



Industrial Data Acquisition and Control System

MA1057

OPC Server User Manual

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🗋 😂 🛃 🛃 Channels/Devices 💌 🍄 🛅 📬 🔁 🦉 🖃 🖌 4a 🏔 🗙 📖						
Dataforth MAQ20 MAQ20DEMO-B MAQ20-DIOL MAQ20-JTC C MAQ20-VDN MAQ20-VO	Tag Name / Iscrete Input Ch 2 Discrete Input Ch 3 Discrete Output Ch 1 Discrete Output Ch 2	Address 409007 409008 409001 409002	Data Type Short Short Short Short	Scan Rate 100 100 100 100	Scaling None None None None	Description Bat Toggle SW3 Bat Toggle SW4 Motor Pot 1 Forward Control Motor Pot 1 Reverse Control
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MAQ20 OPC Server User Manual MA1057 Rev. A – January 2015 © 2015 Dataforth Corporation. All Rights Reserved. ISO9001:2008-Registered QMS

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Errata Sheets

Refer to the Technical Support area of Dataforth's website (<u>www.dataforth.com</u>) for any errata information on this product.

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1.0 System Features

The MAQ[®]20 Data Acquisition System encompasses more than 25 years of design excellence in the process control industry. It is a family of high performance, DIN rail mounted, programmable, multi-channel, industrially rugged signal conditioning I/O and communications modules.

Instrument Class Performance

- ±0.035% Accuracy
- Industry leading ±0.3C CJC Accuracy over full operating temperature range
- Ultra low Zero and Span Tempco
- Over-range on one channel does not affect other channels
- 1500Vrms Channel-to-Bus Isolation
- 240Vrms Continuous Field I/O Protection
- ANSI/IEEE C37.90.1 Transient Protection
- Ventilated Communications and I/O Modules
- Industrial Operating Temperature of -40°C to +85°C
- Wide Range 7-34VDC Power
- CE Compliant, UL/CUL Listing and ATEX Compliance pending

Industry Leading Functionality

- The system is a Modbus Server and can be operated remotely with no local PC
- Up to 4GB of logged data can be transferred via FTP during real-time acquisition
- Up to 24 I/O modules, or 384 channels, per system, per 19" rack width
- Per-channel configurable for range, alarms, and other functions
- Backbone mounts within DIN rail and distributes power and communications
- System firmware automatically registers the installation and removal of I/O modules
- I/O modules can be mounted remotely from the Communications Module
- Equal load sharing power supply modules allow for system expansion
- Hot Swappable I/O modules with Field-side pluggable terminal blocks on most models
- Sophisticated package enables high density mounting in 3U increments
- DIN Rail can be mounted on a continuous flat panel or plate

Distributed Processing Enables Even More Functionality

- Output modules are programmable for user-defined waveforms
- Discrete I/O modules have seven high level functions:
 - Pulse Counter
 - Frequency Counter
 - > Waveform Measurement
 - Time Between Events
 - Frequency Generator
 - PWM Generator
 - One-Shot Pulse Generator

Multiple Software Options

- Free Configuration Software
- Intuitive Graphical Control Software
 - ReDAQ Shape Graphical HMI Design & Runtime Solution
 - IPEmotion Muli-Vendor and Multi-Language Solution
 - Programming examples and LabVIEW VIs
 - OPC Server

2.0 System Description and Documentation

A MAQ[®]20 Data Acquisition System must have as a minimum a Communications Module, a Backbone, and one I/O Module. Examples include:

MAQ20-COMx Communications Module with Ethernet, USB and RS-232 or RS-485 Interface

MAQ20-DIOx Discrete Input / Output Module

MAQ20-xTC Type x Thermocouple Input Module

MAQ20-mVxN, -VxN Voltage Input Module

MAQ20-IxN Process Current Input Module

MAQ20-IO, -VO Process Current Output and Process Voltage Output Module

MAQ20-BKPLx x Channel System Backbone

Refer to <u>www.dataforth.com</u> for a complete listing of available modules and accessories.

System power is connected to the Communications Module, which in turn powers the I/O modules. For systems with power supply requirements exceeding what the Communications Module can provide, the MAQ20-PWR3 Power Supply module is used to provide additional power. When a MAQ®20 I/O module is inserted into a system, module registration occurs automatically, data acquisition starts, and data is stored locally in the module. The system is based on a Modbus compatible memory map for easy access to acquired data, configuration settings and alarm limits. Information is stored in consistent locations from module to module for ease of use and system design.

MAQ[®]20 modules are designed for installation in Class I, Division 2 hazardous locations and have a high level of immunity to environmental noise commonly present in heavy industrial environments.

MAQ[®]20 communications modules provide connection between a host computer and a MAQ[®]20 Data Acquisition System over Ethernet, USB, RS-485 or RS-232. Ethernet communications use the Modbus TCP protocol, USB communications are based on the Modbus RTU protocol, and RS-485 and RS-232 communications use the Modbus RTU protocol. Serial communications over RS-485 can be either 2-wire or 4-wire. Each MAQ20-COMx module can interface to up to 24 MAQ[®]20 I/O modules in any combination allowing high channel counts and great flexibility in system configuration. A removable microSD card can be used by the MAQ20-COMx module to log data acquired from the MAQ[®]20 I/O modules.

For details on hardware installation, configuration, and system operation, refer to the manuals and software available for download from <u>www.dataforth.com</u>. This includes, but is not limited to:

MA1036 MAQ[®]20 Quick Start Guide
MA1040 MAQ[®]20 Communications Module Hardware User Manual
MA1041 MAQ[®]20 milliVolt, Volt and Current Input Module Hardware User Manual
MA1037 MAQ[®]20 Configuration Software Tool User Manual
MA1038 MAQ[®]20 ReDAQ Shape for MAQ[®]20 User Manual

MAQ20-940/-941 ReDAQ[®] Shape Software for MAQ[®]20 – Developer Version/User Version MAQ20-945 MAQ[®]20 Configuration Software Tool MAQ20-952 IPEMotion Software for MAQ[®]20

3.0 General Description

The MAQ[®]20 OPC Server provides a common interface to the MAQ[®]20 Data Acquisition System usable by any SCADA, HMI or other custom software that is an OPC Client. This eliminates the need for a custom interface or driver when using the MAQ[®]20 with industry standard software. The server enables real time information exchange on local hosts or over distributed networks.

An OPC Server consists of three basic parts - Channels, Devices, and Tags.

Channel - A Channel represents the communication medium from the host PC to one or more devices. The MAQ20-COM2 has an RS-232 port and an Ethernet port. Each would be a channel in an OPC server. The MAQ20-COM4 has an RS-485 port and an Ethernet port. Each would be a channel in an OPC server. The MAQ20-COM2 and MAQ20-COM4 support simultaneous connections over the serial and Ethernet ports.

Device - A Device is the hardware with which the server communicates. The device driver that the channel is using restricts the devices that can be connected. For the MAQ[®]20 OPC Server, the MAQ[®]20 Data Acquisition System is the Device.

Tag - A Tag represents addresses within the hardware with which the server communicates. The KEPServerEX allows both Dynamic tags and user-defined Static tags. Dynamic tags are entered in the OPC client and specify device data. User-defined Static tags are created in the server and support tag scaling. When the MAQ[®]20 Data Acquisition System is used as the Device, tags are assigned to the addresses within the MAQ[®]20 I/O modules and communication modules which data is to be read from and written to.

