

# Toledo BTR9091 Driver

<b>File Name</b>	BTR9091.dll
<b>Manufacturer</b>	Toledo
<b>Devices</b>	9091 Digital Indicator
<b>Protocol</b>	P03, P03 with reception (TZPC)
<b>Version</b>	2.0.2
<b>Last Update</b>	08/15/2022
<b>Platform</b>	Win32
<b>Dependencies</b>	IOKit v2.00 or later
<b>Superblock Readings</b>	No
<b>Level</b>	0

## Introduction

This Driver implements the P03, P03 with reception (TZPC) protocol, allowing an application developed by **Elipse Software** to communicate with a 9091 Digital Indicator by Toledo.

## Preparing a Device

The device must be set to communicate using the P03, P03 with reception (TZPC) protocol in **continuous** mode. In addition, sending a checksum must be configured the same way in this Driver and in the device.

## Driver Configuration

This Driver's [P] parameters are not used. All configurations are performed on this Driver's configuration window. For more information about the configuration tabs, please check topic **Documentation of I/O Interfaces**.

## Configuring Properties

Configuration parameters to communicate with a device are available on this Driver's Properties Window. In addition to this Properties Window, these settings can also be defined at run time in **E3** or **Elipse Power** applications. To do so, initialize this Driver in **Offline** mode, that is, execute an application with the **Start driver OFFLINE** option enabled, which is configured on the **Setup** tab of the Properties Window. The configuration options of this Driver are described on the next table.

**Configuration options for Toledo BTR9091 Driver**

TAB	PARAMETER	OFFLINE STRING	DATA TYPE	DESCRIPTION
<b>BTR9091</b>	Checksum	BTR9091.Checksum	Boolean	Protocol verification by checksum. Valid values are <b>False</b> : Disabled or <b>True</b> : Enabled. Use the same option set on the device
<b>Setup</b>	Physical Layer	IO.Type	Text	Physical layer. By default, use the <b>Serial</b>

TAB	PARAMETER	OFFLINE STRING	DATA TYPE	DESCRIPTION
				or <b>Ethernet</b> option
<b>Serial</b>	Port	IO.Serial.Port	Number	Communication port. Use the same value set on the device. Possible values are <b>1</b> : COM1, <b>2</b> : COM2, <b>3</b> : COM3, ..., <b>256</b> : COM256. Default value is <b>1</b>
	Baud rate	IO.Serial.Baudrate	Number	Baud rate. Use the same value set on the device. Default value is 9600
	Data bits	IO.Serial.DataBits	Number	Data bits. Use the same value set on the device. Possible values are <b>7</b> : 7 bits or <b>8</b> : 8 bits. Default value is <b>7</b>
	Parity	IO.Serial.Parity	Number	Parity bit. Use the same value set on the device. Possible values are <b>0</b> : No Parity, <b>1</b> : Odd Parity, <b>2</b> : Even Parity, <b>3</b> : Mark Parity, or <b>4</b> : Space Parity. Default Value is <b>2</b>
	Stop bits	IO.Serial.StopBits	Number	Stop bits. Use the same value set on the device. Possible values are <b>0</b> : 1 stop bit, <b>1</b> : 1.5 stop bits, or <b>2</b> : 2 stop bits. Default value is <b>2</b>
<b>Ethernet</b>	Transport	IO.Ethernet.Transport	Text	Transport layer
	Main IP	IO.Ethernet.MainIP	Text	IP address of a device, in the format "nnn.nnn.nnn.nnn"
	Port	IO.Ethernet.MainPort	Number	TCP/IP addressing port

All properties can be configured via Tags in **String** format, by using the *Item* syntactic parameter with "IO.SetConfigurationParameters" or the *N1* parameter equal to -1 (minus one), the *N2* parameter equal to 0 (zero), the *N3* parameter equal to 0 (zero), and the *N4* parameter equal to 3 (three). For more details and examples, please check topic **Documentation of I/O Interfaces**.

## Tag Reference

This section contains information about the configuration of this Driver's Tags. This Driver implements readings using a single **Block Tag**. The syntactic or numeric (N/B) configuration parameters are not used. In **E3** or **Elipse Power**, users can retrieve a pre-configured Block Tag using Tag Browser.

