Dataforth isoLynx Driver

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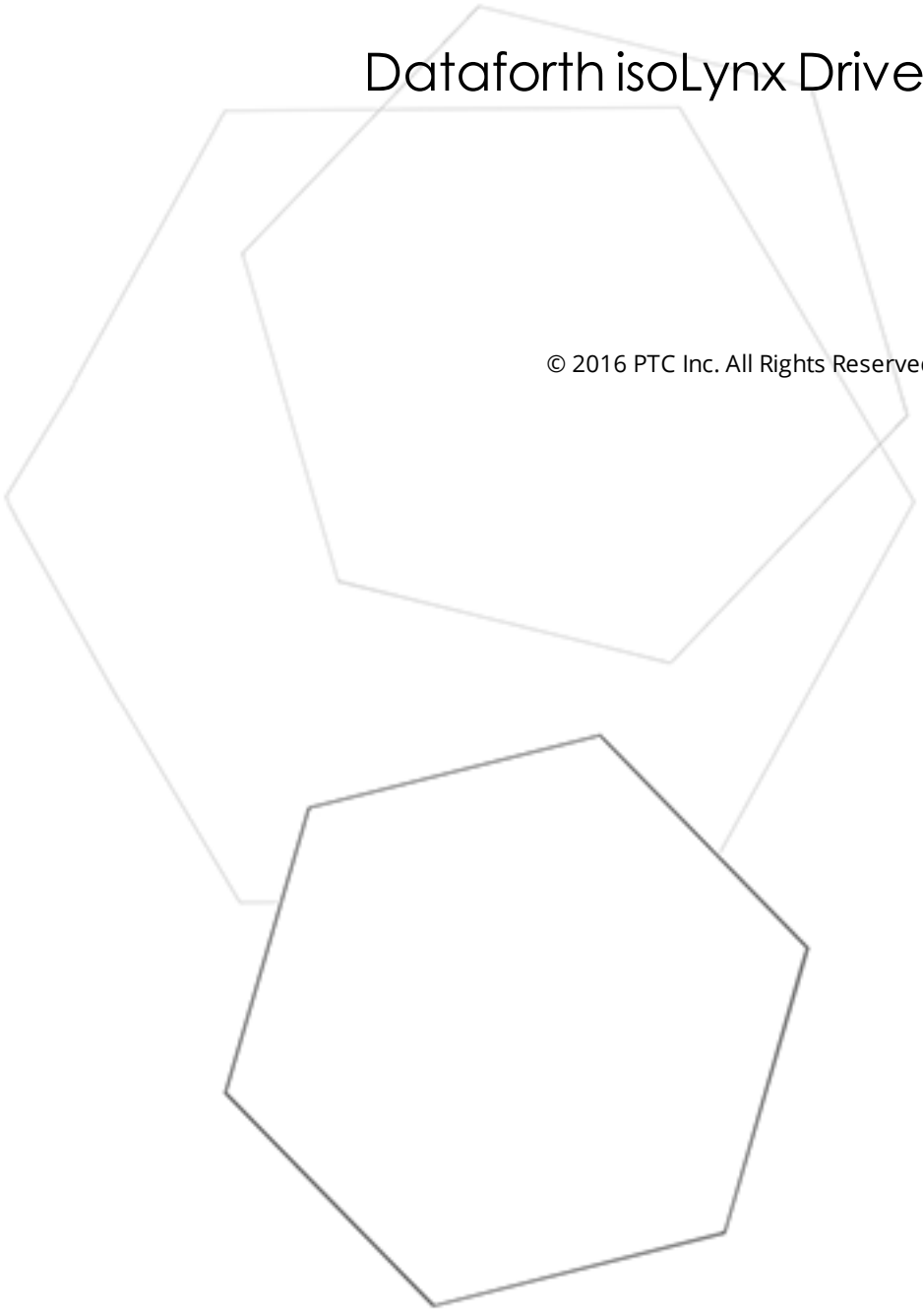

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Dataforth isoLynx Driver

Help version 1.016

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Overview

The Dataforth isoLynx Driver provides an easy and reliable way to connect Dataforth isoLynx devices to OPC Client applications, including HMI, SCADA, Historian, MES, ERP and countless custom applications. It is intended for use with all ISOLYNX SLX100 data acquisition systems.