4.0 Installing and Configuring an OPC Server

The OPC Server implementation outlined in this manual uses the KEPServerEX server and Modbus TCP driver from Kepware Technologies. For further information and technical support related to KEPServerEX, including server and driver software download, knowledge base, user manuals, and video tutorials, visit <u>www.kepware.com/Support_Center</u>.

4.1 Installing KEPServerEX and Starting a Project

Download and install KEPServer EX V5.16. During the installation process, choose the Communications Drivers and Plug-Ins appropriate for the project. Select the OPC Quick Client. At a minimum, under Communications Drivers, select the Modicon Modbus Suite.





Open the software. This will connect the Configuration tool to the Runtime engine. Select 'Yes, Update'. Select File > New or click on the New Project icon to build a project.



4.2 Creating a Channel

A channel is a representation of the communications media. For this example, communications will be over Ethernet using the Modbus TCP protocol. A channel for MAQ[®]20 can also be established over an RS-232 or RS-485 serial port.

Click on the prompt to add a new channel, or click on the icon in the toolbar, or choose Edit > Channels/Devices > New Channel. Assign the channel a unique name.

New Channel - Identification		×
	A channel name can be from 1 to 256 characters in length. Names can not contain periods, double quotations or start with an underscore.	
	Channel name: Dataforth MAC20	
	Decomining	
	< Back Next > Cancel	Help

Select the device driver from the drop down list. If the Modbus TCP/IP Ethernet driver is not installed, exit the setup process and run the KEPServerEX installation again. The installation routine will allow the user to modify the existing installation and install additional drivers.

New Channel - Device Driver	×
	Select the device driver you want to assign to the channel. The drop-down list below contains the names of all the drivers that are installed on your system.
	Device driver: Modbus TCP/IP Ethemet ▼ ▼ Enable diagnostics
	< Back Next > Cancel Help

Check the Enable diagnostics box to capture communications between the Channel and the Device. This is useful for troubleshooting communications problems. Click Next.

Select Virtual Network > None and click Next.

New Channel - Communica	ation Serialization	X
	This driver is capable of limiting data transmissions to one channel at a time. To enable, assign this channel to a Virtual Network. All channels in a network will be granted permission to communicate in a round-robin manner. Select None to disable.	
Contraction of the second seco	You may specify how many transactions the channel should perform when it is given permission to communicate by entering a number in the edit field below.	
	Virtual Network: None Iransactions per cycle: 1	
	< <u>B</u> ack Next > Cancel	Help

Before continuing with the OPC server setup, the MAQ[®]20 and host computer Ethernet port configurations need to be verified.

The standard method of Ethernet connection to the MAQ[®]20 is to use a static IP address. The factory default is:

MAQ[®]20 factory default static IP address: 192.168.128.100

If desired, the IP address can be changed using the MAQ[®]20 Configuration Software Tool or ReDAQ[®] Shape Software for MAQ[®]20.

Configure the Ethernet port on the host computer to also use a static IP address. In Windows 7, this is done by choosing Control Panel > Network and Sharing Center. Next select Change Adapter Settings, select the network adapter to be used for the Channel and select Properties.

Local Area Connection 2 Properties	X			
Networking Sharing				
Connect using:				
ASIX AX88772 USB2.0 to Fast Ethemet Adapter				
Configure This connection uses the following items:				
Image: Contraction Uses the following terms: Image: Contraction Uses the following terms: Image: Contraction Users and Contraction Users Image: Contres Image: Contract				
Install Uninstall Properties				
Description Allows your computer to access resources on a Microsoft network.				
ОК Са	ncel			

Select TCP/IPv4 and Properties.

Local Area Connection 2 Properties	X			
Networking Sharing				
Connect using:				
ASIX AX88772 USB2.0 to Fast Ethemet Adapter				
Configure				
This connection uses the following items:				
Client for Microsoft Networks				
🗹 🜉 Deterministic Network Enhancer				
🗹 📇 QoS Packet Scheduler				
File and Printer Sharing for Microsoft Networks				
Internet Protocol Version 6 (TCP/IPv6)				
Internet Protocol Version 4 (TCP/IPv4)				
🗹 📥 Link-Layer Topology Discovery Mapper I/O Driver				
Link-Layer Topology Discovery Responder				
Install Uninstall Properties				
Description	— II			
Allows your computer to access resources on a Microsoft network.				
ОК Са	ncel			

Configure the port to use a static IP address.

Host computer static IP Address: 192.168.xxx.xxx *choose any address that does not match the one set in the MAQ[®]20.

Host computer Subnet Mask: 255.255.0.0

I	nternet Protocol Version 4 (TCP/IPv4)	Properties 💡 🐹						
	General							
	You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.							
	Obtain an IP address automatical	y						
	• Use the following IP address:							
	IP address:	192 . 168 . 128 . 99						
1	Subnet mask:	255.255.0.0						
1	Default gateway:							
	Obtain DNS server address automatically							
	• Us <u>e</u> the following DNS server add	resses:						
	Preferred DNS server:							
	Alternate DNS server:	· · ·						
	Validate settings upon exit	Ad <u>v</u> anced						
	L	OK Cancel						

Now that the $MAQ^{\otimes}20$ and the host computer port have been configured, return to the OPC server setup.

Select the Ethernet port which the Device (MAQ[®]20) is connected to. Default uses the first Ethernet card in the find order. When multiple Ethernet cards are installed in a host computer, choose the one dedicated to the Device.

New Channel - Network Interfa	ice	X
	This channel is configured to communicate over a network. You can select the network adapter that the driver should use from the list below. Select 'Default' if you want the operating system to choose the network adapter for you. Network Adapter: Default Vet(R) 825791.M. [192:168:128:99] Intel(R) Centino [192:168:0.112]	
	< Back Next > Cancel	Help

Write Optimizations are used to optimize a system and prevent too many writes from overloading the ability to read. Choose the default setting and click Next.

New Channel - Write Optimizat	ions 🗾 🔀	
	You can control how the server processes writes on this channel. Set the optimization method and write to read duty cycle below. Note: Writing only the latest value can affect batch processing or the equivalent. Optimization Method © Write all values for all tags © Write only latest value for non-boolean tags © Write only latest value for all tags Duty Cycle Perform 10	_
\triangleright	< Back Next > Cancel Help)



Choose the default settings for Non-Normalized Float Handling and Socket settings.

Review the summary page and click Finish to create the Channel. Most properties of the Channel can be changed later by selecting the channel and clicking Properties. Once a channel is created, the driver cannot be changed.

😰 KEPServerEX - Configuration [C:\ActiveDoc\0 MAQ20\Software\OPC Server\Kepware\MAQ20 Test Project 2.opf *]							
File Edit View Tools Runtime Help							
🗋 🚰 🛃 Channels/Devic	🗋 📸 🛃 🛃 (Channels/Devices 🔹 🕸 🛗 📬 🚰 🔊 🕉 📭 🖄 😕						
Dataforth MAQ20	Device / Model	ID	Description				
Click to add a device.	Click to add a device.						
🖣 🥔 🖗	45						

4.3 Creating a Device

A Device represents the hardware that will be communicated with over the Channel. For the MAQ[®]20 OPC Server, the Device is the MAQ[®]20 Data Acquisition System. When building larger systems, an OPC server can have multiple devices under a single channel, or multiple channels with one or more devices under each channel.

Click on the prompt to add a new device, or click on the icon in the toolbar, or choose Edit > Channels/Devices > New Device. Assign the Device a unique name. The OPC Server will be set up to interface to the MAQ20DEMO-B demonstration hardware and process simulator.