# Reading Block Tag

## Read-Only

Use a single Block Tag with 5 (five) Elements to read information sent by a device. The scan time configured in the Tag must be, at least, greater than the time between sent messages. According to the manufacturer, the sending rate in continuous mode is 1 (one) message every 185 ms at 4800 bps and 1 (one) message every 165 ms at 9600 bps. Therefore, a scan time greater than 200 ms is recommended. The meaning of each Element is displayed on the next table.

**Description of Reading Block Tag Elements**

ELEMENT	NAME	DATA TYPE	MEANING
0	Status Word A (SWA)	U32	<p><b>Bits 0-2:</b> Multiplier. Possible values are <b>1:</b> Display × 10, <b>2:</b> Display × 1, <b>3:</b> Display × 0.1, <b>4:</b> Display × 0.01, <b>5:</b> Display × 0.001, or <b>6:</b> Display × 0.0001</p> <p><b>Bits 3-4:</b> Increment size. Possible values are <b>1:</b> 1, <b>2:</b> 2, or <b>3:</b> 5</p>
1	Status Word B (SWB)	U32	<p><b>Bit 0:</b> Liquid weight (1)</p> <p><b>Bit 1:</b> Negative Weight (1)</p> <p><b>Bit 2:</b> Overload (1)</p> <p><b>Bit 3:</b> In Movement (1)</p> <p><b>Bit 6:</b> If Auto Reset (1)</p>
2	Status Word C (SWC)	U32	<p><b>Bit 3:</b> Print Button (1)</p> <p><b>Bit 4:</b> Expanded (1)</p> <p><b>Bit 6:</b> Manual Tare Weight (1)</p>
3	Weight	U32	Weight value as shown on the display
4	Tare	U32	Tare value

# Writing Tag

## Write-Only

To send a command, the letter of that command must be written to this Tag's value, according to the next table. Any parameter can be used.

**Description of commands**

VALUE	COMMAND
T	Tare
Z	Zero
P or I	Print
C or D	Clear tare

**NOTE**

This Tag can only be used when this Driver's **physical layer** is configured as **Ethernet**.


## Documentation of I/O Interfaces

This section contains the documentation of I/O Interfaces referring to the **BTR9091** Driver.

### Driver Configuration

I/O Interface configuration is performed on a Driver's configuration dialog box. To access the configuration of this dialog box in **E3** (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 **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 Driver for each serial port.

### Configuration Dialog Box

The I/O Interfaces dialog box 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 each Driver, on the configuration dialog box.

### Setup Tab

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

- **General configurations:** Configurations of 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

Setup

Physical Layer: Serial  Start driver OFFLINE

Timeout: 1000 ms

Connection management

Mode: Automatic (managed by the driver)

Retry failed connection every 20 seconds

Give up after 1 failed retries

Disconnect if non-responsive for 0 seconds

Logging Options

Log to File: C:\eeLogs\Modbus\_%DATE%.log

**Setup tab**

**General options on the Setup tab**

OPTION	DESCRIPTION
<b>Physical Layer</b>	Select the physical layer on a list. Available options are <b>Serial</b> , <b>Ethernet</b> , <b>Modem</b> , and <b>RAS</b> . The selected interface must be configured on its specific tab
<b>Timeout</b>	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 reception's buffer
<b>Start driver OFFLINE</b>	Select this option so that the Driver starts in <b>Offline</b> mode or stopped. This means that the I/O interface is not created until this Driver is configured to <b>Online</b> 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
<b>Mode</b>	Selects a management mode of a connection. Selecting the <b>Automatic</b> option allows a Driver to manage the connection automatically, as specified in the next options. Selecting the <b>Manual</b> option allows an application to fully manage a connection. Please check topic <b>Driver Statuses</b> for more details
<b>Retry failed connection every ... seconds</b>	Select this option to enable a Driver's connection retry in a certain interval, in seconds. If the <b>Give up after failed retries</b> option is not selected, the Driver keeps retrying

OPTION	DESCRIPTION
	until a connection is performed, or until the application is stopped
<b>Give up after ... failed retries</b>	Enable this option to define a maximum number of connection retries. When the specified number of consecutive connection retries is reached, the Driver goes to the <b>Offline</b> 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
<b>Disconnect if non-responsive for ... seconds</b>	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 <b>Timeout</b> option

