2500P-JACP
Janus Application Co-Processor

Classic

2500 Series® PLC System
Product Bulletin

Description

The 2500P-JACP module is a general-purpose auxiliary controller that enhances the capabilities of all CTI 2500 Series® and SIMATIC® 505 PLC systems. This Advanced Function Module is based on Janus technology and includes high-speed processing and multi-protocol communications support to provide existing systems with a significant increase in performance, features, and functionality.

Because of its broad communications capabilities and ability to store large amounts of data on-board, the 2500P-JACP is ideal for Edge Computing applications, bringing computation and data storage closer to the location where it is needed, to improve response times and save bandwidth.

The 2500P-JACP runs as a PLC coprocessor performing complex logic/math functions, data logging, and communications with external devices. Although the 2500P-JACP can operate as a stand-alone controller, the control application generally requires data transfer between a host PLC and the module. Two different data transfer options are provided:

Block Transfer Driver: The 2500P-JACP enables the user to configure the Block Transfer Driver which optimizes the exchange of up to 4096 data points with a Siemens, TI, or CTI PLC using the special function I/O backplane protocol. The application can select to exchange V, X/Y, WX/WY, or Control Relays for continuous Read, Write, or "Read at Startup / Then Write". Note this Block Transfer feature allows the 2500P-JACP to be used with existing Simatic/TI 545 and 555 PLCs.

Data Cache: Proprietary link offering enhanced data throughput to CTI 2500 Series® controllers via a dedicated Ethernet connection. Supports up to 6144 variables mapped to any PLC memory type (including Loop/Alarm variables).

The 2500P-JACP includes two external 10/100/1000Mb Ethernet ports with automatic detection of network speed, duplex mode, and cable wiring. An aliasing and isolation feature allows the two network ports to exist on two separate networks, a useful feature for isolating networks of drives or other I/O devices from the main plant communications network.

Both ports are connected to an internal Ethernet switch that provides enhanced filtering and protection against excessive network traffic known as broadcast "storms". The firmware includes a full function TCP/IP stack that supports both TCP and UDP protocols.

Two serial ports provides an electrical interface for RS-232-C (subset), RS-422-A, and RS485 connections. All port parameters are set by software configuration. Sending and receiving of messages is controlled by program logic.

The module provides extensive diagnostic facilities, accessible by a standard web browser, to monitor module status and aid in the detection and correction of errors. The web server provides access to product information, operational statistics, and diagnostic history.

The 2500P-JACP uses a Secure Digital (SD) card for storage of module configuration data, executable program, application program source files, and user data files. Because all configuration and operational files are contained on the SD card, the complete module profile can be transferred simply by swapping SD cards.

Embedded client and server protocols can be used for data transfer with other controllers and devices. All message processing for client operation (request triggering, packet send/receive, message validation, data insertion/extraction, and error handling/retries) is performed by the module firmware without the need for any additional logic in the PLC or 2500P-JACP application program.

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Features

- Adds IEC-61131 languages, functions, and memory organization features to existing CTI 2500 Series® and SIMATIC® 505 controllers.
- Advanced diagnostics and module status provided by the embedded web server.
- Embedded client/server protocols perform data transfer based on configuration tables without the need for any additional logic in the PLC or 2500P-JACP application program.
- High-speed data transfer and RTC time synchronization with CTI controllers.
- Supports user-created graphics pages containing variable data which can be accessed via web browser

Communications Protocols

- **CAMP Client (TCP, UDP, Multicast)**

The CAMP Client enables reading and writing of memory locations in CTI 2500 Series® PLCs or SIMATIC 505® controllers (equipped with a CTI Ethernet communication module). You can choose to send requests using TCP, UDP, or UDP multicast.

- **CAMP Server**

Allows connection of HMI / SCADA devices which communicate using CAMP

- **Open Modbus (Client, Server)**

The Open Modbus drivers enables the 2500P-JACP to communicate with the wide variety of automation devices that support Open Modbus TCP/UDP protocol.

- **Ethernet/IP Scanner, Adapter, Tag Client, Tag Server, Explicit Message Client, Explicit Message Server, and Flex I/O Client**

The 2500P-JACP supports connections to up to 64 Ethernet/IP devices via I/O Scanner or Tag Client.

- **Profinet Controller and Device (Future)**

- **Serial Modbus RTU (Master, Slave)**

The module can communicate to serial Modbus devices using the Modbus RTU protocol and the onboard serial ports.