New Device - Name	X
	A device name can be from 1 to 256 characters in length. Names can not contain periods, double quotations or start with an underscore.
	Device name: MAQ20DEMO-B
<	Back Next > Cancel Help

Select the Modbus device model.

New Device - Model	×
	The device you are defining uses a device driver that supports more than one model. The list below shows all supported models. Select a model that best describes the device you are defining. Device model: Modbus
	< Back Next > Cancel Help

Next enter the the Device ID. For Ethernet devices this is the IP address and the MAQ[®]20 factory default is 192.168.128.100. For serial devices this is the serial device ID and the MAQ[®]20 factory default is 16.

For Ethernet connections, the fifth character represents the Ethernet gateway. This will auto-fill as zero unless otherwise specified. When using DHCP, the hostname can be entered.

New Device - ID	x
	The device you are defining may be multidropped as part of a network of devices. In order to communicate with the device, it must be assigned a unique ID. Your documentation for the device may refer to this as a "Network ID" or "Network Address."
	Device [D: <192.168.128.100>.0
	Eack Next > Cancel Help

For Scan Mode, keep the default selection to Respect client specified scan rate.

New Device - Scan Mode	
	Choose the first (default) option to use the scan rate requested by the client. Set a lower limit on the requested rate by choosing the second option. Force all tags to scan at the same rate by choosing the third option. Disable active scanning by choosing the last option. Select if clients are expected to poll this device for data. Scan Mode: Respect client specified scan rate
	< Back Next > Cancel Help

Timing is dependent on the device connected to, how the connection is made and the distance to the device. Connection timeout is specific to Ethernet drivers and bus drivers and is the elapsed wait time before timeout while trying to establish a connection. Request timeout is the amount of wait time for a specific data request to be returned before timeout. Fail after specifies how many requests are attempted before the request is considered a failure. Inter-request delay is used when there are radio modems in the communication channel. A delay of 1 to 2 milliseconds allows the modem to switch from transmit to receive before the server continues processing I/O requests. The timing default values are sufficient for basic MAQ[®]20 systems.

New Device - Timing	
	The device you are defining has communications timing parameters that you can configure.
	Connect timeout:
	Request timeout: 1000 milliseconds
	Fail after 3 successive timeouts
	Interrequest delay: 0 iniliseconds
	< Back Next > Cancel Help

Device demotion is used when multiple devices are connected to a channel. Device communication is sequential at the specified poll rate, and if one device has a fault or timeout, communication with the others is delayed and can add significant time to the poll cycle. Discard writes will avoid undesired system action due to unexpected or erroneous data when a system comes back online after timeout.

New Device - Auto-Demot	ion You can demote a device for a specific period upon communications failures. During this time no read request (writes if applicable) will be sent to the device. Demoting a failed device will prevent stalling communications with other devices on the channel.
	Enable auto device demotion on communication failures Demote after 3 successive failures Demote for 10000 milliseconds Discard write requests during the demotion period
	< Back Next Cancel Help

Database Creation is used for auto-tag generation. This feature is currently not available for the MAQ[®]20.

New Device - Database Crea	tion
	The device you are defining has the ability to automatically generate a tag database. Determine if the device should create a database on startup, what action should be performed on previously generated tags, group to add tags to, and allowing subgroups.
	Startup: Do not generate on startup ▼ Action: Delete on create ▼ Add to group: ▼ Image:
	Back Next Cancel Heip

Keep the default Ethernet selections.



Under Data Access, unselect the User zero based addressing checkbox.

New Device - Data Access S	ettings
	The driver can be configured with different settings for each device. Refer to the help file for assistance.
	Use zero based addressing Use zero based bit addressing within registers Use holding register bit mask writes Use Modbus function 06 for single register writes Use Modbus function 05 for single coil writes Mailbox Settings
	Client Privileges: Read Only

Select the defaults for Data Encoding Settings.

New Device - Data Encodin	g Settings	x
	The driver can be configured with different settings for each device. Refer to the help file for assistance.	
	 Use default Modbus byte order First word low in 32 bit data types First Dword low in 64 bit data types Use Modicon bit ordering (bit 0 is MSB) 	
	< Back Next Cancel Help	

Select the default Block Sizes. Changing these values may optimize server operation but can also inhibit operation.

New Device - Block Sizes	×
	Specify the maximum block sizes when reading data from this device. Refer to the http://sile for assistance. Coils (in multiples of 8) Output: 22 * Registers Internal: 32 * Holding: 32 *
	< Back Next > Cancel Help

 New Device - Variable Import Settings

 Image: Set the location of the variable import file to be used in tag database creation. Select whether descriptions should be displayed f provided.

 Variable import file:

 Image: Set the location of the variable import file:

 Image: Set the location of the variable import file:

 Image: Set the location of the variable import file:

 Image: Set the location of the variable import file:

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 Image: Set the location of the variable import file:

 Image: Set the location of the variable import file

Variable Import Settings are used for auto-tag generation and is not used for the MAQ[®]20.

If Error Handling is unselected, a tag will be invalidated instead of deactivated when the server receives certain exception codes from the device. A tag remains invalidated and data is invalid only for the remainder of the poll cycle. A deactivated tag is removed from the poll cycle and is not readded until the client is connected.

New Device - Error Handlin	ig 📃 🚬			
	Select option to deactivate tags on illegal address exception (code 2 or 3) from device.			
	Deactivate tags on illegal address exception			
	D∂			
<back next=""> Cancel Help</back>				

Review the summary page and click Finish to create the Device. Device properties can be changed later by selecting the device and clicking Properties.



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4.4 MAQ[®]20 Demonstration System and Addressing Overview

Tags represent addresses within the MAQ[®]20 Data Acquisition System which the server reads data from and writes data to. Channel data for the MAQ[®]20 Input and Output modules is stored starting at address 1000. The MAQ[®]20 Data Acquisition System uses an automated registration process which periodically scans the system and will detect when MAQ[®]20 I/O modules are added and removed.

Each module is assigned an address space of 2000 addresses based on the Registration Number and starting at address 2000. I/O module with Registration Number 1 is assigned address space 2000 – 3999, I/O module with Registration Number 2 is assigned address space 4000 – 5999 and so on. The starting address for the module is very important because this is the offset address that must be added to the addresses listed in the I/O module address map to know where data for that module is located within the system level address map. The MAQ20-COMx Communication Module is always assigned a Registration Number of 0.

Address Maps for each module are found at the end of the individual MAQ[®]20 I/O and Communication module hardware user manuals. A few of these are listed below.

MA1040 MAQ[®]20 Communications Module Hardware User Manual
MA1041 MAQ[®]20 milliVolt, Volt and Current Input Module Hardware User Manual
MA1042 MAQ[®]20 Voltage & Current Output Module Hardware User Manual
MA1043 MAQ20-DIOL Discrete IO Module Hardware User Manual
MA1044 MAQ[®]20 RTD-Potentiometer Input Module Hardware User Manual
MA1045 MAQ20-PWR3 Load-Share Power Supply Hardware User Manual
MA1046 MAQ[®]20 Strain Gage Input Module Hardware User Manual
MA1047 MAQ[®]20 TC Input Module Hardware User Manual
MA1048 MAQ[®]20 Frequency Input Module Hardware User Manual

The OPC Server will be set up to interface to the MAQ20DEMO-B demonstration hardware. This system is comprised of a MAQ20-COM2 or –COM4 communications module and 4 I/O modules which connect to a Process Simulator to allow user input and output and give visual feedback.