**Options on the Logging Options group**

OPTION	DESCRIPTION
<b>Log to File</b>	<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.</p> <p>If the <b>%PROCESS%</b> macro is used in the log file name, it is replaced by the ID of the current process. This option is particularly useful when using several instances of the same Driver in <b>E3</b>, thus allowing each instance to generate a separate log file. For example, when configuring this option as <b>c:\e3logs\drivers\sim_%PROCESS%.log</b>, a file named <b>c:\e3logs\drivers\sim_0000FDA.log</b> is generated for process <b>0FDAh</b>.</p> <p>Users can also use the <b>%DATE%</b> macro in the file name. In this case a log file is generated every day (in the format <b>aaaa_mm_dd</b>). For example, when configuring this option as <b>c:\e3logs\drivers\sim_%DATE%.log</b>, a file named <b>c:\e3logs\drivers\sim_2005_12_31.log</b> is generated in 12/31/2005 and a file named <b>c:\e3logs\drivers\sim_2006_01_01.log</b> is generated in 01/01/2006</p>

**Serial Tab**

Use this tab to configure parameters for a **Serial** Interface.

Serial

Port:

Baud rate:

Data bits:

Parity:

Stop bits:

Enable 'ECHO' suppression

Handshaking

DTR control:

RTS control:

Wait for CTS before send

CTS timeout:  ms

Delay before send:  ms

Delay after send:  ms

Inter-byte delay (microseconds):   $\mu$ s

Inter-frame delay (milliseconds):  ms

Serial tab

General options on the Serial tab

OPTION	DESCRIPTION
<b>Port</b>	Select a serial port on the list, from <b>COM1</b> to <b>COM4</b> , or type the name of a serial port in the format <b>COMn</b> , such as "COM15". When typing a port's name manually, the dialog box only accepts port names starting with the expression "COM"
<b>Baud rate</b>	Select a baud rate on the list ( <b>1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200</b> ) or type a baud rate, such as 600
<b>Data bits</b>	Select 7 (seven) or 8 (eight) data bits on the list
<b>Parity</b>	Select a parity on the list. The available options are <b>None, Even, Odd, Mark, or List</b>
<b>Stop bits</b>	Select the number of stop bits on the list. The available options are <b>1, 1.5, or 2</b> stop bits
<b>Enable 'ECHO' suppression</b>	Enable this option to remove the echo received after the I/O Interface sends data via serial port. If this echo is not equal to the bytes just sent, then the I/O Interface aborts communication.
<b>Inter-byte delay (microseconds)</b>	Defines a delay between each byte transmitted by the I/O Interface, in millionths of a second, that is, 1000000 is equal to a second. This option must be used with small delays of less than a millisecond
<b>Inter-frame delay (milliseconds)</b>	Defines a delay between packets sent or received by the I/O Interface, in thousandths of a second, that is, 1000 is equal to a second. This delay is applied if the I/O Interface

OPTION	DESCRIPTION
	sends two consecutive packets, or between a received packet and the next sending

The **Handshaking** group configures the usage of **RTS**, **CTS**, and **DTR** signals in the handshaking process (controlling when data can be sent or received via serial line). Most of the time, configuring the **DTR control** option to **ON** and the **RTS control** option to **Toggle** works with RS232 serial lines as well as with RS485 serial lines.