- **General Serial ASCII Send/Receive**

Provides bidirectional communications with devices that use proprietary serial protocol messages. Data is transmitted/received based on the application logic.

- **TCP/UDP Management Functions**

Simple interface to a full set of functions to manage TCP and UDP sockets used for building client/server applications for communications over Ethernet.

- **Network Data Exchange**

Network Data Exchange uses an event-based TCP Publish/Subscribe model to exchange real-time data among CTI Janus Processors, CTI 2500 Series® processors using 2500P-ECC1, 2500P-ACP1, and other 2500P-JACP modules

- **MQTT**

MQTT is an standard messaging protocol for the Internet of Things (IoT). It uses a publish/subscribe messaging transport that is ideal for connecting remote devices with minimal network bandwidth. MQTT today is used in a wide variety of industries, such as automotive, manufacturing, telecommunications, oil and gas, etc. MQTT is an ISO standard publish/subscribe messaging protocol designed for connections to remote locations where a “small code footprint” is required and/or network bandwidth is limited.

- **OPC-UA Server**

OPC-UA provides a standardized interface for data access which is supported by most major HMI/SCADA systems.

Important Note on Maximum Ethernet Connection Limit

The 2500-JACP permits a maximum of 64 Ethernet connections. This is the TOTAL of all Client protocol connections that are configured, plus whatever external devices connect to Server protocols.

For example, suppose an application has:

5 Modbus clients configured

4 Modbus devices which connect to the Modbus Server

16 Ethernet/IP scanner devices configured

2 devices which connect to the Ethernet/IP Tag Server

8 CAMP Client connections configured

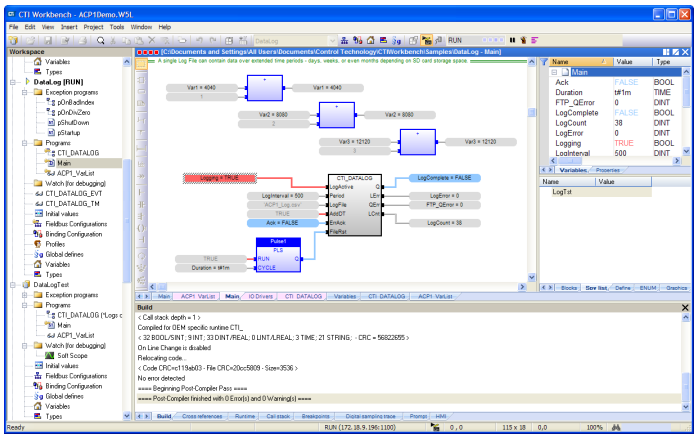
4 devices which connect to CAMP Server

4 devices which connect to OPC-UA Server

This application has used (5+4+16+2+8+4+4) or 43 out of the possible 64 connections.

Programming

The ***CTI Janus Workbench Integrated Development Environment*** provides configuration of module parameters and development of the user application program for the 2500P-JACP.

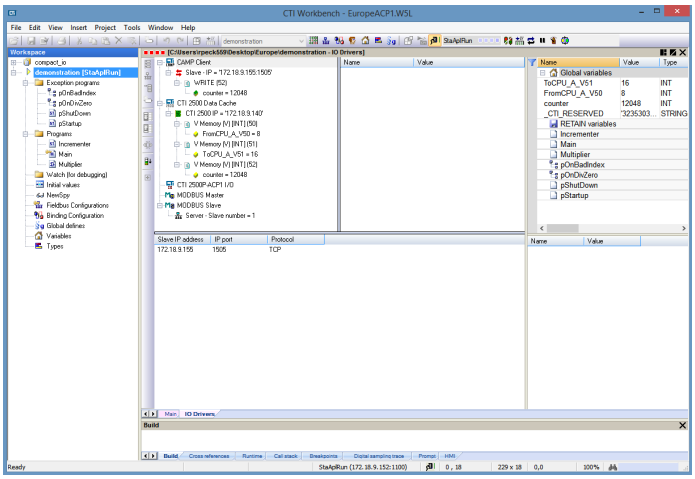


Janus Workbench (JSoft) is used for development of application programs and configuration of communications for the new generation of CTI products including the Janus Processor and 2500P-ACP1 and 2500P-JACP Application Coprocessors. Janus Workbench is a full-featured development environment with integrated programming editor, I/O and fieldbus configuration tool, debugger, trender, data monitor, and simulator. Janus Workbench is PLCopen certified, and may be used to

develop programs that adhere to IEC-61131-3 requirements. Janus Workbench is compatible with Microsoft Windows® 10 and 11.