 WH4226-System

 System and Communication Settings

 Connect To MA0201:
 Disconnection:

 System 1:
 Enabled

 Image: System 1:
 Enabled

 Image: System 1:
 Image: System 1:

 Second Port:
 Image: System 1:

 Second Port:
 Image: System 1:

 Second Port:
 Image: System 1:

 Image: System 1:
 Image: System 1:

 Second Port:
 Image: System 1:

 Image: System 1:
 Image: System 1:
 <

The system details can be viewed using the MAQ[®]20 Configuration Software Tool or ReDAQ[®] Shape Software for MAQ[®]20.

COM Module Setting

Mo	dules Slot Setup C	COM SD Memory Car	rd					
Up	Down S	ave N	IAQ20-COM2 Serial Num	ber: 0094793-01, Date Co	Date Code	ware version: F1.	31	Outout
_	1	2000	MAQ20-JTC	0088358-01	D1013	F2.50	8	0
	2	4000	MAQ20-VDN	0092139-01	D1113	F2.02	8	0
	3	6000	MAQ20-VO	0074051-19	D1013	F1.50	0	8
	4	8000	MAQ20-DIOL	0074049-23	D1013	F1.12	5	5
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

Modbus Function Codes

The MAQ[®]20 Data Acquisition System supports the following Modbus function codes (commands):

- 3, Read Input Registers
- 4, Read Holding Registers
- 6, Write Single Register
- 16, Write Multiple Registers

Modbus Addresses

The system makes no distinction between Modbus Input registers and Modbus Holding registers. Read Input Registers will return the same data as Read Holding Registers as long as both commands use the same address and quantity.

Modbus addresses are 0-based, meaning the first address is 0x0000 (0) and the last is 0xFFFF (65535). Address values map directly to address fields of all Modbus commands. Although only a small percentage of available Modbus addresses are mapped to data and/or control functions, the system allows access to the entire range of Modbus addresses. If a Read command accesses an address that the system does not map, 0x0000 will be returned. If a Write command accesses an address that the system does not map, the write will have no effect.

Modbus Exceptions

The system will return the following Modbus exception codes under the given conditions:

- 1, Illegal Function: The received function code is unknown or not supported.
- 2, Illegal Address: The received address and quantity would access data beyond address 0xFFFF.
- 3, Illegal Data: The number of bytes in the request does not match that expected or one or more fields of the command contains an invalid value (i.e., a quantity field is zero or too large, a byte count field is zero or does not agree with the quantity field, etc.).
- 6, Server Busy: This exception only occurs with Modbus TCP and indicates that the MAQ[®]20 Data Acquisition System is already processing its maximum number of simultaneous transactions and cannot accept more. The request should be re-issued after a response is received from one of the four active transactions.

4.5 Creating Tag Groups and Tags

Click on the prompt to add a new tag, or click on the New Tag Group or New Tag icon in the toolbar, or choose Edit > Channels/Devices > New Tag Group or New Tag.

First, Tag Groups will be created for each I/O module in the Demonstration System.



Next, assign tags to individual channels on each of the I/O modules.



4.5.1 Creating Tags for the MAQ20-JTC, -KTC, -TTC or -RSTC Input Module

On the demonstration system, the MAQ20-JTC module Ch 6 measures the signal from a simulated heated thermocouple and Ch 7 measures the thermocouple protruding from the Process Simulator. TC Heat 1 control is driven by MAQ20-VO Ch 4

To determine the address to read from, use the Address Map for the MAQ20-xTC Types J, K, T, R and S Thermocouple Input Modules found in the appendix of MA1047 MAQ20 TC Input Module Hardware User Manual. An excerpt from the Address Map is shown below. Channel Data is stored starting at address 1000.

NOTE: When a module is registered in a system, addresses are offset by 2000 * R, where R is the Registration Number.

	Address Range 1000 - 1699 : Module Data								
Start Address	Read/ Write	Number of Registers	Contents	Description	Data Range	Data type			
1000	R/W	8	Channel Data	Data for all 8 Channels	See Table	INT16			

The MAQ20-JTC module in the demonstration system has a registration number of 1 and an address offset of 2000 * 1 = 2000.

To read from Input Registers using the OPC server, use base address range 300000. The addresses to read from are then 300000 + 2000 (address offset) + 1006 (MAQ20-JTC Ch 6) = 303006 and 300000 + 2000 (address offset) + 1007 (MAQ20-JTC Ch 7) = 303007.

Choose Data type = Short and Client access = Read Only. Scan rate is only for non-OPC clients.

General Sca	ng l	
Identificatio		
N	ne: Channel 6	
Add	ss: 303006	
<u>D</u> escrip	n: Heated Themocouple	×
Data prope	ies	
	Data type: Short	
	lient access: Read Only	
	Scan rate: 100 milliseconds	
Note: The specify a r	can rate is only used for client applications that do not e when referencing this tag (e.g., non-OPC clients)	

MAQ[®]20 input module input ranges can be set on a per-channel basis. This can be set or checked using the MAQ[®]20 Configuration Software Tool or ReDAQ[®] Shape Software for MAQ[®]20.

etup Scale Data Cor	ntrol Loop / Alarm						
Channel Name	User Tag Name	Data Display	Input Select	Avg Weigh	: Max/Min	Input Range	Control Loop / Alarm
Input 0	1_JTC_1_0	-1113.479	Raw	- 4	Reset	-100 to 760°C	🔹 None 💌 🌖
Input 1	1_JTC_1_1	-1113.479	Raw	- 4 😫	Reset	-100 to 760°C	🔹 None 🔹 🌒
Input 2	1_JTC_1_2	-1113.479	Raw	- 4	Reset	-100 to 760°C	🔹 None 💌 🌒
Input 3	1_JTC_1_3	-1113.479	Raw	- 4	Reset	-100 to 760°C	🔹 None 💌 🌒
Input 4	1_JTC_1_4	-1113.479	Raw	- 4	Reset	-100 to 760°C	🔹 None 🔹 🌒
Input 5	1_JTC_1_5	-1113.479	Raw	- 4	Reset	-100 to 760°C	▼ None ▼ 🥚
Input 6	1_JTC_1_6	81.131	Raw	- 4 😫	Reset	-100 to 760°C	🔹 None 💌 🌘
Input 7	1_JTC_1_7	26.569	Raw	▼ 4 😫	Reset	-100 to 199°C	▼ None ▼



Data stored in the MAQ[®]20 addresses is in raw counts. To convert this to engineering units, use the count mapping tables in the appendix of the specific MAQ[®]20 Hardware User Manual.

MAQ20-JTC Range Table

	Range	Standard Input Temperature	Equivalent Counts	Over/Under Range	Equivalent Counts	Deg C per Count
<u>с</u>	0	-100°C to +760°C (Default)	-539 to 4095	-102°C to +775°C	-550 to 4177	0.1855
5	1	-100°C to +393°C	-1078 to 4236	-102°C to +401°C	-1100 to 4321	0.0928
	2	-100°C to +199°C	-2156 to 4290	-102°C to +203°C	-2199 to 4376	0.0464

Using this information, scaling can be entered in the tag configuration. Use linear scaling, enter the raw count range from the Range Table, select data type Float and enter the corresponding high and low temperature. Scaled values can be clamped to prevent out of range scaling errors and can be negated if desired. Enter units of degrees Celsuis.

