CX-Server OPC
User Manual

Getting Started
Version 2.0

Notice

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided in them. Failure to heed precautions can result in injury to people or damage to the product.

DANGER! Indicates information that, if not heeded, is likely to result in loss of life or serious injury.

WARNING Indicates information that, if not heeded, could possibly result in loss of life or serious injury.

Caution Indicates information that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

OMRON Product References

All OMRON products are capitalised in this manual. The word “Unit” is also capitalised when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “PLC” means Programmable Logic Controller and is not used as an abbreviation for anything else.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note: Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3… Indicates lists of one sort or another, such as procedures, checklists etc.

Represents a shortcut on the Toolbar to one of the options available on the menu of the same window.

Start Indicates a program must be started, usually by clicking the appropriate option under the standard Windows 'Start' button.

Note: Indicates procedures that are specific to Visual Basic.

No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

About this Manual

This manual describes the CX-Server OPC application and its ability to interface with OMRON CS, CV and C PLCs. It does not provide detailed information concerning the PLCs themselves, for this information the commercial manual for the device must be consulted.

This manual contains the following information:

- ***Getting Started with CX-Server OPC:*** This describes the CX-Server OPC software in general terms.
- ***Using the OPC Server:*** This describes running and setting up the OPC Server for use by any OPC Client.
- ***Using Omron OPC Client Components:*** This describes using the supplied ActiveX components to access PLC data and includes a tutorial for Excel and Visual Basic host applications.
- ***Appendix A Component Properties:*** This appendix summarises the available properties for the ActiveX objects.
- ***Appendix B Script Interface:*** The Visual Basic script interface for the OPC Server communications control.

A ***Glossary of Terms*** and ***Index*** are also provided.

Warning:	Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each chapter in its entirety and be sure you understand the information provided in the chapter and related chapters before attempting any of the procedures or operations given.

Table of Contents

Getting Started with CX-Server OPC

This book introduces the CX-Server OPC application to a new user.

CX-Server OPC allows PLC data collected by the OMRON CX-Server and Fins Gateway communications software to be accessed by standard OPC clients. It allows existing process data to be collected and analysed, plus it includes graphical components allowing easy creation of simple SCADA applications.

Included with CX-Server OPC is the CX-Server runtime system, plus a range of ActiveX components that can be dragged and dropped onto your Workbook or Form. A Fins Gateway runtime system installer is also provided on the CX-Server OPC CD, as Fins Gateway may be used as an alternative to the CX-Server communications drivers for Ethernet and Controller Link communication to CS/CJ PLCs.

About this Manual

This manual helps a new user get started with CX-Server OPC, by describing the software installation and computer configuration, and by leading the user through the basics of CX-Server OPC.

Separate OMRON manuals describe the related CX Automation Suite products; CX-Server, CX-Programmer and CX-Supervisor.

Small example applications are included to demonstrate the basic features of the product. These can be used to help with product familiarity.

CX-Server OPC comes with a comprehensive on-line help system, which is designed to complement this manual, and provide a quick reference at any point in the CX-Server OPC application when the manual is not to hand. This general help system uses a fast 'hypertext' system that allows progressively more information to be obtained about any topic by selecting keywords within the descriptive text.

Throughout this manual, it is assumed that a working knowledge of Microsoft Windows is obtained, and that the user can:

- ♦ Use the keyboard and mouse.
- ♦ Select options from Windows menus.
- ♦ Operate dialog boxes.
- ♦ Locate, open and save data files.
- ♦ Edit, cut and paste text.
- ♦ Drag and drop.
- ♦ Use standard Help systems including Index and Find features.
- ♦ Start programs from the “START” button.

If Windows has not been used before, it is recommended that some time working with the Microsoft documentation is spent before using CX-Server OPC.

This introductory section deals with several important aspects of installing CX-Server OPC and setting it up for use. It is recommended that this entire section be read before installing the software.

System Requirements

CX-Server OPC operates on IBM compatible personal computers with at least a 400 MHz Pentium II central processor. It is designed to run in the Microsoft NT 4.0 / 2000 / XP / Vista environments.

Note: CX-Server OPC is not guaranteed to be compatible with computers running Windows emulation (e.g. Apple Macintosh).

Hardware Requirements

The following configuration is the **minimum** system requirements for running CX-Server OPC

- IBM PC compatible Pentium II processor
- 512 Mbytes of RAM
- 30 Mbytes available hard disk space,
- 800 x 600 Super VGA display.

The Recommended **minimum** is:

- IBM PC compatible Pentium 4 processor,
- 1024 Mbytes of RAM
- 50 Mbytes available hard disk space,
- 1024 x 768 Super VGA display.

Operating Systems and Environments

The operating systems on which this software will run are:

- Microsoft Windows NT 4.0 (Service Pack 5 and later),
- Microsoft Windows 2000 (Service Pack 2 and later),
- Microsoft Windows XP Professional
- Microsoft Windows Vista Business and Ultimate editions

Containers in which this software will run are:

- Microsoft Excel 97 and later,
- Microsoft Visual Basic version 5.0 and later.
- Microsoft Visual C++ 6.0.
- CX-Supervisor v1.1 and later (v2.0 and later recommended)

The *recommended* Operating System is Microsoft Windows XP Professional or Vista Business.

For use in Microsoft .Net, see the separate “Guide to Using CX-Server Lite in Microsoft .Net”

Interfaces to Hardware - PLC Communications

Interfaces to PLC and temperature controller hardware are via the CX-Server and/or Fins Gateway 2003 runtime systems.

Interfaces to Network Service Boards (NSBs) are achieved using a Fins Gateway driver which is supplied and supported as part of the CX-Server product.

Interfaces to Hardware - Peripherals

Interfaces to PC hardware (printers, graphics, keyboard, mouse, Ethernet etc) are supported by drivers installed and supported by Windows.

Installing/Uninstalling CX-Server OPC

The CX-Server OPC software is supplied on CD-ROM and is installed easily from within Windows.

To install CX-Server OPC

1, 2, 3…

1. Close all programs.
2. Insert the CD labelled **CX-Server OPC** into your CD-ROM drive. If Autorun is enabled on your system, the installation starts automatically, otherwise see the README.TXT on the CD-ROM for instructions to launch manually
3. Follow the instructions on the screen.

By default, CX-Server OPC is installed in **C:\Program Files\Omron**. Additional Omron applications will be installed in a subfolder under Omron. Common components are installed into **C:\Program Files\Common Files\Omron\Components**

To uninstall CX-Server OPC

When you uninstall, your CX-Server OPC project data remains intact – uninstall only removes program files. It is recommended, however, that you copy and move any projects you saved in the CX-Server OPC folder. Save a copy of your projects in another location on your hard drive (such as your My Documents folder) before uninstalling CX-Server OPC.

1, 2, 3…

1. From the **Start** menu, select **Settings – Control Panel**.
2. Double-click the **Add/Remove Programs**.
3. Click the **Install/Uninstall** tab.
4. From the list programs that you can remove, select **CX-Server OPC**.
5. **Click Add/Remove**.

6 At the prompt, select the **Remove** item and click **Next** and follow any further prompts

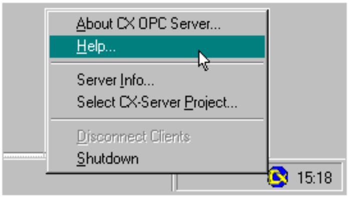
7 Wait until the uninstall program indicates that the process is complete.

The Help system, and How to Access it

CX-Server OPC comes with a detailed help system. At any time while using the software, it is possible to get help on a particular point that is currently being worked on, or on general aspects of CX-Server OPC. This system is intended to complement the manual, by providing on-line reference to specific functions of the software and how to use them. The manual is designed to provide tutorial information and discuss the various facilities offered by CX-Server OPC.