#### Available options on the Handshaking group

OPTION	DESCRIPTION
<b>DTR control</b>	Select <b>ON</b> to keep the <b>DTR</b> signal always on while the serial port is open. Select <b>OFF</b> to turn the <b>DTR</b> signal off while the serial port is open. Some devices require the <b>DTR</b> signal always on to allow communication.
<b>RTS control</b>	Select <b>ON</b> to keep the <b>RTS</b> signal always on while the serial port is open. Select <b>OFF</b> to turn the <b>RTS</b> signal off while the serial port is open. Select <b>Toggle</b> to turn the <b>RTS</b> signal on while sending bytes via serial port and turn it off when not sending bytes, therefore enabling the reception.
<b>Wait for CTS before send</b>	Available only when the <b>RTS control</b> option is configured to <b>Toggle</b> . Use this option to force a Driver to check the <b>CTS</b> signal before sending bytes via serial port, after turning the <b>RTS</b> signal on. In this mode the <b>CTS</b> signal is handled as a permission flag for sending.
<b>CTS timeout</b>	Determines a maximum time, in milliseconds, that a Driver waits for the <b>CTS</b> signal after turning the <b>RTS</b> signal on. If the <b>CTS</b> signal is not turned on within this time-out, the Driver then fails the current communication and returns an error.
<b>Delay before send</b>	Some serial port hardware have a delay when enabling a data sending circuit after the <b>RTS</b> signal is turned on. Configure this option to wait a certain number of milliseconds after turning the <b>RTS</b> signal on and before sending the first byte. <b>IMPORTANT:</b> This delay must be used carefully, because it uses 100% of CPU resources while waiting. System's general performance degrades as this value increases.
<b>Delay after send</b>	This is the same effect of the <b>Delay before send</b> option, but in this case the delay is performed after sending the last byte, before turning the <b>RTS</b> signal off.

## 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**.

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' suppression

IP Filter:

Connect to

<input type="checkbox"/> Main IP:	<span style="border: 1px solid gray; display: inline-block; width: 100%; height: 15px;"></span>	Port:	<span style="border: 1px solid gray; padding: 2px;">502</span>	<input type="checkbox"/> Local port:	<span style="border: 1px solid gray; padding: 2px;">0</span>
<input type="checkbox"/> Backup IP 1:	<span style="border: 1px solid gray; display: inline-block; width: 100%; height: 15px;"></span>	Port:	<span style="border: 1px solid gray; padding: 2px;">0</span>	<input type="checkbox"/> Local port:	<span style="border: 1px solid gray; padding: 2px;">0</span>
<input type="checkbox"/> Backup IP 2:	<span style="border: 1px solid gray; display: inline-block; width: 100%; height: 15px;"></span>	Port:	<span style="border: 1px solid gray; padding: 2px;">0</span>	<input type="checkbox"/> Local port:	<span style="border: 1px solid gray; padding: 2px;">0</span>
<input type="checkbox"/> Backup IP 3:	<span style="border: 1px solid gray; display: inline-block; width: 100%; height: 15px;"></span>	Port:	<span style="border: 1px solid gray; padding: 2px;">0</span>	<input type="checkbox"/> Local port:	<span style="border: 1px solid gray; padding: 2px;">0</span>

**Ethernet tab**

**Available options on Ethernet tab**

OPTION	DESCRIPTION
<b>Transport</b>	Select <b>TCP/IP</b> for a TCP socket (stream). Select <b>UDP/IP</b> to use a UDP socket (connectionless datagram)
<b>Listen for connections on port</b>	Use this option to wait for new connections in a specific IP port, common in Slave Drivers. If this option remains unselected, the Driver connects to the address and port specified in the <b>Connect to</b> option
<b>Share listen port with other processes</b>	Select this option to share the listen port with other Drivers and processes
<b>Interface</b>	Select the local network interface, identified by its IP address, that is used by the Driver to establish and receive connections, or select the <b>(All Interfaces)</b> item to use any local network interface
<b>Use IPv6</b>	Check this option to force the Driver to use IPv6 addresses on all Ethernet connections. If this option is unchecked the Driver will work with IPv4 addresses
<b>Enable 'ECHO' suppression</b>	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
<b>IP Filter</b>	List of restricted or allowed IP addresses from where a Driver accepts connections (Firewall). Please check the <b>IO.Ethernet.IPFilter</b> property for more details
<b>PING before connecting</b>	Enable this option to execute a <b>ping</b> command, that is, check whether a device can be reached on a network, for a device before trying a socket connection. This is a quick way of determining a successful connection before trying to

OPTION	DESCRIPTION
	<p>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"> <li>• <b>Timeout:</b> Specify the number of milliseconds to wait for a reply from the <b>ping</b> command. Users must use the <b>ping</b> 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 one and four seconds</li> <li>• <b>Retries:</b> Number of retries of a <b>ping</b> command, not counting the first attempt. If all attempts fail, then the socket connection is aborted</li> </ul>

**Available options on the Connect to group**

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

## Modem Tab

Use this tab to configure parameters of a **Modem** Interface. Some options on the **Serial** tab affect the modem configuration, therefore users must also configure the **Serial** Interface.