This driver was created in partnership with DATAFORTH and DATAFORTH endorses the use of this driver as the ISOLYNX SLX100 official OPC interface for their products. In addition, this driver uses DATAFORTH supplied communication software modules that encapsulates the low-level communication details of the isoLynx Command Protocol.

Channel Setup

A channel represents a serial line connected to one of the computer's COM ports or an Ethernet network connected to the computer's default Network Interface Card (NIC). The Channel Properties specify the type of connection as well as other properties shared by devices on that network. For more information on general Channel Properties, refer to the main OPC server's help documentation.

Communications

Descriptions of the properties are as follows:

- **Interface Type:** This property specifies the interface type. Options include RS-232, RS-485/2, RS-485/4, and Ethernet. The default setting is RS-232.
- **COM Port:** This property specifies the COM port for serial communications. The valid range is 1 to 255. The default setting is COM1.
- **Baud Rate:** This property specifies the baud rate that will be used to configure the selected COM port. Options include 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200. The default setting is 9600.
- **Interface Option:** This property specifies the options available to the interface. When the interface type is RS-485/2, the options Echo Off and Echo On will be available. When the interface type is RS-232, RS-485/4, or Ethernet, no options will be available. The setting will be disabled and display None.

Note: The selected communication properties must match those set in the Dataforth Configuration Utility. For more information, refer to section 3.5 "Sample Applications" and "Configuration Sample" in the software user's manual.

Device Setup

For more information on general Device Properties, refer to the main OPC server's help documentation.

Supported Devices

All ISOLYNX SLX100 data acquisition systems that support the ISOLYNX protocol.

Supported Protocols

ISOLYNX protocol over serial lines and Ethernet.

Networking

This driver supports communications over serial lines and Ethernet. For more information on ISOLYNX communications and connections, refer to Section 7.0 of ISOLYNX hardware user's manual.

Maximum Number of Supported Channels and Devices

The maximum number of supported channels is 100. The maximum number of devices supported per channel is 16.

IP Address

This property specifies the IP address of the device to poll.

Note: TCP/IP must be properly installed in order to use this driver with Ethernet devices. For more information on setting up TCP/IP, refer to Windows documentation.

Port Number

This property specifies the Ethernet port that will be used when connecting to a remote terminal server. The default setting is 9000.

Device Configuration

Each device on a network must be configured with a unique Address/ID. For information on setting each device's network address, refer to "Network Address Selection" in the ISOLYNX hardware user's manual.

Each additional panel within the system must also have its individual address configured. For more information, refer to ISOLYNX hardware user's manual section on "Analog I/O expansion panel-Address selection" and "Digital I/O expansion panel-Network Address Selection".

The final step in the device setup process is to use the Dataforth supplied configuration utility to configure both the Interface and the I/O. For more information, refer to section 3.5 "Sample Applications" in the software user's manual. It is possible to configure an I/O channel incorrectly or to configure a channel with no I/O module physically present. The best way to verify that the I/O configuration is correct is to perform an auto create of the tag database and then match the tags generated to the actual hardware I/O.

The Ethernet interface board supports up to four simultaneous connections at a time. This means that there can only be up to four devices with same IP address running in the server at one time. These devices can be assigned to one or more channels.

When configuring a device's IP address and associated items using Dataforth's configuration utility, pay attention to the Keep Alive item. This item defines how long (in seconds) the Ethernet interface board will keep its connection alive when no activity is seen. When using multiple connections to the same device, it is strongly recommended that this item be set to a value of 1. If not, the server may not be able to re-establish a connection to the device when a break occurs in the connection.

Note 1: This driver provides multi-threaded processing for optimum performance.

Note 2: Each physical device to be polled must be represented by a device object in the server.

Important: The communication properties selected must match those set up with the Dataforth configuration utility. For more information, refer to 3.5 "Sample Applications" and "Configuration Sample" in the software manual.

Driver Setup

This driver uses the ISOLYNX Data Acquisition Library, which is comprised of the following six dynamic link libraries.

- LYNXW32.DLL
- _ISOLYNX.DLL
- _SUPER.DLL
- SUPERCOM.DLL
- SCRS232.DLL
- SCTCPIP.DLL.

When the driver is installed, the server will install these components into the Windows system directory.

