

Torque Tool Ethernet Driver

© 2018 PTC Inc. All Rights Reserved.

Table of Contents

Torque Tool Ethernet Driver	1
Table of Contents	2
Torque Tool Ethernet Driver	4
Overview	4
Setup	5
Channel Properties — General	5
Channel Properties — Ethernet Communications	6
Channel Properties — Write Optimizations	6
Channel Properties — Advanced	7
Device Properties — General	8
Device Properties — Scan Mode	9
Device Properties — Timing	10
Device Properties — Communications Parameters	11
Device Properties — Settings	12
Device Properties — Redundancy	13
Optimizing Communications	14
Data Types Description	15
Address Descriptions	16
Message IDs	16
Command Set: Alarm	18
Command Set: Auto-Disable Settings	19
Command Set: Flash	20
Command Set: Identifiers	20
Command Set: IO Interface	21
Command Set: Job Info	21
Command Set: Job Data	23
Command Set: Job Number Data	24
Command Set: Last Tightening Results	24
Command Set: Multi-Spindle Results	30
Command Set: Old Tightening Results	31
Command Set: Parameter Set Data	35
Command Set: Parameter Set Numbers	36
Command Set: Parameter Set Selected	36
Command Set: Time	37
Command Set: Tool Data	37

Command Set: VIN	38
Error Descriptions	39
Address <address> is out of range for the specified device or register.	39
Array size is out of range for address <address>.	39
Array support is not available for the specified address: <address>.	40
Data type <type> is not valid for device address <address>.	40
Device address <address> contains a syntax error.	40
Device address <address> is read only.	40
Unable to bind to adapter: <adapter name>. Connect failed.	41
Winsock initialization failed (OS error = <error>).	41
Winsock shut down failed (OS error = <error>).	41
Winsock V1.1 or higher must be installed to use the driver.	41
Device <device name> failed to connect.	42
Device <device name> is not responding.	42
Unable to read tag <tag name>: Device <device name> encountered a parsing error.	42
Unable to read tag <tag name>: Device <device name> received an error response (Error <error code>).	43
Unable to write tag <tag name>: Device <device name> encountered a parsing error.	43
Unable to write tag <tag name>: Device <device name> received an error response (Error <error code>).	43
Unable to write tag <tag name>: Device <device name> received invalid data for write.	44
Unable to write to <address> on device <device name>.	44
Error Codes	44
Index	47

Torque Tool Ethernet Driver

Help version 1.053

CONTENTS

Overview

What is the Torque Tool Ethernet Driver?

Device Setup

How do I configure a device for use with this driver?

Optimizing Communications

How do I get the best performance from the driver?

Data Types Description

What data types does the Torque Tool Ethernet Driver support?

Address Descriptions

How do I reference a data location in a Torque Tool Ethernet device?

Error Descriptions

What error messages does the Torque Tool Ethernet Driver produce?

Overview

The Torque Tool Ethernet Driver provides a reliable way to connect Torque Tool Ethernet devices to OPC Client applications; including HMI, SCADA, Historian, MES, ERP, and countless custom applications. It is intended to work with all devices supporting the Torque Tool Open Protocol.

Setup

Supported Devices

The Torque Tool Ethernet Driver is designed to work with any device that supports the Torque Tool Open Protocol. The driver has been tested with the Stanley QA Alpha Controller and the Atlas Copco Power Focus.

Maximum Number of Channels and Devices

The driver supports a maximum of 256 channels and 1024 devices.

Channel Properties — General

This server supports the use of simultaneous multiple communications drivers. Each protocol or driver used in a server project is called a channel. A server project may consist of many channels with the same communications driver or with unique communications drivers. A channel acts as the basic building block of an OPC link. This group is used to specify general channel properties, such as the identification attributes and operating mode.

Property Groups	<input type="checkbox"/> Identification	
General	Name	
Write Optimizations	Description	
Advanced	Driver	
	<input type="checkbox"/> Diagnostics	
	Diagnostics Capture	Disable

Identification

Name: User-defined identity of this channel. In each server project, each channel name must be unique. Although names can be up to 256 characters, some client applications have a limited display window when browsing the OPC server's tag space. The channel name is part of the OPC browser information.

• For information on reserved characters, refer to "How To... Properly Name a Channel, Device, Tag, and Tag Group" in the server help.

Description: User-defined information about this channel.

• Many of these properties, including Description, have an associated system tag.

Driver: Selected protocol / driver for this channel. This property specifies the device driver that was selected during channel creation. It is a disabled setting in the channel properties.

• **Note:** With the server's online full-time operation, these properties can be changed at any time. This includes changing the channel name to prevent clients from registering data with the server. If a client has already acquired an item from the server before the channel name is changed, the items are unaffected. If, after the channel name has been changed, the client application releases the item and attempts to re-acquire using the old channel name, the item is not accepted. With this in mind, changes to the properties should not be made once a large client application has been developed. Utilize the User Manager to prevent operators from changing properties and restrict access rights to server features.

Diagnostics

Diagnostics Capture: When enabled, this option makes the channel's diagnostic information available to OPC applications. Because the server's diagnostic features require a minimal amount of overhead

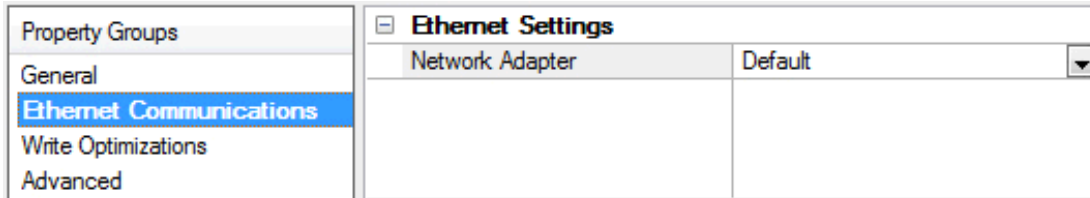
processing, it is recommended that they be utilized when needed and disabled when not. The default is disabled.

● **Note:** This property is disabled if the driver does not support diagnostics.

● For more information, refer to "Communication Diagnostics" in the server help.

Channel Properties — Ethernet Communications

Ethernet Communication can be used to communicate with devices.

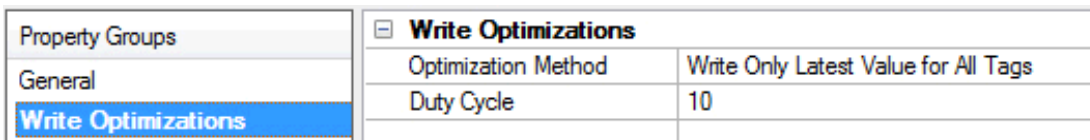


Ethernet Settings

Network Adapter: Specify the network adapter to bind. When Default is selected, the operating system selects the default adapter.

Channel Properties — Write Optimizations

As with any OPC server, writing data to the device may be the application's most important aspect. The server intends to ensure that the data written from the client application gets to the device on time. Given this goal, the server provides optimization properties that can be used to meet specific needs or improve application responsiveness.



Write Optimizations

Optimization Method: controls how write data is passed to the underlying communications driver. The options are:

- **Write All Values for All Tags:** This option forces the server to attempt to write every value to the controller. In this mode, the server continues to gather write requests and add them to the server's internal write queue. The server processes the write queue and attempts to empty it by writing data to the device as quickly as possible. This mode ensures that everything written from the client applications is sent to the target device. This mode should be selected if the write operation order or the write item's content must uniquely be seen at the target device.
- **Write Only Latest Value for Non-Boolean Tags:** Many consecutive writes to the same value can accumulate in the write queue due to the time required to actually send the data to the device. If the server updates a write value that has already been placed in the write queue, far fewer writes are needed to reach the same final output value. In this way, no extra writes accumulate in the server's queue. When the user stops moving the slide switch, the value in the device is at the correct value at virtually the same time. As the mode states, any value that is not a Boolean value is updated in the server's internal write queue and sent to the device at the next possible opportunity. This can greatly

improve the application performance.

- **Note:** This option does not attempt to optimize writes to Boolean values. It allows users to optimize the operation of HMI data without causing problems with Boolean operations, such as a momentary push button.
- **Write Only Latest Value for All Tags:** This option takes the theory behind the second optimization mode and applies it to all tags. It is especially useful if the application only needs to send the latest value to the device. This mode optimizes all writes by updating the tags currently in the write queue before they are sent. This is the default mode.

Duty Cycle: is used to control the ratio of write to read operations. The ratio is always based on one read for every one to ten writes. The duty cycle is set to ten by default, meaning that ten writes occur for each read operation. Although the application is performing a large number of continuous writes, it must be ensured that read data is still given time to process. A setting of one results in one read operation for every write operation. If there are no write operations to perform, reads are processed continuously. This allows optimization for applications with continuous writes versus a more balanced back and forth data flow.

● **Note:** It is recommended that the application be characterized for compatibility with the write optimization enhancements before being used in a production environment.

Channel Properties — Advanced

This group is used to specify advanced channel properties. Not all drivers support all properties; so the Advanced group does not appear for those devices.

Property Groups	<input type="checkbox"/> Non-Normalized Float Handling	
General	Floating-Point Values	Replace with Zero
Write Optimizations	<input type="checkbox"/> Inter-Device Delay	
Advanced	Inter-Device Delay (ms)	0

Non-Normalized Float Handling: A non-normalized value is defined as Infinity, Not-a-Number (NaN), or as a Denormalized Number. The default is Replace with Zero. Drivers that have native float handling may default to Unmodified. Non-normalized float handling allows users to specify how a driver handles non-normalized IEEE-754 floating point data. Descriptions of the options are as follows:

- **Replace with Zero:** This option allows a driver to replace non-normalized IEEE-754 floating point values with zero before being transferred to clients.
- **Unmodified:** This option allows a driver to transfer IEEE-754 denormalized, normalized, non-number, and infinity values to clients without any conversion or changes.

● **Note:** This property is disabled if the driver does not support floating point values or if it only supports the option that is displayed. According to the channel's float normalization setting, only real-time driver tags (such as values and arrays) are subject to float normalization. For example, EFM data is not affected by this setting.