The application program may be developed in any of five IEC-61131 programming languages:

- Ladder Diagram (LD)
- Function Block Diagram (FBD)
- Structured Text (ST)
- Sequential Function Chart (SFC)
- Instruction List (IL)



A complete library of functions is provided to perform the following tasks:

- Complex mathematical computations
- Boolean logic
- File management
- String handling
- Timer/Counter operations
- PID control
- Real-time data logging

Development Aids

Graphical editor for creation of animated objects for monitoring and HMI applications

- Complete context-sensitive help documentation to get quick help in understanding features
- Custom online change facility with reporting / cancellation feature
- Customization of menus, windows, fonts, display colors, and editing rules
- Program translation between ST, LD, FBD, and IL languages
- Navigation tools for compare, search, and editing across all programs
- Automatic documentation and Revision History reporting
- Full syntax coloring

Time-Saving Features

- Support of OLE drag-and-drop in all editors
- Quick-edit mode with "on-the-fly" variable declaration
- Auto-completion of variable and function names within editors

Monitoring and Debugging

- Built-in web server provides extensive diagnostic information on system operation, status and performance of the various communications protocols, and module configuration
- Application monitoring features such as variable "spy lists", soft-scope trend charts, digital sampling trace, and run-time status displays
- Full array of debugging tools for PC simulator and run-time target:
    - Set Breakpoints and Tracepoints
    - Program can be paused or set to cyclic or step-by-step execution mode.
    - Call stack display shows nested execution levels for function blocks and sub-programs

Hardware Specifications

Module Size: Single Wide

Ethernet Ports:

Number of Ports: 2 (Switched)
Connectors: RJ-45 (Auto-MDIX)
Speed: 10/100/1000Mb (auto-negotiated)
Duplex: Half or Full (auto-negotiated)
Ethernet Storm Protection: Broadcast/Multicast

Status LEDs:

GOOD: Module Operational Status
ACTIVE: Application Program Status
USER: Logic-controlled Status
XMT: Serial Transmit, each port
RCV: Serial Receive, each port
LINK: Link Status (Port 1 and Port 2)
ACT: Activity (Port 1 and Port2)

Status Display:

Three character LED display for system status, error reporting, and IP address.

Serial Ports:

Connector: removeable screw-terminal connector
Electrical Interface: RS-232, RS-422, RS-485
Baud Rates: 1200b -115Kb

Backplane Power: 5.0 watts

Operating Temperature

0-60°C (-40 – 85°F)

Storage Temp

-40 to 85°C (-40 to 185° F)

Relative Humidity

5% to 95% non-condensing

Agency Approvals (pending)

UL, UL-C, CE
Class 1 Div 2

Shipping Weight

1.5 lb. (0.68 Kg)

