

Mitsubishi MC Driver

File Name	MitsubishiMC.dll
Manufacturer	Mitsubishi Electric Brasil
Devices	Melsec FX3 series with FX3U-ENET or FX3U-ENET-ADP modules, Melsec FX3GE with built-in Ethernet port, and Melsec A e QnA series with E71 Ethernet modules
Protocol	Melsec communication A compatible 1E frame binary over Ethernet
Version	1.0.3
Last Update	02/20/2026
Platform	Win32
Dependencies	IOKit version 2.0 or later
Superblock Readings	No
Level	0

Introduction

This Driver implements the Melsec communication A compatible 1E frame binary over Ethernet protocol by Mitsubishi Electric Brasil, which allows **Elipse Software** products to communicate with Melsec FX3 series with FX3U-ENET or FX3U-ENET-ADP modules, Melsec FX3GE with built-in Ethernet port, and Melsec A e QnA series with E71 Ethernet modules.

The Mitsubishi MC Driver was developed using **Elipse Software's** **IOKit** library.

Driver Settings

All configurations are performed on this Driver's properties window. When adding this Driver to an application, it is loaded with its default configuration of extra parameters for an **Ethernet** interface, that is, TCP/IP port 5001 and time-out of 1000 milliseconds. Users must open this Driver's properties window and configure a valid main IP address referring to a device to access. For more information about **Setup** and **Ethernet** tabs, please check topic **Documentation of I/O Interfaces**.

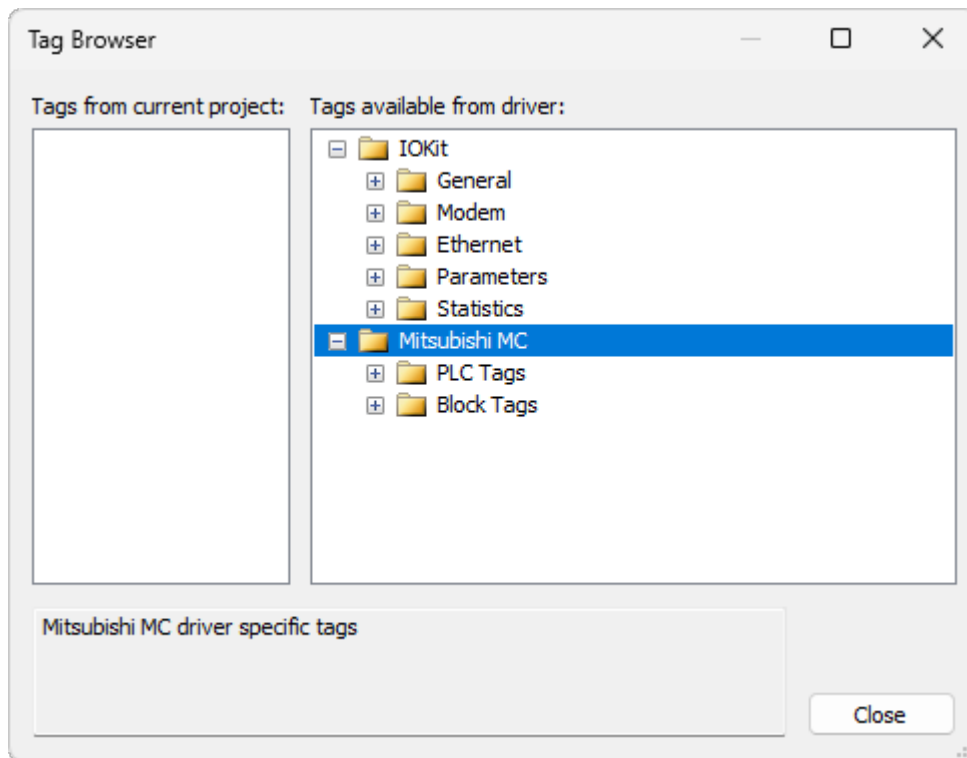
The **MitsubishiMC** tab contains only the **Standard maximum string length** option, which corresponds to the maximum standard size of a **String**-type variable. The default value of this option is 128 and this value can range between 1 (one) and 128.

Tag Reference

This section contains information about the configuration of Tags for this Driver. Users can configure these Tags by using **Strings** in the **Item** field in **Elipse E3**, in **Elipse Power**, or in **Elipse Water** or by using **[N/B]** parameters.

Using Tag Browser

Elipse E3 starting with version **2.0**, **Elipse Power**, and **Elipse Water** contain a tool called **Tag Browser**, which allows this Driver to help users creating and configuring Tags.



Tag Browser window

The **Tags from current project** list displays Tags and folders already in the current project. The **Tags available from driver** list displays a tree with Tags available in this Driver. To create a Tag in an application, drag one of the Tags defined by this Driver to a folder on the current directory. The Mitsubishi MC Driver contains the following nodes on this tree view:

- The **IOKit** node displays the Tags available in the **IOKit** library, grouped into the following categories:
 - **General:** Tags for general use
 - **Modem:** Tags for manipulating communication via modem
 - **Ethernet:** Tags for manipulating communication via Ethernet network
 - **Parameters:** Tags for configuring **IOKit** library parameters
- The **Mitsubishi MC** node contains folders classifying the type of Tags they contain, **PLC Tags** or **Block Tags**. On each one of these folders there are other folders separating Tags by Area, and these ones finally contain end nodes, which are examples of Tags for every area. There is an example for each type. Drag one of these Tags to the list on the left, or even a node from an entire folder to move all of them at the same time, and this Tag or Tags are already configured to work

This Tag Browser for Mitsubishi MC Driver aims to automate the configuration of its Tags through examples for each area and for each supported type. Evidently, in most cases it is useful to add through it only Tags from areas and types that are interesting to a project, with manual settings performed later. Tag Browser suggests the value "00000" (zero) as an area's Address, in the **Item** field, which might be probably reconfigured after including those Tags. If a Block Tag is selected, it is already shown with a suggested size of 10 Elements, which can also be modified later.