Help Topics

The help can be launched in several ways. The Contents page can be launched by selecting **Help** from the **CX-Server OPC** folder on the Start button. Alternatively, if the server is running right click the CX logo in the system tray and select **Help…** from the menu.



The help system provides a standard look-up dialog under the Contents tab showing the contents of the CX-Server OPC Help file. Double-click on an item to read the associated information.

Refer to *Microsoft Windows* documentation for further information on using the Index and Find features.

About CX-Server OPC

The OPC Server menu includes an About dialog contains essential version number information and includes details of the version of CX-Server installed that are required for obtaining technical support. The CX-Server ActiveX Components also include an About dialog containing essential version number information, which is accessible from their properties menu.

In addition, a brief description of CX-Server OPC and the CX-Automation Suite can be accessed from the main help contents dialog.

Technical Support

If the installation instructions for this application have been followed, no difficulties should be encountered.

If a problem occurs, check that it does not relate to a fault outside CX-Server OPC, for instance, with external components. Check the following:

- The PC is working correctly,

- The external system or application is working correctly,
- The communications system is set up correctly,
- Any errors are cleared in the associated PLCs.

When Customer Services need to be contacted, keep the following details to hand. A clear and concise description of the problem is required, together with the exact text of any error messages.

Note: Use the About dialog to obtain the version number of the application.

Using the OPC Server

This section introduces the OPC Server application to a new user.

What is OPC?

OPC stands for **O**LE for **P**rocess **C**ontrol, and is a standard published by the OPC Foundation. The basic aim of the OPC standard is to allow hardware vendors to produce software drivers (called OPC Servers) and for software vendors to produce applications (called OPC Clients) that use a standard method for data interchange. This allows software and hardware from different vendors to be used together.

The most widely used version of the OPC standard is version 2. This replaces the earlier version 1 standard.

CX-Server OPC provides an OPC version 2 Server by adding an OPC version 2.05 interface to the CX-Server runtime used for communication to Omron PLCs. Note that the OPC version 1.0a interface is also supported by the CX-Server OPC Server, but has now been superseded, and the version 2 interface should be used wherever possible. The CX-Server OPC Communications Client only uses the version 2 interface. Unless otherwise stated, this document refers to use with the OPC version 2 standard.

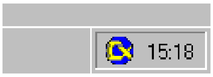
Users of CX-Server OPC, who have existing OPC clients or intend to use the OPC client functionality included may need some basic understanding of OPC. OPC client developers will need a complete understanding of OPC, and the interfaces defined. For more information on OPC, see the OPC Foundation web site at **www.opcfoundation.org**.

Starting CX OPC Server

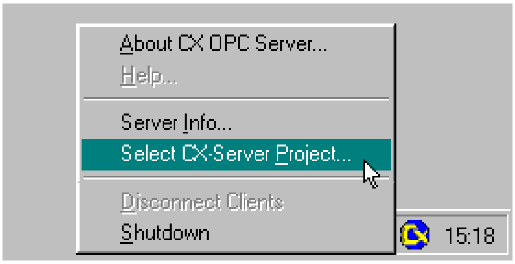
To launch the OPC Server:

1, 2, 3…

1. From the Start button, select **OPC Server** from the section **Programs**, **Omron**, **CX-Server OPC**.
2. The server will start. Note the CX logo in the system tray:



3. Configure the server namespace by clicking the CX logo with the right mouse button and selecting **Select CX-Server Project** from the popup menu.



i. **To open an existing CX-Server Project (.CDM) file:**

- ♦ Click the **Open…** button and in the Open Project dialog navigate to the file you wish to open.
- ♦ When you click the **Open** button, the full path name of the selected file will be entered into the Project field.

Caution: When sharing a CDM file with other applications it is important to realise that any changes that are made to the CDM file may affect the other applications.

ii. **To create a new CX-Server Project (.CDM) file:**

- ♦ Click the **New…** button and in the Create Project dialog navigate to the directory in which you wish to create the new file.
- ♦ In the File Name field, enter the new file name. When you click the **Save** button, the full path name of the new file will be entered into the Project field.

Click the **OK** button.

4. Projects can be edited by clicking the **Edit Project…** button and then making the required changes from the Project Editor Dialog. This is a CX-Server runtime utility – invoke help from within it for details of how to add and configure PLCs and Points.
5. Click the **OK** button to complete the configuration.

The OPC Server is now ready for use by any OPC Client that is compliant with OPC Data Access version 2 interface.

The CX-Server project file cannot be changed while clients are connected. To select a different CX-Server project file at a later date, either start the OPC Server manually from the Start button or if the server is running, select **Disconnect Clients** and then follow steps 3-5 of the above procedure.

Tip: You can make the OPC Server start automatically when the PC starts, by copying the shortcut on the Start button in the **CX-Server OPC** folder to the **Startup** folder.

Using the CX-Server Communications Utilities

CX-Server OPC is supplied with CX-Server. This powerful communications middleware includes a set of utilities typically used for configuring or monitoring PLC networks, e.g. as part of a CX-Programmer application. These utilities can also be used with CX-Server OPC. They are accessed from the “Communications Utilities” submenu that is obtained by right-clicking on the CX-Server OPC icon which is present in the Windows task bar whenever CX-Server OPC is running.

Most of these utilities are only available when CX-Server OPC is connected to a PLC (i.e. when a client is connected), in which case a PLC selection dialog is shown before the utility is launched. The utility will then automatically connect to the PLC.

The Network Configuration Tool and Performance Monitor Tool are always available. The Network Configuration Tool is particularly powerful, including options to scan serial ports for PLCs, or to check communications with a PLC, go online and configure it.

For full details of these utilities consult the CX-Server help files.

Note: If access to these powerful utilities is not required, and no other program that requires them (e.g. CX-Programmer, CX-Supervisor) is being used on a machine, then they can be removed by uninstalling CX-Server PLC Tools from the Windows Control Panel.

Fins Gateway Option

CX-Server OPC normally uses the Omron CX-Server Communications software for both device and point configuration, and also for runtime communications (reading and writing values from a PLC).

Another Omron product, “Fins Gateway 2003”, also provides communications drivers that can be used for interfacing to Omron devices. Some users may already have this software installed on their computers, and may prefer to use it. In addition, a suitable Fins Gateway 2003 installer is supplied on the CX-Server OPC CD.

The “Server Info” dialog, which can be reached by clicking on the CX-Server OPC Windows Toolbar icon using the right-mouse button, contains options for configuring communications. One of these options controls the use of Fins Gateway. If the Fins Gateway option is set, and Fins Gateway 2003 is present on a computer, then the Fins Gateway drivers will automatically be used for runtime communication to CS/CJ devices via Ethernet and Controller Link. CX-Server will still be used for any non CS/CJ devices, and for any devices that don’t use either Ethernet or Controller Link. In addition it will still be used for any devices for which dual-network redundancy is enabled. CX-Server is also always used for configuring the point data.

Note: This is an advanced option. For most applications, communications via the standard Omron CX-Server communications drivers is ideal, but in some cases performance may be better or more consistent using the Omron Fins Gateway 2003 drivers. This option allows the user to choose between the two sets of drivers.

Using with Third Party OPC Clients

The exact procedure for connecting Third Party OPC Clients to the OPC Server will depend on the client being used. Consult your OPC Client documentation for full details. However, the following is a basic overview:

1, 2, 3…

Start

Start

1. Start and configure the OPC Server as described above.
2. Start the OPC Client.
3. Depending on the client, either browse for local OPC servers and select **OMRON.OpenDataServer.1** or type the name directly.
   Note: If the client supports browsing for servers, but the server is not shown, the client may not be fully OPC version 2 compliant.
4. Create an OPC Group from the client.
5. Create an OPC Item from the client. If the client supports OPC item browsing facilities, browse the OPC Server to list the namespace groups and items to create the OPC Item ID. Otherwise, type the CX-Server logical name as the OPC Item ID.