● *For more information on the floating point values, refer to "How To ... Work with Non-Normalized Floating Point Values" in the server help.*

Inter-Device Delay: Specify the amount of time the communications channel waits to send new requests to the next device after data is received from the current device on the same channel. Zero (0) disables the delay.

● **Note:** This property is not available for all drivers, models, and dependent settings.

Device Properties — General

A device represents a single target on a communications channel. If the driver supports multiple controllers, users must enter a device ID for each controller.

Property Groups	Identification	
General	Name	
Scan Mode	Description	
	Channel Assignment	
	Driver	
	Model	
	ID Format	Decimal
	ID	2
	Operating Mode	
	Data Collection	Enable
	Simulated	No

Identification

Name: This property specifies the name of the device. It is a logical user-defined name that can be up to 256 characters long, and may be used on multiple channels.

● **Note:** Although descriptive names are generally a good idea, some OPC client applications may have a limited display window when browsing the OPC server's tag space. The device name and channel name become part of the browse tree information as well. Within an OPC client, the combination of channel name and device name would appear as "ChannelName.DeviceName".

● *For more information, refer to "How To... Properly Name a Channel, Device, Tag, and Tag Group" in server help.*

Description: User-defined information about this device.

● Many of these properties, including Description, have an associated system tag.

Channel Assignment: User-defined name of the channel to which this device currently belongs.

Driver: Selected protocol driver for this device. This property specifies the driver selected during channel creation. It is disabled in the channel properties.

Model: This property specifies the specific type of device that is associated with this ID. The contents of the drop-down menu depends on the type of communications driver being used. Models that are not supported by a driver are disabled. If the communications driver supports multiple device models, the model selection can only be changed when there are no client applications connected to the device.

● **Note:** If the communication driver supports multiple models, users should try to match the model selection to the physical device. If the device is not represented in the drop-down menu, select a model that conforms closest to the target device. Some drivers support a model selection called "Open," which allows users to communicate without knowing the specific details of the target device. For more information, refer to the driver help documentation.

ID: This property specifies the device's station / node / identity / address. The type of ID entered depends on the communications driver being used. For many drivers, the ID is a numeric value. Drivers that support a Numeric ID provide users with the option to enter a numeric value whose format can be changed to suit the needs of the application or the characteristics of the selected communications driver. The ID format can be

Decimal, Octal, and Hexadecimal. If the driver is Ethernet-based or supports an unconventional station or node name, the device's TCP/IP address may be used as the device ID. TCP/IP addresses consist of four values that are separated by periods, with each value in the range of 0 to 255. Some device IDs are string based. There may be additional properties to configure within the ID field, depending on the driver.

Operating Mode

Data Collection: This property controls the device's active state. Although device communications are enabled by default, this property can be used to disable a physical device. Communications are not attempted when a device is disabled. From a client standpoint, the data is marked as invalid and write operations are not accepted. This property can be changed at any time through this property or the device system tags.

Simulated: This option places the device into Simulation Mode. In this mode, the driver does not attempt to communicate with the physical device, but the server continues to return valid OPC data. Simulated stops physical communications with the device, but allows OPC data to be returned to the OPC client as valid data. While in Simulation Mode, the server treats all device data as reflective: whatever is written to the simulated device is read back and each OPC item is treated individually. The item's memory map is based on the group Update Rate. The data is not saved if the server removes the item (such as when the server is reinitialized). The default is No.

Notes:

1. This System tag (_Simulated) is read only and cannot be written to for runtime protection. The System tag allows this property to be monitored from the client.
2. In Simulation mode, the item's memory map is based on client update rate(s) (Group Update Rate for OPC clients or Scan Rate for native and DDE interfaces). This means that two clients that reference the same item with different update rates return different data.

Simulation Mode is for test and simulation purposes only. It should never be used in a production environment.

Device Properties — Scan Mode

The Scan Mode specifies the subscribed-client requested scan rate for tags that require device communications. Synchronous and asynchronous device reads and writes are processed as soon as possible; unaffected by the Scan Mode properties.

Property Groups	<input type="checkbox"/> Scan Mode	
General	Scan Mode	Respect Client-Specified Scan Rate ▼
Scan Mode	Initial Updates from Cache	Disable

Scan Mode: specifies how tags in the device are scanned for updates sent to subscribing clients.

Descriptions of the options are:

- **Respect Client-Specified Scan Rate:** This mode uses the scan rate requested by the client.
- **Request Data No Faster than Scan Rate:** This mode specifies the maximum scan rate to be used. The valid range is 10 to 99999990 milliseconds. The default is 1000 milliseconds.
 - **Note:** When the server has an active client and items for the device and the scan rate value is increased, the changes take effect immediately. When the scan rate value is decreased, the changes do not take effect until all client applications have been disconnected.

- **Request All Data at Scan Rate:** This mode forces tags to be scanned at the specified rate for subscribed clients. The valid range is 10 to 99999990 milliseconds. The default is 1000 milliseconds.
- **Do Not Scan, Demand Poll Only:** This mode does not periodically poll tags that belong to the device nor perform a read to get an item's initial value once it becomes active. It is the client's responsibility to poll for updates, either by writing to the `_DemandPoll` tag or by issuing explicit device reads for individual items. *For more information, refer to "Device Demand Poll" in server help.*
- **Respect Tag-Specified Scan Rate:** This mode forces static tags to be scanned at the rate specified in their static configuration tag properties. Dynamic tags are scanned at the client-specified scan rate.

Initial Updates from Cache: When enabled, this option allows the server to provide the first updates for newly activated tag references from stored (cached) data. Cache updates can only be provided when the new item reference shares the same address, scan rate, data type, client access, and scaling properties. A device read is used for the initial update for the first client reference only. The default is disabled; any time a client activates a tag reference the server attempts to read the initial value from the device.

Device Properties — Timing

The device Timing properties allow the driver's response to error conditions to be tailored to fit the application's needs. In many cases, the environment requires changes to these properties for optimum performance. Factors such as electrically generated noise, modem delays, and poor physical connections can influence how many errors or timeouts a communications driver encounters. Timing properties are specific to each configured device.

Property Groups	[-] Communication Timeouts	
General	Connect Timeout (s)	3
Scan Mode	Request Timeout (ms)	5000
Timing	Retry Attempts	3
Auto-Demotion	[-] Timing	
	Inter-Request Delay (ms)	0

Communications Timeouts

Connect Timeout: This property (which is used primarily by Ethernet based drivers) controls the amount of time required to establish a socket connection to a remote device. The device's connection time often takes longer than normal communications requests to that same device. The valid range is 1 to 30 seconds. The default is typically 3 seconds, but can vary depending on the driver's specific nature. If this setting is not supported by the driver, it is disabled.

● **Note:** Due to the nature of UDP connections, the connection timeout setting is not applicable when communicating via UDP.

Request Timeout: This property specifies an interval used by all drivers to determine how long the driver waits for a response from the target device to complete. The valid range is 50 to 9,999,999 milliseconds (167.6667 minutes). The default is usually 1000 milliseconds, but can vary depending on the driver. The default timeout for most serial drivers is based on a baud rate of 9600 baud or better. When using a driver at lower baud rates, increase the timeout to compensate for the increased time required to acquire data.

Attempts Before Timeout: This property specifies how many times the driver issues a communications request before considering the request to have failed and the device to be in error. The valid range is 1 to 10. The default is typically 3, but can vary depending on the driver's specific nature. The number of attempts

configured for an application depends largely on the communications environment. This property applies to both connection attempts and request attempts.

Timing

Inter-Request Delay: This property specifies how long the driver waits before sending the next request to the target device. It overrides the normal polling frequency of tags associated with the device, as well as one-time reads and writes. This delay can be useful when dealing with devices with slow turnaround times and in cases where network load is a concern. Configuring a delay for a device affects communications with all other devices on the channel. It is recommended that users separate any device that requires an inter-request delay to a separate channel if possible. Other communications properties (such as communication serialization) can extend this delay. The valid range is 0 to 300,000 milliseconds; however, some drivers may limit the maximum value due to a function of their particular design. The default is 0, which indicates no delay between requests with the target device.

● **Note:** Not all drivers support Inter-Request Delay. This setting does not appear if it is not available.

Device Properties — Communications Parameters

Property Groups	<input type="checkbox"/> Ethernet Parameters	
General	Port Number	4545
Scan Mode	Set Error State for All DNRs	Disable
Timing	<input type="checkbox"/> Keep Alive Parameters	
Communications Parameters	Poll Time (s)	10
Settings	Reply Timeout (ms)	1000
Redundancy	Retries	3

Ethernet Parameters

Port Number: Specify the port number that the driver will use when connecting to the device. The valid range is 0 to 65535. For Open Protocol, the default setting is 4545. For FEP, the default setting is 9001.

Set Error State for All DNRs: When enabled, the driver will set the error state if the device does not respond (DNR) to writes or subscription requests. The driver will always set the error state if the device does not respond to reads. The default setting is disabled.

Keep-Alive Parameters

Poll Time: Specify the amount of time of inactivity before the driver will send a Keep Alive message to the device. The valid range is 1 to 15 seconds. The default setting is 10 seconds.

● **Caution:** If the Keep Alive interval is set to a value greater than 10 seconds, the driver may post "Device Not Responding" messages to the Event Log. This is because the device closes the connection.

Reply Timeout: Specify the amount of time that the driver will wait for a response from a Keep Alive message. The valid range is 100 to 30000 milliseconds. The default setting is 1000 milliseconds (1 second).

Fail After: Specify the number of times that the driver will attempt to send a Keep Alive message before considering it to have failed. The valid range is 1 to 10. The default setting is 3.

Device Properties — Settings

The Settings properties are used to request different revisions of messages from the device. To request a specific message revision, enter the message revision number for that message. If the device does not support revisions, enter 0.

Note: The FEP model does not support message revisions, and will disable these options.

