Wonderware Operations Integration – Supervisory Texas Instruments TI500 Server (G-1.2 Series)

Contents

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This document describes the technical specifications and configuration options for the Wonderware® Operations Integration - Supervisory Texas Instruments TI500 Server (or TI500 OI Server, for short).

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Legal Information

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Technical Support

Wonderware Technical Support offers a variety of support options to answer any questions on Wonderware products and their implementation.

Before you contact Technical Support, refer to the relevant section(s) in this documentation for a possible solution to the problem. If you need to contact technical support for help, have the following information ready:

• The type and version of the operating system you are using.

• Details of how to recreate the problem.

• The exact wording of the error messages you saw.

• Any relevant output listing from the Log Viewer or any other diagnostic applications.

• Details of what you did to try to solve the problem(s) and your results.

• If known, the Wonderware Technical Support case number assigned to your problem, if this is an ongoing problem.

Introduction to the TI500 OI Server

These are the technical specifications for Wonderware Operations Integration - Supervisory Texas Instruments TI500 Server.

Requirements

TI500 OI Server requires Wonderware Operations Integration – Core G-1.2 or later.

Supported hardware and software

This OI Server connects to the following 500 Series PLCs from Texas Instruments (Siemens):

- TI545
- TI565
- TI575
- CTI2500

For RS 232/Ethernet communication, CTI2500-C100 PLCs can use either the TBP or NITP. (The specific protocol can be selected in the communication settings.)

To program CTI2500-C100 PLCs, you need PLC WorkShop Suite for Siemens 505. For more information, go to: www.fast-soft.com/page.php?20

Conformance

The following hardware and software was used for conformance testing of this OI Server.

Configuration #1:

- Device: CTI2500-C100 PLC with PLC WorkShop Suite for Siemens 505
- Module Port: 1505
- Module IP Address: 10.13.63.161
- Protocol: NITP
- Serial Encapsulation mode: Ethernet

Configuring the TI500 OI Server

Each server instance has its own hierarchy of objects, and each object has parameters that you need to configure in order to establish communication between the OI Server and individual devices on the network.

You can view a TI500 server instance's configuration hierarchy under its **Configuration** node.

This section only describes how to configure object parameters for a TI500 server instance. For more general information about adding and configuring objects, see "Configuring Your OI Server" in the *Operations Integration Server Manager Help.*

Direct Serial Communication and Serial Encapsulation

This OI Server supports direct serial communication with the target device, as well as serial encapsulation over a TCP/IP or UDP/IP network link.

Direct serial communication requires that the target device be directly connected to the computer that is running this OI Server. If you plan to use direct serial communication, you need to know the serial communication settings (e.g., baud rate, parity, etc.) that have been configured on the device, because you must configure this OI Server to match those settings.

Serial encapsulation enables serial communication with a target device that is connected to a terminal server on your TCP/IP or UDP/IP network. The terminal server is like a virtual serial port: it converts TCP or UDP messages to serial data and then relays them to the connected device. If you plan to use serial encapsulation, the target device should already be connected to the terminal server, and you need to know the IP address of the terminal server and the port number assigned to the device.
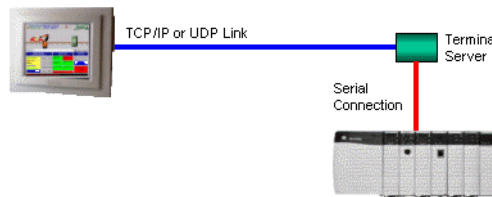
Serial encapsulation over a TCP/IP or UDP/IP link

All of the serial communication settings are included in the OI Server's channel parameters.

To configure the serial communication settings for a channel:

1. In the Operations Integration Server Manager, navigate to the ChannelSelector object that you want to configure:
   a) Expand the **Operations Integration Server Manager**, expand the node group, expand **Local** (or the remote computer name), and then expand **Operations Integration Supervisory Servers**.
   b) Locate and expand **Texas Instruments - TI500**, and then expand its **Configuration** node.
   c) Select the ChannelSelector object that you want to configure.

   The channel parameters are displayed in the details pane on the right.