Modem

Select the modem to use:

Dial Number:

Accept incoming calls

**Modem tab**

The **Modem** Interface uses the TAPI modems installed on the computer.

#### Available options on the Modem tab

OPTION	DESCRIPTION
<b>Select the modem to use</b>	Select a modem on the list of available modems on the computer. If the <b>Default modem</b> option is selected, then the first available modem is used. Selecting this option is recommended specially when an application is used on another computer
<b>Modem settings</b>	Click to open the configuration window of the selected modem
<b>Dial Number</b>	Type a default number for dialing. This value can be changed at run time. Users can use the <b>w</b> character to represent a pause or a waiting time for a dial tone. For example, "0w33313456" dials the number zero, waits, and then dials the number "33313456"
<b>Accept incoming calls</b>	Enable this option so that the Driver answers the phone when receiving an external call. To use this option, users must configure the <b>Connection management</b> option on the <b>Setup</b> tab to <b>Manual</b>

## 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.IOKitEvent

<b>Type of Tag</b>	Block Tag
<b>Type of Access</b>	Read-Only
<b>B1 Parameter</b>	-1 (minus one)
<b>B2 Parameter</b>	0 (zero)
<b>B3 Parameter</b>	0 (zero)
<b>B4 Parameter</b>	1 (one)
<b>Size Property</b>	4 (four)
<b>ParamItem Property</b>	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 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:** Event message, 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

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

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

- **0:** Physical layer stopped, that is, the 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, the Driver is in **Online** mode but the physical layer is not connected. If the **Connection management** option is configured as **Automatic**, the physical layer can be connecting, disconnecting, or waiting for a reconnection attempt. If the **Connection management** option is configured as **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 the device is connected, only the access layer is working

## IO.SetConfigurationParameters

<b>Type of Tag</b>	Block Tag
<b>Type of Access</b>	Read-Only
<b>B1 Parameter</b>	-1 (minus one)
<b>B2 Parameter</b>	0 (zero)
<b>B3 Parameter</b>	0 (zero)
<b>B4 Parameter</b>	3 (three)
<b>Size Property</b>	2 (two)
<b>ParamItem Property</b>	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 the 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 **Elipse SCADA**, users must use a Block Tag. Every parameter to configure uses two Block Elements. For example, if users want to configure three parameters, then the size of the Block must be 6 (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 writing 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 **E3**, the ability to create arrays at run time allows using an I/O Tag as well as a Block Tag. Users can use Driver's **Write** method to send all parameters to the 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 Driver's log or use the *writeStatus* parameter of the **WriteEx** method to find out the exact cause of the 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

<b>Type of Tag</b>	I/O Tag
<b>Type of Access</b>	Reading or Writing
<b>N1 Parameter</b>	-1 (minus one)
<b>N2 Parameter</b>	0 (zero)
<b>N3 Parameter</b>	0 (zero)
<b>N4 Parameter</b>	4 (four)
<b>String Configuration</b>	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 on the **IO.PhysicalLayerStatus** Tag

In the next example, using **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 can fail when configuring a Driver to **Online** mode, that is, writing the value 1 (one). In this case, the 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
- 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 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, where a Driver manages the connection or **1**: Manual mode, where an application manages the connection.

### IO.GiveUpEnable

■ When configured to True, defines a maximum number of reconnection attempts. If all reconnection attempts fail, the Driver enters the **Offline** mode. When configured to False, the 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 reconnection is lost. If this one fails, a 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 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

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

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

## IO.Stats.Partial.BytesSent

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

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

## IO.Stats.Partial.TimeConnectedSeconds

<b>Type of Tag</b>	I/O Tag
<b>Type of Access</b>	Read-Only
<b>N1 Parameter</b>	-1 (minus one)
<b>N2 Parameter</b>	0 (zero)
<b>N3 Parameter</b>	0 (zero)
<b>N4 Parameter</b>	1102
<b>Configuration by String</b>	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