Property Groups	<input type="checkbox"/> Message Revisions	
General	VIN	0
Scan Mode	Last Tightening	0
Timing	Old Tightening	0
Communications Parameters	Job State	0
Settings	Job Data	0
Redundancy	Job Info	0
	<input type="checkbox"/> Options	
	Disable Tool on LTR	Disable
	Revision Format	Empty

Message Revisions

VIN: Specify the revision number for the Vehicle Identification Number messages. At this time, 1, 2 is supported. The default setting is 0. This affects MIDs 0051 through 0054.

Last Tightening: Specify the revision number for the Last Tightening Results messages. At this time, 1..5 and 999 (for low-bandwidth version) are supported. The default setting is 0. This affects MIDs 0060 through 0063.

Old Tightening: Specify the revision number for the Old Tightening Results messages. At this time, 1..4 is supported. The default setting is 0. This affects MIDs 0064 and 0065.

Job State: Specify the revision number for Job ID Upload, Job Select, and Job Restart messages. At this time, 1, 2 is supported. The default setting is 0. This affects MIDs 0030, 0031, 0038, and 0039.

Job Data: Specify the revision number for Job Data messages. At this time, 1..3 is supported. The default setting is 0. This affects MIDs 0032 and 0033.

Job Info: Specify the revision number for Job Info messages. At this time, 1..4 is supported. The default setting is 0. This affects MIDs 0034 through 0037.

Options

Disable Tool On LTR: When enabled, the driver will disable the tool whenever a Last Tightening Results (LTR) message is received. This ensures that no LTR data is overwritten before the system has had time to process it. The default setting is disabled.

Revision Format: Specify how the driver should format the revision number for commands that use the default revision (revision 0). By default, when the driver sends a revision 0 message it leaves the revision number blank. Some devices do not support this and require the revision number to be explicitly set. Setting this to Zero or One forces the driver to use 0 or 1 for the revision number in the message.

Device Properties — Redundancy

Property Groups	<input type="checkbox"/> Redundancy	
General	Secondary Path	...
Scan Mode	Operating Mode	Switch On Failure
Timing	Monitor Item	
Redundancy	Monitor Interval (s)	300
	Return to Primary ASAP	Yes

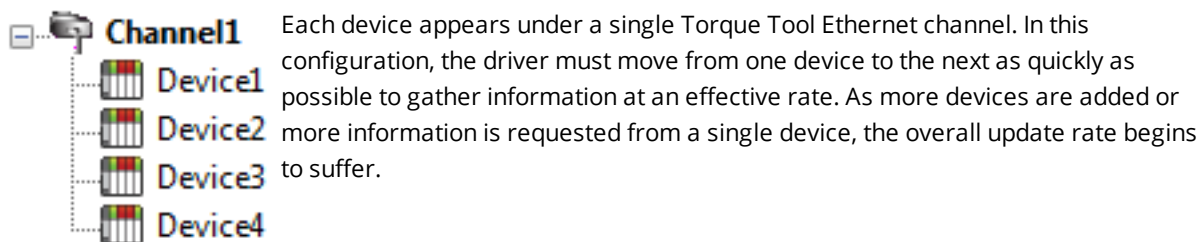
Redundancy is available with the Media-Level Redundancy Plug-In.

● *Consult the website, a sales representative, or the user manual for more information.*

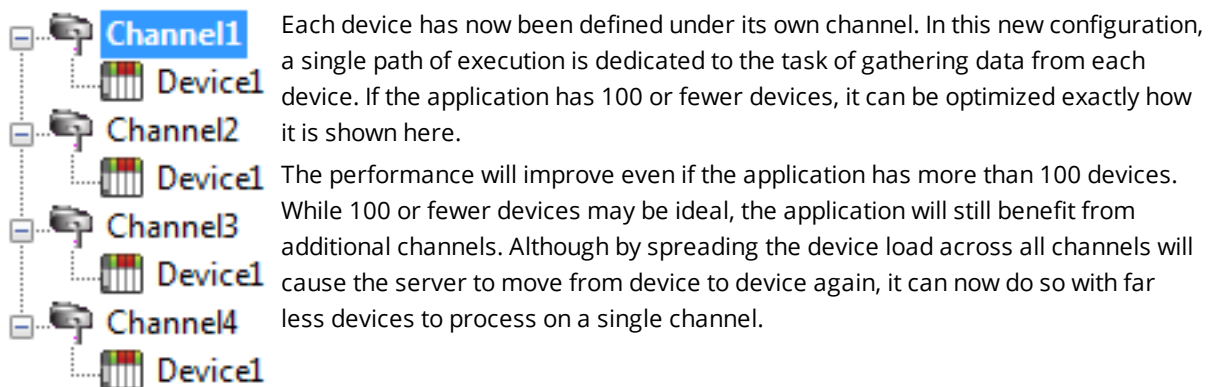
Optimizing Communications

The Torque Tool Ethernet Driver has been designed to provide the best performance with the least amount of impact on the system's overall performance. While the driver is fast, there are a couple of guidelines that can be used to control and optimize the application and gain maximum performance.

This server refers to communications protocols like Torque Tool Ethernet as a channel. Each channel defined in the application represents a separate path of execution in the server. Once a channel has been defined, a series of devices must then be defined under that channel. Each of these devices represents a single Torque Tool controller from which data will be collected. While this approach to defining the application will provide a high level of performance, it won't take full advantage of the Torque Tool Ethernet Driver or the network. An example of how the application may appear when configured using a single channel is shown below.



If the Torque Tool Ethernet Driver could only define one single channel, the example shown above would be the only option available; however, the driver can define up to 100 channels. Using multiple channels distributes the data collection workload by simultaneously issuing multiple requests to the network. An example of how the same application may appear when configured using multiple channels to improve performance is shown below.



Note: Some devices support only one Ethernet connection. For these devices, only one channel and device should be configured.

Data Types Description

The Torque Tool Ethernet Driver supports the following data types.

Data Type	Description
Boolean	Single bit
Word	Unsigned 16-bit integer
Short*	Signed 16-bit integer
DWord	Unsigned 32-bit integer
Long*	Signed 32-bit integer
String	ASCII text string
Float	32-bit floating point value
Double*	64-bit floating point value


*These types are not used natively, but are supported through conversion.

● **Note:** Each tag used in the driver has a fixed data type. Therefore, it is recommended that users allow the driver to use the default data type for the point.

Address Descriptions

The Torque Tool Ethernet Driver specifies addresses by the name of the item that will be addressed. It may be optionally followed by a bit or index number. The syntax is *ITEMNAME*<.BIT/INDEX>, where:

- **ITEMNAME:** The name of the item that will be addressed.
- **BIT/INDEX:** The bit number for items using bit fields, or index for arrayed items. The bit/index is only used for certain address items.

 **Important:** Bits are 0-based, with 0 being the LSB. Array indices are 1-based, with 1 being the first item.

Unsolicited Data

Some of the command sets are sent unsolicited by the device. These command sets will not have data available until the device sends the data to the driver. All unsolicited command sets have a NEWDATA item, which will be set to 1 when new data arrives. Users may then clear this flag back to 0 by writing any value to it.

Message Revisions

Some commands have multiple message revisions which hardware may support. Some items are only available for certain message revisions. These items have been marked as being available in a certain message revision. For example, an item marked with (Rev 2) is only available in message revision 2 or later. Some messages also have a low-bandwidth version available and will be marked appropriately.

Protocols

The Torque Tool Ethernet Driver supports the Open Protocol model and the Ford Ethernet Protocol (FEP) model. Each protocol supports a set of commands that have one or more items available for addressing. Not all command sets are supported for each model. For more information, refer select a link from the list below.

[Alarm](#)

[Auto-Disable Settings](#)

[Flash](#)

[Identifiers](#)

[Job Info](#)

[Job Number Data](#)

[Job Data](#)

[Last Tightening Results](#)

[Multi Spindle Results](#)

[Old Tightening Results](#)

[Parameter Set Data](#)

[Parameter Set Numbers](#)

[Parameter Set Selected](#)

[Time](#)

[Tool Data](#)

[VIN](#)

Message IDs

For more information on the Message IDs (MIDs) supported by each device model, refer to the table below.

Message ID	Description	Supported Models
0001	Start communication.	Open, FEP
0002	Start communication acknowledge.	Open, FEP
0003	Stop communication.	Open, FEP
0004	Command error.	Open, FEP
0005	Command accepted.	Open, FEP
0010	Pset number upload request.	Open, FEP
0011	Pset number upload reply.	Open, FEP
0012	Pset data upload request.	Open, FEP
0013	Pset data upload reply.	Open, FEP
0014	Pset selected subscribe.	Open, FEP
0015	Pset selected telegram.	Open, FEP
0016	Pset selected telegram acknowledge.	Open, FEP
0017	Pset selected unsubscribe.	Open, FEP
0018	Selected Pset.	Open, FEP
0019	Set Pset batch size.	Open, FEP
0020	Reset Pset batch size.	Open, FEP
0030	Job numbers upload request.	Open, FEP
0031	Job numbers upload reply.	Open, FEP
0032	Job data upload request.	Open
0033	Job data upload response.	Open
0034	Job selected/info subscribe.	Open, FEP
0035	Job selected/info	Open, FEP
0036	Job selected/info acknowledge.	Open, FEP
0037	Job selected/info unsubscribe.	Open, FEP
0038	Job selected in PF3000.	Open, FEP
0039	Job restart.	Open, FEP
0040	Tool data upload request.	Open, FEP
0041	Tool data upload reply.	Open, FEP
0042	Disable tool.	Open, FEP
0043	Enable tool.	Open, FEP
0050	VIN download request.	Open, FEP
0051	VIN upload subscribe.	Open, FEP
0052	VIN number upload.	Open, FEP*
0053	VIN upload acknowledge.	Open, FEP
0054	VIN upload subscribe.	Open, FEP
0060	Last Tightening Result (LTR) subscribe.	Open, FEP
0061	LTR upload.	Open, FEP*
0062	LTR upload acknowledge.	Open, FEP
0063	LTR unsubscribe.	Open, FEP