2. In the **Serial Encapsulation** box, select the encapsulation mode:

Option	Description
None	Direct serial communication with the device.
TCP/IP	Serial encapsulation over a TCP/IP Ethernet connection.
UDP/IP	Serial encapsulation over a UPD/IP Ethernet connection.

3. If you selected **None** above, configure the direct serial communication settings:
   a) In the **COM** box, select the COM port to which the target device is connected.

    b) In the **Baud Rate**, **Data Bits**, **Stop Bits**, and **Parity** boxes, configure the serial communication settings to match the settings that have already been configured on the target device.

4. If you selected either **TCP/IP** or **UDP/IP** above, configure the serial encapsulation settings:

    a) In the **IP Address** box, type the IP address of the terminal server.

    b) In the **Port Number** box, type the port number on the terminal server that has been assigned to the target device.

    c) If you want to make the target device responsible for establishing communication with this OI Server, select **Server Mode**.

> ☞ **Note:** This option is not available for UDP/IP.

5. Proceed with configuring the rest of the channel parameters, as described in this documentation.

Configuring a Channel's Communication Settings

Configure the communication settings for a selected channel to ensure uninterrupted communication with the device network.

Write word bits

    An option to allow or disallow writing to individual bits of a Word. Select one of the following:

Value	Option	Description
0	No	Do not allow writing to individual bits.
1	Yes	Allow writing to individual bits.

Protocol

    The specific transport protocol to be used. Select one of the following:

Value	Option	Description
0	TBP	Transparent Byte Protocol
1	NITP	Non-Intelligent Terminal Protocol

Signed or Unsigned Value

    Whether register values are unsigned or signed by default. Select either **Signed** or **Unsigned**.

Max Block Size

    The maximum number of bytes that will be requested from the device in a single read operation. You can type any value from 0 to 64, but the defalult value is 7.

Advanced

    Click this button to open the *Advanced Settings* dialog box, which provides access to additional communication settings such as timeouts, retries, and buffer sizes. You might need to change these settings if the DAServer behaves unexpectedly during run time, but the default settings should work for most network configurations. For more information about these settings, see "Advanced Settings" in *Operations Integration Server Manager Help*.

Setting a Device's Station ID

Set the station ID for a selected device so that the OI Server can identify and communicate with it on the network.

Syntax

A station ID is required only for Ethernet encapsulation. In other words, it is required only if both of the following conditions apply:

- Serial encapsulation is enabled, as an alternative to direct serial communication, in order to connect to a terminal server via Ethernet; and

- The target device is also connected via Ethernet but has its own address that is different from terminal server's address.

Otherwise, if both conditions do not apply, you may leave the station ID blank.

> ☞ **Note:** If serial encapsulation is not enabled, this OI Server can only do direct serial communication. There is no option to do Ethernet communication only.

The station ID for a target device must use the following syntax:

> **`<IP address>:<Port Number>|`**

The following syntax diagram shows all of the possible options:
IP address:*port number*|

IP address

> The IP address of the target device.

port number

> The port number of the PLC program running on the target device. The default port is 1505, but you can use the PLC programming software to change it if necessary.

Please note the pipe character (|) at the end of the station ID, after the port number. It indicates that the station ID should override the address of the terminal server, as configured in the Serial Encapsulation settings.

> **Examples**
>
> Examples of valid station IDs:
>
> `192.168.0.5:1505|`
>
> `10.13.63.90:1505|`

TI500 OI Server Reference

Use item references to access data stored in memory registers in connected devices, as well as to access standard system items in the OI Server itself.

This section only describes the item reference syntax and options for the TI500 server. For more general information about item references, see "Managing Device Items" and "Item Reference Descriptions" in the *Operations Integration Server Manager Help*.

Item Reference Syntax

Item references in this OI Server use the following syntax.

For digital registers (i.e., register types X, Y, C), use the following syntax:

```
<register type><address>
```

For analog registers (i.e., register types V, K, TCP, TCC, WX, WY), use either of the following syntaxes:

```
<register type><address>:[bit]
```

```
<register type><address><data type>
```

The following syntax diagram shows all of the possible options:
{ { X | Y | C }*address* | { V | K | TCP | TCC | WX | WY }*address*{ | :*bit* | F | R | . | D }}

register type

The type of memory register on the target device:

Type	Description
X	Discrete Input
Y	Discrete Output
C	Control Relay
V	Variable Memory
K	Constant Memory
TCP	Timer/Count Preset Memory
TCC	Timer/Count Count Memory
WX	Word Input Memory
WY	Word Output Memory

address

The address of the memory register on the target device.

bit

The bit number (0 to 15) to be accessed in the memory register.

