b> 3	Ozone
CH <sub>4</sub>	Methane
_	(Combustible Gas)
H <sub>2</sub> O <sub>2</sub>	Hydrogen Peroxide
HCI	Hydrogen Chloride
HCN	Hydrogen Cyanide
HF	Hydrogen Fluoride
H <sub>2</sub> S	Hydrogen Sulfide
NO <sub>2</sub>	Nitrogen Dioxide
NOx	Oxides of Nitrogen
SO <sub>2</sub>	Sulfur Dioxide
H <sub>2</sub> Se	Hydrogen Selenide
B <sub>2</sub> H <sub>6</sub>	Diborane
GeH <sub>4</sub>	Germane
AsH₃	Arsine
<b>PH</b> ₃	Phosphine
SiH <sub>4</sub>	Silane
нсно	Formaldehyde
C <sub>2</sub> H <sub>4</sub> O <sub>3</sub>	Peracetic Acid
DMA	Dimethylamine