Message ID	Description	Supported Models
0064	Old Tightening Results (OTR) upload request.	Open, FEP
0065	OTR upload reply.	Open, FEP*
0070	Alarm subscribe.	Open, FEP
0071	Alarm upload reply.	Open, FEP
0072	Alarm upload acknowledge.	Open, FEP
0073	Alarm unsubscribe.	Open, FEP
0074	Alarm acknowledge on Torque controller.	Open, FEP
0075	Alarm acknowledge on Torque controller acknowledge.	Open, FEP
0076	Alarm status.	Open, FEP
0077	Alarm status acknowledge.	Open, FEP
0080	Time upload request.	Open, FEP
0081	Time upload.	Open, FEP
0082	Set Time in Torque controller.	Open, FEP
0100	Multi-spindle result subscribe.	Open, FEP
0101	Multi-spindle result upload.	Open, FEP**
0102	Multi-spindle result upload acknowledge.	Open, FEP
0103	Multi-spindle result unsubscribe.	Open, FEP
0113	Flash green light tool.	Open, FEP
0127	Job abort.	Open, FEP
0128	Batch increment.	Open
0200	Set external controlled relays.	Open
0210	Status externally monitored inputs subscribe.	Open
0211	Status externally monitored inputs upload.	Open
0212	Status externally monitored inputs upload acknowledge.	Open
0213	Status externally monitored inputs unsubscribe.	Open
0400	Auto/man mode subscribe.	FEP
0401	Auto/man mode upload.	FEP
0402	Auto/man mode acknowledge.	FEP
0403	Auto/man mode unsubscribe.	FEP
0410	Auto disable setting request.	FEP
0411	Auto disable setting reply.	FEP
0999	Keep alive.	Open, FEP

*Only supports MID Revision 1 as indicated in Revision 4.62 of the FEP specification.

**Unlike Open protocol, FEP does not use batch size, batch counter, and batch status parameters.

Command Set: Alarm

The Alarm command set is used to receive alarm data. All items belonging to this command set use MID 70 (Alarm subscribe) for the subscription request. The device sends the data through MID 71 (Alarm), which is replied to by MID 72 (Alarm acknowledge).

Item	Data Type	Access	Description	Data Range
ALARM_STATUS	Boolean	Read Only	0 if no alarm is active, 1 if an alarm is currently active*	0-1
ALARM_ERROR	String	Read Only	Error code	4 characters
ALARM_C_READY	Boolean	Read Only	Controller ready status. 1 = OK 0 = NOK	0-1
ALARM_T_READY	Boolean	Read Only	Tool ready status. 1 = OK 0 = NOK	0-1
ALARM_TIME	String	Read Only	Timestamp	19 characters
ALARM_NEWDATA	Boolean	Read/Write	New data flag. Set to 1 when new data arrives. Write a 0 to this flag to clear it.	0-1

*The ALARM_STATUS flag is valid on an initial connection to the device. Any subsequent alarm messages after the initial update set the quality of the tag to "Bad" because the status is no longer provided by the device.

Command Set: Auto-Disable Settings

The Auto-Disable Settings command set is only supported by the FEP model.

Item	Data Type	Access	Description	Data Range
AD_SETTING	Word, Short	Read Only	Auto-Disable setting. AD_SETTING and AD_BATCH data is retrieved using MID 410 (AutoDisable settings request) for the request, which is replied to with MID 411 (AutoDisable settings reply).	0-99
AD_BATCH	Word, Short	Read Only	Current batch	0-99
AM_MODE	Boolean	Read Only	Automatic/Manual mode. AM_MODE uses MID 400 (Automatic/Manual mode subscribe) for the subscription request. The device sends the data through MID 401 (Automatic/Manual mode), which is replied to by MID 402 (Automatic/Manual mode acknowledge) 0 = Automatic Mode 1 = Manual Mode	2-10
AM_NEWDATA	Boolean	Read/Write	New data flag. Set to 1 when new data arrives. Write a 0 to this flag to clear it.	0-1

Command Set: Flash

The Flash command set is used to cause the tool's green light to flash.

Item	Data Type	Access	Description	Data Range
FLASH	Boolean	Write Only	Write any value to this item to cause the green light on the tool to flash until an operator pushes the tool trigger. FLASH uses MID 113 (Flash green light on tool).	N/A

Command Set: Identifiers

The Identifiers command set is used to manage the multiple identifiers in the controller. It is only supported by the Open Protocol model. All tags prefixed by MID_ are subscription based and use MID 151 (Multiple identifiers work order subscribe) for the subscription request. The device sends the item data to the server through MID 152 (Multiple Identifiers work order), which the server responds to with MID 153 (Multiple Identifiers work order acknowledge).

Item	Data Type	Access	Description	Data Range
ID_DOWNLOAD	String	Write Only	Write the identifiers to this item to send the identifiers to the controller. ID_DOWNLOAD uses MID 150 (Identifier download request) to send the identifier that was written to the item to the controller.	100 characters
ID_BYPASS	Boolean	Write Only	Write any value to this item to bypass the next identifier expected in the work order. ID_BYPASS uses MID 155 (Bypass Identifier) to bypass the next identifier expected in the work order.	N/A
ID_RESET	Boolean	Write Only	Write any value to this item to reset the latest identifier or bypassed identifier in the work order. ID_RESET uses MID 156 (Reset latest Identifier) to reset the latest identifier or bypassed identifier in the work order.	N/A
ID_RESETALL	Boolean	Write Only	Write any value to this item to reset all identifiers in the work order. ID_RESETALL uses MID 157 (Reset all Identifiers) to reset all identifiers in the current work order.	N/A
MID_TYPE	Word, Short	Read Only	Identifier type number*	1-4
MID_IN_ORDER	Boolean	Read Only	Included in work order* 0 = No 1 = Yes	0-1
MID_STATUS	Word, Short	Read Only	Status in work order* 0 = Not accepted 1 = Accepted 2 = Bypassed 3 = Reset	0-3

Item	Data Type	Access	Description	Data Range
MID_ID	String	Read Only	Identifier*	25 characters
MID_NEWDATA	Boolean	Read/Write	New data flag. Set to 1 when new data arrives. Write a 0 to this flag to clear it.	N/A

*These items require an array index (1..4).

Command Set: IO Interface

The IO Interface command set is used to control external IO devices connected to the Torque Tool device.

Item	Data Type	Access	Description	Data Range
STATUS_RELAY_#	Word, Short	Write Only	Set "external controlled" relays Write to this item to set the status of the corresponding external relay number. All other relays will be sent a '3'. 0 = Off, 1 = On (fast), 2 = Flashing, 3 = Keep the same results STATUS_RELAY_# tags use MID 200 (Set externally controlled relays) to set individual relay statuses.	0-3
STATUS_DIGIN_#	Boolean	Read Only	Get "external controlled" digital input statuses This item uses an unsolicited command set to get the current status of all digital inputs whenever one of them change. The valid DigIn range is 1-8. 0 = Off, 1 = On STATUS_DIGIN_# tags use MID 210 (Status externally monitored inputs subscribe) to subscribe to individual digital input statuses, the data is sent from the device to the server using MID 211 (Status externally monitored inputs)	0, 1

Command Set: Job Info

The Job Info command set is used to receive data on the selected job, to allow the user to select a different job, and to control job execution.

JOB_JOBNUM uses MID 38 (Select Job) to set the current job, JOB_RESTART uses MID 39 (Job restart) to restart a job, JOB_ABORT uses MID 127 (Abort job) to abort the current job. All other tags use MID 34 (Job info subscribe) to subscribe to job info. The device sends job info to the server using MID 35 (Job info), which is responded to with MID 36 (Job info acknowledge). If the device supports 4-digit Job IDs, revision 2 or higher must be used.

Note: Some command set items also have alias names. In the table below, the alias name will be listed beneath the item where applicable.

Item	Data Type	Access	Description	Data Range
JOB_JOBNUM	Word,	Read/Write	The selected job number. To select a different	0-99 (Rev 1)

Item	Data Type	Access	Description	Data Range
LINK_LINKNUM	Short		job, write a job number to this item.	0-9999 (Rev 2+)
JOB_STATUS* LINK_STATUS*	Word, Short	Read Only	Job batch status 0 = Job batch not completed 1 = Job batch OK 2 = Job batch NOK	0-2
JOB_BMODE* LINK_BMODE*	Word, Short	Read Only	Job batch mode 0 = Only the OK bolts are counted 1 = Both the OK and the NOK bolts are counted	0-1
JOB_BSIZE* LINK_BSIZE*	Word, Short	Read Only	Job batch size	0-9999
JOB_BCOUNT* LINK_BCOUNT*	Word, Short	Read Only	Job batch counter	0-9999
JOB_TIME* LINK_TIME*	String	Read Only	Timestamp for the job info	19 characters
JOB_STEP*	Word, Short	Read Only	The current step the job is on.	0-999 (Rev 3 and 4**)
JOB_SCOUNT*	Word, Short	Read Only	The number of steps in the job.	0-999 (Rev 3 and 4**)
JOB_STYPE*	Word, Short	Read Only	The step type 1 = Batch Step 2-6 = Reserved	0-99 (Rev 3 and 4**)
JOB_TSTATUS*	Word, Short	Read Only	The status of the job tightening. 0 = JobTight OFF 1 = JobTight OK 2 = JobTight NOK 3 = JobTight Aborted 4 = JobTight Incremented 5 = JobTight Decrement 6 = JobTight Bypassed 7 = JobTight Reset Batch 8 = JobTight Loosening 9 = JobTight Free Batch 10 = JobTight Job Aborted	0-10 (Rev 4)
JOB_NEWDATA LINK_NEWDATA	Boolean	Read/Write	New data flag. Set to 1 when new data arrives. Write a 0 to this flag to clear it.	0-1
JOB_RESTART LINK_RESTART	Word, Short	Write Only	Write a job number to this item to restart that job	0-99 (Rev 1) 0-9999 (Rev 2)
JOB_ABORT LINK_ABORT	Boolean	Write Only	Write any value to this item to abort the current job	N/A
JOB_BATCH_INCREMENT*	Boolean	Write Only	Write any value to this item to increment the batch number	N/A

*This item is only supported by the Open Protocol model.

** This tag may not be valid for some devices when using revision 4.

• Consult device documentation for supported MIDs and data fields.