Configuring the PC for remote connection

The OPC interface uses a Microsoft technology called DCOM. This allows the OPC client and OPC server to be seamlessly ‘Distributed’ over a PC network. The OPC Server should be running on the PC with direct connection to the PLC or PLC network. However, the OPC Client, or indeed multiple OPC Clients, can be run on different networked PCs and will automatically read and write data over the PC network. To do this, the PC running the OPC Server must be correctly configured. For full details of DCOM configuration and security issues see your Microsoft documentation. The following is a quick guide:

Configuring DCOM

1, 2, 3…

Start

1. Start DCOMCNFG.EXE e.g. by selecting **RUN** from the Start button. The default location on NT is C:\WINNT\SYSTEM32.
2. View the **Default Properties** tab (found under the properties section of ‘My Computer’ in the Computers section of Component Services on XP). Ensure that the **Enable Distributed COM on this computer** is checked.

3. From the **Default Properties** tab, configure the **Default Authentication Level** to **Connect** and the **Default Impersonation Level** to **Identify**. Setup the access permissions by either:

   a) On the **Default Security** tab, adding the user to the Access, Launch and Configuration lists by clicking the **Edit Default…** button in each case. The user added should have Administrator rights on the local PC. If not, it may be necessary to add user groups '**INTERACTIVE**' and '**NETWORK**' as well.

   b) From the **Applications** tab, configure the properties for **OpenDataServer** and **OpcEnum**. On the **Security** tab, add the required users to each of the **Custom Permissions**. The users added should have Administrator rights on the local PC. If not, it may be necessary to add user groups '**INTERACTIVE**' and '**NETWORK**' as well.

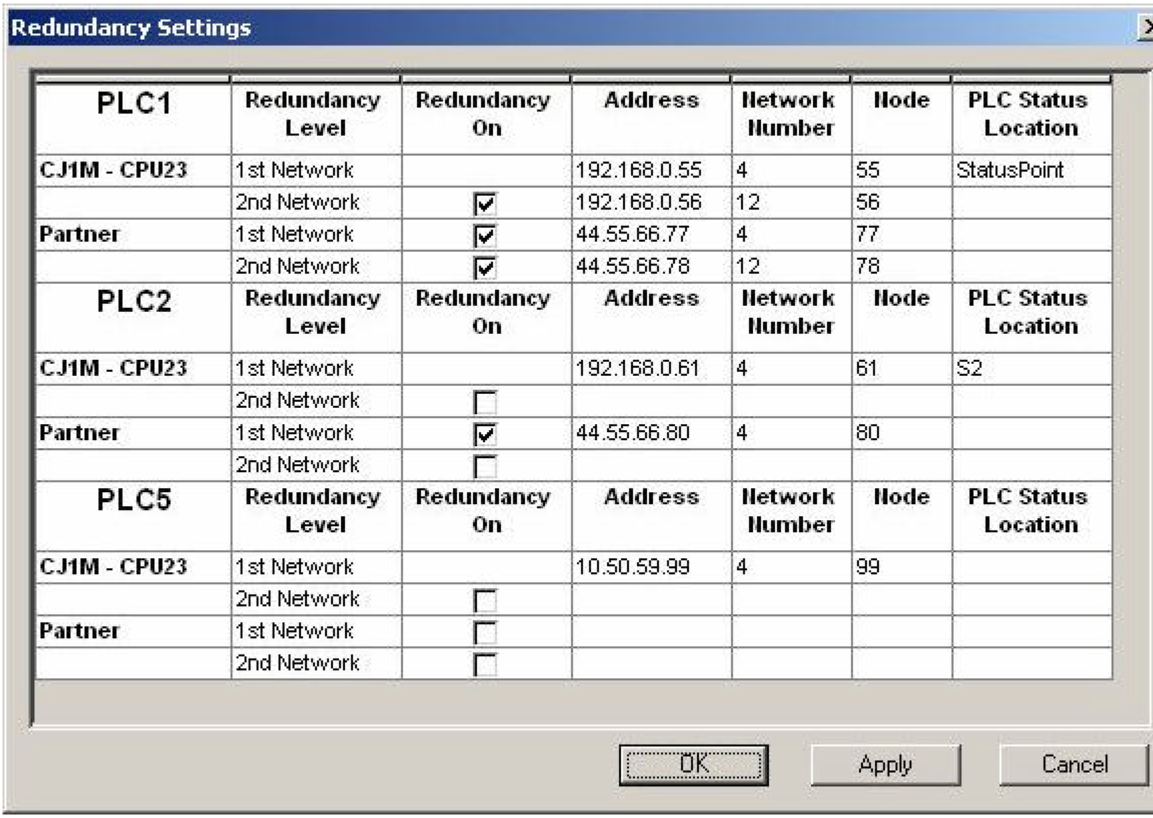
Using CX-Server OPC offline

CX-Server OPC can be used offline (not connected to a PLC). To use this mode of operation set the "local values" option on the "Server Info" dialog (accessed by right-clicking with the mouse on the CX-Server OPC icon in the taskbar that is present whenever CX-Server OPC is running.) The OPC Server should be closed and restarted after setting or unsetting this option to ensure correct operation.

Using CX-Server OPC Device Redundancy Functionality

CX-Server OPC supports device and network redundancy in a way that is transparent to the OPC client. In order to achieve the full benefits the use of specialist function blocks running in the PLCs is required. These are usually supplied separately (e.g. on the Installation CD) along with technical documentation describing their usage. Those documents should be consulted for detailed technical information on how to set up device redundancy. This section only contains a brief general overview.

The redundancy is enabled via the "redundant configuration" checkbox on the main "Select CX-Server Project" dialog, and a separate configuration file is used to store the redundancy configuration information. The relevant settings are shown below:



PLC1	Redundancy Level	Redundancy On	Address	Network Number	Node	PLC Status Location
CJ1M - CPU23	1st Network		192.168.0.55	4	55	StatusPoint
	2nd Network	☑	192.168.0.56	12	56	
Partner	1st Network	☑	44.55.66.77	4	77	
	2nd Network	☑	44.55.66.78	12	78	
PLC2	**Redundancy Level**	**Redundancy On**	**Address**	**Network Number**	**Node**	**PLC Status Location**
CJ1M - CPU23	1st Network		192.168.0.61	4	61	S2
	2nd Network	□				
Partner	1st Network	☑	44.55.66.80	4	80	
	2nd Network	□				
PLC5	**Redundancy Level**	**Redundancy On**	**Address**	**Network Number**	**Node**	**PLC Status Location**
CJ1M - CPU23	1st Network		10.50.59.99	4	99	
	2nd Network	□				
Partner	1st Network	□				
	2nd Network	□				

With device redundancy an OPC client sees a single device connection, which in fact consists of two physical devices which are effectively duplicates of each other in terms of programs, data, I/O connectivity etc. In normal operation reading of data occurs from one of the devices, but data written is sent to both. If the device being read from fails, then a switch is seamlessly made to the "partner" PLC. In order to ensure that operation proceeds smoothly, and the PLCs transfer status data between themselves correctly, the use of specialist Function Blocks (produced by Omron) is required.

For each device in the CX-Server file redundancy can be turned on or off. A partner IP address and node number can be specified for all suitable (CS/CJ) Ethernet devices. In addition a "status location" can be specified – this represents the start address of the status data used by the Omron-supplied function blocks.

In addition to the device-level redundancy there is also network-level redundancy- i.e. for each device two separate Ethernet connections, associated with two different networks, can be specified. It is possible for example, to connect to a PLC via two entirely separate Ethernet networks, with the only common hardware being the PC and the PLC.