Automatic Tag Database Generation

The Dataforth isoLynx Driver supports an automatic tag database generation feature that enables drivers to automatically create tags to access data. It queries the device for its configuration and then uses that information to build a tag database.

OPC Server Configuration

Automatic tag database generation can be customized to fit the application's needs. The primary control options can be set during the Database Creation step of the Device Wizard or later by clicking **Device Properties** | **Database Creation**. For more information on these properties, refer to the server help documentation.

Operation

Depending on the configuration, tag generation may start automatically when the server project starts or be initiated manually at some other time. The server's Event Log will show when the tag generation process started, any errors that occurred while the device's configuration was queried and when the process completed.

Group and Tag Naming Conventions

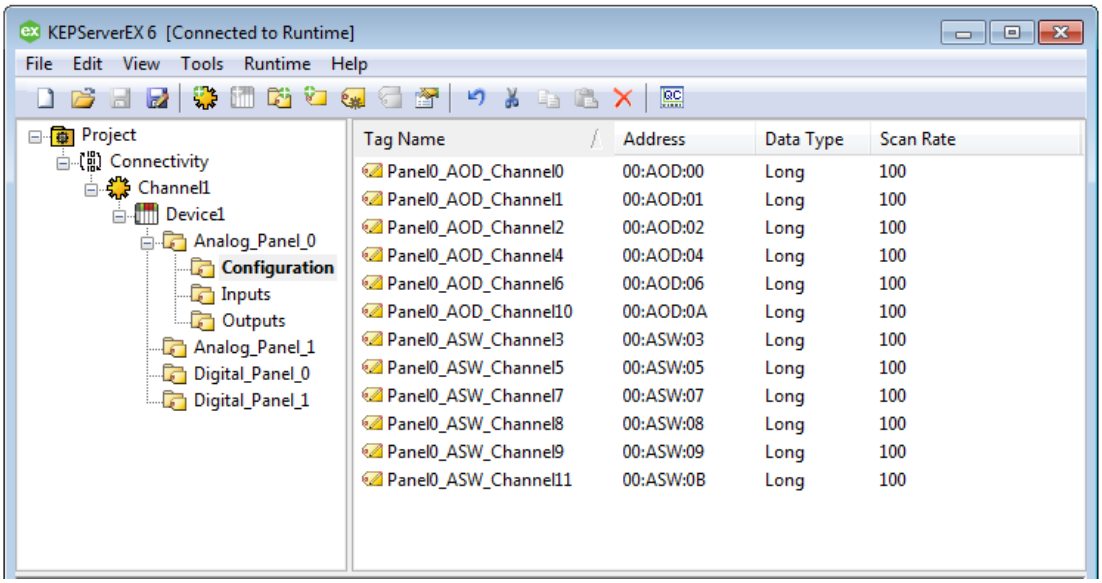
A group is created for each analog and digital panel in the system. Three subgroups are created under each panel's group for **Configuration**, **Inputs** and **Outputs** tags.

- The Configuration group contains tags that will be used for device configuration. Tag types include AOD, ASW, and DOD.
- The Inputs group contains tags for reading inputs. Tag types include AIA, AIC, and DI.
- The Outputs group contains tags for reading and writing to outputs. Tag types include AO and DO.