Command Set: Job Data

The Job Data command set is used to request the configuration of a specific job. To request a job, write the Job ID to JOBDATA_JOBID. All items belonging to this comment set use MID 32 (Job Data Upload Request) to request the data, which is replied to with MID 33 (Job Data Upload Reply). If the device supports 4 digits Job IDs, revision 2 or higher must be used.

Item	Data Type	Access	Description	Data Range
JOBDATA_JOBID	Word, Short	Read/Write	Write a Job ID to this item to request the job's configuration	0-9999
JOBDATA_NAME	String	Read Only	The name of job	25 characters
JOBDATA_FORCED_ORDER	Word, Short	Read Only	Forced Order 0 = Free Order 1 = Forced Order 2 = Free and Forced	0-2
JOBDATA_MAX_FIRST_TIGHTENING_TIME	Word, Short	Read Only	Maximum time for first tightening	0-9999
JOBDATA_MAX_COMPLETION_TIME	DWord, Long	Read Only	Maximum time to complete the job	0-99999
JOBDATA_BATCH_MODE	Word, Short	Read Only	Job batch mode/batch count type 0 = Only the OK tightenings are counted 1 = Both OK and NOK tightenings are counted.	0-1
JOBDATA_LOCK_ON_DONE	Boolean	Read Only	Lock at Job done True = Yes False = No	True/False
JOBDATA_LINE_CONTROL	Boolean	Read Only	Use line control True = Yes False = No	True/False
JOBDATA_REPEAT_JOB	Boolean	Read Only	Repeat Job True = Yes False = No	True/False
JOBDATA_TOOL_LOOSENING	Word, Short	Read Only	Tool loosening 0 = Enable 1 = Disable 2 = Enable only on NOK tightening	0-2
JOBDATA_TOOL_RESERVED	Word, Short	Read Only	Reserved for Job repair	0-1
JOBDATA_PARAMETER_CHANNEL_ID	Word, Short*	Read Only	The parameter's Channel ID	0-99

Item	Data Type	Access	Description	Data Range
JOBDATA_PARAMETER_TYPE_ID	Word, Short*	Read Only	The parameter's Type ID	0-999
JOBDATA_PARAMETER_AUTO_VALUE	Boolean*	Read Only	The parameter's Auto Value	True/False
JOBDATA_PARAMETER_BATCH_SIZE	Word, Short*	Read Only	The parameter's batch size	0-99
JOBDATA_PARAMETER_COUNT	Word, Short	Read Only	The number of parameters in the job	0-99 (Rev 3)
JOBDATA_PARAMETER_SOCKET	Word, Short*	Read Only	The parameter's socket number	0-99 (Rev 3)
JOBDATA_PARAMETER_STEP_NAME	String*	Read Only	The parameter's step name	25 characters (Rev 3)
JOBDATA_PARAMETER_STEP_TYPE	Word, Short*	Read Only	The parameter's step type	0-99 (Rev 3)

*This item requires an array index or bit index. The valid array / bit index range is 1 to 99.

Command Set: Job Number Data

Some command set items also have alias names. In the table below, the alias name will be listed beneath the item where applicable. All items belonging to this command set use MID 30 (Job ID upload request) for requesting the item data, which is replied to with MID 31 (Job ID upload reply). If the device supports 4-digit Job IDs, revision 2 or higher must be used.

Item	Data Type	Access	Description	Data Range
JOBN_COUNT	Word, Short	Read Only	Count of the number of valid jobs	0-99 (Rev 1)
LINKN_COUNT				0-9999 (Rev 2)
JOBN_ID	Word, Short*	Read Only	Valid job numbers (the number available is specified by JOBN_COUNT)	0-99 (Rev 1)
LINKN_ID				0-9999 (Rev 2)

*This item requires an array index or bit index. The valid array / bit index range is 1 to 9999.

Command Set: Last Tightening Results

The Last Tightening Results command set is used to receive data for the last tightening. All items belonging to this command set use MID 60 (Last tightening result data subscribe) for the subscription request. The device sends the data through MID 61 (Last tightening result data), which is replied to by MID 62 (Multi-spindle result acknowledge).

Item	Data Type	Access	Description	Data Range
LTR_CELL_ID	Word, Short	Read Only	Cell ID	0-9999
LTR_CHAN_ID	Word, Short	Read Only	Channel ID	0-99
LTR_TC_NAME	String	Read Only	Torque controller name	25 characters
LTR_VIN	String	Read Only	Vehicle ID number*	25 characters
LTR_JOB	Word, Short	Read Only	Job number*	0-99 (Rev 1) 0-9999 (Rev 2+)
LTR_PSET	Word, Short	Read Only	PSet number*	0-999
LTR_BATCH_SIZE	Word, Short	Read Only	Batch size*	0-9999
LTR_BATCH_COUNTER	Word, Short	Read Only	Batch counter*	0-9999
LTR_TIGHT_STATUS	Word, Short	Read Only	Tightening status* 0 = NOK 1 = OK	0-1
LTR_TORQUE_STATUS	Word, Short	Read Only	Torque status* 0 = Low 1 = OK 2 = High	0-2
LTR_ANGLE_STATUS	Word, Short	Read Only	Angle status* 0 = Low 1 = OK 2 = High	0-2
LTR_TORQUE_MIN	Float	Read Only	Torque minimum limit	0-9999.99
LTR_TORQUE_MAX	Float	Read Only	Torque maximum limit	0-9999.99
LTR_TORQUE_TARGET	Float	Read Only	Torque final target	0-9999.99
LTR_TORQUE_VALUE	Float	Read Only	Torque value*	0-9999.99
LTR_ANGLE_MIN	DWord	Read Only	Angle minimum value, in degrees	0-99999
LTR_ANGLE_MAX	DWord	Read Only	Angle maximum value, in degrees	0-99999
LTR_ANGLE_TARGET	DWord, Long	Read Only	Target angle value, in degrees	0-99999

Item	Data Type	Access	Description	Data Range
LTR_ANGLE_VALUE	DWord, Long	Read Only	Turning angle value, in degrees*	0-99999
LTR_TIMESTAMP	String	Read Only	Timestamp*	19 characters
LTR_CHANGETIME	String	Read Only	Last change in PSet settings*	19 characters
LTR_BATCH_STATUS	Word, Short	Read Only	Batch status* 0 = NOK 1 = OK 2 = Batch not used	0-2
LTR_ID	DWord, Long	Read/Write**	Tightening ID*	0-4294967295
LTR_STRATEGY	Word, Short	Read Only	(Rev 2) Strategy 1 = Torque control 2 = Torque control / angle monitoring 3 = Torque control / angle control AND 4 = Angle control / torque monitoring 5 = DS control 6 = DS control torque monitoring 7 = Reverse angle 8 = Reverse torque 9 = Click wrench 10 = Rotate spindle forward 11 = Torque control angle control OR 12 = Rotate spindle reverse 99 = No strategy	0-99
LTR_STRAT_OPT	Boolean	Read Only	(Rev 2) Strategy options This item requires a bit number (0-15) Bit 0 = Torque Bit 1 = Angle Bit 2 = Batch Bit 3 = PVT monitoring Bit 4 = PVT compensate Bit 5 = Selftap Bit 6 = Rundown Bit 7 = CM Bit 8 = DS control Bit 9 = Click wrench Bit 10 = RBW monitoring	0-1
LTR_RDA_STATUS	Word, Short	Read Only	(Rev 2) Rundown angle status 0 = NOK	0-2

Item	Data Type	Access	Description	Data Range
			1 = OK 2 = High	
LTR_CMN_STATUS	Word, Short	Read Only	(Rev 2) Current monitoring status 0 = NOK 1 = OK 2 = High	0-2
LTR_ST_STATUS	Word, Short	Read Only	(Rev 2) Selftap status 0 = NOK 1 = OK 2 = High	0-2
LTR_PTM_STATUS	Word, Short	Read Only	(Rev 2) Prevail torque monitoring status 0 = NOK 1 = OK 2 = High	0-2
LTR_PTC_STATUS	Word, Short	Read Only	(Rev 2) Prevail torque compensate status 0 = NOK 1 = OK 2 = High	0-2
LTR_PVT	Float	Read Only	(Rev 6) PVT compensation value	0-99999.99
LTR_TERR_STATUS	Boolean	Read Only	(Rev 2) Tightening error status This item requires a bit number (0-31) Bit 0 Rundown angle max shut off Bit 1 Rundown angle min shut off Bit 2 Torque max shut off Bit 3 Angle max shut off Bit 4 Selftap torque max. shut off Bit 5 Selftap torque min. shut off Bit 6 Prevail torque max. shut off Bit 7 Prevail torque min. shut off Bit 8 Prevail torque compensate overflow Bit 9 = Current monitoring max shut off Bit 10 = Post view torque min. torque shut off Bit 11 = Post view torque max. torque shut off Bit 12 = Post view torque angle too small Bit 13 = Trigger lost Bit 14 = Torque less than target Bit 15 = Tool hot Bit 16 = Multistage abort Bit 17 = Rehit Bit 18 = DS measure failed	0-1