Configuration by Syntactical Parameters

Reading and Writing

Elipse E3 starting with version **2.0**, **Elipse Power**, and **Elipse Water** allow configuring Tags by syntactic parameters. Use the next syntax for each field:

- The **Device** field is not used and it must be kept empty
- The **Item** field must obey the syntax **<Area name><Address>[:<Data Type>]**, in which:
 - **<Area name>** must be filled with a **String** from table **Area Names**
 - **<Address>** must be filled with an address in an area or an offset
 - **<Data type>** is optional and, if used, it must be separated by colons and filled with a **String** from table **Data Types**. If this data type is omitted, then the default data type for this area is displayed

Area Names

AREA	MEANING	SUPPORTED DATA TYPES
D	Data register	Word (default), Short , BCD , DWord , Long , LBCD , Float , Double , Date , and String
R	Extension register	Word (default), Short , BCD , DWord , Long , LBCD , Float , Double , Date , and String
TN	Timer value	Word (default), Short , and BCD
TS	Timer contact	Bit (default), Word , Short , BCD , DWord , Long , and LBCD
CN	Counter value	Word (default), Short , BCD , DWord , Long , and LBCD
CS	Counter contact	Bit (default), Word , Short , BCD , DWord , Long , and LBCD
X	Input	Bit (default), Word , Short , BCD , DWord , Long , and LBCD
Y	Output	Bit (default), Word , Short , BCD , DWord , Long , and LBCD
M	Auxiliary relay	Bit (default), Word , Short , BCD , DWord , Long , and LBCD
S	State	Bit (default), Word , Short , BCD , DWord , Long , and LBCD

Data Types

DATA TYPE	MEANING
W or WORD	Word value (unsigned 16-bit)
S, SH, or SHORT	Short value (signed 16-bit)
DW or DWORD	Double Word value (unsigned 32-bit)
L or LONG	Long value (signed 32-bit)
F or FLOAT	Floating Point value (32-bit floating point, IEEE 754)
D or DOUBLE	Double Floating Point value (64-bit double precision floating point, IEEE 754)
BCD	BCD value (16-bit)

DATA TYPE	MEANING
LBCD	Long BCD value (32-bit)
DATE	32-bit value
STR or STRING	Sequence of String characters

The syntax for the **Item** field, if the **String** data type is selected, is the following:

- **<Area name><Address>:STR[<Maximum length>]**, in which:
 - **<Area name>** and **<Address>** refer to the same items on the general syntax
 - **<Maximum length>** is optional and informs the maximum size declared on the **String**. If not informed, considers the maximum default size of a **String** as declared on this Driver's configuration window

NOTE
Any area whose default data type is **Bit**, when accessed with another data type, must be addressed with a value that is a multiple of 16.

Examples

1. Reading or writing an *Input* with address 1 (one) and a basic **Bit** data type: The **Item** field is filled with "X1".
2. Reading or writing an *Output* with address 100 and data type configured as **Word**: The **Item** field is filled with "Y100:W". Values from 16 contiguous *Outputs* starting at address 100 are reinterpreted as a **Word** value.
3. Reading or writing a *Counter Value* with address 50 and a basic **Word** data type: The **Item** field is filled with "CN50". Filling it with "CN50:W" produces the same result.
4. Reading or writing a *Data Register* with address 1000 and data type configured as **Double Word**: The **Item** field is filled with "D1000:DW". Values from two contiguous *Data Registers* starting at address 1000 are reinterpreted as a **Double Word** value.
5. Reading or writing a *Data Register* with address 100 and data type configured as a **String** with a maximum size of 64: "D100:STR[64]".

Configuration by Numeric Parameters

Reading and Writing

Addressing fields by N/B parameters

- **N1 or B1**: Not used, leave it in 0 (zero)
- **N2 or B2: Data type and Area**. This value must be composed by the sum of data type plus the area (*N2 or B2* equal to Data Type Value + Area Value). If the value of **Type** is equal to 0 (zero), then assumes area's default data type
- **N3 or B3**: Address value in this area or offset
- **N4 or B4**: Used only if data type is **String**. Informs the maximum size declared in a **String**. If it is not informed, considers the maximum default size of a **String** as provided on this Driver's configuration window

Area values

VALUE	MEANING	SUPPORTED DATA TYPES
0	Data register	Word (default), Short , BCD , DWord , Long , LBCD , Float , Double , Date , and String
1	Extension register	Word (default), Short , BCD , DWord , Long , LBCD , Float , Double , Date , and String
2	Timer value	Word (default), Short , and BCD
3	Timer contact	Bit (default), Word , Short , BCD , DWord , Long , and LBCD
4	Counter value	Word (default), Short , BCD , DWord , Long , and LBCD
5	Counter contact	Bit (default), Word , Short , BCD , DWord , Long , and LBCD
6	Input	Bit (default), Word , Short , BCD , DWord , Long , and LBCD
7	Output	Bit (default), Word , Short , BCD , DWord , Long , and LBCD
8	Auxiliary relay	Bit (default), Word , Short , BCD , DWord , Long , and LBCD
9	State	Bit (default), Word , Short , BCD , DWord , Long , and LBCD

Data type values

VALUE	MEANING
000	Basic data type of this area (Bit or Word)
100	Bit (value 1 or 0)
200	Word value (unsigned 16-bit)
300	Short value (signed 16-bit)
400	Double Word value (unsigned 32-bit)
500	Long value (signed 32-bit)
600	Floating Point value (32-bit floating point, IEEE 754)
700	Double Floating Point value (64-bit double precision floating point, IEEE 754)
800	BCD value (16-bit)
900	Long BCD value (32-bit)
1000	32-bit value
1100	Sequence of String characters

NOTE

Any area whose default data type is **Bit**, when accessed with another data type, must be addressed with a value that is a multiple value of 16.