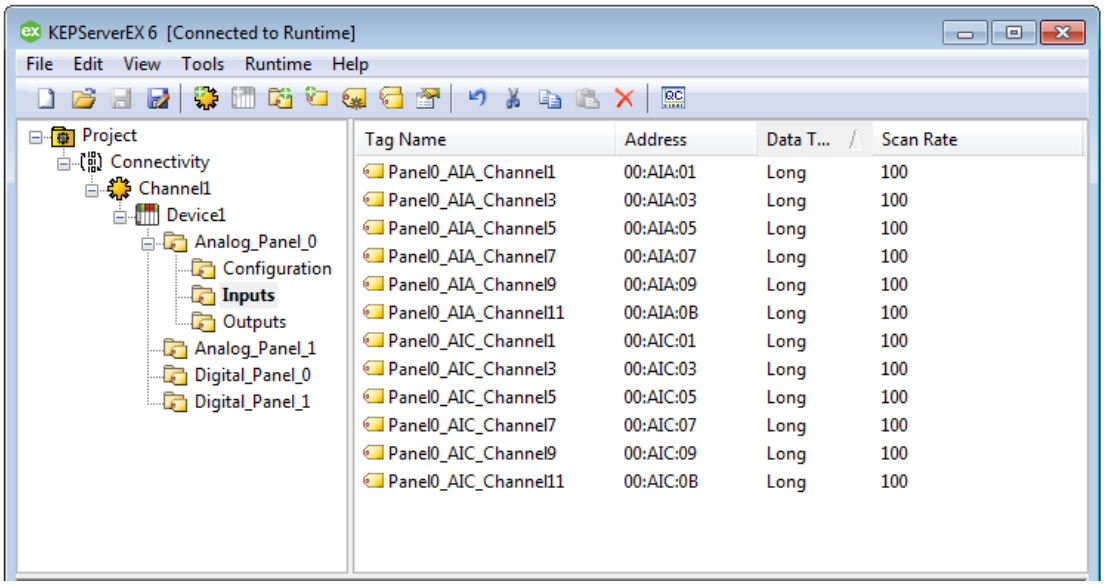
Each tag name includes the panel, tag type and channel number. The following images illustrate a system with two analog panels and two digital panels.

Note: Digital panels names are numbered starting at 0 even though they are physically addressed at 8 and up.

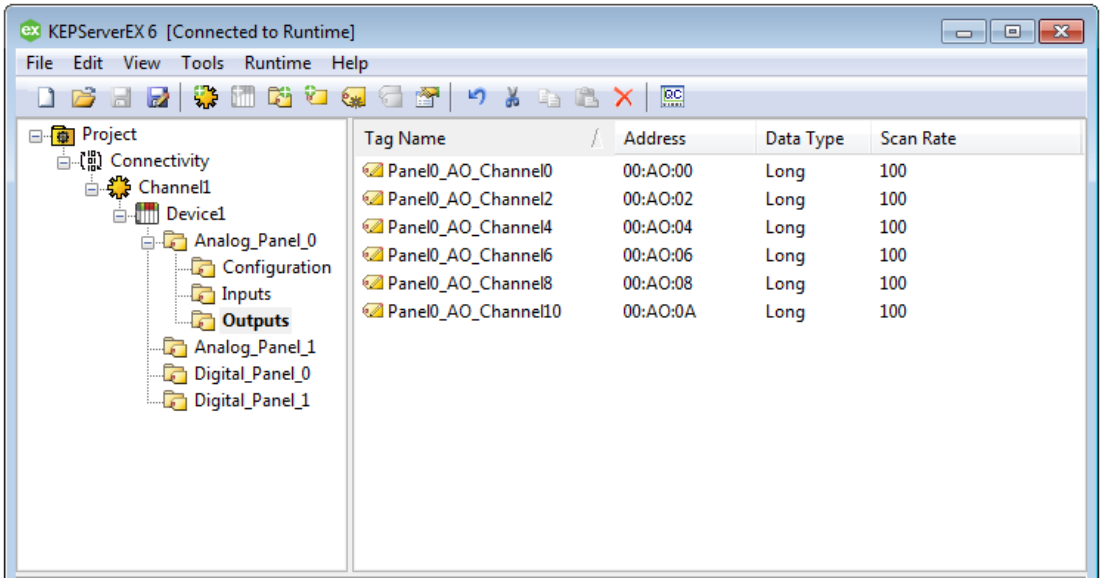
Configuration



Inputs



Outputs



Data Types Description

Data Type	Description
Boolean	Library returns a signed 32 bit value which is either a 0 or 1.
Long*	Library returns a signed 32 bit value.

*Even though the data type is Long, all analog values are limited to a range of +32,767 to -32,768.

Address Descriptions

The following table lists the address syntax for all of the supported addresses.

