Woodhead's Industrial Ethernet products provide a connection to various PLC manufacturers through TCP/IP protocols using powerful real-time data acquisition and easy integration through network analysis and test tools.

18 Jan. 06

PCCC / Logix5000 on EtherNet/IP

Client and Server modes

Features

- **Compatible Woodhead Products:**
  - ▶ applicom® Interface Cards (PCCC + Logix5000 messaging)
  - ▶ applicom® Gateways (Logix5000 messaging)
  - ▶ Direct-Link™ Software Drivers (PCCC messaging)

- **Manages Client and Server modes simultaneously**

- **Multi requests management supported**

- **Supports Allen-Bradley PLCs: ControlLogix, PLC-5, and SLC-500 series**

- **OPC redundancy through the network interface card**

- **Gateway feature: EtherNet/IP can run simultaneously with all Woodhead Ethernet TCP/IP messagings**

- **Tag browsing feature (online and offline) with Logix5000 messaging**

Description

PLC-5, **SLC-500** and **Logix5000** series from **Allen-Bradley** PLCs manufacturer use TCP/IP transport to communicate on Industrial Ethernet. The application layer is supported by two messaging: **PCCC** for the **PLC-5** and **SLC-500** models and **Logix5000** for the **Logix5000 PLC**. For compatibility, the Logix5000 PLC is also able to support PCCC messaging under certain conditions.

All layers produced for this protocol are represented using the following OSI model:
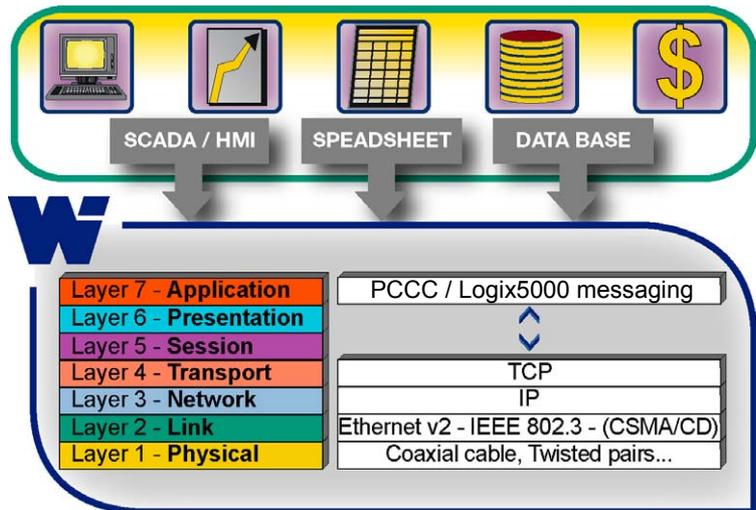
The Transport **TCP** and Network **IP** layers allow for communication, i.e. the **data transport,** between the various peripherals connected on the network (PLCs, sensors, devices, etc). The application layer, in this case PCCC / Logix5000 messaging, defines the **format of data exchanges**.

EtherNet/IP messaging on Woodhead compatible products handles exchanges in the Allen-Bradley architecture with PLC couplers such as:

Logix5000 Messaging[1]

Controller family	Reference	
Logix5000	1756-L1	Logix5550 controller
	1756-L55	Logix5555 controller
	1794-L34	FlexLogix controller - Logix5434
	1756-ENET	AUI and RJ45 connection
	1756-ENBT	RJ-45 connection
	1788-ENBT	RJ-45 connection

(1) Supported .L5K file versions 2.1, 2.2, and 2.3 for offline tag browsing.

PCCC Messaging

Controller family	Reference	
Logix5000	1756-ENET	AUI and RJ45 connection
	1756-ENBT	RJ-45 connection
PLC5	1785-ENET	AUI connection
	PLC-5/20E	AUI connection integrated on the CPU
	PLC-5/40E	AUI connection integrated on the CPU
	PLC-5/80E	AUI connection integrated on the CPU
SLC-500	SLC 5/05	RJ-45 connection integrated on the CPU

BradCommunications™

Woodhead products, running PCCC / Logix5000 messaging, provide the following functionality:

- **Multi-request client mode**: read and write variables in the various PLC memory areas.
- **Server mode for Allen-Bradley PLCs**: access to the internal memory and device monitoring of Woodhead products.
- **Redundancy of equipment:** enables the application to dynamically change the target equipment. This feature is managed through OPC server available on applicom® and Direct-Link™ products.