Tag Properties			tan tan'n	X					
General Sc	aling								
© None	💿 None 💿 Linear 💿 Square root								
- Raw Va	Raw Value Range Scaled Value Range								
Data typ	be: Short	Data type	Float	•					
High:	4095	High:	760	Clamp					
Low:	-539	Low:	-100	Clamp					
		Units:	С						
			Negate scaled	value					
		ОКСС	ancel App	ly Help					

Click OK to add the tag.

😰 KEPServerEX - Configuration [C:\ActiveDoc\0 MAQ20\Software\OPC Server\Kepware\MAQ20 Test Project 2.opf]							
<u>File E</u> dit <u>V</u> iew <u>T</u> ools <u>R</u> untime <u>H</u> elp							
🗋 📸 🗟 🛃 Channels/Devices 🔻 🍄 👬 🔂 🚰 🧭 🖃 🏎 🔉 📭 🔀 🗙							
□ The provide the provided and the p	Tag Name	Address	Data Type	Scan Rate	Scaling	Description	
□ MAQ20DEMO-B	💶 Channel 6	303006	Short	100	Linear	Heated Thermocouple	
	💶 Channel 7	303007	Short	100	Linear	Ambient Temperature Sensor	
G MAQ20-VDN G MAQ20-VO	4						

4.5.2 Creating Tags for the MAQ20-MVDN, -VDN, -VSN, -IDN or -ISN Input Module

On the demonstration system, MAQ20-VDN module Ch 0 measures a 0 to 3V signal for the green LED bar display, labeled VOUT2, which is controlled by Motor Pot 1 and Ch 5 measures a 0 to 250mV signal from the TC Heat 1 control which is driven by MAQ20-VO Ch 4.

To determine the address to read from, use the Address Map for the MAQ20-MVDN, -VDN, -VSN, -IDN or –ISN Input Modules found in the appendix of MA1041 MAQ20 mV-V-mA Input Module Hardware User Manual. An excerpt from the MAQ20-VDN Address Map is shown below. Channel Data is stored starting at address 1000.

NOTE: When a module is registered in a system, addresses are offset by 2000 * R, where R is the Registration Number.

	Address Range 1000 - 1699 : Module Data									
Start Address	Read/ Write	Number of Registers	Contents	Description	Data Range	Data type				
1000	R	16	Channel Data	Data for all 8 Channels	-4096 to 4095	INT16				

The MAQ20-VDN module in the demonstration system has a registration number of 2 and an address offset of 2000 * 2 = 4000.

To read from Input Registers using the OPC server, use base address range 300000. The addresses to read from are then 300000 + 4000 (address offset) + 1000 (MAQ20-VDN Ch 0) = 305000 and 300000 + 4000 (address offset) + 1005 (MAQ20-VDN Ch 5) = 305005.

Choose Data type = Short and Client access = Read Only. Scan rate is only for non-OPC clients.

General	Scaling	
Identi	fication	
	Name:	Channel 0
	Address:	305000
De	escription:	Green LED Bar Graph Control Monitor
Data	properties	
	[Data type: Short 💌
	Clier	nt access: Read Only
	9	Scan rate: 100 🚔 milliseconds
Note spec	: The scar ify a rate w	n rate is only used for client applications that do not when referencing this tag (e.g., non-OPC clients)

MAQ[®]20 input module input ranges can be set on a per-channel basis. This can be set or checked using the MAQ[®]20 Configuration Software Tool or ReDAQ[®] Shape Software for MAQ[®]20.

Setup Scale Data Con	ntrol Loop / Alarm								
Channel Name	User Tag Name	Data Display	Input Select	Avg We	eight I	Max/Min	Input Range		Control Loop / Alarm
Input 0	1_VDN_2_0	0	Raw	◄ 4		Reset	-5V to +5V	-	None 👻 🥥
Input 1	1_VDN_2_1	0	Raw	- 4	÷	Reset	-60V to +60V	•	None 👻 🌖
Input 2	1_VDN_2_2	0 1	Raw	- 4	÷	Reset	-5V to +5V	•	None 👻 🌑
Input 3	1_VDN_2_3	0	Raw	- 4	-	Reset	-60V to +60V	•	None 👻 🌑
Input 4	1_VDN_2_4	0	Raw	- 4	-	Reset	-5V to +5V	•	None 👻 🥥
Input 5	1_VDN_2_5	0	Raw	- 4	÷	Reset	-5V to +5V	•	None 👻 🌑
Input 6	1_VDN_2_6	0	Raw	- 4	-	Reset	-60V to +60V	-	None 👻 🥥
Input 7	1_VDN_2_7	0	Raw	- 4	÷	Reset	-60V to +60V	-	None 👻 🌖



Data stored in the MAQ[®]20 addresses is in raw counts. To convert this to engineering units, use the count mapping tables in the appendix of the specific MAQ[®]20 Hardware User Manual.

MAQ20-VDN Range Table

	Range	Standard Input Voltage	Equivalent Counts	Over/Under Range	Equivalent Counts	Volts per Count
z	0	-60V to +60V	-4016 to 4016	-61.2V to +61.2V	-4096 to 4095	14.94*10^-3
۲ D	1	-40V to +40V	-4016 to 4016	-40.8V to +40.8V	-4096 to 4095	9.961*10^-3
20-	2	-20V to +20V	-4016 to 4016	-20.4V to +20.4V	-4096 to 4095	4.980*10^-3
AQ	3	-10V to +10V	-4016 to 4016	-10.2V to +10.2V	-4096 to 4095	2.490*10^-3
Σ	4	-5V to +5V (Default)	-4016 to 4016	-5.1V to +5.1V	-4096 to 4095	1.245*10^-3

Using this information, scaling can be entered in the tag configuration. Use linear scaling, enter the raw count range from the Range Table, select data type Float and enter the corresponding high and low input voltages. Scaled values can be clamped to prevent out of range scaling errors and can be negated if desired. Enter units of Volts.

Tag Properties	;			and the second s		x	
General Sc	aling						
None	Linear	Square ro	ot				
- Raw Va	alue Range	Sc	aled Value	Range			
Data ty	pe: Short	C)ata type:	Short	•		
High:	4016		High:	5	Clamp		
Low:	-4016		Low:	-5	Clamp		
			Units:	V]		
				Negate scaled v	alue		
OK Cancel Annly Hein							

Click OK to add the tag.

KEPServerEX - Configuration [C:\	ActiveDoc\0 MAQ2	20\Software\OPC Se	rver\Kepware\N	1AQ20 Test Pro	ject 2.opf *]				
<u>File Edit View Tools Runtim</u>	<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>T</u> ools <u>R</u> untime <u>H</u> elp								
🗋 💕 🛃 🛃 Channels/Devic	🗋 📸 🛃 Channels/Devices 💌 🍄 👬 🏂 🐲 🎢 🤟 🦛								
Dataforth MAQ20	Tag Name	/ Address	Data Type	Scan Rate	Scaling	Description			
ia MAQ20DEMO-B	Channel 0	305000	Short	100	Linear	VOUT2 LED Bar Display Control Monitor			
MAQ20-DIOL MAQ20-JTC MAQ20-VDN	G Channel 5	304005	Short	100	Linear	TC Heat 1 Control Signal			
\$				G					

4.5.3 Creating Tags for the MAQ20-VO or -IO Output Module

On the demonstration system, MAQ20-VO module Ch 0 provides a -10V to +10V output signal which drives the yellow LED bar display, labeled VOUT1, from zero to full scale, and Ch 4 drives the TC Heat 1 control which simulates an elevated temperature measured by MAQ20-JTC module Ch 6.