Item	Data Type	Access	Description	Data Range
			Bit 19 = Current limit reached Bit 20 = End time out shutoff Bit 21 = Remove fastener limit exceeded Bit 22 = Disable drive	
LTR_TERR_STATUS_COMBINED	DWord, Long	Read Only	(Rev 2) All tightening error status bits are combined in one value. <i>Refer to LTR_TERR_STATUS to review the match of each bit and the value.</i>	0 to 4294967295 (DWord) - 2,147,483,648 to 2,147,483,647 (Long)
LTR_TERR_STATUS2	Boolean	Read Only	(Rev 6) Tightening error status 2 This item requires a bit number (0-31) Bit 0 Drive deactivated Bit 1 Tool stall Bit 2 Drive hot Bit 3 Gradient monitoring high Bit 4 Gradient monitoring low Bit 5 Reaction bar failed Bit 6 - 31 Reserved	0-1
LTR_TERR_STATUS2_COMBINED	DWord, Long	Read Only	(Rev 6) All tightening error status 2 bits are combined in one value. <i>Refer to LTR_TERR_STATUS2 to review the match of each bit and the value.</i>	0 to 4294967295 (DWord) - 2,147,483,648 to 2,147,483,647 (Long)
LTR_RDA_MIN	DWord, Long	Read Only	(Rev 2) Rundown angle minimum value, in degrees	0-99999
LTR_RDA_MAX	DWord, Long	Read Only	(Rev 2) Rundown angle maximum value, in degrees	0-99999
LTR_RDA_VALUE	DWord, Long	Read Only	(Rev 2) Rundown angle value reached, in degrees	0-99999
LTR_CM_MIN	Word, Short	Read Only	(Rev 2) Current monitoring minimum limit	0-999
LTR_CM_MAX	Word, Short	Read Only	(Rev 2) Current monitoring maximum limit	0-999
LTR_CM_VALUE	Word, Short	Read Only	(Rev 2) Current monitoring value in percent	0-999
LTR_ST_MIN	Float	Read Only	(Rev 2) Selftap minimum limit	0-9999.99
LTR_ST_MAX	Float	Read Only	(Rev 2) Selftap maximum limit	0-9999.99

Item	Data Type	Access	Description	Data Range
LTR_ST_TORQUE	Float	Read Only	(Rev 2) Selftap torque.	0-9999.99
LTR_PTM_MIN	Float	Read Only	(Rev 2) Prevail torque monitoring minimum limit	0-9999.99
LTR_PTM_MAX	Float	Read Only	(Rev 2) Prevail torque monitoring maximum limit	0-9999.99
LTR_PT	Float	Read Only	(Rev 2) Prevail torque value	0-9999.99
LTR_JOB_SEQ_NUM	Word, Short	Read Only	(Rev 2) Job sequence number	0-65535
LTR_STID	Word, Short	Read Only	(Rev 2) Synch tightening ID	0-65535
LTR_SERIAL_NUM	String	Read Only	(Rev 2) Tool serial number	14 characters
LTR_PSET_NAME	String	Read Only	(Rev 3) Parameter set name	25 characters
LTR_UNITS	Word, Short	Read Only	(Rev 3) Torque value units 1 = Nm 2 = Lbf.ft 3 = Lbf.in 4 = Kpm	1-4
LTR_RESULT_TYPE	Word, Short	Read Only	(Rev 3) Result type 1 = Tightening 2 = Loosening 3 = Batch Increment 4 = Batch decrement 5 = Bypass Pset result 6 = Abort job result 7 = Sync tightening	1-7
LTR_IDR2	String	Read Only	(Rev 4) Identifier result part 2	25 characters
LTR_IDR3	String	Read Only	(Rev 4) Identifier result part 3	25 characters
LTR_IDR4	String	Read Only	(Rev 4) Identifier result part 4	25 characters
LTR_CUSTOM_ERR	String	Read Only	(Rev 5) Customer tightening error code	4 characters
LTR_NEWDATA	Boolean	Read/Write	New data flag. Set to 1 when new data arrives. Write a 0 to this flag to clear.	0-1

*These items are available in the low-bandwidth (revision 999) message.

**Writing any value to the Tightening ID will set the value in the driver to 0. This will not have any effect on the hardware.

● **Note:** Any commands that require special revisions (such as 2, 3, and so forth) are not supported by the FEP Protocol model.

Command Set: Multi-Spindle Results

The Multiple Spindle Results telegram can be used to receive data that includes tightening results for tools that have multiple spindles. All items belonging to this command set use MID 100 (Multi-spindle result subscribe) for the subscription request. The device sends the data through MID 101 (Multi-spindle result), which is replied to by MID 102 (Last tightening result data acknowledge).

Item	Data Type	Access	Description	Data Range
MS_NUMBER	Word, Short	Read Only	Number of running spindles	2-10
MS_VIN	String	Read Only	Vehicle ID number	25 characters
MS_JOBNUM	Word, Short	Read Only	Job number (Link Group)	0-99
MS_PSET	Word, Short	Read Only	Parameter set (App)	0-999
MS_BSIZE*	Word, Short	Read Only	Batch size	0-9999
MS_BCOUNT*	Word, Short	Read Only	Batch counter	0-9999
MS_BSTATUS*	Word, Short	Read Only	Batch status 0 = NOK 1 = OK 2 = Batch not used	
MS_TMIN	Float	Read Only	Torque minimum limit	0-9999.99
MS_TMAX	Float	Read Only	Torque maximum limit	0-9999.99
MS_TTARG	Float	Read Only	Torque final target	0-9999.99
MS_AMIN	DWord, Long	Read Only	Angle minimum limit	0-99999
MS_AMAX	DWord, Long	Read Only	Angle maximum limit	0-99999
MS_ATARG	DWord, Long	Read Only	Angle final target	0-99999
MS_CHANGETIME	String	Read Only	Last change in setting	19 characters
MS_TIME	String	Read Only	Time stamp	19 characters
MS_SYNCID	DWord, Long	Read Only	Sync tightening ID	0-99999
MS_SYNCSTAT	Word, Short	Read Only	Overall tightening status 0 = NOK 1 = OK	0-1
SPD_NUM**	Word,	Read Only	Spindle number	1-10

Item	Data Type	Access	Description	Data Range
	Short			
SPD_CHAN**	Word, Short	Read Only	Channel ID	1-20
SPD_STATUS**	Word, Short	Read Only	Overall spindle status 0 = NOK 1 = OK	0-1
SPD_TSTATUS**	Word, Short	Read Only	Individual torque status 0 = NOK 1 = OK	0-1
SPD_TORQUE**	Float	Read Only	Individual torque	0-9999.99
SPD_ASTATUS**	Word, Short	Read Only	Individual angle status 0 = NOK 1 = OK	0-1
SPD_ANGLE**	DWord, Long	Read Only	Individual angle	0-99999
MS_NEWDATA	Boolean	Read/Write	New data flag. Set to 1 when new data arrives. Write a 0 to this flag to clear it.	0-1

*Although this was not supported by the Open protocol, the Torque Tool Ethernet Driver supports this feature. This feature is supported by prefixing the Address Item with the Spindle number delimited by a ':' (e.g. 01:VIN_VIN). For the Open protocol, the spindle data is ignored.

**This item requires an array index. The maximum array index is given by MS_Number.

Command Set: Old Tightening Results

The Old Tightening Results command set is used to retrieve data for an old tightening. To retrieve the data for a tightening, write the Tightening ID to the OTR_ID field. All items belonging to this command set use MID 64 (Old tightening result upload request) for requesting the item data, which is replied to with MID 65 (Old tightening result upload reply).

Item	Data Type	Access	Description	Data Range
OTR_ID	DWord, Long	Read/Write	Tightening ID. Write the Tightening ID to this item to retrieve data for that tightening. Writing 0 will retrieve the last tightening results.	0-4294967295
OTR_VIN	String	Read Only	Vehicle ID number	25 characters
OTR_PSET	Word, Short	Read Only	PSet number	0-999
OTR_BCOUNT	Word, Short	Read Only	Batch counter	0-9999

Item	Data Type	Access	Description	Data Range
OTR_TIGHTSTAT	Word, Short	Read Only	Tightening status 0 = NOK 1 = OK	0-1
OTR_TORQSTAT	Word, Short	Read Only	Torque Status 0 = Low 1 = OK 2 = High	0-2
OTR_ANGSTAT	Word, Short	Read Only	Angle Status 0 = Low 1 = OK 2 = High	0-2
OTR_TORQUE	Float	Read Only	Torque value.	0-9999.99
OTR_ANGLE	DWord, Long	Read Only	Turning angle value in degrees	0-99999
OTR_TIME	String	Read Only	Timestamp	19 characters
OTR_BATSTAT	Word, Short	Read Only	Batch status 0 = NOK 1 = OK 2 = Batch not used	0-2
OTR_JOBNUM	Word, Short	Read Only	(Rev 2) Job number	0-9999
OTR_STRATEGY	Word, Short	Read Only	(Rev 2) Strategy 1 = Torque control 2 = Torque control / angle monitoring 3 = Torque control / angle control AND 4 = Angle control / torque monitoring 5 = DS control 6 = DS control torque monitoring 7 = Reverse angle 8 = Reverse torque 9 = Click wrench 10 = Rotate spindle forward 11 = Torque control angle control OR 12 = Rotate spindle reverse 99 = No strategy	0-99
OTR_STROPT	Boolean	Read Only	(Rev 2) Strategy options This item requires a bit number (0-15)	0-1

Item	Data Type	Access	Description	Data Range
			Bit 0 = Torque Bit 1 = Angle Bit 2 = Batch Bit 3 = PVT Monitoring Bit 4 = PVT Compensate Bit 5 = Selftap Bit 6 = Rundown Bit 7 = CM Bit 8 = DS Control Bit 9 = Click Wrench Bit 10 = RBW Monitoring	
OTR_BSIZE	Word, Short	Read Only	(Rev 2) Batch size	0-9999
OTR_RASTAT	Word, Short	Read Only	(Rev 2) Rundown angle status 0 = NOK 1 = OK 2 = High	0-2
OTR_CMSTAT	Word, Short	Read Only	(Rev 2) Current monitoring status 0 = NOK 1 = OK 2 = High	0-2
OTR_STSTAT	Word, Short	Read Only	(Rev 2) Selftap status 0 = NOK 1 = OK 2 = High	0-2
OTR_PTMSTAT	Word, Short	Read Only	(Rev 2) Prevail torque monitoring status 0 = NOK 1 = OK 2 = High	0-2
OTR_PTCSTAT	Word, Short	Read Only	(Rev 2) Prevail torque compensate status 0 = NOK 1 = OK 2 = High	0-2
OTR_TERRSTAT	Boolean	Read Only	(Rev 2) Tightening error status This item requires a bit number (0-31) Bit 0 = Rundown angle max shut off Bit 1 = Rundown angle min shut off Bit 2 = Torque max shut off	0-1