<b>Type of Tag</b>	I/O Tag
<b>Type of Access</b>	Read-Only
<b>N1 Parameter</b>	-1 (minus one)
<b>N2 Parameter</b>	0 (zero)
<b>N3 Parameter</b>	0 (zero)
<b>N4 Parameter</b>	1103
<b>Configuration by String</b>	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

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

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

## IO.Stats.Total.BytesSent

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

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

## IO.Stats.Total.ConnectionCount

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

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

## IO.Stats.Total.TimeConnectedSeconds

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

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

## IO.Stats.Total.TimeDisconnectedSeconds

<b>Type of Tag</b>	I/O Tag
<b>Type of Access</b>	Read-Only
<b>N1 Parameter</b>	-1 (minus one)
<b>N2 Parameter</b>	0 (zero)
<b>N3 Parameter</b>	0 (zero)
<b>N4 Parameter</b>	1003
<b>Configuration by String</b>	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

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

During the connection process, if the active IP address is not available, the I/O Interface tries to connect using the next alternative 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 IP address or **1, 2, 3**: Alternative IP address) if the Driver is currently connected. If the Driver is disconnected, this Tag configures the active IP address for the next connection attempt.

## IO.Ethernet.IPSwitch

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

Any value written to this Tag forces a manual switchover. If the main IP address is active, then the Driver tries to connect to each one of the alternative or backup IP addresses and back to the main IP address until a connection is established.

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

## 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 the Driver must not accept external connections, that is the Driver behaves as a master, or configure to True to enable the reception of connections, that is, the 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, the Driver tries to use an alternative IP address. Configure to False to disable its usage.

## 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 of a remote device or configure to False to use any available local port.

## IO.Ethernet.BackupIP[2,3]

**A** 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.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

A 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. 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 from 192.168.0.41 to 192.168.0.50
- **192.168.0.\***: Accepts connections from IPv4 addresses from 192.168.0.0 to 192.168.0.255
- **fe80:3bf:877::\*:\*** (**expands to fe80:03bf:0877:0000:0000:0000:0000:0000**): Accepts connections from IPv6 addresses from fe80:03bf:0877:0000:0000:0000:0000:0000 to 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 from 192.168.0.0 to 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 listen mode, where 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 receive connections. Leave this property empty to use 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 sends to a device.

## IO.Ethernet.Transport

**A** 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).

# Modem Interface Configuration

This section contains information about the configuration of **I/O Tags** and **Properties** of a **Modem** (TAPI) Interface.

## I/O Tags

### Tags of a Modem Interface (N2/B2 = 3)

The Tags described next allow controlling and diagnosing a **Modem** (TAPI) Interface at run time.

#### IMPORTANT

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

### IO.TAPI.ConnectionBaudRate

<b>Type of Tag</b>	I/O Tag
<b>Type of Access</b>	Read-Only
<b>N1 Parameter</b>	-1 (minus one)
<b>N2 Parameter</b>	0 (zero)
<b>N3 Parameter</b>	3 (three)
<b>N4 Parameter</b>	5 (five)
<b>String Configuration</b>	IO.TAPI.ConnectionBaudRate

Indicates a baud rate value for the current connection. If a modem is not connected, returns the value 0 (zero).

### IO.TAPI.Dial

<b>Type of Tag</b>	I/O Tag
<b>Type of Access</b>	Write-Only
<b>N1 Parameter</b>	-1 (minus one)
<b>N2 Parameter</b>	0 (zero)
<b>N3 Parameter</b>	3 (three)
<b>N4 Parameter</b>	1 (one)
<b>String Configuration</b>	IO.TAPI.Dial

Write any value to this Tag to force a **Modem** Interface to start a call. This is an asynchronous command, only starting the call process. Users can monitor the **IO.TAPI.IsModemConnected** Tag to detect when a call is established.

## IO.TAPI.HangUp

<b>Type of Tag</b>	I/O Tag
<b>Type of Access</b>	Write-Only
<b>N1 Parameter</b>	-1 (minus one)
<b>N2 Parameter</b>	0 (zero)
<b>N3 Parameter</b>	3 (three)
<b>N4 Parameter</b>	4 (four)
<b>String Configuration</b>	IO.TAPI.HangUp

Any value written to this Tag turns the current call off.