To determine the address to write to, use the Address Map for the MAQ20-VO or -IO Output Modules found in the appendix of MA1042 MAQ20 Voltage & Current Output Module Hardware User Manual. An excerpt from the MAQ20-VO Address Map is shown below. Channel Data is stored starting at address 1000.

NOTE: When a module is registered in a system, addresses are offset by 2000 * R, where R is the Registration Number.

	Address Range 1000 - 1699 : Module Data									
Start AddressR/WNumber of RegistersContents		Description	Data Range	Data type						
1000	R/W	8	Channel Data	Data for each of 8 channels Default = 2048	See Table	INT16				

The MAQ20-VO module in the demonstration system has a registration number of 3 and an address offset of 2000 * 3 = 6000.

To write to Holding Registers using the OPC server, use base address range 400000. The addresses to write to are then 400000 + 6000 (address offset) + 1000 (MAQ20-VO Ch 0) = 407000 and 400000 + 6000 (address offset) + 1004 (MAQ20-VO Ch 4) = 407004.

Choose Data type = Short and Client access = Read/Write. Scan rate is only for non-OPC clients.

Та	g Properties	×
	General Scaling	
ľ	Identification	
	Name: Channel 0	
	Addr <u>e</u> ss: 407000	
	Description: VOUT1 LED Bar Display Control	
	Data properties	
	Data type: Short	
	<u>C</u> lient access: Read/Write ▼	
	Scan rate: 100 milliseconds	
	Note: The scan rate is only used for client applications that do not specify a rate when referencing this tag (e.g., non-OPC clients)	
	OK Cancel Apply	Help

MAQ[®]20 output module ranges can be set on a per-channel basis. This can be set or checked using the MAQ[®]20 Configuration Software Tool or ReDAQ[®] Shape Software for MAQ[®]20.

Setup	Scale Data							
	● Continuous Scan Mode 🔿 Buffer Scan Mode Buffer Mode Interval (Range: 10-65535 ms) : 100 👘							
Char	nnel Name	User Tag Name	Output Data	Default Output	Output Range	Buffer Mode Output Data		
Outp	ut 0	1_V0_3_0	10	4.954	-10V to 10V	1,1.5,2,2.5,3,3.5,4,4.5,R		
Outp	ut 1	1_V0_3_1	-0.005	-0.005	-10V to 10V	4.5,4,3.5,3,2.5,2,1.5,1,R		
Outp	ut 2	1_V0_3_2	-0.005	-0.005	-10V to 10V	1,1.5,2,2.5,3,3.5,4,4.5,S		
Outp	ut 3	1_V0_3_3	-0.005	-0.005	-10V to 10V	4.5,4,3.5,3,2.5,2,1.5,1,S		
Outp	ut 4	1_V0_3_4	-0.005	-0.005	-10V to 10V	1,1.5,2,2.5,3,3.5,4,4.5,R		
Outp	ut 5	1_V0_3_5	-0.005	-0.005	-10V to 10V	4.5,4,3.5,3,2.5,2,1.5,1,R		
Outp	ut 6	1_VO_3_6	10	10	-10V to 10V	1,1.5,2,2.5,3,3.5,4,4.5,S		
Outp	ut 7	1_V0_3_7	10	10	-10V to 10V	4.5,4,3.5,3,2.5,2,1.5,1,S		

Data stored in the MAQ[®]20 addresses is in raw counts. To convert this to engineering units, use the count mapping tables in the appendix of the specific MAQ[®]20 Hardware User Manual.

MAQ20-VO Range Table

	Standard Output	Equivalent		Equivalent	Volts per
Range	Voltage	Counts	Over/Under Range	Counts	Count
0	-10V to +10V (Default)	98 to 3998	-10.5V to +10.5V	0 to 4095	5.128*10^-3
1	-5V to +5V	1073 to 3023	-5.25V to +5.25V	1024 to 3072	5.128*10^-3
2	-2.5V to +2.5V	1561 to 2536	-2.625V to +2.625V	1536 to 2560	5.128*10^-3
3	0 to +10V	2048 to 3998	0 to +10.5V	2048 to 4095	5.128*10^-3
4	0 to +5V	2048 to 3023	0 to +5.25V	2048 to 3072	5.128*10^-3
5	0 to +2.5V	2048 to 2536	0 to +2.625V	2048 to 2560	5.128*10^-3

Using this information, scaling can be entered in the tag configuration. Use linear scaling, enter the raw count range from the Range Table, select data type Float and enter the corresponding high and low output voltages. Scaled values can be clamped to prevent out of range scaling errors and can be negated if desired. Enter units of Volts.

Tag Properties	
General Scaling	
🔘 <u>N</u> one 💿 <u>L</u> inear 🔘 S	jquare root
Raw Value Range	Scaled Value Range
D	
Data type: Short	Data type: Hoat
<u>High:</u> 3998	High: 10 🔲 Qamp
L <u>o</u> w: 98	Lo <u>w</u> : -10 Cla <u>m</u> p
	Units: V
	Negate scaled value
	OK Cancel Apply Help

Click OK to add the tag.

KEPServerEX - Runtime [C:\Active	eDoc\0 MAQ20\Software\/	OPC Server\Kej	oware\MAQ20	Test Project 2.c	opf] (Demo Ex	pires 01:32:14)		
<u>File E</u> dit <u>V</u> iew <u>I</u> ools <u>R</u> untime <u>H</u> elp								
🗋 📂 🗟 🛃 Channels/Devic	ses 🕶 🦃 🔚 🚰 ն	🚰 🗐 🐰	ъ 🛍 🗙	RC				
Dataforth MAQ20	Tag Name 🖉	Address	Data Type	Scan Rate	Scaling	Description		
B. MAQ20DEMO-B	Channel 0	407000	Short	100	Linear	VOUT1 LED Bar Display Control		
	😡 Channel 4	407004	Short	100	Linear	TC Heat 1 Control		
MAQ20-JTC								
MAQ20-VO								
1 15								
🛱 🥔 🕸								
						F		

4.5.4 Creating Tags for the MAQ20-DIOL Discrete Input/Output Module

On the demonstration system, MAQ20-DIOL module output channels DO1 and DO2 are connected to Motor Pot 1 FWD and REV controls respectively. Input channels DI2 and DI3 are connected to bat toggle switches SW3 and SW4 respectively. The discrete input channels read logic 1 for the bat toggle switch in the left position and the LED off and logic 0 for the bat toggle switch in the right position and the LED on.

To determine the addresses to read from and write to, use the Address Map for the MAQ20-DIOL Discrete I/O Module found in the appendix of MA1043 MAQ20-DIOL Discrete IO Module Hardware User Manual. An excerpt from the MAQ20-DIOL Address Map is shown below. Channel Data is stored starting at address 1000.

NOTE: When a module is registered in a system, addresses are offset by 2000 * R, where R is the Registration Number.

	Address Range 1000 - 1299 : Module Data and Special Function Selection											
Start Address	Read/ Write	Number of Registers	Contents	Description	Data Range	Data type						
1000	R/W	10	DIO States, Binary Representation, Inverted Logic Addr 1000 = LSB Addr 1009 =MSB	Example: Starting at address 1009 and decreasing to address 1000, MSB to LSB DI4 to DI0 and DO4 to DO0 = 1011011000. Data written to an input channel will be ignored. Data written to an output channel committed to a Special Function returns an error. Default = 1 for all channels.	DO0 – DO4 Inverted Logic 0 = switch closed 1 = switch open DI0 – DI4 Inverted Logic 0 = input > threshold 1 = input < threshold	INT16						

The MAQ20-DIOL module in the demonstration system has a registration number of 4 and an address offset of 2000 * 4 = 8000.