client/server functionality
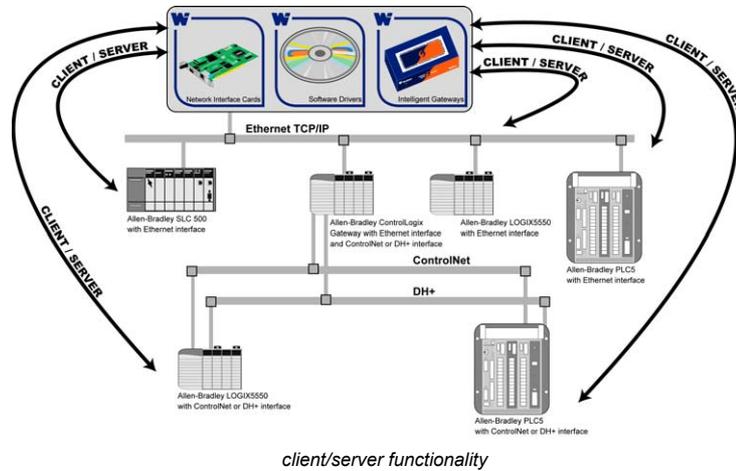
Logix5000 messaging - Client mode

The Logix5000 messaging is supported through OPC Server, ActiveX control, and Wonderware I/O Server (SuiteLink / FastDDE).

These data servers support the following types of variable: **Simple** (BOOL, SINT, INT, DINT or REAL), **Structure** and **Array**. An internal mechanism optimizes the data exchanges in reading and writing by automatically gathering the contiguous tags in the same request network.

Maximum number of tags per transaction

Tags	Maximum quantity in read per transaction		Maximum quantity in write per transaction	
	Simple	Array	Simple	Array
BOOL	81	3872	32	3872
SINT	162	484	32	484
INT	121	242	30	242
DINT	81	121	26	121
REAL	81	121	26	121

Allen-Bradley PLCs using Logix5000 transport offer a new method for process data acquisition by a direct access to the PLCs variables. The access to the variables is done by using a reference symbol called "TAG". The tags can be accessible and browsed according two different access modes:

- **ON-Line browsing**
  The ON-Line mode allows to directly upload the tag database from the ControlLogix processor to the software application. To use this mode, you must be connected to the Logix5000 processor.

- **OFF-Line browsing**
  The Rockwell RSLogix5000 configuration software allows a tag database to be generated from the L5K files of a ControlLogix project. The user can then access "virtually" to all the tags within the ControlLogix5000 controller.
  This mode allows the user to browse the tag database even if you are not connected to the Logix5000 processor.

The browsing feature, it is only available through OPC Server and ActiveX control.
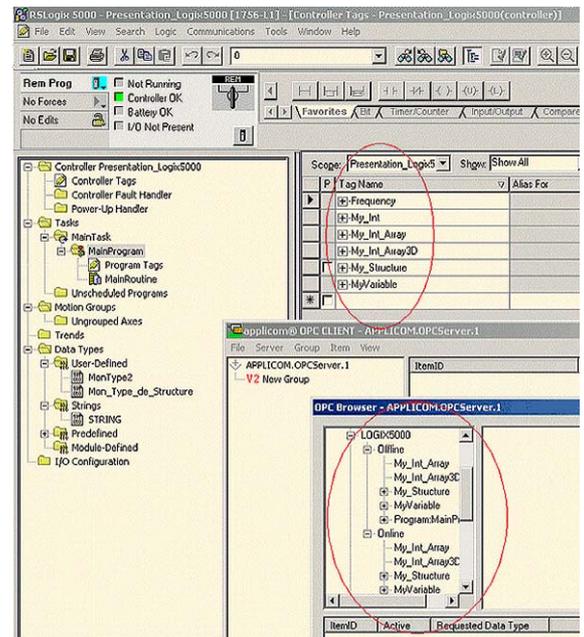
PCCC messaging - Client mode

PCCC protocol running in Client mode can send several requests simultaneously to equipment before receiving the first response: this operation is called **multi-request**. To send several requests simultaneously, several connections are used. Each request is sent on a virtual communication channel. The interface can manage up to **128 connections**. Only 30 of them can be used simultaneously for all equipment.