### NOTE

Use this command only when managing the physical layer manually or when explicitly trying to force a Driver to restart the communication. If the physical layer is configured for automatic reconnection, the Driver immediately tries to reestablish the connection.

## IO.TAPI.IsModemConnected

<b>Type of Tag</b>	I/O Tag
<b>Type of Access</b>	Read-Only
<b>N1 Parameter</b>	-1 (minus one)
<b>N2 Parameter</b>	0 (zero)
<b>N3 Parameter</b>	3 (three)
<b>N4 Parameter</b>	3 (three)
<b>String Configuration</b>	IO.TAPI.IsModemConnected

This Tag indicates the status of a modem connection. Possible values are **0**: The modem is not connected, but it may be performing or receiving an external call or **1**: The modem is connected and the Driver completed or received an external call successfully. While it is in this status, the physical layer can send or receive data.

## IO.TAPI.IsModemConnecting

<b>Type of Tag</b>	I/O Tag
<b>Type of Access</b>	Read-Only
<b>N1 Parameter</b>	-1 (minus one)
<b>N2 Parameter</b>	0 (zero)
<b>N3 Parameter</b>	3 (three)
<b>N4 Parameter</b>	6 (six)
<b>String Configuration</b>	IO.TAPI.IsModemConnecting

This Tag indicates the status of a modem connection, with more details than the **IO.TAPI.IsModemConnected** Tag. Possible values are **0**: Modem is not connected, **1**: Modem is connecting, that is, performing or receiving an external call, **2**: Modem is connected. While in this status, the physical layer can send or receive data, or **3**: Modem is disconnecting the current call.

## IO.TAPI.ModemStatus

<b>Type of Tag</b>	I/O Tag
<b>Type of Access</b>	Read-Only
<b>N1 Parameter</b>	-1 (minus one)
<b>N2 Parameter</b>	0 (zero)
<b>N3 Parameter</b>	3 (three)
<b>N4 Parameter</b>	2 (two)
<b>String Configuration</b>	IO.TAPI.ModemStatus

Returns a **String** with the current status of a modem. Possible values are the following:

- **"No status!"**: The **Modem** Interface was not open yet or was already closed
- **"Modem initialized OK!"**: The **Modem** Interface was initialized successfully
- **"Modem error at initialization!"**: Driver could not initialize modem's line. Check Driver's log file for more details
- **"Modem error at dial!"**: Driver could not start or accept a call
- **"Connecting..."**: Driver started a call successfully, and is currently processing that call
- **"Ringing..."**: Indicates that the modem is receiving an external call, but it did not accepted it yet
- **"Connected!"**: Driver connected successfully, that is, completed or accepted an external call
- **"Disconnecting..."**: Driver is turning the current call off
- **"Disconnected OK!"**: Driver turned the current call off
- **"Error: no dial tone!"**: Driver aborted a call because the available line signal was not detected
- **"Error: busy!"**: Driver aborted a call because the line was busy
- **"Error: no answer!"**: Driver aborted a call because no answer was received from the other modem
- **"Error: unknown!"**: Current call was aborted because of an unknown error

## IO.TAPI.PhoneNumber

Type of Tag	I/O Tag
Type of Access	Reading or Writing
N1 Parameter	-1 (minus one)
N2 Parameter	0 (zero)
N3 Parameter	3 (three)
N4 Parameter	0 (zero)
String Configuration	IO.TAPI.PhoneNumber

This Tag is a **String** that reads or changes the telephone number used by the **IO.TAPI.Dial** Tag. When changing this Tag, the new value is used only on the next **Dial** command.

## Properties

These properties control the configuration of a **Modem** (TAPI) Interface.

## IO.TAPI.AcceptIncoming

**9** Configure to False if a modem cannot accept external calls, that is, the Driver behaves as a master, and configure to True to enable receiving calls, that is, the Driver behaves as a slave.

## IO.TAPI.ModemID

**9** This is the identification number of a modem. This ID is created by Windows and used internally to identify a modem on a list of devices installed on a computer. This ID may not remain valid if a modem is reinstalled or an application is executed on another computer.

### NOTE

It is advisable to configure this property as 0 (zero), indicating that a Driver must use the first available modem.