To read from and write to Holding Registers using the OPC server, use base address range 400000. The addresses to write to are then:

400000 + 8000 (address offset) + 1001 (MAQ20-DIOL Ch DO1) = 409001 400000 + 8000 (address offset) + 1002 (MAQ20-DIOL Ch DO2) = 409002

and the address to read from are:

400000 + 8000 (address offset) + 1001 (MAQ20-DIOL Ch DI2) = 409007 400000 + 8000 (address offset) + 1001 (MAQ20-DIOL Ch DI3) = 409008

Although the data is Boolean, the MAQ[®]20 stores it as INT16 and uses holding register R/W operations for access. Choose Data type = Short and Client access = Read/Write. Scan rate is only for non-OPC clients.

Tag Properties	×
General Scaling	
Identification	
Name:	Discrete Output Ch 1
Address:	409001
Description:	Motor Pot 1 Forward Control
- Data properties	
C	ata type: Short
Clien	t access: Read/Write
s	can rate: 100 💌 milliseconds
Note: The scan specify a rate w	rate is only used for client applications that do not hen referencing this tag (e.g., non-OPC clients)
	OK Cancel Apply Help

Click OK to add the tag.

😰 KEPServerEX - Runtime [C:\ActiveDoc\0 MAQ20\Software\OPC Server\Kepware\MAQ20 Test Project 2.opf] (Demo Expires 01:21:43)								
<u>Eile Edit V</u> iew <u>T</u> ools <u>R</u> untime <u>H</u> elp								
🗋 📸 🗟 🛃 Channels/Devices 🔻 🍄 🔚 🎦 🚰 🦉 🗁 🐰 📭 🎘 🗙 🔛								
Dataforth MAQ20	Tag Name / Address	Data Type	Scan Rate	Scaling	Description			
ia MAQ20DEMO-B	Discrete Input Ch 2 409007	Short	100	None	Bat Toggle SW3			
	Discrete Input Ch 3 409008	Short	100	None	Bat Toggle SW4			
	Ø Discrete Output Ch 1 409001	Short	100	None	Motor Pot 1 Forward Control			
	Iscrete Output Ch 2 409002	Short	100	None	Motor Pot 1 Reverse Control			
	•	m	Ş		•			
Ready				Default User	Clients: 2 Active tags: 0 of 0			

5.0 Reading and Writing Data with the OPC Quick Client

Once the Channel and Device have been configured and Tags have been assigned, use the OPC Quick Client to view data and write data to addresses.

🖀 KEPServerEX - Runtime [C:\ActiveDoc\0 MAQ20\Software\OPC Server\Kepware\MAQ20 Test Project 2.opf *] (Demo Expires 01:02:25)							
<u>File Edit View Tools Runtime</u>	<u>H</u> elp						_
🗋 💕 🗟 🛃 Event Log	F	🔄 🖌 🕺	6 6 ×	RC			
Dataforth N 🛄 Launch OP	C Quick Client	Address	Data Type	Scan Rate	Scaling	Description	
ianti MAQ20 → → → → → → → → → → → → → → → → → → →		409007 409008	Short Short	100 100	None None	Bat Toggle SW3 Bat Toggle SW4	
MAQ20-JTC	Discrete Output Ch	1 409001	Short	100	None	Motor Pot 1 Forward Cont	trol
MAQ20-VDN	😡 Discrete Output Ch	2 409002	Short	100	None	Motor Pot 1 Reverse Cont	rol
\$	٢						•
					Default User	Clients: 2 Active tags: 0 of	0 .44

Start the Quick Client from the Tools pulldown menu, or by using the icon on the toolbar.

OPC Quick Client -	Untitled *								
File Edit View To	ools Help								
E Kepware.KEPSe	rverEX.V5		Item ID	Data 🛆 👌	Value	Timestamp	Quality	Update Count	
🛅 _DataLogge	r		Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL.Discrete I	Short 1	L	12:06:49.472	Good	2	
🚞 _System			Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL.Discrete I	Short ()	12:07:07.725	Good	3	
- 🛅 Dataforth M	1AQ20Communicatio	onSerialization	Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL.Discrete	Short ()	12:06:09.933	Good	1	
🛅 Dataforth M	1AQ20Statistics		Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL.Discrete	Short ()	12:06:09.933	Good	1	
🔤 Dataforth N	1AQ20System								
🔤 Dataforth N	1AQ20.MAQ20DEMO-E	BStatistics							
🛅 Dataforth M	1AQ20.MAQ20DEMO-E	BSystem							
- 🔄 Dataforth I	MAQ20.MAQ20DEMO	-B.MAQ20-DIOL							
🛅 Dataforth M	IAQ20.MAQ20DEMO-E	B.MAQ20-JTC							
- Dataforth N	1AQ20.MAQ20DEMO-E	B.MAQ20-VDN							
👘 Dataforth M	1AQ20.MAQ20DEMO-E	B.MAQ20-VO							
Date	Time	Event	,					-	
1/27/2015	12:06:10 PM	Added group 'Dataf	orth MAQ20.MAQ20DEMO-B.MAQ20-JTC' to 'Kepware.KEPServe	rEX.V5'.					
1/27/2015	12:06:10 PM	Added 4 items to gr	oup 'Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL'.						
1/27/2015 12:06:10 PM Added group 'Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN' to 'Kepwa			orth MAQ20.MAQ20DEMO-B.MAQ20-VDN' to 'Kepware.KEPServe	erEX.V5'.					
12:06:10 PM Added 2 items to group 'Dataforth MAQ20.MAQ20DEMO-B.MAQ20-JTC'.									
1/27/2015 12:06:10 PM Added group 'Dataforth MAQ20			orth MAQ20.MAQ20DEMO-B.MAQ20-VO' to 'Kepware.KEPServer	EX.V5'.					
1/27/2015 12:06:10 PM Added 2 items to group			oup 'Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN'.					=	
1/27/2015	12:06:10 PM	Added 2 items to gr	oup 'Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VO'.						
Ready								Item Count: 87	

Tag groups are in individual folders. Click on a folder to view tags and active data. Data is updated at the rate specified in the Client with a default rate of 1000ms. When data changes, the Update Count increases.

The pane at the bottom shows all system events. Review this pane and the similar pane in KEPServerEX if there are problems connecting or acquiring data.

To write data to a channel, left-click on the channel to highlight it, then right click to open a menu with actions that can be performed.



Select either Synchronous Write or Asynchronous 2.0 Write, then enter the desired value either in counts or in scaled units and press Apply or OK.

6.0 Operating the MAQ[®]20 Process Simulator with the OPC Quick Client

The I/O channels presented in this manual are interrelated on the MAQ[®]20 Process Simulator, so the following exercises can be performed once the system has been configured as outlined in the previous sections.

6.1 Read Ambient Temperature

Select the MAQ20-JTC tag group. Observe the ambient temperature read on Channel 7. Touch the thermocouple protruding from the Process Simulator and observe the temperature change.