This parameter is optional; if no bit is specified, the entire 16-bit Word is used by default.

data type

The data type of the memory register:

Type	Description
F	Floating point or real number (32-bit)

Type	Description
R	Floating point or real number (32-bit)
.	Floating point or real number (32-bit)
D	DWord (i.e., unsigned, 32-bit decimal)

☞ **Note:** F, R, and . all mean the same thing and can be used interchangeably.

This parameter is optional; if no type is specified, it is considered to be Word (i.e., unsigned, 16-bit decimal) by default.

Address Descriptions

The address descriptions consist of the register type, its item name and the allowable range of values, the default data type, allowable suffixes (if any), and allowable access methods.

Register Type	Item Reference		Data Type	Access
	Item Name	Range		
Discrete Input	X	0000 to 0377	Bit	Read only
Discrete Output	Y	1000 to 1177	Bit	Read/Write
Control relay	C	0000 to 0177	Bit	Read/Write
Variable Memory	V	0000 to 0777	Word	Read/Write
Constant Memory	K	0000 to 0777	Word	Read/Write
Timer/Count Preset Memory	TCP	0000 to 0777	Word	Read/Write
Timer/Count Count Memory	TCC	0000 to 1777	Word	Read/Write
Word Input Memory	WX	0000 to 0777	Word	Read only
Word Output Memory	WY	0000 to 0377	Word	Read/Write

Unsupported register types

The following registers are also implemented in this OI Server, but they have not been validated in conformance tests.

Register Type	Item Name
Loop Process Variable	LPV
Loop Setpoint	LSP
Loop Output	LMN
Loop Bias	LMX
Loop Error	LERR
Loop Gain	LKC
Loop Rate	LTD
Loop Reset	LTI
Loop V-flags	LVF
RAMP/SOAK flags	LRSF
Analog Alarm Process Variable	APV
Analog Alarm Setpoint	ASP
Analog Alarm flags	AVF

Register Type	Item Name
Loop Process Variable High Limit	LPVH
Loop Process Variable Low Limit	LPVL
Analog Alarm Process Variable High Limit	APVL
Analog Alarm Process Variable Low Limit	APVH
Loop Sample Rate (in seconds)	LTS
Analog Alarm Sample Rate (in seconds)	ATS
Loop High Alarm Limit	LHA
Loop Low Alarm Limit	LLA
Loop Orange Deviation Alarm Limit	LODA
Loop Yellow Deviation Alarm Limit	LYDA
Loop Setpoint High Limit	LSPH
Loop Setpoint Low Limit	LSPL
Most-significant word of Loop C-flags	LCFH
Least-significant word of Loop C-flags	LCFL
Loop High-High Alarm Limit	LHHA
Loop Low-Low Alarm Limit	LLLA
Loop Rate-of-Change Alarm Limit (in Engineering Units per minute)	LRCA
Loop Alarm Deadband	LADB
Analog Alarm High Alarm Limit	AHA
Analog Alarm Low Alarm Limit	ALA
Analog Alarm Orange Deviation Alarm Limit	AODA
Analog Alarm Yellow Deviation Alarm Limit	AYDA
Analog Alarm Setpoint High Limit	ASPH
Analog Alarm Setpoint Low Limit	ASPL
Most-significant word of Analog Alarm C-flags	ACFH
Least-significant word of Analog Alarm C-flags	ACFL
Analog Alarm High-High Alarm Limit	AHHA
Analog Alarm Low-Low Alarm Limit	ALLA
Analog Alarm Rate-of-Change Alarm Limit (in Engineering Units per minute)	ARCA
Analog Alarm Alarm Deadband	AADB
Analog Alarm Error	AERR
Loop Derivative Gain-limiting coefficient	LDK
Loop RAMP/SOAK Step Number	LRSN
Loop Alarm / Alarm Acknowledge flags	LACK
Analog Alarm / Alarm Acknowledge flags	AACK
Loop Peak Elapsed Time Value Represents the elapsed time from when the process is scheduled until it completes execution (TI545, TI555,TI575).	LPET
Analog Alarm Peak Elapsed Time Value	APET

Register Type	Item Name
Represents the elapsed time from when the process is scheduled until it completes execution (TI545 , TI555 , TI575).	
SF PGM Peak Elapsed Time Value Represents the elapsed time from when the process is scheduled until it completes execution (TI545 , TI555 , TI575).	PPET

Supported Data Types

The data type is specified as a suffix in the item syntax. This OI Server supports the following data types.