## IO.TAPI.PhoneNumber

**A** A telephone number used by **Dial** commands, such as "0w01234566", where the "w" character forces a modem to wait for a call sign.

## Serial Interface Configuration

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

## I/O Tags

### Tags of a Serial Interface (N2/B2 = 2)

Currently, there are no Tags defined specifically to manage a **Serial** Interface at run time.

## Properties

These properties control the configuration of a **Serial** Interface.

### IO.Serial.Baudrate

9 Specifies a baud rate of a serial port, such as 9600.

### IO.Serial.CTSTimeoutMs

9 Time to wait for a **CTS** signal, in milliseconds. After turning the **RTS** signal on, a timer is started to wait for a **CTS** signal. If this timer expires, the Driver aborts sending bytes through the serial port. Available only when the **IO.Serial.RTS** property is configured as **Toggle** and the **IO.Serial.WaitCTS** property is configured to True.

### IO.Serial.DataBits

9 Specifies the number of data bits to configure a serial port. Possible values are **5**: Five data bits, **6**: Six data bits, **7**: Seven data bits, or **8**: Eight data bits.

### IO.Serial.DelayAfterMs

9 Number of milliseconds to delay after the last byte is sent through a serial port, but before turning the **RTS** signal off. Available only when the **IO.Serial.RTS** property is configured to **Toggle** and the **IO.Serial.WaitCTS** property is configured to False.

### IO.Serial.DelayBeforeMs

9 Number of milliseconds to delay after turning the **RTS** signal on, but before data is sent. Available only when the **IO.Serial.RTS** property is configured to **Toggle** and the **IO.Serial.WaitCTS** property is configured to False.

### IO.Serial.DTR

A Indicates how a Driver deals with the **DTR** signal. Possible values are **OFF**: **DTR** signal is always turned off or **ON**: **DTR** signal is always turned on.

### IO.Serial.InterbyteDelayUs

9 Delay time, in milliseconds (1/1000000 of a second), for each two bytes sent through a **Serial** Interface.

### IO.Serial.InterframeDelayMs

9 Delay time, in milliseconds, before sending a packet after the last packet sent or received.


### IO.Serial.Parity

A Specifies a parity for the configuration of a serial port. Possible values are **E or Even**: Even parity, **N or None**: No parity, **O or Odd**: Odd parity, **M or Mark**: Mark parity, or **S or Space**: Space parity.


### IO.Serial.Port

9 Number of the local serial port. Possible values are **1**: Uses the COM1 port, **2**: Uses the COM2 port, **3**: Uses the COM3 port, or **n**: Uses the COMn port.


## IO.Serial.RTS

 Indicates how a Driver deals with the **RTS** signal. Possible values are **OFF**: **RTS** signal always off, **ON**: **RTS** signal always on, or **Toggle**: Turns the **RTS** signal on when transmitting data and turns the **RTS** signal off when not transmitting data.


## IO.Serial.StopBits

 Specifies the number of stop bits for the configuration of a serial port. Possible values are **1**: One stop bit, **2**: One and a half stop bit, or **3**: Two stop bits.

## IO.Serial.SuppressEcho

 Use a value different from 0 (zero) to enable suppressing the echo or 0 (zero) to disable it.

## IO.Serial.WaitCTS

 Configure to True to force a Driver to wait for the **CTS** signal before sending bytes when the **RTS** signal is turned on. Available only when the **IO.Serial.RTS** property is configured to **Toggle**.

## Driver Revision History

VERSION	DATE	AUTHOR	COMMENTS
2.0.2	08/15/2022	H. Coelho	<ul style="list-style-type: none"> <li>Implemented support for sending commands using a writing Tag (<i>Case 31521</i>).</li> </ul>
2.0.1	12/20/2019	G. Beal	<ul style="list-style-type: none"> <li>Driver ported to Visual Studio 2017 (<i>Case 27733</i>).</li> </ul>
1.1.1	03/04/2002	C. Mello	<ul style="list-style-type: none"> <li>Added a validation of configuration parameters.</li> </ul>
1.0.1	02/14/2002	A. Dexheimer	<ul style="list-style-type: none"> <li>Initial version of this Driver.</li> </ul>

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