Device and Network redundancy can be used separately, or together (i.e. it is possible to have up to two network connections to each single or paired device).

The Fins Gateway communications option can be used for device-level redundancy, but will have no effect where network-level redundancy is in use (i.e. CX-Server will still be used to communicate to any device that is configured to have access via a second network).

System points that provide access to PLC redundancy function block data include:

PLCNAME_Active – Whether a PLC is currently the active device (boolean)

PLCNAME_Inactive – Whether a PLC is currently the inactive device (boolean)

PLCNAME_ForcedRun – Whether the PLC forced run bit is set

PLCNAME_ProgChangeAlm – Whether the PLC FB “Program Change Alarm” bit is set.

PLCNAME_PartnerFailAlm – Whether the PLC FB “Partner Change Alarm” bit is set.

PLCNAME_Lifecycle – Whether the PLC FB “Lifecycle” bit is set.

PLCNAME_PrimaryNodeNum – PLC FB Primary Node Number

PLCNAME_MakeActive – When set, makes a PLC Active

PLCNAME_MakeInactive – When set, makes a PLC Inactive

PLCNAME_ForceRunPLC – When set, forces a PLC to run

PLCNAME_UseFBInput – Signals that the Function Block Input data should be used

PLCNAME_AutoSwitch – When set, indicates that the server should treat a device as inactive when communications with it is lost (otherwise the FB Active and Inactive setting will always be treated as correct – i,e, the redundancy will be under full Function Block control).

PLCNAME_OKConnections – Number of currently valid connections to a device (e.g. in a system with both device redundancy and network redundancy this value will normally be 4).

Consult the function block documentation for further details of function block operation.

Predefined System Points

In addition to the redundancy system points described in the section on redundancy, CX-Server OPC includes several other predefined points which can be used for reading status and diagnostic information. These points include:

(Note: In all of the points below PLCNAME is replaced with the actual name of the PLC)

PLCNAME_Status – Current PLC Status as an integer – the values correspond to the standard OPC values and should be displayed in hexadecimal, e.g. 0xC0 (the 0x prefix indicates hexadecimal, 0xC0 is 192 in decimal) means OPC status OK

(Note: the most common OPC values are “OPC Quality Bad” = 0x00, “OPC Quality Uncertain” = 0x40, “OPC Quality Good” = 0xC0, “OPC Quality Configuration Error” = 0x04, “OPC Quality Not Connected” = 0x08, “OPC Quality Device Failure” = 0x0C, “OPC Quality Out of Service” = 0x1C. The status text point – see below – will contain a description of the status.)

PLCNAME_StatusText – Current PLC Status (as a string)

PLCNAME_Mode – Current PLC Mode (as an integer, unknown mode = -1 (or 65535 if displayed as an unsigned value), stop/program mode = 0, run mode = 1, monitor mode = 2)

PLCNAME_Time – Current PLC Time (as a string)

PLCNAME_IsOpen. – Whether PLC has been “opened” for communications (as a boolean)

PLCNAME_Heartbeat – The current “heartbeat” of the communications, in milliseconds. This value is normally 1000, and a consistently higher value can indicate that communications is overloaded. Note: Calculation of this value relies on the presence of at least one point that is being read at a 1-second subscription update rate, otherwise 0 will be returned.

The following diagnostics points are only maintained if communications is being read via Fins Gateway. (The CX-Server Performance Tool should be used to obtain the corresponding values when communicating via CX-Server):

PLCNAME_MessageQLen – Number of outstanding comms messages (as an integer)

PLCNAME_TXBytes – Total bytes transmitted

PLCNAME_RXBytes – Total bytes received

PLCNAME_Latency – time in milliseconds between starting to transmit a message and receiving the last byte of the reply.

PLCNAME_TheoreticalCPS – Number of characters (bytes) expected to be transmitted

PLCNAME_ActualCPS– Total characters (bytes) transmitted in last second

Controlling CX-Server Input Optimisations

The Omron CX-Server middleware contains optimisations that improve communications throughput and which are enabled by default. In certain specific circumstances it may be best to disable the CX-Server input optimisations: if a program is running in the PLC which changes a memory location that is being written by CX-Server soon after the time that CX-Server writes it, then there is a theoretical risk that the change of value by the PLC program may be missed by a current subscription to the same location. This situation can also occur if the value written to the PLC by the PLC program is a constant value, and CX-Server changes it in-between the writes by the PLC program. (Note: any new attempt to read *from device*, e.g. a synchronous read from device, would return the correct value). Disabling the CX-Server input optimisations will ensure that the correct value is always obtained, but will slow down communications, although this is unlikely to be noticeable except in the circumstances where there are subscriptions to large numbers of points that are rapidly changing value.

PLC Opening Option

The “Open all PLCs when first client connects” option does what it says -automatically opens all PLCs when the first client connects. This means that an attempt is made to communicate with the PLC. The PLC will be polled thereafter, while open, at the rate of about once a second to check that it remains online and ready for communications.

If the option is not set, then the PLC will only be opened when an attempt is made to communicate with it (e.g. a point within it is made active). The PLC will be closed when the last active point within it is made inactive.

Users should be aware that opening and closing a PLC can be quite inefficient, so in normal circumstances it is better to leave this option set. In circumstances where some PLCs are deliberately left unconnected, it may be better to unset the option and to control whether the PLC is opened or closed by the use of active points within it – as long as one point is active the PLC will be kept open. Users should also be aware that any direct read of the PLC will also cause it to be opened, even if no points within it are active, and that it will not be automatically closed thereafter. It will be left open, awaiting any further direct PLC communications.

String Option

The “Set default (cardinal) type for signed char arrays to string (VT_BSTR)” option is intended for use with clients which display the default server type for items. The CX-Server signed char array type is the internal CX-Server data type used for strings, but some clients do not convert this into a string by default. Setting this option means that CX-Server OPC will inform clients that the default native (cardinal) type for any points defined as signed char arrays is string (VT_BSTR). This should ensure that those clients correctly represent the data as a string.

Silent Mode Option

This option can be used to configure CX-Server OPC to start up hidden (without a splash screen, and without an icon on the Windows system tray).

Command Line Options

Parameters that can be passed to CX-Server OPC are normally preceded with a hyphen or the slash symbol /, and include the following:

-Silent – This will force CX-Server OPC to start up hidden (without a splash screen, and without an icon on the Windows system tray)

-Display – This will **force** CX-Server OPC to start up visibly (with a splash screen, and with an icon in the Windows system tray). This option overrides the silent mode option (and the Silent parameter).

-Persist – If this option is **not** set then CX-Server OPC will automatically close when the last client disconnects, otherwise it will continue to run. Use the combination of this option and Silent cautiously, as CX-Server OPC will then continue running until Windows is shut down.

-RegServer - This is an advanced option, normally used on its own, which, rather than running CX-Server OPC, simply registers it at the location of the .exe being run, so that it can be automatically invoked from OPC etc.

These parameters can be passed via the Windows Run command, or added to a Windows icon shortcut linked to CX-Server OPC.

Using the OPC Client Components

CX-Server OPC also includes an OPC Client, called **Omron OPC Communications Component** and graphical controls that link directly to the communications component. These are all ActiveX controls allowing data to easily be collected and displayed in either Excel or Visual Basic. The graphical controls and communication component can of course be used with any version 2 OPC Server.

Objects Overview

OPC Communications Control

This control provides a seamless interface between the CX-Server OPC host application (Excel, Visual Basic) and any version 2 compliant OPC Server. Note that the control is only visible when the host application is in the Design mode.