Comparing 2500 Series® Ethernet Solutions

	2572	2572-A	2572-B	2500 Series® CPU	2500P-ECC1	2500P-ACP1	2500P-JACP	2500P-J750 CPU	Siemens 505-CP1434-TF	Siemens 505-CP1434-TCP
Applications Supported										
Programs with				Workshop, TISoft, APT	ECC1 Configurator	Workbench (Jsoft)	Workbench (Jsoft)	Workbench (Jsoft)		
PLC programming	✓	✓	✓						✓	✓
HMI/SCADA access	✓	✓	✓	✓	✓		✓[11]	✓[11]	✓	✓
Peer-peer (CAMP)	✓	✓	✓	✓[6]	✓	✓	✓	✓		✓
Peer-peer (other)	✓[1]	✓[2]	✓[2]		✓[2,3]	✓[2,3]	✓[2,3]	✓[2,3]	✓	
Communication to SIMATIC/TI 505® CPU over the backplane	✓	✓	✓			✓	✓		✓	✓
Communication to Rockwell PLCs		✓[4]	✓[4]			✓[5]	✓[12]	✓[12]		
Communication to S7	✓									✓
Email	✓									✓
Communication to Modbus TCP devices		✓[9]	✓[9]		✓	✓	✓	✓		
Communication to Ethernet/IP devices		✓[4]	✓[4]			✓[5]	✓[12]	✓[12]		
Performance in CTI standard SCADA test										
Packets sent/received per second [10]	68	102	102	199	989	N/A	N/A	N/A	N/A	N/A
Protocols Supported										
505 Ethernet (aka CAMP, NITP)	✓	✓	✓	✓[7]	✓	✓[8]	✓	✓		✓
Multicast		✓	✓		✓	✓	✓	✓		
Network Data Exchange					✓	✓	✓	✓		
Data Share	✓									
Modbus-TCP		✓[7]	✓[7]		✓	✓	✓	✓		
Ethernet/IP		✓[4]	✓[4]			✓[5]	✓[12]	✓[12]		
H1									✓	
Communicates Directly With (Over Ethernet)										
2572	✓	✓	✓	✓	✓	✓	✓	✓		✓
2572-A	✓	✓	✓	✓	✓	✓	✓	✓		✓
2572-B	✓	✓	✓	✓	✓	✓	✓	✓		✓
2500 Series® CPUs	✓	✓	✓		✓	✓	✓	✓		✓
2500P-ECC1	✓	✓	✓	✓	✓	✓	✓	✓		✓
2500P-ACP1	✓	✓	✓	✓	✓	✓	✓	✓		✓
2500P-JACP						✓	✓	✓		
2500P-J750 CPU						✓	✓	✓		
505-CP1434-TF									✓	
505-CP1434-TCP	✓	✓	✓	✓	✓	✓	✓	✓		✓
Other										
For Direct Use with SIMATIC TI505®	✓	✓	✓			✓	✓		✓	✓
Webserver for diagostics		✓	✓	✓	✓	✓	✓	✓		
OPC/DDE support	✓	✓	✓	✓	✓		✓	✓	✓	✓
100Mbit speed		✓	✓	✓	✓	✓	✓	✓		
1000Mbit speed							✓	✓		
Availability										
Manufactured and supported			✓	✓	✓	✓	✓	✓		
Support Only	✓	✓								

Notes

[1] Datashare protocol

[2] IP Multicast

[3] Network Data Exchange

[4] Supports accessing V memory using CIP DATA TABLE READ and CIP DATA TABLE WRITE messages

[5] Supports connections to Ethernet/IP devices via I/O Scanner, I/O Adapter, Explicit Message Adapter, and Tag Client interfaces

[6] CPU supports "server only" for peer-peer

[7] Supports "server" operation only

[8] Supports "client" operation only

[9] Supports "slave" operation only

[10] Tested with Kepware OPC Server, 3 connections from 2 different PCs, each connection polling 1000 C's and 1000 V's at 10msc speed, 30msec PLC scan

[11] Using OPC-UA or CAMP Server

[12] Supports connections to Ethernet/IP devices via I/O Scanner, I/O Adapter, Tag Client/Server, Explicit Message Client/Server, and Flex I/O Client

2500P-JACP SPECIFICATIONS	
Built-in display for IP address and errors	yes
Ethernet	
Number of IP/Subnet Configurations	2
Number of connections	64
User Memory	
Code (Programs + Fieldbus)	3MB
Data	4MB
Web Server	yes
Web Visualization (variables)	unlimited
Enhanced On-line change	yes
Communication Protocols	
Binding (peer-peer)	yes
CAMP Server	yes
Camp Client	yes
Modbus UDP/TCP Client	choose 2*
Modbus UDP/TCP Server	yes
Ethernet/IP Scanner & Flex I/O	choose 2*
Ethernet/IP Adapter	yes
Ethernet/IP Tag Server	yes
Ethernet/IP Tag Client	choose 2*
Ethernet/IP Explicit Message Server	yes
MQTT Client (communicates with broker)	yes
OPC-UA Server	yes
Profinet Controller	future
Profinet Device	future
Host PLC Interfaces	
CTI Enhanced Data Cache (1 Host PLC Connections / 6144 of variables)	choose 1*
CTI Block Transfer (Backplane data transfer) (1 Host PLC Connection / 4096 Variables)	choose 1*
Serial Communications	
Electrical Interfaces (2 ports)	RS232 / RS422 / RS485
Modbus-RTU Master/Slave	yes
General ASCII	yes

Choose 1 * Project may include one (1) Host PLC interface:
CTI Enhanced Data Cache or CTI Block Transfers

Choose 2 ** Project may include two (2) of the following protocols:
Open Modbus Client, Ethernet/IP Scanner, Ethernet/IP Tag Client, Ethernet/IP Explicit Message Client