Woodhead interfaces can read and/or write to many different PLC data types according to the table below:

LOGIX5550[1]PLC-5 and SLC-500 series

Data Format	Device data type				
	Internal	Input	Output	Timer[2]	Counter[2]
Bit	B	I	O		
Word (16-bit)[1]	N	I	O	T.PRE, T.ACC, T.TB, T/EN, T/TT, T/DN	C.PRE, C.ACC, C/CU, C/CD, C/DN, C/OV, C/UN
Double word (32-bit)	D				
Floating point (32-bit) IEEE Format	F				

[1]: With Logix5550, the accessed variables in the PLC must be arrayed in PLC-5-type files and reading/writing of timers and counters is not supported.
[2]: Only available with applicom interface cards and Direct-Link software drivers.

Maximum number of variables per request[3]

Data Format	Read			Write		
	PLC-5	SLC-500	LOGIX	PLC-5	SLC-500	LOGIX
Bit	12336	2032	3840	12224	2032	3744
Word	771	127	241	765	127	235
Double/floating Word	385	63	120	382	63	117
Timer	771	1	-	765	1	-
Counter	771	1	-	765	1	-

[3]: Maximum of variables could vary depending of the software interfaces used (DLL, OPC, DDE).

PCCC messaging - Server mode

PCCC protocol running in server mode provides an internal shared memory **32K Words/32K Bits** called database for Allen-Bradley PLCs client connected to the network. With no prior configuration, the Allen-Bradley clients have direct access to the database via the Allen-Bradley messaging functions "Type Read" and "Type Write".

This data base could be accessed in Read and Write modes.

Data-Base management for PLC clients

Supported requests	data type	Nb max data/request		Corresponding Allen-Bradley variables
		Read	Write	
Read/write bit	Bit area	12336	12224	B9 : 0/0 ► B9 : 0/15 B9 : 1/0 ► B9 : 1/15 B9 : 255/0 ► B9 : 255/15 B10 : 0/0 ► B10 : 0/15 B10 / 255/0► B10 : 255/15 B16 : 0/0 ► B16 : 0/15 B16 : 255/0► B16 : 255/15
Read/write word	Word area	771	765	N17 : 0 ► N17 : 255 N18 : 0 ► N18 : 255 N144 : 0 ► N144 : 255
Read/write floating word	Word area	385	382	F145 : 0 ► F145 : 255 F146 : 0 ► F146 : 255 F272 : 0 ► F272 : 255

Allen-Bradley server feature can be used to optimize information feedback. Rather than permanently polling the equipment to monitor variables which change status occasionally, the equipment can write information to be fed back to the database only when status changes (alarm feedback) occur.
This operating mode results in:
- PLC processors solicited less often.
- Reduced load on Network architecture.
- Minimized information feedback time.

This principle is made **reliable** by using a monitoring mechanism of PLC client connections:
- You can set a maximum time between the accesses of the client equipment to the interface server. After this interval, the absence is indicated to the application by an **"ACCESS STATUS WORD"** in the Database.
- Your application can read (or write to reset) a word counter located in the words area of the Database. **"ACCESS INDICATOR WORD"** informs you of the current number of writes made by the client device.
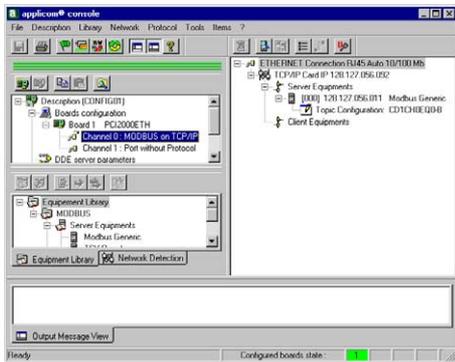
- Configuration console -
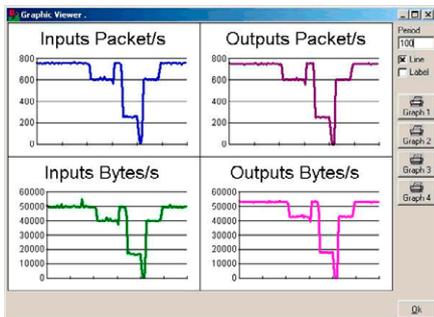
- Data Flow control -
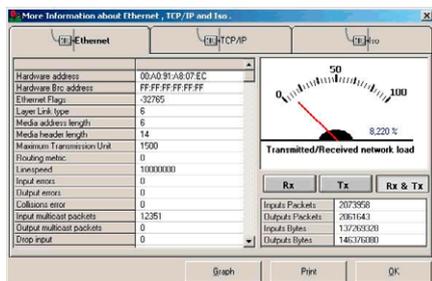
- Real time network analysis -
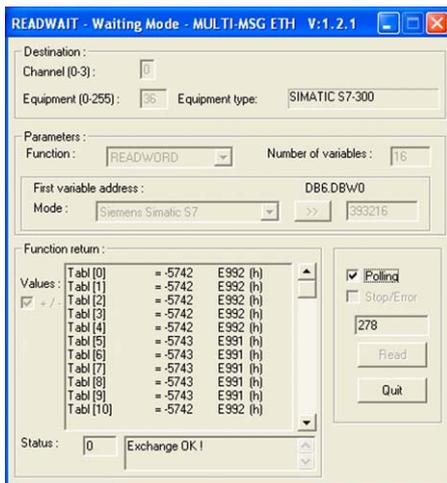
- Read/Write Access tool -