Address	Description	Syntax	Data Type	Access
AIC	Analog Input Current	**PP:AIC:CC** PP (panel) range: 00-03 CC (channel) range: 00-0F	Long*	Read Only
AIA	Analog Input Average	**PP:AIA:CC** PP (panel) range: 00-03 CC (channel) range: 00-0F	Long*	Read Only
DI	Digital Input	**PP:DI:CC** PP (panel) range: 08-0F CC (channel) range: 00-0F	Boolean	Read Only
AO	Analog Output	**PP:AO:CC** PP (panel) range: 00-03 CC (channel) range: 00-0F	Long*	Read/Write
ASW**	Analog Sample Weight	**PP:ASW:CC** PP (panel) range: 00-03 CC (channel) range: 00-0F	Long*	Read/Write
DO	Digital Output	**PP:DO:CC** PP (panel) range: 08-0F CC (channel) range: 00-0F	Boolean	Read/Write
AOD	Analog Output Default	**PP:AOD:CC** PP (panel) range: 00-03 CC (channel) range: 00-0F	Long*	Read/Write
DOD	Digital Output Default	**PP:DOD:CC** PP (panel) range: 08-0F CC (channel) range: 00-0F	Boolean	Read/Write

*Even though the data type is Long, all analog values are limited to range of +32,767 to -32,768.

**Tag type ASW (Analog Sample Weight) is a special case in that the value is limited to powers of 2 up to a maximum value of 16384. If an attempt is made to write a value that is not a power of 2, then the next power of 2 will be derived from that value and then written into the device. For example, if a value of 5 is written to an ASW tag, then 5 will be rounded up to 8 and then written to the device. Therefore, when reading back the value written, it will be 8 instead of 5. For more information, refer to section 3.3.4.9 "IOATTR_ISOLYNX_ AIOPTION_STRUCT" in the software user's manual.

Notes:

- Both panel and channel numbers are hexadecimal.
- Analog panel 0 ONLY has a channel range of 0 to B.
- The first digital panel's number would be 8 even though the physical address of the board would be likely set to 0. For more information, refer to section 6.0 "isoLynx Digital I/O Backpanel Description" in the hardware user's manual.

Error Descriptions

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

Address Validation

Missing address
Device address '<address>' contains a syntax error
Address '<address>' is out of range for the specified device or register
Data Type '<type>' is not valid for device address '<address>'
Device address '<address>' is Read Only

Device Status Messages

Device '<device name>' is not responding
Unable to write to '<address>' on device '<device name>'

Driver Error Messages

Device '<device name>' responded with error '<Error Code>' (Tag '<address>')
Device '<device name>' responded with error '<Error Code>' (Tag '<address>') during Connect

Automatic Tag Database Generation Messages

Unable to Connect to Device or IO Inquire error

See Also: Dataforth Data Acquisition Library Error Code Descriptions

Dataforth Data Acquisition Library Error Code Descriptions

The following table lists the Error Codes returned by the Dataforth Data Acquisition Library.

Error Code	Description
0	Success.
1000	Client already initialized.
1001	Failed to initialize client.
1002	Client not initialized.
1003	Logging not enabled.
1004	Failed to find error text.
1005	Invalid library link type.
1006	Invalid library callback type.
1007	Log file full.
1008	Memory pointer null.
1009	Failed to allocate memory.
1010	Failed to create thread.
1011	Invalid checksum type.
2000	Invalid communications processor type.
2001	Communications processor library does not exist.
2002	Failed to open communications processor device.

Error Code	Description
2003	Invalid communications processor device handle.
2004	Communications processor virtual function does not exist.
2005	Communications processor API function does not exist.
2006	Communications timeout.
2007	Communications cancelled.
2008	Invalid communications processor configuration type.
2009	Communications receive buffer pointer null.
2010	Communications send buffer pointer null.
2011	Communications send buffer empty.
2012	Non-blocking communications operation in progress.
2012	Communications port not initialized.
2030	Communications send operation with echo failed.
-2000	Non-blocking communications operation pending.
-2020	COM receive buffer overflow.
3000	Invalid I/O processor type.
3001	I/O processor library does not exist.
3002	Failed to open I/O processor device.
3003	Invalid I/O processor device handle.
3004	I/O processor virtual function does not exist.
3005	I/O processor API function does not exist.
3006	I/O timeout.
3007	I/O cancelled.
3008	Failed to add I/O device to list.
3009	Invalid I/O channel type.
3010	Invalid I/O channel list count.
3011	Invalid I/O channel panel.
3012	Invalid I/O channel number.
3013	I/O channel duplicate.
3014	I/O channel not configured.
3015	Invalid I/O channel group.
3016	Invalid I/O channel order.
3017	Failed to add I/O channel to list.
3018	Failed to parse I/O channel configuration.
3019	Invalid I/O channel attribute type.
3020	Invalid I/O channel attribute list count.
3021	Invalid I/O channel Read/Write control type.
3022	I/O processor function not implemented.
3023	Invalid I/O channel Read/Write samples.
3024	Invalid I/O channel Read/Write channel list count.
3025	Non-blocking I/O operation in progress.
3026	Invalid I/O processor command state.
3027	Invalid I/O response.
3028	Invalid I/O response length.