7 Segment

The 7 segment displays a numerical value in Binary, Decimal or Hexadecimal formats. Leading zeros and unused segments can be hidden. The colour of the segments and the display background can be set independently. The 7 Segment cannot be used to set a value.

Data Logging

The Data Logging control provides logging and trending functionality through use of the Data Log Viewer components currently used by other Omron software packages including CX-Supervisor and SYS-Config. The control is configured in design-mode to log data items and is controlled in runtime-mode using script commands. See the on-line help for further details regarding the script interface.

Display

The Display displays an analogue or text value. The Display only displays a value i.e. you cannot set a value using this display.

LED Indicator

The LED functions as a coloured on/off indicator. The colour of the indicator and the display background can be set independently while its shape can be round or square. In the off state, the chosen indicator colour is dimmed.

Linear Gauge

The Linear Gauge displays an analogue value by filling a rectangle to represent the actual value as a proportion of its expected maximum. The rectangle can be filled from bottom to top (like a thermometer) or from left to right (like a progress complete bar). There is also a configurable scale, enabling intermediate values to be estimated. The Linear gauge will only display a value, you can not set a value with this gauge.

Linker

This control gives the ability to link COTS (commercial off the shelf) ActiveX components to any of the Omron communications controls, e.g. the CX-Server communications control. The control is configured in design-mode to select the ActiveX component (e.g. a Microsoft Forms V2.0 check box control) to which the control will link at runtime. In runtime mode data will be read from and written to the selected PLC item and the selected ActiveX component.

Rotational Gauge

The Rotational Gauge displays an analogue value, similar to a speedometer. An indicator needle rotates according to the value. There is a configurable scale, enabling intermediate values to be estimated. The Rotational gauge will only displays a value, you can not set a value with this gauge.

Rotary Knob

The Rotary Knob allows the you to set an analogue value, similar to a volume knob. You can rotate the knob, e.g. by clicking and dragging the mouse, to set the pointer to a new position. There is a configurable scale, enabling intermediate values to be estimated. The pointer always reflects the current value e.g. on start-up, and will change position in response to an external influence.

Toggle

The Toggle allows you to toggle a Boolean bit between its ‘On’ and ‘Off’ state. This is as a switch that can be clicked to change its state. The current state is shown by the position of the switch. The switch position also reflects the current value e.g. on start-up, and will change position in response to an external influence.

Timer

The timer enables you to run a set of instructions repeatedly at regular intervals.

Thumbwheel

The Thumbwheel provides a set of input controls, similar to a hardware Thumbwheel Switch. By clicking minus and plus buttons, the various input digits can be set. There are two modes of operation; Commit and Direct. When the optional *Commit* button is enabled, digit values may be edited freely. The PLC will not receive an updated value until the Commit button is pressed. In *direct mode* [without the optional Commit button] changes to digit values are sent direct to the PLC as they occur. Floating point is supported, and integer values can be represented in both decimal and hexadecimal.

Using the OPC Server

The following sections take you through the steps required to open your selected application, i.e. Excel or Visual Basic and create a working area. Using the short tutorial you can then continue and load a number of ActiveX objects, link them together and run a simulation.

As you became more practised in using CX-Server OPC you will find there is usually more then one way to perform an operation. The following procedures may not always be the quickest but have been written to show how the application works using the basic features.

If the ActiveX objects are not visible in the Visual Basic Toolbox they can be added as follows:

1, 2, 3…

1. Right click in the Toolbox and select the **Components…** option. This will open the Components dialog.
2. Find the CX-Server OPC controls in the list, all of which all start with **OMRON CX**, and tick each box.
3. Click the **OK** button. The objects are now displayed in the Toolbox.

Step 1: Viewing Data using Omron Graphical Controls

Adding the Communications Control

Before the Graphical Controls objects of CX-Server OPC can communicate with an OPC Server, the correct data source connections have to be set up for it. This is not necessary if the Graphical Control will be used stand alone and driven from script.

To add a Communications Control:

1, 2, 3…

1. Start the host application e.g. Microsoft Excel 97.
   Tip: If you intend having a large number of components on your desktop it is recommended you run Excel in full screen mode.
2. Ensure the **Control Toolbox** and **CX-Server OPC** toolbars are shown by selecting them from the **View**, **Toolbar** menu.

   Note: In Visual Basic, ensure the **Toolbox** is shown by selecting **Toolbox** from the **View** menu.
3. Ensure the host application is in design mode for example, in Excel by clicking the Design Mode button in the **Control Toolbox**.
4. In the **CX-Server OPC** toolbar click the **Add OPC Communications Control** button. The Communications Control object is drawn in the default position - top left hand corner of the work area.

   Note: In Visual Basic, select the required component from the **Toolbox** and draw a rectangle at the desired position.
   Tip: Double clicking the toolbox button inserts the component with a default size.
5. Using Drag and Drop the object can now be repositioned in the work area. Note that the object will not be visible in run mode.

Connecting the Communications Control to an OPC Server

The first step is to create a project file (.OPC file) or select one which has been previously created. This file contains configuration data and symbolic definitions for the desired OPC items

The following procedure takes you through the steps required to load an existing .OPC file or create a new one.

1, 2, 3…

1. Right click on the OPC communications control. In the popup menu, select the **OMRON CX OPC Communications Control Object** option.

   Note: In Visual Basic, the menu option is called **Properties**.

2. In the Communication Control Properties dialog select the Project file:

   i. **To open an existing project (.OPC) file:**

   - Click the **Open…** button and in the Open Project dialog navigate to the file you wish to open.
   - When you click the **Open** button, the full path name of the selected file will be entered into the Project field.

   ii. **To create a new project (.OPC) file:**

   - Click the **New…** button and in the Create Project dialog navigate to the directory in which you wish to create the new file.
   - In the File Name field, enter the desired file name. When you click the **Save** button, the full path name of the new file will be entered into the Project field.

3. By default, the Computer Name field shows the name of the local computer. If the OPC Server is on a remote machine, click **Show All**. This may take a few moments, depending on your network and operating system. When complete the Computer Name list now shows all computer names. Select the required computer, and wait while connection is tested.
4. The Server name list shows all the OPC version 2 compliant servers registered on the computer listed in Computer Name field. For the server included with CX-Server OPC select **Omron.OpenDataServer.1** from the list. The connection can be tested by clicking the **Info…** button that will display standard OPC status information collected from the OPC server.
5. At least one OPC client Groups must now be defined using the **Groups** tab. Choose any meaningful name.
6. Add an Item for the data to display using the **Items** tab. Choose any meaningful name e.g. OPCBoilerTemp. Type the Item ID of the item as defined by the OPC Server or use the **Browse…** button if the server supports the optional ‘Browse items’ interface. For the server included with CX-Server OPC the Item ID is same as the CX-Server Point Name e.g. “BoilerTemp”.
7. Click the **OK** button to complete the configuration.

The communications control is now ready to connect to the OPC Server, and retrieve data. This data can be accessed using script commands (see Appendix B), or by adding a Graphical Component.

Adding a 7 Segment Display

1, 2, 3…

1. With the host application in design mode, add a 7 Segment control.
2. Right click on the graphical component and from the popup menu select the **OMRON CX 7 Segment Control Object** option.

   Note: In Visual Basic, the menu option is called **Properties**.
3. In the component properties dialog select the **Data Source** tab and enter the following information:
   - ***Server:*** **-** Select the name of the communications control to be used. If only one has been added, it is selected automatically. If the list is empty then you need to add one first.
   - ***Group:*** - Select the required group. If the appropriate group is not in the list click the **>** button and select **Add Group…**.
   - ***Item:*** **-** Select the point Item. If the appropriate Item is not in the list click the **>** button and select **Add Item…**.
4. Click **OK** to complete the connection.