Item	Data Type	Access	Description	Data Range
			Bit 3 = Angle max shut off Bit 4 = Selftap torque max shut off Bit 5 = Selftap torque min shut off Bit 6 = Prevail torque max shut off Bit 7 = Prevail torque min shut off Bit 8 = Prevail torque compensate overflow Bit 9 = Current monitoring max shut off Bit 10 = Post view torque min torque shut off Bit 11 = Post view torque max torque shut off Bit 12 = Post view torque Angle too small Bit 13 = Trigger Lost Bit 14 = Torque Less Than Target Bit 15 = Tool Hot Bit 16 = Multistage Abort Bit 17 = Rehit Bit 18 = DS Measure Failed Bit 19 = Current Limit Reached Bit 20 = EndTime out Shutoff Bit 21 = Remove fastener limit exceeded Bit 22 = Disable drive	
OTR_TERRSTAT_COMBINED	DWord, Long	Read Only	(Rev 2) All tightening error status bits are combined in one value. <i>Refer to OTR_TERRSTAT to review the match of each bit and the value.</i>	0 to 4294967295 (DWord) -2,147,483,648 to 2,147,483,647 (Long)
OTR_RANGLE	DWord, Long	Read Only	(Rev 2) Rundown angle value reached, in degrees	0-99999
OTR_CMVALUE	Word, Short	Read Only	(Rev 2) Current monitoring value in percent	0-999
OTR_STORQUE	Float	Read Only	(Rev 2) Selftap torque	0-9999.99
OTR_PTORQUE	Float	Read Only	(Rev 2) Prevail torque value	0-9999.99
OTR_JOBSEQ	Word, Short	Read Only	(Rev 2) Job sequence number	0-65535
OTR_STID	Word, Short	Read Only	(Rev 2) Synch Tightening ID	0-65535
OTR_SERIAL	String	Read Only	(Rev 2) Tool serial number	14 characters
OTR_TVUNIT	Word, Short	Read Only	(Rev 3) Torque value units 1 = Nm 2 = Lbf.ft 3 = Lbf.In	1-4

Item	Data Type	Access	Description	Data Range
			4 = Kpm	
OTR_RTTYPE	Word, Short	Read Only	(Rev 3) Result type 1 = Tightening 2 = Loosening 3 = Batch Increment 4 = Batch decrement 5 = Bypass pset result 6 = Abort job result 7 = Sync tightening	1-7
OTR_ID2	String	Read Only	(Rev 4) Identifier result part 2	25 characters
OTR_ID3	String	Read Only	(Rev 4) Identifier result part 3	25 characters
OTR_ID4	String	Read Only	(Rev 4) Identifier result part 4	25 characters

● **Note:** Any commands that require special revisions (such as 2, 3, and so forth) are not supported by the FEP Protocol model.

Command Set: Parameter Set Data

The Parameter Set Data command set is used to retrieve data for a specific command set on demand. To retrieve data for a command set, write the command set number to the PSD_ID item. All items belonging to this command set use MID 12 (Parameter set data upload request) for requesting the item data, which is replied to with MID 13 (Parameter set data upload reply).

● **Note:** Some command set items also have alias names. In the table below, the alias name will be listed beneath the item where applicable.

Item	Data Type	Access	Description	Data Range
PSD_ID APPD_ID	Word, Short	Read/Write	The parameter set ID. Write the ID of the desired parameter set to this item to retrieve the data for that parameter set.	0-999
PSD_NAME APPD_NAME	String	Read Only	The name of the parameter set	25 characters
PSD_DIR APPD_DIR	Word, Short	Read Only	Rotation direction 1 = Clockwise 2 = Counterclockwise	1-2
PSD_BSIZE APPD_BSIZE	Word, Short	Read Only	Batch size	0-99
PSD_TMIN APPD_TMIN	Float	Read Only	Torque minimum limit	0-9999.99
PSD_TMAX APPD_TMAX	Float	Read Only	Torque maximum limit	0-9999.99
PSD_TTARG	Float	Read Only	Torque final target value	0-9999.99

Item	Data Type	Access	Description	Data Range
APPD_TTARG				
PSD_AMIN APPD_AMIN	Word, Short	Read Only	Angle minimum value in degrees	0-99999
PSD_AMAX APPD_AMAX	Word, Short	Read Only	Angle maximum value in degrees	0-99999
PSD_ATARG APPD_ATARG	Word, Short	Read Only	Target angle in degrees	0-99999

Command Set: Parameter Set Numbers

The Parameter Set Numbers command set is used to retrieve the list of parameter set numbers from the device.

● **Note:** Some command set items also have alias names. In the table below, the alias name will be listed beneath the item where applicable.

Item	Data Type	Access	Description	Data Range
PSN_COUNT APPN_COUNT	Word, Short	Read Only	The number of parameter sets in the list. This command set use MID 10 (Parameter set ID upload request) for requesting the item data, which is replied to with MID 11 (Parameter set ID upload reply).	0-999
PSN_ID APPN_ID	Word, Short*	Read Only	The parameter set ID. The array size is defined by the PSN_COUNT. This command set use MID 10 (Parameter set ID upload request) for requesting the item data, which is replied to with MID 11 (Parameter set ID upload reply). This item requires an array index (1-999).	0-999

*This item requires an array index or bit index.

Command Set: Parameter Set Selected

The Parameter Set Selected command set is used to select a particular command set, to notify the user when a new command set has been selected, and to control certain batch properties. All items belonging to this command set use MID 14 (Parameter set selected subscribe) for the subscription request. The device sends item data to the server through MID 15 (Parameter set selected), which the server responds to with MID 16 (Parameter set selected acknowledge).

● **Note:** Some command set items also have alias names. In the table below, the alias name will be listed beneath the item where applicable.

Item	Data Type	Access	Description	Data Range
PSET_NUMBER	Word, Short	Read/Write	ID number of the last parameter set selected. Users may also write a parameter set number to this item	0-999

Item	Data Type	Access	Description	Data Range
APP_NUMBER			to select a parameter set.	
PSET_LASTCHANGE APP_LASTCHANGE	String	Read Only	Time of last change in PSet setting	19 characters
PSET_NEWDATA APP_NEWDATA	Boolean	Read/Write	New data flag. Set to 1 when new data arrives. Write a 0 to this flag to clear it.	0-1
PSET_BSIZE APP_BSIZE	String	Write Only	Use this item to set the batch size for a particular parameter set. The format of the string is: PSETNUM = BATCHSIZE Where PSETNUM is the parameter set number, and BATCHSIZE is the desired batch size. For example, to set the batch size to 20 for parameter set 3, users would write the following to this tag. 3 = 20	PSet: 0-999 Batch Size: 0-99
PSET_RESETBC APP_RESETBC	Word, Short	Write Only	Writing a parameter set number to this item will reset the batch counter for that parameter set.	0-999

Command Set: Time

The Time command set is used to read the controller's time and to synchronize it with the PC.

Item	Data Type	Access	Description	Data Range
TIME	String	Read Only	Current time in the controller. TIME uses MID 80 (Read time upload request) for requesting time data, which is replied to with MID 81 (Read time upload reply).	19 characters
TIME_SYNC	Boolean	Write Only	Write any value to this item to set the controller's time to the current PC time. TIME_SYNC uses MID 82 (Set Time) for setting the controller's time to the current PC time.	N/A

Command Set: Tool Data

The Tool Data command set is used to receive data for the connected tool and to enable/disable the tool. The TOOLDATA items use MID 40 (Tool data upload request) for requesting tool data, which is replied to with MID 41 (Tool data upload reply). The TOOL_ENABLE item uses MID 42 (Disable tool) when a 0 is written and MID 43 (Enable tool) when a 1 is written.

Item	Data Type	Access	Description	Data Range
TOOLDATA_TSERIAL	String	Read Only	Tool serial number	14 characters
TOOLDATA_NT	DWord, Long	Read Only	Tool number of tightening	0-4294967295
TOOLDATA_LCD	String	Read Only	Last calibration date	19 characters
TOOLDATA_CSERIAL	String	Read Only	Controller serial number	10 characters
TOOL_ENABLE	Boolean	Write Only	Write a 0 to disable the tool or a 1 to enable the tool	0-1
TOOLDATA_FWV1*	String	Read Only	The controller firmware version	10 characters
TOOLDATA_FWV2*	String	Read Only	Auxiliary firmware version in the case there is a second firmware required	10 characters

*This item is only supported by the FEP Protocol model.

Command Set: VIN

The VIN command set is used to receive data about the VIN (Vehicle ID Number). Writing to VIN_VIN sends a MID 50 (Vehicle ID Number download request) message to the controller. The device subscribes to all VIN data through MID 51 (Vehicle ID Number subscribe), the controller sends item data to the server through MID 52 (Vehicle ID Number), which the server responds to with a MID 53 (Vehicle ID Number Acknowledge).

Item	Data Type	Access	Description	Data Range
VIN_VIN	String	Read/Write	Vehicle ID Number. To send it to the controller, write a VIN to this field.	25 characters
VIN_VIN2	String	Read Only	(Rev 2) Identifier result part 3	25 characters
VIN_VIN3	String	Read Only	(Rev 2) Identifier result part 3	25 characters
VIN_VIN4	String	Read Only	(Rev 2) Identifier result part 3	25 characters
VIN_NEWDATA	Boolean	Read/Write	New data flag. Set to 1 when new data arrives. Write a 0 to this flag to clear it.	0-1

Note: Any commands that require special revisions (such as 2, 3, and so forth) are not supported by the FEP Protocol model.

Error Descriptions

The following messages may be generated. Click on the link for a description of the message.