Examples

1. Reading or writing an *Input* with address 1 (one) and a basic **Bit** data type: $N1 = 0$, $N2 = 0$, $N3 = 1$, and $N4 = 0$. If $N2$ is filled with value "100", then the result is the same.
2. Reading or writing an *Output* with address 100 and data type configured as **Word**: $N1 = 0$, $N2 = 202$, $N3 = 100$, and $N4 = 0$.
3. Reading or writing a *Counter Value* with address 50 and a basic **Word** data type: $N1 = 0$, $N2 = 20$, $N3 = 50$, and $N4 = 0$. If $N2$ is filled with value "220", then the result is the same.
4. Reading or writing a *Data Register* with address 1000 and data type configured as **Double Word**: $N1 = 0$, $N2 = 421$, $N3 = 1000$, and $N4 = 0$. Values from two contiguous *Data Registers* starting at address 1000 are reinterpreted as a **Double Word**.

Block Operations

For a good performance on data communication, it is advisable to perform readings with the largest possible number of points in the same area. When these points are separated into individual Tags, then a single operation occurs for each Tag, while as a Block a single operation occurs for all Tags.

To do so, users must notice that the address indicated by the parameters is the initial address, and each Element corresponds to a single memory position that is multiple, according to a basic type relative to a reinterpreted type.

If the basic data type is **Bit** and it is configured to be displayed as a **Bit**, each Element represents a bit with their position incrementing 1 (one) by 1 (one). For example, for $Y100$ on a Block with 3 (three) Elements, the first Element is equal to $Y100$, the second Element is equal to $Y101$, and the third Element is equal to $Y102$.

However, if the basic data type is **Bit** and it is configured to be displayed as a **Word**, each Element represents 16 bits with their position incrementing 16 by 16. For example, for $X0$ on a Block with 3 (three) Elements, the first Element is equal to $X0$, the second Element is equal to $X16$, and the third Element is equal to $X32$.

Documentation of I/O Interfaces

This section contains the documentation of I/O Interfaces referring to the **MitsubishiMC** Driver.

Configuration of a Driver

I/O Interface configuration is performed on a Driver's configuration dialog box. To access the configuration of this dialog box in **Eclipse E3** in version 1.0, follow these steps:

1. Right-click a Driver object (IODriver).
2. Select the **Properties** item on the contextual menu.
3. Select the **Driver** tab.
4. Click **Other parameters**.

In **Eclipse E3** version 2.0 or later, click **Configure driver**  on a Driver's toolbar. In **Eclipse SCADA**, follow these steps:

1. Open the Organizer.
2. Select a Driver on Organizer's tree.
3. Click **Extras** on the **Driver** tab.

Currently, an I/O Interface allows opening only one connection for each Driver. This means that, if users want to access two serial ports, they must add two Drivers to an application and then configure each one of these Drivers for each serial port.

Configuration Dialog Box

The dialog box of I/O Interfaces allows configuring the I/O connection used by a Driver. This dialog box contains the **Setup**, **Serial**, **Ethernet**, **Modem**, and **RAS** tabs, described on the next topics. If a Driver does not implement a specific I/O connection, its corresponding tab is not available for configuration. Some Drivers may contain additional tabs, specific for that Driver, on the configuration dialog box.

Setup Tab

The **Setup** tab contains general configurations of a Driver. This tab is divided into the following groups:

- **General configurations:** Configurations of a Driver's physical layer, time-out, and initialization mode
- **Connection management:** Configurations on how the I/O Interface keeps a connection and which recovery policy is used on failure
- **Logging options:** Controls the generation of log files

The screenshot shows the 'Setup' tab of a configuration dialog box. It is organized into several sections:

- Physical Layer:** A dropdown menu is set to 'Ethernet'. To the right, there is an unchecked checkbox labeled 'Start driver OFFLINE'.
- Timeout:** A text box contains '1000' followed by 'ms'.
- Communication check time:** A text box contains '5000' followed by 'ms'.
- Connection management:** This section is enclosed in a rounded rectangle and contains:
 - Mode:** A dropdown menu set to 'Automatic (managed by the driver)'.
 - Retry failed connection every:** A checked checkbox followed by a text box with '20' and 'seconds'.
 - Give up after:** An unchecked checkbox followed by a text box with '1' and 'failed retries'.
 - Disconnect if non-responsive for:** An unchecked checkbox followed by a text box with '0' and 'seconds'.
- Logging Options:** This section is also enclosed in a rounded rectangle and contains:
 - Log to File:** An unchecked checkbox followed by a text box containing the path 'C:\eeLogs\MicrolokII_%DATE%.log'.
 - File size limit (MB):** A text box with '0' followed by '(0 is unlimited)'.