Error Code	Description
3029	Invalid I/O response checksum or CRC.
3030	I/O command not acknowledged.
-3000	Non-blocking I/O operation pending.
3100	Invalid analog I/O range.
5000	Invalid date type.
5001	Invalid date string.
6000	String not found in file.
6001	Value not found in file.
6002	Error writing string to file.
6003	Error writing value to file.
-6000	Maximum number of files exceeded.
11000	Failed to initialize serial COM port.
11001	Failed to open serial COM port.
11002	Invalid serial COM port.
11003	Serial COM port not present.
11004	Serial COM port already in use.
11005	Invalid serial COM IRQ.
11006	Invalid serial COM flow control.
11007	Invalid serial COM parity.
12000	Failed to initialize socket COM port.
12001	Failed to open socket COM port.
12002	Invalid socket COM port.
12003	Failed to connect to socket COM server.
21000	Invalid isoLynx script.
21001	Invalid isoLynx address.
21002	Invalid isoLynx panel.
21020	Invalid isoLynx I/F type.
21021	Invalid isoLynx I/F options.
21022	Invalid isoLynx I/F baudrate.
21030	Invalid isoLynx analog input range.
21031	Invalid isoLynx analog input average weight.
21040	Invalid isoLynx analog output range.
21041	Invalid isoLynx analog output initial data.
21060	Invalid isoLynx digital output initial data.
21100	isoLynx I/O command not acknowledged.
21101	isoLynx I/O command not acknowledged-Error Code 01.
21102	isoLynx I/O command not acknowledged-Error Code 02.
21103	isoLynx I/O command not acknowledged-Error Code 03.
21104	isoLynx I/O command not acknowledged-Error Code 04.
21105	isoLynx I/O command not acknowledged-Error Code 05.
21106	isoLynx I/O command not acknowledged-Error Code 06.
21107	isoLynx I/O command not acknowledged-Error Code 07.
21108	isoLynx I/O command not acknowledged-Error Code 08.

Error Code	Description
21109	isoLynx I/O command not acknowledged-Error Code 09.
21116	isoLynx I/O command not acknowledged-Error Code 10.
21117	isoLynx I/O command not acknowledged-Error Code 11.
21118	isoLynx I/O command not acknowledged-Error Code 12.
21119	isoLynx I/O command not acknowledged-Error Code 13.
21120	isoLynx I/O command not acknowledged-Error Code 14.
21121	isoLynx I/O command not acknowledged-Error Code 15.
21122	isoLynx I/O command not acknowledged-Error Code 16.
21123	isoLynx I/O command not acknowledged-Error Code 17.
21200	Invalid isoLynx IP address.
21201	Invalid isoLynx subnet mask.
21202	Invalid isoLynx gateway.
21203	Invalid isoLynx DNS server.
21204	Invalid keep alive timeout value.
-21000	isoLynx I/O configuration does not match script.
-21001	isoLynx I/F configuration does not match script.
-21030	isoLynx analog input options do not match script.
-21040	isoLynx analog output options do not match script.
-21050	isoLynx digital input options do not match script.
-21060	isoLynx digital output options do not match script.
-21200	isoLynx network options do not match script.

Address Validation

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

Address Validation

Missing address
Device address '<address>' contains a syntax error
Address '<address>' is out of range for the specified device or register
Data Type '<type>' is not valid for device address '<address>'
Device address '<address>' is Read Only

Missing address

Error Type:

Warning

Possible Cause:

A tag address that has been specified dynamically has no length.

Solution:

Re-enter the address in the client application.

Device address '<address>' contains a syntax error

Error Type:
Warning

Possible Cause:
A tag address that has been specified dynamically contains one or more invalid characters.

Solution:
Re-enter the address in the client application.

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

Error Type:
Warning

Possible Cause:
A tag address that has been specified dynamically 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.

Data Type '<type>' is not valid for device address '<address>'

Error Type:
Warning

Possible Cause:
A tag address that has been specified dynamically has been assigned an invalid data type.