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⊡;∎ Kepware.KEPServerEX.V5	Item ID	Data 🛆	Value	Timestamp	Quality	Update
DataLogger	Dataforth MAQ20.MAQ20DEMO-B.MAQ20-JTC.Channel 6	Float	114.536	12:31:10.732	Good	1090
🛅 _System	Dataforth MAQ20.MAQ20DEMO-B.MAQ20-JTC.Channel 7	Float	26.4465	12:31:09.723	Good	1330
Dataforth MAQ20CommunicationSerialization						
Dataforth MAQ20Statistics						
Dataforth MAQ20System						
Dataforth MAQ20.MAQ20DEMO-BStatistics						
Dataforth MAQ20.MAQ20DEMO-BSystem						
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL						
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN						
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VO						
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6.2 Read VOUT2 LED Bar Control Monitor

Select the MAQ20-VDN tag group. Observe the control voltage read on Channel 0. Rotate Motor Pot 1 and observe the voltage change.

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Item ID	Data 🛆	Value	Timestamp	Quality	Update Count
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN.Channel 0	Float	3.05279	12:38:33.846	Good	1049
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN.Channel 5	Float	0.061006	12:38:32.837	Good	1213
	•				
	5				
	Item ID Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN.Channel 0 Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN.Channel 5	Item ID Data / Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN.Channel 0 Float Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN.Channel 5 Float	Item ID Data / Value Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN.Channel 0 Float 3.05279 Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN.Channel 5 Float 0.061006	Item ID Data / Value Timestamp Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN.Channel 0 Float 3.05279 12:38:33.846 Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN.Channel 5 Float 0.061006 12:38:32.837	Item ID Data / Value Timestamp Quality Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN.Channel 0 Float 3.05279 12:38:33.846 Good Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN.Channel 5 Float 0.061006 12:38:32.837 Good

6.3 Control the VOUT1 LED Bar

Select the MAQ20-VO tag group. Use Synchronous or Asynchronous Write to change the value of Channel 0 between -10V and +10V. Observe the change on the VOUT1 LED bar.

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□:: Kepware.KEPServerEX.V5	Item ID	Data 🛆	Value	Timestamp	Quality	Update Count
DataLogger	Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VO.Channel 0	Float	-2	12:41:28.312	Good	3
System	Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VO.Channel 4	Float	2.50256	12:25:57.054	Good	2
Dataforth MAQ20CommunicationSerialization						
Dataforth MAQ20Statistics						
Dataforth MAQ20System						
Dataforth MAQ20.MAQ20DEMO-BStatistics						
Dataforth MAQ20.MAQ20DEMO-BSystem						
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL			1			
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-JTC						
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN						
Bataforth MAQ20.MAQ20DEMO-B.MAQ20-VO						
Date Time Event	2					-

6.4 Control TC Heat 1

Select the MAQ20-VO tag group. Use Synchronous or Asynchronous Write to change the value of Channel 4 between 0V and +10V. The intensity of the TC Heat 1 indicator will indicate heater control voltage. Select the MAQ20-JTC tag group and observe the simulated temperature change on Channel 6. Select MAQ20-VDN tag group and observe the heat control voltage on Channel 5.

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⊡: Kepware.KEPServerEX.V5	Iter	n ID		Data 🛆	Value	Timestamp	Quality	Update Count
- DataLogger	0	ataforth MAQ20.MAQ20DEN	IO-B.MAQ20-VO.Channel 0	Float	-2	12:41:28.312	Good	3
🛅 _System		ataforth MAQ20.MAQ20DEN	IO-B.MAQ20-VO.Channel 4	Float	7.50256	12:46:33.490	Good	6
Dataforth MAQ20CommunicationSerialization Dataforth MAQ20Statistics	Asy	nchronous 2.0 Write						×
Dataforth MAQ20System								ΟΚ
Dataforth MAQ20.MAQ20DEMO-BStatistics		Item ID	Current Value	Write Value				
Dataforth MAQ20.MAQ20DEMO-BSystem		Dataforth MAQ20.MAQ2	7.50256	7.5				Apply
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL								Cancel
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-JTC								Cancer
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN								
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VO								
		3						



6.5 Read Bat Toggle Switch Position

Select the MAQ20-DIOL tag group. Operate switch SW3 on the Process Simulator and observe the state change on Discrete Input Ch 2. Operate switch SW4 on the Process Simulator and observe the state change on Discrete Input Ch 3.

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⊡…::miii Kepware.KEPServerEX.V5	Item ID	Data 🛆	Value	Timestamp	Quality	Update Count
🛅 _DataLogger	Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL.Discrete Input Ch 2	Short	1	12:06:49.472	Good	2
System	Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL.Discrete Input Ch 3	Short	0	12:07:07.725	Good	3
Dataforth MAQ20CommunicationSerialization	Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL.Discrete Output Ch 1	Short	0	12:06:09.933	Good	1
Dataforth MAQ20Statistics	Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL.Discrete Output Ch 2	Short	0	12:06:09.933	Good	1
Dataforth MAQ20System						
Dataforth MAQ20.MAQ20DEMO-BStatistics						
Dataforth MAQ20.MAQ20DEMO-BSystem						
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-JTC						
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN						
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VO						
	•					•

6.6 Control Motor Pot 1

Select the MAQ20-DIOL tag group. Use Synchronous or Asynchronous Write to change the value of Channel 1 to turn on or off forward motion (clockwise) or the value of Channel 2 to turn on or off reverse motion (counter-clockwise). The VOUT2 LED Bar indicates rotational position.

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⊡:: EPServerEX.V5	Item ID	Data 🛆	Value	Timestamp	Quality	Update Count
🛅 _DataLogger	Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL.Discrete Input Ch 2	Short	1	12:06:49.472	Good	2
🛅 _System	Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL.Discrete Input Ch 3	Short	0	12:07:07.725	Good	3
Dataforth MAQ20CommunicationSerialization	Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL.Discrete Output Ch 1	L Short	0	1 2.06.00 022	Good	1
Dataforth MAQ20Statistics	Dataforth MAQ20.MAQ20DEMO-B.MAQ20-DIOL.Discrete Output Ch 2	2 Short 🛷	New	Item		
🛅 Dataforth MAQ20System			Set A	eti ve		
Dataforth MAQ20.MAQ20DEMO-BStatistics			Set A	cuve		
Dataforth MAQ20.MAQ20DEMO-BSystem			Set Ir	nactive		
			Sunc	hronous Cache	Read	
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-JTC			Sync			
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VDN			Sync	hronous Device	Read	
Dataforth MAQ20.MAQ20DEMO-B.MAQ20-VO			Sync	hronous Write	•	
			Acum	chronous 2.0 R	bea	
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The Motor Pot controls have the following truth-table:

Channel DO1	Channel DO2	Motor Pot Rotation
0	0	None
1	0	CW
0	1	CCW
1	1	None

7.0 OPC Server Setup File

The project created by following the steps in this manual is titled MAQ20DEMO-B.opf and is available for download from <u>www.dataforth.com</u>.

8.0 References

Dataforth Software Download Center

MAQ[®]20 Configuration Software Tool ReDAQ[®] Shape Software for MAQ[®]20 MAQ[®]20 Hardware and Software User Manuals http://www.dataforth.com/mag20_download.aspx

OPC Foundation

www.opcfoundation.org/ OPC Basics www.opcfoundation.org/about/what-is-opc/

Wikipedia

OPC basics and links to related topics and references http://en.wikipedia.org/wiki/OLE for Process Control

Kepware Technologies

KEPServerEX FAQ database, video tutorials, software download, drivers www.kepware.com/Support Center

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- 2. Product serial number.
- 3. Name, address, and telephone number of person returning product.
- 4. Special repair instructions.
- 5. Purchase order number for out-of-warranty repairs.

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