Setup tab

General options on the Setup tab

OPTION	DESCRIPTION
Physical Layer	Select the physical layer on a list. Available options are Serial , Ethernet , Modem , and RAS . The selected interface must be configured on its specific tab
Timeout	Configure a time-out, in milliseconds, for the physical layer. This is the amount of time an I/O interface waits to receive any byte from the reception's buffer
Communication check time	Set the time, in milliseconds, to define the interval at which communication is considered to be in an inactive state. As long as an I/O Driver receives valid data, its communication state is considered active. However, if during operation an I/O Driver does not receive valid data inside this period of time, the state is considered inactive. The communication state is shown in the IO.CommunicationStatus Tag
Start driver OFFLINE	Select this option so that a Driver starts in Offline mode or stopped. This means that the I/O interface is not created until this Driver is configured to Online mode by using a Tag in an application. This mode enables a dynamic configuration of an I/O interface at run time

Options on the Connection management group

OPTION	DESCRIPTION
Mode	Selects a management mode of a connection. Selecting the Automatic option allows a Driver to manage the connection automatically, as specified in the next options. Selecting the Manual option allows an application to fully manage a connection
Retry failed connection every ... seconds	Select this option to enable a Driver's connection retry in a certain interval, in seconds. If the Give up after failed retries option is not selected, this Driver keeps retrying until a connection is performed, or until the application is stopped
Give up after ... failed retries	Enable this option to define a maximum number of connection retries. When the specified number of consecutive connection retries is reached, a Driver goes to the Offline mode, assuming that a hardware problem was detected. If a Driver establishes a successful connection, the number of unsuccessful retries is cleared. If this new connection is lost, then the retry counter starts at zero
Disconnect if non-responsive for ... seconds	Enable this option to force a Driver to disconnect if no byte was received by the I/O interface during the specified time-out, in seconds. This time-out must be greater than the time-out configured in the Timeout option

Options on the Logging Options group

OPTION	DESCRIPTION
Log to File	<p>Enable this option and configure the name of a file to write a log. Log files can be large, so use this option for short periods of time, only for testing and debugging purposes. If the %PROCESS% macro is used in the log file name, it is replaced by the identifier of the current process. This option is particularly useful when using several instances of the same Driver in Elipse E3, thus allowing each instance to generate a separate log file. For example, when configuring this option with value "c:\e3logs\drivers\sim_%PROCESS%.log", it generates a file named c:\e3logs\drivers\sim_00000FDA.log for process OFDAh. Users can also use the %DATE% macro in the file name. In this case a log file is generated every day, in the format aaaa_mm_dd. For example, when configuring this option with value "c:\e3logs\drivers\sim_%DATE%.log", it generates a file named c:\e3logs\drivers\sim_2005_12_31.log in 12/31/2005 and a file named c:\e3logs\drivers\sim_2006_01_01.log in 01/01/2006. Similarly, the %DATE_HOUR% macro generates one log file per hour, in the format aaaa_mm_dd_hh.</p>
File size limit (MB)	<p>Configure the log file size limit, in megabytes. A value equal to 0 (zero) means that there is no size limit for the log file.</p>

Ethernet Tab

Use this tab to configure parameters of an **Ethernet** Interface. These parameters, except port configurations, must also be configured for use in the **RAS** Interface.

Ethernet

Transport: TCP/IP ▼

PING before connecting
 Timeout: 4000 ms
 Retries: 1

Listen for connections on port: 0
 Share listen port with other processes
 Interface: (All Interfaces) ▼
 Use IPv6 Use SSL SSL Settings
 Enable 'ECHO' supression
 IP Filter:

Connect to

<input type="checkbox"/> Main IP:	<input style="width: 90%;" type="text"/>	Port:	502	<input type="checkbox"/> Local port:	0
<input type="checkbox"/> Backup IP 1:	<input style="width: 90%;" type="text"/>	Port:	0	<input type="checkbox"/> Local port:	0
<input type="checkbox"/> Backup IP 2:	<input style="width: 90%;" type="text"/>	Port:	0	<input type="checkbox"/> Local port:	0
<input type="checkbox"/> Backup IP 3:	<input style="width: 90%;" type="text"/>	Port:	0	<input type="checkbox"/> Local port:	0

Ethernet tab

Available options on the Ethernet tab

OPTION	DESCRIPTION
Transport	Select the value TCP/IP for a TCP socket (<i>stream</i>) or select the value UDP/IP to use a UDP socket (<i>connectionless datagram</i>)
Listen for connections on port	Use this option to wait for new connections in a specific IP port, common in Slave Drivers. If this option remains unselected, a Driver connects to the address and port specified in the Connect to option
Share listen port with other processes	Select this option to share the listening port with other Drivers and processes
Interface	Select the local network interface, identified by its IP address, that a Driver uses to establish and receive connections, or select the value (All Interfaces) to allow connection in any network interface
Use IPv6	Select this option to force a Driver to use addresses in IPv6 format on all Ethernet connections. Leave this option deselected to use the IPv4 format
Enable 'ECHO' supression	Enable this option to remove the echo from received data. An echo is a copy of sent data, which can be returned before a reply message
IP Filter	List of restricted or allowed IP addresses from where a Driver accepts connections (<i>Firewall</i>). Please check the IO.Ethernet.IPFilter property for more information
PING before connecting	Enable this option to execute a ping command, that is, to check whether a device can be reached on a network, for a device before trying a socket connection. This is a quick way

OPTION	DESCRIPTION
	<p>of determining a successful connection before trying to open a socket with a device. The time-out of a connection with a socket can be very high. The available options are:</p> <ul style="list-style-type: none"> • Timeout: Specify the number of milliseconds to wait for a reply from a ping command. Users must use a ping command to check the normal reply time, configuring this option for a value above that average. Usually this value can be configured between 1000 and 4000 milliseconds, that is, between 1 (one) and 4 (four) seconds • Retries: Number of retries of a ping command, not counting the first attempt. If all attempts fail, then the socket connection is aborted

Available options on the Connect to group

OPTION	DESCRIPTION
Main IP	Type the IP address of a remote device. Users can use an IP address separated by dots, as well as a URL. In case of a URL, a Driver uses the available DNS service to map that URL to an IP address, such as "192.168.0.13" or "Server1"
Port	Type the IP port of a remote device, between 0 (zero) and 65535
Local port	Select this option to use a fixed local IP port when connecting to a remote device
Backup IP 1, 2, and 3	Indicate the IP address, the IP port, and the fixed local IP port of up to 3 (three) backup addresses of a remote device

General Configurations

This section contains information about the configuration of general **I/O Tags** and **Properties** of I/O Interfaces.