Running the Application

Click the Mode button to change to 'Run' mode. The communications control will disappear and will connect to the server. Once connected, the 7 Segment display will show the current value.

Note: In Visual Basic, click ▶ to switch to run mode, and ■ to return to design mode.

Step 2: Inserting Data in Cells

Step 1 shows data in a graphical control, but the data can also be inserted directly into cells within Excel. This could be useful for further numerical analysis, like averaging or statistical control.

Note: In Visual Basic, there is no concept of cells, but the same technique could be used to set a Visual Basic variable.

Assuming Step 1 above has been completed:

1, 2, 3… 1. Decide when the data should be updated:

   i. For the user to control the data update, add a standard **Command Button** from the **Control Toolbox**.

   ii. For the value to constantly update on a regular interval, add the Omron timer control.

2. Double click the added object to access the script and add the line:

```
Cells(1, 1) = OPCComms1.Value(“GroupName”,
"OPCBoilerTemp")
```

   where OPCBoilerTemp is the name of the item to read.

3. Close the Visual Basic editor, and run the application as shown in Step 1. The cell A1 (that is row 1, column 1) will show the required data.

Step 3: Adding Third Party ActiveX Controls

Step 1 shows data in an Omron graphical control, but the data can used by other ActiveX controls, like Graphical Control Libraries supplied by other manufacturers, or controls like Charts or Scroll Bars supplied with Microsoft products.

Assuming Step 1 above has been completed, the following steps show connecting the data to a standard Scroll Bar:

1, 2, 3… 1. Add a standard **Scroll Bar** from the **Control Toolbox**.

2. Select and resize the buttons as required then drag and drop the buttons in the desired position.

3. Double- click on the scroll bar buttons. This will reposition the cursor in the code sheet at the following entry.

```
Private Sub Scrollbar1_Change()
End Sub
```

Note: In Visual Basic, the default name for scroll bars is **HScroll1** or **VScroll1.**

4. Add the following syntax. The additional command instructs any new Scroll Bar value to be written to the server.

```
Private Sub Scrollbar1_Change()
    OPCComms1.Value(“GroupName”, “OPCBoilerTemp”) =
Scrollbar1.Value
End Sub
```

Run the application as shown in Step 1. The communications control will disappear and the 7 Segment display will show the current value. When you click on the scroll bar buttons the value is sent to the server. This new value is then shown on the 7 segment display. Note that the maximum value is limited to 100. This is the default value of the scroll bar buttons.

This example shows a control setting a value. Third Party controls can also display values. For this, the syntax would be (depending on actual control):

```
ControlName.Value = OPCComms1.Value(“GroupName”, “OPCBoilerTemp”)
```

This script could also be added to a button or Timer control, as explained in Step 2. Script functions are described further in Appendix B.

Other Features

The following sections provide a brief overview of some of the more advanced features available in CX-Server OPC.

Event Driven Routines

Many of the script examples in this manual use asynchronous communications, that is communications are carried out on demand without synchronisation with the rest of the system. Asynchronous communications can be easily used to quickly create solutions that are easy to understand. As a solution grows however, asynchronous communications can prove inefficient and produce unpredictable updating, which is difficult to debug because multiple scripts may be demanding the same data at the same time.

The OPC Communications Control provides facilities for synchronous communications, that is communications and data updating are synchronised. The **GetData** and **StopData** script commands (see Appendix B for full details) control the generation of **OnData** events on regular intervals, which can be used to efficiently drive multiple controls, and is easier to debug.

Example:

1, 2, 3...

1. Add an **OMRON CX OPC Communications Control** and two standard **Command Buttons**.
2. Double click the communications control to add the following script. Note the script is in the Event **OnData**:

```
Private Sub OPCComms1_OnData(ByVal Group As String,
ByVal Item As String, ByVal Value As Variant, ByVal
BadQuality As Boolean)
        If (Item = "OPCBoilerTemp") Then
          'Data is from this point
          Cells(1, 1) = Value
        End If
End Sub
```

Every time **OnData** is called with data from the point **OPCBoilerTemp** the value is written to the cell A1.

3. Double click the Command Buttons to add the following script:

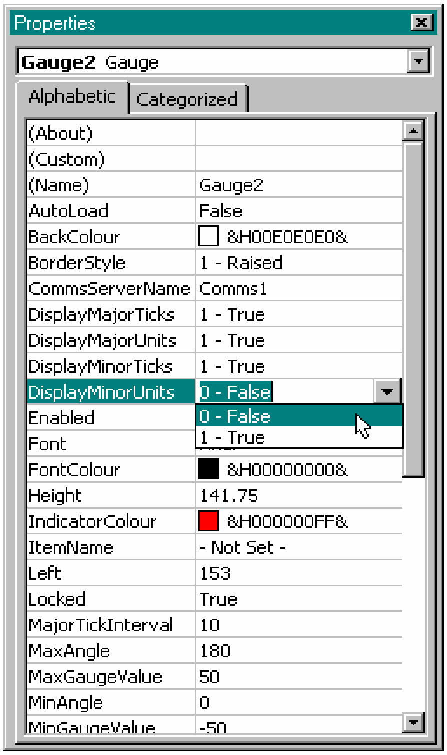
```
Private Sub CommandButton1_Click()
   OPCComms1.GetData "MyGroup", "OPCBoilerTemp"
End Sub

Private Sub CommandButton2_Click()
   OPCComms1.StopData "MyGroup", "OPCBoilerTemp”
End Sub
```

Run the application. Click CommandButton1 to start creating OnData events every second. Note the cell A1 updating. Click CommandButton2 to stop the updating.

Advanced Properties

When working with Visual Basic the advanced properties dialog is normally displayed on the right of the work form, although it can be docked in any position. In Excel it is opened by right clicking on an object and selecting the Properties option from the popup menu. The dialog allows you to scan through all the available options. Some options require you to enter specific information, others provide a choice of entries from a drop down menu.

From the drop down menu at the top of the dialog select the object to be edited. This will display the full range of options available for that object, which can then be viewed either Alphabetically or Categorised. A full list of the options and their settings and ranges for the CX-Server OPC objects can be found in Appendix A – Component Properties.

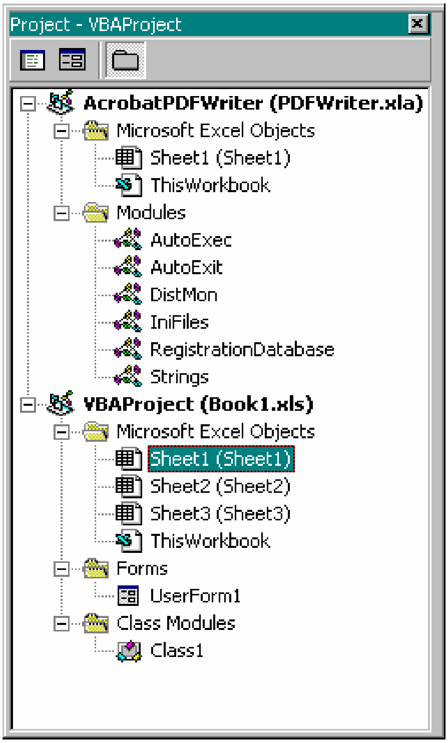


(About)	
(Custom)	
(Name)	Gauge2
AutoLoad	False
BackColour	□ &H00E0E0E0&
BorderStyle	1 - Raised
CommsServerName	Comms1
DisplayMajorTicks	1 - True
DisplayMajorUnits	1 - True
DisplayMinorTicks	1 - True
DisplayMinorUnits	0 - False
Enabled	
Font	
FontColour	■ &H00000000&
Height	141.75
IndicatorColour	🟥 &H000000FF&
ItemName	- Not Set -
Left	153
Locked	True
MajorTickInterval	10
MaxAngle	180
MaxGaugeValue	50
MinAngle	0
MinGaugeValue	-50

Project Tree

Like Explorer the Project Tree provides a graphical representation of you application. In Visual Basic it is displayed to the right of the work form while in Excel it is shown on the left of the code sheet.