Address Validation Errors

[Address <address> is out of range for the specified device or register.](#)

[Array size is out of range for address <address>.](#)

[Array support is not available for the specified address: <address>.](#)

[Data type <type> is not valid for device address <address>.](#)

[Device address <address> contains a syntax error.](#)

[Device address <address> is read only.](#)

Ethernet Errors

[Unable to bind to adapter: <adapter name>. Connect failed.](#)

[Winsock initialization failed \(OS Error = <error code>\).](#)

[Winsock shut down failed \(OS Error = <error code>\).](#)

[Winsock V1.1 or higher must be installed to use the driver.](#)

Runtime Errors

[Device <device name> failed to connect.](#)

[Device <device name> is not responding.](#)

[Unable to read tag <tag name>: Device <device name> encountered a parsing error.](#)

[Unable to read tag <tag name>: Device <device name> received an error response \(Error <error code>\).](#)

[Unable to write tag <tag name>: Device <device name> encountered a parsing error.](#)

[Unable to write tag <tag name>: Device <device name> received an error response \(Error <error code>\).](#)

[Unable to write tag <tag name>: Device <device name> received invalid data for write.](#)

[Unable to write to <address> on device <device name>.](#)

Error Codes

[Error Codes](#)

Address <address> is out of range for the specified device or register.

Error Type:

Warning

Possible Cause:

A tag address that has been specified statically references a location that is beyond the range of supported locations for the device.

Solution:

Verify that the address is correct; if it is not, re-enter it in the client application.

Array size is out of range for address <address>.

Error Type:

Warning

Possible Cause:

A tag address that has been specified statically is requesting an array size that is too large for the address type or block size of the driver.

Solution:

Re-enter the address in the client application to specify a smaller value for the array or a different starting point.

Array support is not available for the specified address: <address>.**Error Type:**

Warning

Possible Cause:

A tag address that has been specified statically contains an array reference for an address type that doesn't support arrays.

Solution:

Re-enter the address in the client application to remove the array reference or correct the address type.

Data type <type> is not valid for device address <address>.**Error Type:**

Warning

Possible Cause:

A tag address that has been specified statically has been assigned an invalid data type.

Solution:

Modify the requested data type in the client application.

Device address <address> contains a syntax error.**Error Type:**

Warning

Possible Cause:

An invalid tag address has been specified in a dynamic request.

Solution:

Re-enter the address in the client application.

Device address <address> is read only.**Error Type:**

Warning

Possible Cause:

A tag address that has been specified statically has a requested access mode that is not compatible with what the device supports for that address.

Solution:

Change the access mode in the client application.

Unable to bind to adapter: <adapter name>. Connect failed.**Error Type:**

Fatal

Possible Cause:

The specified adapter is not working properly or is not installed correctly.

Solution:

Make sure that the correct Ethernet adapter is chosen, and verify that it is functioning properly.

Winsock initialization failed (OS error = <error>).**Error Type:**

Fatal

OS Error	Indication	Possible Solution
10091	Indicates that the underlying network subsystem is not ready for network communication.	Wait a few seconds and restart the driver.
10067	Limit on the number of tasks supported by the Windows Sockets implementation has been reached.	Close one or more applications that may be using Winsock and restart the driver.

Winsock shut down failed (OS error = <error>).**Error Type:**

Informational

Possible Cause:

Indicates that Winsock encountered a problem when shutting down.

Winsock V1.1 or higher must be installed to use the driver.**Error Type:**

Fatal

Possible Cause:

The version number of the Winsock DLL found on the system is less than 1.1.

Solution:

Upgrade Winsock to version 1.1 or higher.

Device <device name> failed to connect.

Error Type:

Serious

Possible Cause:

1. The device is offline.
2. The IP address entered for the device is incorrect.

Solution:

1. Verify that the device is online.
2. Verify that the IP address entered for the device is correct.

Device <device name> is not responding.

Error Type:

Serious

Possible Cause:

1. The device does not support the specified command set.
2. The response from the device took longer to receive than the amount of time specified in the "Request Timeout" device property.
3. The connection to the device failed.
4. The device is offline.
5. The device cannot answer the request within the allotted time.

Solution:

1. Verify that the device is online.
2. Increase the Request Timeout property so that the entire response can be handled.
3. Verify that the connection to the device is still valid.
4. Increase the timeout value to allow the device more time to respond.

Unable to read tag <tag name>: Device <device name> encountered a parsing error.

Error Type:

Serious

Possible Cause:

1. The device supports a different command set version than standard.
2. Line noise has corrupted the packet.

Solution:

Use channel diagnostics to verify that the received packet is in the correct format.

Unable to read tag <tag name>: Device <device name> received an error response (Error <error code>).

Error Type:

Serious

Possible Cause:

1. The device does not support the specified command set.
2. One or more parameters sent to the device are out of range.
3. The device is not in the proper state to execute the command.

Solution:

Look up the error code.

See Also:

[Error Codes](#)

Unable to write tag <tag name>: Device <device name> encountered a parsing error.

Error Type:

Serious

Possible Cause:

1. The device supports a different command set version than standard.
2. Line noise has corrupted the packet.

Solution:

Use channel diagnostics to verify that the received packet is in the correct format.

Unable to write tag <tag name>: Device <device name> received an error response (Error <error code>).

Error Type:

Serious

Possible Cause:

1. The device does not support the specified command set.
2. One or more parameters sent to the device are out of range.
3. The device is not in the proper state to execute the command.

Solution:

Look up the error code.

See Also:

[Error Codes](#)

Unable to write tag <tag name>: Device <device name> received invalid data for write.

Error Type:

Warning

Possible Cause:

The data that was written to a tag was not in the proper format.

Solution:

View the information for the named tag to learn the proper format for data writes.

Unable to write to <address> on device <device name>.

Error Type:

Serious

Possible Cause:

1. The named device may not be connected to the network.
2. The named device may have been assigned an incorrect Network ID.
3. The named device is not responding to write requests.
4. The device does not support the requested command set.

Solution:

1. Check the hardware network connections.
2. Verify that the Network ID given to the named device matches that of the actual device.

Error Codes

Error Code	Description
01	Invalid data.

Error Code	Description
02	Pset number not present.
03	Pset can not be set.
04	Pset not running.
06	VIN upload subscription already exists.
07	VIN upload subscription does not exist.
08	VIN input source not granted.
09	Last tightening result subscription already exists.
10	Last tightening result subscription does not exist.
11	Alarm subscription already exists.
12	Alarm subscription does not exist.
13	Parameter set selection subscription already exists.
14	Parameter set selection subscription does not exist.
15	Tightening ID requested not found.
16	Connection rejected protocol busy.
17	Job number not present.
18	Job info subscription already exists.
19	Job info subscription does not exist.
20	Job can not be set.
21	Job not running.
22	Spindle exceeds limits.
23	Spindle off line.
30	Controller is not a sync Master.
31	Multi spindle status subscription already exists.
32	Multi spindle status subscription does not exist.
33	Multi spindle result subscription already exists.
34	Multi spindle result subscription does not exist.
40	Job line control info subscription already exists.
41	Job line control info subscription does not exist.
42	Identifier input source not granted.
43	Multiple identifiers work order subscription already exists.
44	Multiple identifiers work order subscription does not exist.
50	Status "external monitored inputs" subscription already exists.
51	Status "external monitored inputs" subscription does not exist.
52	IO device not connected.
53	Faulty IO device number.
58	No alarm present.
59	Tool currently in use.
60	No histogram available.
80	Reserved.

Error Code	Description
81	Reserved.
82	Automatic/manual mode subscribe already exists.
83	Automatic/manual mode subscribe does not exist.
95	Reject request, PowerMACS is in manual mode.
96	Client already connected.
97	MID revision unsupported.
98	Controller internal request timeout.
99	Unknown MID.

Index

A

Address <address> is out of range for the specified device or register. 39
Address Descriptions 16
Advanced Channel Properties 7
Array size is out of range for address <address>. 39
Array support is not available for the specified address: <address>. 40
Attempts Before Timeout 10

C

Channel Assignment 8
Channel Properties — Ethernet Communications 6
Channel Properties — General 5
Channel Properties — Write Optimizations 6
Command Set 21
Command Set: Alarm 18
Command Set: Auto-Disable Settings 19
Command Set: Flash 20
Command Set: Identifiers 20
Command Set: Job Data 23
Command Set: Job Info 21
Command Set: Job Number Data 24
Command Set: Last Tightening Results 24
Command Set: Multi Spindle Results 30
Command Set: Old Tightening Results 31
Command Set: Parameter Set Data 35
Command Set: Parameter Set Numbers 36
Command Set: Parameter Set Selected 36
Command Set: Time 37
Command Set: Tool Data 37
Command Set: VIN 38
Communications Parameters 11
Communications Timeouts 10-11
Connect Timeout 10

D

Data Collection 9
Data type <type> is not valid for device address <address>. 40
Data Types Description 15
Description 8
Device <device name> failed to connect. 42
Device <device name> is not responding. 42
Device address <address> contains a syntax error. 40
Device address <address> is read only. 40
Device Properties — General 8
Diagnostics 5
Do Not Scan, Demand Poll Only 10
Driver 5, 8
Duty Cycle 7

E

Error Codes 44
Error Descriptions 39

H

Help Contents 4

I

ID 8
IEEE-754 floating point 7
Initial Updates from Cache 10
Inter-Request Delay 11
IO Interface 21

M

Message IDs 16
Model 8

N

Name 8

Network Adapter 6

Non-Normalized Float Handling 7

O

Optimization Method 6

Optimizing Communications 14

Overview 4

R

Redundancy 13

Request All Data at Scan Rate 10

Request Data No Faster than Scan Rate 9

Request Timeout 10

Respect Client-Specified Scan Rate 9

Respect Tag-Specified Scan Rate 10

S

Scan Mode 9

Settings 12

Setup 5

Simulated 9

U

Unable to bind to adapter: <adapter name>. Connect failed. 41

Unable to read tag <tag name>: Device <device name> encountered a parsing error. 42

Unable to read tag <tag name>: Device <device name> received an error response (Error <error code>). 43

Unable to write tag <tag name>: Device <device name> encountered a parsing error. 43

Unable to write tag <tag name>: Device <device name> received an error response (Error <error code>). 43

Unable to write tag <tag name>: Device <device name> received invalid data for write. 44

Unable to write to <address> on device <device name>. 44

W

Winsock initialization failed (OS error = <error>). 41

Winsock shut down failed (OS Error = <error>). 41

Winsock V1.1 or higher must be installed to use the driver. 41

Write All Values for All Tags 6

Write Only Latest Value for All Tags 7

Write Only Latest Value for Non-Boolean Tags 6

Write Optimizations 6