I/O Tags

General I/O Interfaces Tags (N2/B2 = 0)

The Tags described next are provided for all supported I/O Interfaces.

IO.CommunicationStatus

Type of Tag	I/O Tag
Type of Access	Reading
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	0 (zero)
N4 Parameter	6 (six)
String Configuration	IO.CommunicationStatus

This Tag informs the communication status of a Driver. It indicates how communication works relative to receiving valid data within a time period arbitrated in the configuration. For more information, please check topic **Setup Tab**. Possible values are **0 - Inactive communication**: The Driver did not receive valid data or stopped receiving data after *n* milliseconds, as configured in the properties window, or **1 - Active communication**: The Driver is receiving valid data.

IO.IOKitEvent

Type of Tag	Block Tag
Type of Access	Read-Only
B1 Parameter	-1 (minus one)
B2 Parameter	0 (zero)
B3 Parameter	0 (zero)
B4 Parameter	1 (one)
Size Property	4 (four)
ParamItem Property	IO.IOKitEvent

This Block returns Driver events generated by several sources in I/O Interfaces. The **TimeStamp** property of this Block represents the moment this event occurred. The Block Elements are the following:

- **Element 0**: Type of event. Possible values are **0**: Information, **1**: Warning, or **2**: Error
- **Element 1**: Source of an event. Possible values are **0**: Driver (specific of a Driver), **-1**: IOKit (generic events of I/O Interfaces), **-2**: **Serial** Interface, **-3**: **Modem** Interface, **-4**: **Ethernet** Interface, or **-5**: **RAS** Interface
- **Element 2**: Error number, specific for each source of event
- **Element 3**: Message of an event, a **String** specific for each event

NOTE

A Driver keeps a maximum number of 100 events internally. If additional events are reported, older events are discarded.

IO.PhysicalLayerStatus

Type of Tag	I/O Tag
Type of Access	Read-Only
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	0 (zero)
N4 Parameter	2 (two)
String Configuration	IO.PhysicalLayerStatus

This Tag indicates the status of a physical layer. Possible values are the following:

- **0**: Physical layer stopped, that is, a Driver is in **Offline** mode, the physical layer failed when initializing, or exceeded the maximum number of reconnection attempts
- **1**: Physical layer started but not connected, that is, a Driver is in **Online** mode but the physical layer is not connected. If the **Connection management** option is configured with the value **Automatic**, the physical layer can be connecting, disconnecting, or waiting for a reconnection attempt. If the **Connection management** option is configured with the value **Manual**, then the physical layer remains in this status until forced to connect
- **2**: Physical layer connected, that is, the physical layer is ready for use. This **DOES NOT** mean a device is connected, only that the access layer is working

IO.SetConfigurationParameters

Type of Tag	Block Tag
Type of Access	Read-Only
B1 Parameter	-1 (minus one)
B2 Parameter	0 (zero)
B3 Parameter	0 (zero)
B4 Parameter	3 (three)
Size Property	2 (two)
ParamItem Property	IO.SetConfigurationParameters

Use this Tag to change any property of a Driver's configuration dialog box at run time.

This Tag works only while a Driver is in **Offline** mode. To start a Driver in **Offline** mode, select the **Start driver OFFLINE** option on that Driver's configuration dialog box. Users can write to a PLC Tag or to a Block Tag containing the parameters to change. Writing individual Block Elements is not supported, the whole Block must be written at once.

In **Eclipse SCADA**, users must use a Block Tag. Every parameter to configure uses two Block Elements. For example, if users want to configure 3 (three) parameters, then the size of the Block must be 6 (six, 3×2). The first Element is the property's name, as a **String**, and the second Element is the property's value, according to the next example.

```
// 'Block' must be a Block Tag with automatic reading,
// scan reading, and automatic writings disabled.
// Configure all parameters
Block.element001 = "IO.Type" // Parameter 1
Block.element002 = "Serial"
Block.element003 = "IO.Serial.Port" // Parameter 2
Block.element004 = 1
Block.element005 = "IO.Serial.BaudRate" // Parameter 3
Block.element006 = 19200
// Writes the whole Block
Block.Write()
```

When using **Eclipse E3**, the ability to create arrays at run time allows using an I/O Tag as well as a Block Tag. Users can use the **Write** method of a Driver to send the parameters directly to that Driver, without creating a Tag, according to the next example.

```
Dim arr(6)
' Configure all array elements
arr(1) = "IO.Type"
arr(2) = "Serial"
arr(3) = "IO.Serial.Port"
arr(4) = 1
arr(5) = "IO.Serial.BaudRate"
arr(6) = 19200
' There are two methods to send parameters
' Method 1: Using an I/O Tag
tag.WriteEx arr
' Method 2: Without using a Tag
Driver.Write -1, 0, 0, 3, arr
```

A variation of the previous example uses a bidimensional array.

```
Dim arr(10)
' Configure all array elements. Notice the array was resized
' to 10 elements. Empty array elements are ignored by a Driver
arr(1) = Array("IO.Type", "Serial")
arr(2) = Array("IO.Serial.Port", 1)
arr(3) = Array("IO.Serial.BaudRate", 19200)
Driver.Write -1, 0, 0, 3, arr
```