By expanding the tree you can see all your associated files and work sheets. It is possible to open any number of work sheets by simply double- clicking on them. Having multiple work sheets open in this way enables you to copy and paste between them saving you valuable time rewriting sections of code that already exist, and more importantly are known to work.



Controlling ActiveX Objects

A number of objects can be grouped together such as the 7 segment display and the spin buttons by selecting the objects you want to group while holding down the ‘Shift’ key as you select each object. When you have selected all the objects, right click on an object and select the ‘Group’ option from the drop down menu. Note however that objects must be ungrouped before their parameters can be edited.

Other drawing commands such as Bring to Front, Send to Back, Cut, Copy, Past etc. follow the standard windows conventions and are selected from the toolbar and/or drop down menus.

Temperature Controller Support

This version of CX-Server OPC provides access to all the temperature controller devices supported by CX-Server. For further information regarding the functionality support, see Appendix C.

Appendix A
Component Properties

This appendix gives a list of the available properties. Each component supports a selection of these properties which can be set in design mode by using the properties dialog, or in the run time by using a Visual Basic script command – for example: - `Object1.Value = 10`

(Note: The container application may also display additional container-specific properties that apply to all objects, e.g. Excel provides a parent property. Consult the help for the container application for details of these properties.)

Property Title	Example Values	Description
About	None	Description of the object.
(Custom)	None	Opens the properties dialog for the object.
(Name)	Object Name	This is the system generated name for the object.
Active	Group and Item name	This property can be used to get or set OPC group or item active status (to get or set agroup, use an empty name for the item). OPC active status is more normally set by the EnableGroup and EnableItem methods
Autoload	True False	Switches the Autoload function On or Off. When set to On the ActiveX component value will autoload. True = On, False = Off.
AutoSize	0 to 1	Switches the fonts auto size option on or off. 0 = Off, 1 = On.
BackColour	■ &H00E0E0E0&	The code determines the background colour of the object. Click the browse button to display the colour palette.
BorderStyle	0 to 3	The value determines the visual appearance of the border that surrounds the object. 0 = None, 1 = Raised, 2 = Sunken, 3 = Single_Line
ButtonOn	0 to 1	Determines the default state of the toggle. 0 = Off, Up, Inactive. 1 = On. Down, Active . etc.
ButtonStyle	0 to 6	The value determines the button style. 0 = Toggle Switch, 1 = Colour Button, 2 = In/Out Button, 3 – Rotary Switch 4 = Rocker Switch, 5 = Indicator Button, 6 = Blank Button.
CommsServerName	Comms1 to n	This is the name of associated communications control.
ControlName	CheckBox1	Selects the control name that will be linked to the PLC item at runtime
DatasetName	MyLogFile	Determines the name of the dataset and the file to which the log data will be saved
DecimalPlaces	2	Number of decimal places for 7 Segment. Only applies when NumberBase = 10
DisplayErrors	True False	Determines whether or not error messages will be displayed by the communications control in a message box (set to True), or returned as an error code to the client application (set to False), in which case the Visual Basic Error Object should be used to display the error.
DisplayFont	Arial	This is the system name of the font used for the display. Use the browse button to display the font dialog. Arial is the default.
DisplayFontColour	■ &H00000000&	The code determines the colour of the display font. Click the browse button to display the colour palette.
DisplayFormat	0 – Dec 1 – Hex 2 – Scientific	Determines the format used to display the analogue display information. 0 = Decimal, 1 = Hexadecimal, 2 = Scientific.
DisplayMajorTicks	False True	Shows or hides the major tick marks of the scale. True = Show, - False = Hide.
DisplayMajorUnits	False	Shows or hides the major units markers of the scale.

	True	True = Show, False = Hide.
DisplayMinorTicks	False True	Shows or hides the minor tick marks of the scale. True = Show, False = Hide.
DisplayMinorUnits	False True	Shows or hides the minor units markers of the scale. True = Show, False = Hide.
DisplayType	0 – Analogue 1 – Digital 2 – Text	Determines the type of display. 0 – Analogue: as a numeric value, 1 – Digital: as textual value, 2 – Text: as text.
Enabled	True False	Switches the object on or off. True = On, False = Off.
Font	Arial	This is the system name of the font used for the object title. Use the browse button to display the font dialog. Arial is the default.
FontColour	■ &H00000000&	The code determines the colour of the title font. Click the browse button to display the colour palette.
Height	141	Sets the overall height of the object in pixels.
IndicatorColour	■ &H00FF0000&	The code determines the colour of the indicator. Click the browse button to display the colour palette.
IsPointvalid	PointName	Returns whether a point is valid Use of this property is described in the script interface section below
ItemName	Output Flow No1	This is the reference name given to the object.
KnobBorderPercentage	25	This value determines the size of the knob border as a percentage of the overall size.
KnobColour	■ &H02C4723E&	The code determines the colour of the knob. Click the browse button to display the colour palette.
KnobStyle	0 – Integer 1 – Real	Determines how the numerical value of the knob is interpreted 0 = as an integer or 1 = as a real number.
LeadingZeros	False True	Turns On or Off the leading zero's of the display. False = On, True = Off.
LEDColour	■ &H00FF0000&	The code determines the default or inactivated colour of the LED indicator. Click the browse button to display the colour palette.
Left	153	Determines the position of the object from the left hand edge of the work area in pixels.
ListPoints	PLCName (optional)	Lists the points in a project (or PLC) Use of this property is described in the script interface section below
ListPLCs	-	Lists the PLCs in a project (or PLC) Use of this property is described in the script interface section below
Locked	True False	Locks the actions of the ActiveX object. True = Locked, False = Unlocked.
MajorTickInterval	10	Sets the number of major tick intervals.
MaxAngle	180	Determines the length of the arc for rotary gauges. Range ±360^{0}.
MaxCharacters	6	Determines the number of digits to be included in the display.
MaxDecimalPlaces	2	Determines the position of the decimal point in the display.
MaxGaugeValue	50	Sets the maximum value of the gauge.
MaxValue	999.99	Sets the maximum value that can be shown by a display.
MinAngle	0	Determines the length of the arc for rotary gauges. Range ±360^{0}.
MinGaugeAngle	50	Sets the minimum angle of the gauge.
MinGaugeValue	10	Sets the minimum value displayed on the gauge.
MinorTickInterval	2	Sets the number of tick intervals between each major tick interval.
MinValue	-999.99	Sets the minimum value that can be shown by a display.
NumberBase	10	Number Base for 7 Segment e.g. 2 for Binary, 10 for Decimal, 16 for Hexadecimal
NumberOfDigits	3	Determines the number of digits to be included in the display.
Orientation	0 or 1	Sets the orientation of the gauge – Horizontal or Vertical.