Data Type	Suffix	Description
Bit (Boolean)	:bit	Single bit. Bit 0 is the low bit. Bit 15 is the high bit.
Float	F	Floating point or real number (32-bit).
	R	
	.	
DWord	D	Unsigned, 32-bit decimal value. Bit 0 is the low bit. Bit 31 is the high bit.

Examples of Item References

These are examples of valid item references for this OI Server. For more information about the referenced addresses, see the manufacturer's documentation for your device.

Register Type	Address on the Device	Item Reference
Discrete Input	X1000	X1000
Discrete Output	Y0007	Y7
Control relay	C1400	C1400
Variable Memory	V00001 (Float format)	V1F
		V1:0
	V00100 (DWord format)	V100D
		V100:8
Constant Memory	K0007	K7
		K7:7
	K0026	K26
		K26:6
Timer/Count Preset Memory	TCP0010	TCP10
	TCP0053	TCP53
Timer/Count Count Memory	TCC0017	TCC17
	TCC0020	TCC20
Word Input Memory	WX0000 (DWord format)	WX0D
	WX0000 (Float format)	WX0F
Word Output Memory	WY0007	WY7
	WY0021	WY21:1

TI500 OI Server Error Codes

The following tables describe the additional error codes that you might receive when poll/poke requests and operations fail.

Code	Description	Possible Causes	Solution
1	Protocol Error	OI Server settings do not match the PLC settings.	Check the PLC settings, and then configure the OI Server settings to match.
2	Invalid Command	OI Server settings do not match the PLC settings.	Check the PLC settings, and then configure the OI Server settings to match.
3	Invalid Response	OI Server settings do not match the PLC settings.	Check the PLC settings, and then configure the OI Server settings to match.
4	Invalid Block Size	The PLC model does not accept the number of bytes requested or sent.	Adjust the **Max Block Size** (in the channel settings).
5	Invalid Header	One or more of the specified item references does not use the required syntax.	Verify the item references according to the syntax provided in this documentation, and then correct them if necessary.
6	Invalid Address	One or more of the specified item references does not use the required syntax.	Verify the item references according to the syntax provided in this documentation, and then correct them if necessary.
9	Word bit write is not enabled	Attempted to write to a word bit without enabling it in the channel settings.	Select the **Write word bits** option (in the channel settings).
14	Busy Error	• Disconnected cables • Device is turned off, or in Stop or error mode • Station number is wrong	• Check the cable wiring. • Check the device state. It must be RUN • Check the station number. • Check the configuration.
15	Invalid Entry	Invalid entry or entries for channel settings.	Check **Write word bits** or **Protocol** (in the channel settings) and make sure they are each set to either 0 or 1, according to the descriptions provided in this documentation.
16	Configured block size is not supported by PLC	The OI Server is requesting more registers than what is supported by the PLC model.	Set the **Max Block Size** (in the channel settings) to a value that is supported by the PLC model. The default value is 7.
17	Invalid entry for block size	The specified maximum block size is invalid.	Set **Max Block Size** (in the channel settings) to an integer value from 1 to 64.
18	Invalid block size	The specified maximum block size is invalid.	Set **Max Block Size** (in the channel settings) to an integer value from 1 to 64.

Code	Description	Possible Causes	Solution
0	OK	Communicating without error.	None required.
-15	Timeout waiting for message to start	• Disconnected cables. • PLC is turned off, in stop mode, or in error mode. • Wrong station number. • Wrong parity (for serial communication). • Wrong RTS/CTS configuration (for serial communication).	• Check cable wiring. • Check the PLC mode — it must be RUN. • Check the station number. • Increase the timeout in the driver's advanced settings. • Check the RTS/CTS configuration (for serial communication).