A Driver does not validate parameter names or passed values, therefore be careful when writing parameters and values. The **Write** method fails if the configuration array is incorrectly created. Users can check the log of a Driver or use the *writeStatus* parameter of the **WriteEx** method to find out the exact cause of an error.

```
Dim arr(10), strError
arr(1) = Array("IO.Type", "Serial")
arr(2) = Array("IO.Serial.Port", 1)
arr(3) = Array("IO.Serial.BaudRate", 19200)
If Not Driver.WriteEx -1, 0, 0, 3, arr, , , strError Then
    MsgBox "Failed configuring Driver parameters: " + strError
End If
```

IO.WorkOnline

Type of Tag	I/O Tag
Type of Access	Reading or Writing
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	0 (zero)
N4 Parameter	4 (four)
String Configuration	IO.WorkOnline

This Tag informs the current status of a Driver and allows starting or stopping the physical layer. Possible values are the following:

- **0 - Driver Offline:** Physical layer is closed or stopped. This mode allows a dynamic configuration of a Driver's parameters using the **IO.SetConfigurationParameters** Tag
- **1 - Driver Online:** Physical layer is open or executing. While in **Online** mode, the physical layer can be connected or disconnected and its current status can be checked using the **IO.PhysicalLayerStatus** Tag

In the next example, using **Elipse E3**, a Driver is configured to **Offline** mode, its COM port is changed, and then configured to **Online** mode again.

```
'Configure to Offline mode
Driver.Write -1, 0, 0, 4, 0
'Change port to COM2
Driver.Write -1, 0, 0, 3, Array("IO.Serial.Port", 2)
'Configure to Online mode
Driver.Write -1, 0, 0, 4, 1
```

The **Write** method may fail when configuring a Driver to **Online** mode, that is, writing the value 1 (one). In this case, this Driver remains in **Offline** mode. The cause of failure can be:

- Type of physical layer incorrectly configured, probably an invalid value was configured in the **IO.Type** property
- This Driver may have run out of memory
- Physical layer probably did not create its working thread. Search the log file for a message "Failed to create physical layer thread!"
- Physical layer could not start. The cause of this failure depends on the type of physical layer. It can be an invalid serial port number, a failure when starting Windows Sockets, or a failure when starting TAPI (modem), among others. This cause is recorded on the log file

IMPORTANT

Even if the configuration of a Driver to **Online** mode is successful, this does not necessarily mean the physical layer is ready to use, that is, ready to execute input and output operations with an external device. The **IO.PhysicalLayerStatus** Tag must be checked to ensure the physical layer is connected and ready for communication.

Properties

These are general properties of all supported I/O Interfaces.

IO.ConnectionMode

9 Controls the management mode of a Connection. Possible values are **0**: Automatic mode, in which a Driver manages the connection or **1**: Manual mode, in which an application manages the connection.

IO.GiveUpEnable

■ When configured to True, defines a maximum number of reconnection attempts. If all reconnection attempts fail, a Driver enters the **Offline** mode. When configured to False, a Driver tries until a reconnection is successful.

IO.GiveUpTries

9 Number of reconnection attempts before this one is aborted. For example, if the value of this property is equal to 1 (one), a Driver tries only one reconnection when the connection is lost. If this one fails, this Driver enters the **Offline** mode.

IO.InactivityEnable

■ Configure to True to enable and to False to disable inactivity detection. The physical layer is disconnected if inactive for a certain period of time. The physical layer is considered inactive only if it is capable of sending data but not capable of receiving it back.

IO.InactivityPeriodSec

9 Number of seconds to check for inactivity. If the physical layer is inactive for this period of time, it is then disconnected.

IO.RecoverEnable

☑ Configure to True to enable a Driver to recover lost connections and to False to leave a Driver in **Offline** mode when a connection is lost.

IO.RecoverPeriodSec

9 Delay time between two connection attempts, in seconds.

NOTE

The first reconnection is executed immediately after a connection is lost.

IO.StartOffline

☑ Configure to True to start a Driver in **Offline** mode and to False to start a Driver in **Online** mode.

NOTE

It is pointless to change this property at run time, as it can only be changed when a Driver is already in **Offline** mode. To configure a Driver in **Online** mode at run time, write the value 1 (one) to the **IO.WorkOnline** Tag.

IO.TimeoutMs

9 Defines a time-out for the physical layer, in milliseconds. One second is equal to 1000 milliseconds.

IO.Type

A Defines the type of physical interface used by a Driver. Possible values are the following:

- **N or None:** Does not use a physical interface, that is, a Driver must provide a customized interface
- **S or Serial:** Uses a local serial port (COM n)
- **M or Modem:** Uses a local modem, internal or external, accessed via TAPI (*Telephony Application Programming Interface*)
- **E or Ethernet:** Uses a TCP/IP or UDP/IP socket
- **R or RAS:** Uses a **RAS** (*Remote Access Server*) Interface. A Driver connects to a RAS device using the **Ethernet** Interface and then sends an **AT** (*dial*) command

Statistical Configuration

This section contains information about the configuration of **I/O Tags** and **Properties** of I/O Interfaces statistics.

I/O Tags

Tags of I/O Interface Statistics (N2/B2 = 0)

The Tags described next display statistics for all I/O Interfaces.

IO.Stats.Partial.BytesRecv

Type of Tag	I/O Tag
Type of Access	Read-Only
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	0 (zero)
N4 Parameter	1101
Configuration by String	IO.Stats.Partial.BytesRecv

This Tag returns the number of bytes received in the current connection.

IO.Stats.Partial.BytesSent

Type of Tag	I/O Tag
Type of Access	Read-Only
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	0 (zero)
N4 Parameter	1100
Configuration by String	IO.Stats.Partial.BytesSent

This Tag returns the number of bytes sent through the current connection.