Solution:
Modify the requested data type in the client application.

Device address '<address>' is Read Only

Error Type:
Warning

Possible Cause:
A tag address that has been specified dynamically 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.

Device Status Messages

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

Device Status Messages

Device '<device name>' is not responding
Unable to write to '<address>' on device '<device name>'

Device '<Device name>' is not responding

Error Type:

Serious

Possible Cause:

1. The connection between the device and the Host PC is broken.
2. The IP address or ID assigned to the device is incorrect.
3. The response from the device took longer to receive than the amount of time specified in the "Request Timeout" device property.
4. The interface type, com port or baud rate on device are configured incorrectly.

Solution:

1. Verify the cabling between the PC and the device.
2. Verify the IP address or ID given to the named device matches that of the actual device.
3. Increase the Request Timeout property so that the entire response can be handled.
4. Verify that the Communications Channel Properties match those used when the device was configured with Dataforth configuration utility. For more information, refer to the section on "Communication Interface Reset Jumper" in the hardware user's manual.
5. Cycle power to device.

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

Error Type:

Serious

Possible Cause:

1. The connection between the device and the Host PC is broken.
2. The IP address or ID assigned to the device is incorrect.
3. The interface type, com port or baud rate on device are configured incorrectly.

Solution:

1. Verify the cabling between the PC and the device.
2. Verify the IP address or ID given to the named device matches that of the actual device.

3. Verify that the Communications Channel Properties match those used when the device was configured with Dataforth configuration utility. For more information, refer to the section on "Communication Interface Reset Jumper" in the hardware user's manual.

Driver Error Messages

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

Driver Error Messages

Device '<device name>' responded with error '<Error Code>' (Tag '<address>')
Device '<device name>' responded with error '<Error Code>' (Tag '<address>') during Connect

Device '<device name>' responded with error 'Error Code' (Tag 'address')

Error Type:

Serious

Possible Cause:

1. The connection between the device and the Host PC is broken.
2. The IP address or ID assigned to the device is incorrect.
3. The interface type, com port or baud rate on device are configured incorrectly.

Solution:

1. Verify the cabling between the PC and the device.
2. Verify the IP address or ID given to the named device matches that of the actual device.
3. Verify that the Communications Channel Properties match those used when the device was configured with Dataforth configuration utility. For more information, refer to the section on "Communication Interface Reset Jumper" in the hardware user's manual.

Note:

The error code detailed in the message was returned by the Dataforth Data Acquisition Library . For more information, refer to **Dataforth Data Acquisition Library Error Code Descriptions**.

Device '<device name>' responded with error 'Error Code' (Tag 'address') during Connect

Error Type:

Serious

Possible Cause:

1. The connection between the device and the Host PC is broken.
2. The IP address or ID assigned to the device is incorrect.
3. The interface type, com port or baud rate on device are configured incorrectly.

Solution:

1. Verify the cabling between the PC and the device.
2. Verify the IP address or ID given to the named device matches that of the actual device.
3. Verify that the Communications Channel Properties match those used when the device was configured with Dataforth configuration utility. For more information, refer to the section on "Communication Interface Reset Jumper" in the hardware user's manual.

Note:

The error code detailed in the message was returned by the Dataforth Data Acquisition Library while trying to connect to the device. For more information, refer to **Dataforth Data Acquisition Library Error Code Descriptions**.

Automatic Tag Database Generation Messages

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

Automatic Tag Database Generation Messages

Unable to Connect to Device or IO Inquire error

Unable to Connect to Device or IO Inquire error during tag Database Creation

Error Type:

Serious

Possible Cause:

1. The connection between the device and the Host PC is broken.
2. The IP address or ID assigned to the device is incorrect.
3. The interface type, com port or baud rate on device are configured incorrectly.
4. The I/O configuration set with Dataforth configuration utility is incorrect.

Solution:

1. Verify the cabling between the PC and the device.
2. Verify the IP address or ID given to the named device matches that of the actual device.
3. Verify that the Communications Channel Properties match those used when the device was configured with Dataforth configuration utility. For more information, refer to the section on "Communication Interface Reset Jumper" in the hardware user's manual.

4. Run the Dataforth configuration utility and verify that the I/O configuration matches the physical hardware.

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