Diagnostics

All Woodhead products, compatible with the EtherNet/IP messaging, include free of charge a set of powerful and easy-to-use tools for developing, testing and monitoring any kind of application.

These tools co-exist with your industrial application providing invaluable help implementing Woodhead products and troubleshooting the entire control and communication system before and during operation.

They provide real-time information about the network traffic (network load, number of request, data rate, etc). A tree structure displays the network topology that provides specific information corresponding to the communication project selected: card, channel, protocol, and equipment. Animated icons provide rapid information about status of equipment (connected, active, error, not configured…).
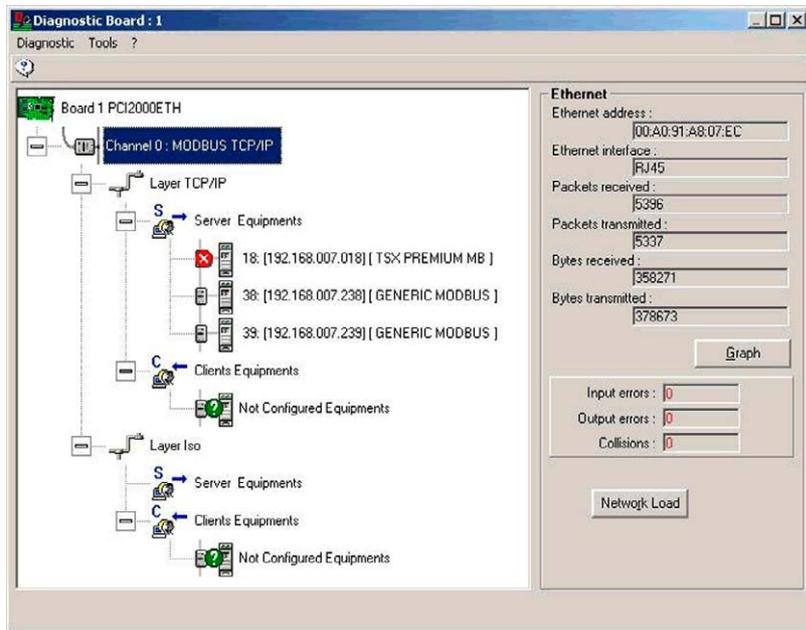
These utilities enable you to send Read and Write requests using various data formats to the industrial equipment and the internal Database. The requests are confirmed with status words indicating successful read/write requests, attempts or indicating errors encountered.

Ordering Information

PCCC / Logix5000 messaging are delivered with the software package of the following Woodhead compatible products:

Part Number	Product description
APP-ETH-PCU	applicom® PCU2000ETH Ethernet TCP/IP 10/100 Mbps card
APP-DRV-AB	applicom® license for Allen-Bradley PCCC messaging
APP-ESP-GTW	applicom® GATEway Profibus ↔ Ethernet / Serial
APP-ESR-GTW	applicom® GATEway Ethernet ↔ Serial
DRL-ALL-SWL	Direct-Link™ SW1000 Ethernet TCP/IP software drivers - Ethernet TCP/IP 1000 tags
DRL-ALL-SWF	Direct-Link™ SW1000 Ethernet TCP/IP software drivers - Ethernet TCP/IP Full tags

Important: For EtherNet/IP Explicit and Implicit (I/O control) messaging, refer to Direct-Link PCU-ETHIO solution (DRL-EIO-PCU).

Other related products: IP67/IP20 Ethernet switches, connectors and I/O blocs.

For product and technical information,
Visit: **www.woodhead.com**