IO.Stats.Partial.TimeConnectedSeconds

Type of Tag	I/O Tag
Type of Access	Read-Only
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	0 (zero)
N4 Parameter	1102
Configuration by String	IO.Stats.Partial.TimeConnectedSeconds

This Tag returns the number of seconds a Driver is connected in the current connection or 0 (zero) if a Driver is disconnected.

IO.Stats.Partial.TimeDisconnectedSeconds

Type of Tag	I/O Tag
Type of Access	Read-Only
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	0 (zero)
N4 Parameter	1103
Configuration by String	IO.Stats.Partial.TimeDisconnectedSeconds

This Tag returns the number of seconds a Driver is disconnected since the last connection ended or 0 (zero) if a Driver is connected.

IO.Stats.Total.BytesRecv

Type of Tag	I/O Tag
Type of Access	Read-Only
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	0 (zero)
N4 Parameter	1001
Configuration by String	IO.Stats.Total.BytesRecv

This Tag returns the number of bytes received since a Driver was loaded.

IO.Stats.Total.BytesSent

Type of Tag	I/O Tag
Type of Access	Read-Only
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	0 (zero)
N4 Parameter	1000
Configuration by String	IO.Stats.Total.BytesSent

This Tag returns the number of bytes sent since a Driver was loaded.

IO.Stats.Total.ConnectionCount

Type of Tag	I/O Tag
Type of Access	Read-Only
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	0 (zero)
N4 Parameter	1004
Configuration by String	IO.Stats.Total.ConnectionCount

This Tag returns the number of connections a Driver already established, successfully, since it was loaded.

IO.Stats.Total.TimeConnectedSeconds

Type of Tag	I/O Tag
Type of Access	Read-Only
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	0 (zero)
N4 Parameter	1002
Configuration by String	IO.Stats.Total.TimeConnectedSeconds

This Tag returns the number of seconds a Driver remained connected since it was loaded.

IO.Stats.Total.TimeDisconnectedSeconds

Type of Tag	I/O Tag
Type of Access	Read-Only
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	0 (zero)
N4 Parameter	1003
Configuration by String	IO.Stats.Total.TimeDisconnectedSeconds

This Tag returns the number of seconds a Driver remained disconnected since it was loaded.

Properties

Currently, there are no properties defined specifically to display I/O Interface statistics at run time.

Ethernet Interface Configuration

This section contains information about the configuration of **I/O Tags** and **Properties** of an **Ethernet** Interface.

I/O Tags

Tags of an Ethernet Interface (N2/B2 = 4)

The Tags described next allow controlling and identifying an **Ethernet** Interface at run time and they are also valid when the **RAS** Interface is selected.

IMPORTANT

These Tags are available **ONLY** while a Driver is in **Online** mode.

IO.Ethernet.IPSelect

Type of Tag	I/O Tag
Type of Access	Reading or Writing
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	4 (four)
N4 Parameter	0 (zero)
String Configuration	IO.Ethernet.IPSelect

Indicates the active IP address. Possible values are **0**: The main IP address is selected, **1**: The first alternative or backup IP address is selected, **2**: The second alternative or backup IP address is selected, or **3**: The third alternative or backup IP address is selected.

If the **Ethernet** or **RAS** Interface is connected, this Tag indicates which one of the four configured IP addresses is in use. If the Interface is disconnected, this Tag indicates which IP address is used first on the next attempt to connect.

During the connection process, if the active IP address is not available, the I/O Interface tries to connect using the other IP address. If the connection with the alternative IP address works, it is configured as the active IP address (automatic switchover).

To force a manual switchover, write values from 0 (zero) to 3 (three) to this Tag. This forces a reconnection with the specified IP address (**0**: Main address or **1, 2, 3**: Alternative address) if a Driver is currently connected. If a Driver is disconnected, this Tag configures the active IP address for the next attempt to connect.

IO.Ethernet.IPSwitch

Type of Tag	I/O Tag
Type of Access	Write-Only
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	4 (four)
N4 Parameter	1 (one)
String Configuration	IO.Ethernet.IPSwitch

Any value written to this Tag forces a manual switchover. If the main IP address is active, then the first alternative or backup IP address is activated, and so on for all alternative IP addresses and returning to the main address until a connection is established.

If a Driver is disconnected, this Tag configures the active IP address for the next attempt to connect.

IO.Ethernet.SocketState

Type of Tag	I/O Tag
Type of Access	Read-Only
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	4 (four)
N4 Parameter	2 (two)
String Configuration	IO.Ethernet.SocketState

The Value property of this Tag corresponds to socket states as a map of bits:

- **Bit 0:** 0 (zero, not listening) or 1 (one, listening)
- **Bit 1:** 0 (zero, disconnected) or 1 (one, connected)

Properties

These properties control the configuration of an **Ethernet** Interface.

NOTE

The **Ethernet** Interface is also used by the **RAS** Interface.

IO.Ethernet.AcceptConnection

Configure to False if a Driver must not accept external connections, that is, if a Driver behaves as a master, or configure to True to enable the reception of connections, that is, if a Driver behaves as a slave.

IO.Ethernet.BackupEnable[2,3]

■ Configure to True to enable an alternative or backup IP address. If the reconnection attempt with the main IP address fails, a Driver tries to use an alternative IP address. Configure to False to disable its usage.

IO.Ethernet.BackupIP[2,3]

▲ Alternative or backup IP address of a remote device. Users can use a numerical address, as well as a device's host name, such as "192.168.0.7" or "SERVER2".

IO.Ethernet.BackupLocalPort[2,3]

9 Local port number to be used when connecting to an alternative IP address of a remote device. Used only if **IO.Ethernet.BackupLocalPortEnable** is equal to True.

IO.Ethernet.BackupLocalPortEnable[2,3]

■ Configure to True to force the use of a specific local port when connecting to an alternative or backup IP address or configure to False to use any available local port.

IO.Ethernet.BackupPort[2,3]

9 Port number of an alternative or backup IP address of a remote device, used with the **IO.Ethernet.BackupIP** property.

IO.Ethernet.IPFilter

▲ List with a comma-separated IPv4 or IPv6 addresses, which defines from which addresses a Driver accepts or blocks connections. Users can use asterisks, such as "192.168.*.*", or intervals, such as "192.168.0.41-50", in any part of IP addresses. To block an IP address or a range of IP addresses, use the tilde ("~") character at the beginning of the address, according to the next examples:

- **192.168.0.24**: Accepts only connections from IPv4 address 192.168.0.24
- **192.168.0.41-50**: Accepts connections from IPv4 addresses in the interval between 192.168.0.41 and 192.168.0.50
- **192.168.0.***: Accepts connections from IPv4 addresses in the interval between 192.168.0.0 and 192.168.0.255
- **fe80:3bf:877::** (expands to fe80:03bf:0877:0000:0000:0000:0000:0000:****)**: Accepts connections from IPv6 addresses in the interval between fe80:03bf:0877:0000:0000:0000:0000:0000 and fe80:03bf:0877:0000:0000:0000:ffff:ffff
- **192.168.0.10, 192.168.0.15, 192.168.0.20**: Accepts connections from IPv4 addresses 192.168.0.10, 192.168.0.15, and 192.168.0.20
- **~192.168.0.95, 192.168.0.***: Accepts connections from IPv4 addresses in the interval between 192.168.0.0 and 192.168.0.255, except the IPv4 address 192.168.0.95

When a Driver receives a connection attempt, the list of filters is scanned sequentially from left to right, searching for a specific authorization or block for the IP address where the connection comes from. If no element on the list corresponds to the IP address, the authorization or block are dictated by the last element of that list:

- If the last element on the list is an authorization, such as "192.168.0.24", then all IP addresses not found on the list are blocked
- If the last element on the list is a block, such as "~192.168.0.24", then all IP addresses not found on the list are authorized

If an IP address appears on more than one filter on the list, the leftmost filter has precedence. For example, in case of "~192.168.0.95, 192.168.0.*", the IP address 192.168.0.95 fits both rules, but the rule that wins is the leftmost one, "~192.168.0.95", and therefore this IP address is blocked.

When **IOKit** blocks a connection, it logs a message "Blocked incoming socket connection from {IP}!".

In case of UDP connections in broadcast listening mode, in which a Driver can receive packets from different IP addresses, blocks or permissions are performed at each packet received. If a packet is received from a blocked IP address, it logs a message "Blocked incoming packet from {IP} (discarding {N} bytes)!".

IO.Ethernet.ListenIP

A IP address of the local network interface that a Driver uses to establish and accept connections. Leave this property empty to establish and accepts connections using any local network interface.

IO.Ethernet.ListenPort

9 Number of the IP port used by a Driver to listen to connections.

IO.Ethernet.MainIP

A IP address of a remote device. Users can use a numerical address, as well as a device's host name, such as "192.168.0.7" or "SERVER2".

IO.Ethernet.MainLocalPort

9 Local port number to use when connecting to the main IP address of a remote device. This value is only used if the **IO.Ethernet.MainLocalPortEnable** property is equal to True.

IO.Ethernet.MainLocalPortEnable

☑ Configure to True to force the use of a specific local port when connecting to the main IP address of a remote device or configure to False to use any available local port.

IO.Ethernet.MainPort

9 Number of the IP port of a remote device, used with the **IO.Ethernet.MainIP** property.

IO.Ethernet.PingEnable

☑ Configure to True to enable sending a **ping** command to the IP address of a remote device, before trying to connect to the socket. This socket's connection time-out cannot be controlled, therefore sending a **ping** command before connecting is a fast way to detect if the connection is going to fail. Configure to False to disable a **ping** command.

IO.Ethernet.PingTimeoutMs

9 Delay time to wait for a response from a **ping** command, in milliseconds.

IO.Ethernet.PingTries

9 Maximum number of attempts of a **ping** command. Minimum value is 1 (one), including the first **ping** command.

IO.Ethernet.ShareListenPort

☑ Configure to True to share a listening port with other Drivers and processes or False to open a listening port in exclusive mode. To successfully share a listening port, all Drivers and processes that use that port must open it in shared mode. When a listening port is shared, each incoming connection is distributed to one of the processes listening. This way, if a Slave Driver only supports one connection at a time, users can use several instances of this Driver listening on the same port, therefore simulating a Driver with support for multiple connections.

IO.Ethernet.SupressEcho

☑ Configure to True to eliminate echoes in communication. An echo is the unwanted reception of an exact copy of all data packets a Driver sent to a device.

IO.Ethernet.Transport

⚠ Defines a transport protocol. Possible values are **T or TCP**: Uses the TCP/IP protocol or **U or UDP**: Uses the UDP/IP protocol.

IO.Ethernet.UseIPv6

☑ Configure to True to use IPv6 addresses on all Ethernet connections or configure to False to use IPv4 addresses (default).

Driver Revision History

VERSION	DATE	AUTHOR	COMMENTS
1.0.3	02/20/2026	M. Ludwig	<ul style="list-style-type: none"> Driver updated to IOKit library version 3.0 and Visual Studio 2022 (<i>Case 37994</i>).
1.0.2	08/27/2019	M. Ludwig	<ul style="list-style-type: none"> Driver ported to Visual Studio 2017 (<i>Case 27319</i>).
1.0.1	04/09/2018	M. Ludwig	<ul style="list-style-type: none"> Initial version of this Driver.

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Gartner, Cool Vendors in Brazil 2014, April 2014.

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