		0 = Vertical, 1 = Horizontal.
Path	C:\TEMP	Determines the location in which the control will save the log data
PLCName	PLC1	This is the name given to the PLC, not its type.
Precision	2	Number of decimal places for 7 Segment. Only applies when NumBase = 10
PrintObject	True False	Determines if this ActiveX object will be shown on a printout of the work sheet. True = Printed, False = Not printed.
PropertyName	Value	The name of the property in the control to which the PLC item is linked at runtime
ProjectName	C:\Test1.OPC	The OPC client project file (used by the OPC Client control).Note: This should not be changed while communications are active –to change the project name disconnect comms first, then reconnect after setting the new name.
Rollovertime	1	Determines the frequency in hours at which the control will create a new log file
Round	0 or 1	Determines the shape of the LED indicator. 0 = Square, 1 = Round.
ScaleFont	Arial	This is the system name of the font used for the scale. Use the browse button to display the font dialog. Arial is the default.
ScaleFontColour	■ &H00000040&	The code determines the colour of the scale font. Click the browse button to display the colour palette.
SegmentColour	■ &H0000C000&	The code determines the colour of the display segments. Click the browse button to display the colour palette.
ServerComputerName	\\MAINPC	The machine name of the computer on which the OPC Server is running
ServerName	OMRON.OpenData Server.1	The name of the OPC Server
ServerProjectName	C:\CXSPROJ.CDM	The project file used by the OPC Server (optional, may be blank)
Shadow	True False	Adds or removes a shadow from the object giving it a raised appearance. True = Shadow On, False = Shadow Off.
State0Colour	■ &H000000FF&	The code determines the colour of the toggle switch in the 0 state. Click the browse button to display the colour palette.
State0Text	Text	This is the text indicating the 0 state of the switch, i.e. Off, Stopped, Halt etc.
State1Colour	■ &H0000FF00&	The code determines the colour of the toggle switch in the 1 state. Click the browse button to display the colour palette.
State1Text	Text	This is the text indicating the 1 state of the switch, i.e. On, Running, Start etc.
StateFont	Arial	This is the system name of the font used to display the sate of the switch ro button. Use the browse button to display the font dialog. Arial is the default.
StateFontColour	■ &H00000000&	The code determines the colour of the title font. Click the browse button to display the colour palette.
Title	Text	This is the title that appears in the object.
TitlePosition	0 – Top 1 – Bottom	Determines where title will be placed in the object. Above or below the scale.
Top	230	Determines the position of the object from the top of the work area in pixels.
UnitPostion	0 – Inside 1 – Outside	Positions the dial units inside or outside the scale.
UpdateMethodID	-610	The ID of the method that will invoke the update to the PLC at runtime.
UpdateRate	10	The value sets the frequency, in seconds, at which the data passing to or from the object is updated.
Value	0	Determines the default value of the ActiveX object. This is typically (although not always) the default property for a control, so ControlName. = 10 is usually the same as ControlName.Value = 10
Visible	True False	Switches the object between visible and invisible in run mode. True = Visible, False = Invisible.
Width	98.25	Determines the overall width of the object in pixels.

Appendix B
Script Interface

The Script Interface defines the Visual Basic script interface for the OPC communications control. (Note: The container application may also display additional container-specific methods that apply to all objects, e.g. Excel provides a BringToFront method. Consult the help for the container application for details of these methods.)

Functions

Value	Function for getting and setting an OPC item value.
Read	Function to read the value of an OPC item.
Write	Function to write the value of an OPC item.
GetData	Function for starting OnData events.
StopData	Function for stopping OnData events.
OnData	Event for receiving notification of a change in data.
EnableGroup	Function for enabling (or disabling) active state of an OPC Group
EnableItem	Function for enabling (or disabling) active state of an OPC Item
IsBadQuality	Checks whether an item is currently indicating “Bad Quality”
About	Brings up the about box
Help	Brings up help information
ConnectToServer	Connects to an OPC Server, optionally adding client group and item definitions to the Server. Note: it is usually not necessary to call this method, as many other methods automatically call it first if it is required
Disconnect	Disconnects from the OPC Server. Note: it is usually not necessary to call this method, as many other methods automatically call it if it is required
ListGroups	Returns a list of the groups in an OPC project.
ListItems	Returns the list of items in an OPC group.
VarType	Returns the data type of an OPC item

Value

Reads or writes the value of an OPC item.

Example 1 – Reading a value:

intVal = OPCComms1.Value(“MyGroup”, “BoilerTemp”)

In this example, the OPC item ‘BoilerTemp’ in the OPC group called “MyGroup” will be read from the OPC Server and will be stored in ‘intVal’.

Example 2 – Writing a value:

OPCComms1.Value("MyGroup", "BoilerTemp") = 50

In this example, the value 50 will be written to the OPC item 'BoilerTemp'.

Note: 'Value' is the default property for all objects, so is assumed if omitted. Therefore, the following examples are the same:

intVal = OPCComms1.Value("MyGroup", "BoilerTemp")
and
intVal = OPCComms1("MyGroup", "BoilerTemp")

Read

Reads the value of an OPC item.

Example of synchronous read from device:

intVal = OPCComms1.Read("MyGroup", "BoilerTemp", ReadFromDevice)

In this example, the OPC item 'BoilerTemp' in the OPC group called "MyGroup" will be read from the device (e.g. PLC) by the OPC Server and will be stored in 'intVal'. The script will wait for the read operation to complete before continuing to execute the next line. This is identical to the operation of the 'Value' method.

Example of synchronous read from cache:

intVal = OPCComms1.Read("MyGroup", "BoilerTemp", ReadFromCache)

In this example, the OPC item 'BoilerTemp' in the OPC group called "MyGroup" will be returned by the OPC Server from its cache, and will be stored in 'intVal'. The script will wait for the read operation to complete before continuing to execute the next line. If the value is not available in the cache (e.g. because the point is not active) then an error (E_FAIL) will be returned and the quality of the item will be set to bad quality.

Example of synchronous read from cache (or device if cache not available):

intVal = OPCComms1.Read("MyGroup", "BoilerTemp", ReadFromCacheOrDevice)

In this example, the OPC item 'BoilerTemp' in the OPC group called "MyGroup" will be returned by the OPC Server from its cache, and will be stored in 'intVal'. The script will wait for the read operation to complete before continuing to execute the next line. If the value is not available in the cache (e.g. because the point is not active) then the value will be read from device instead.

Example of asynchronous read:

OPCComms1.Read "MyGroup", "BoilerTemp", ReadFromDeviceAsync

In this example, the OPC item 'BoilerTemp' in the OPC group called "MyGroup" will be read from the device by the OPC Server. The script will continue to execute the next line immediately, and when the data is read, it generates an OnData event.

Write

Writes the value of an OPC item.

Example of synchronous write:

OPCComms1.Write “MyGroup”, “BoilerTemp”, NewValue, WaitUntilComplete

In this example, ‘NewValue’ will be written to the OPC item ‘BoilerTemp’ in the OPC group called “MyGroup”. The script will wait for the write operation to complete before continuing to execute the next line. This is identical to the operation of the ‘Value’ method.

Example of asynchronous write:

OPCComms1.Write “MyGroup”, “BoilerTemp”, NewValue, NoWaiting

In this example, ‘NewValue’ will be written to the OPC item ‘BoilerTemp’ in the OPC group called “MyGroup”. The script will continue to execute the next line immediately.

GetData

Starts asynchronous data reading of the specified OPC item at the group update rate

Example

OPCComms1.GetData “MyGroup”, “MyItem”

In this example, MyItem in MyGroup would be read at the group update rate. Data is then sent to the OnData routine.

An individual element of a point, defined as an array in a CDM file, can be accessed for reading or writing values.

Example

Comms1.GetData “MyPLC”, “MyPoint[2]”, nUpdateRate

In this example, the third element of the point MyPoint (defined as plc1/DM500/10/USH) can now be accessed as MyPoint[2]. By default, if the array element is not specified, then the whole point (whole array of elements) is manipulated.

By using the ‘OnChange’ command as the forth parameter, the GetData method will only return points when they change.

Example

Comms1.GetData “MyPLC”, “MyPoint”, nUpdateRate, OnChange

OnChange is of type *‘UpdateSetting’*. By default, the UpdateSetting is set to *Continuous*, to remain compatible with previous versions.

StopData

Stops asynchronous data reading of the specified OPC item

Example

```
OPCComms1.StopData "MyGroup", "MyItem"
```

In this example, the asynchronous reading of MyItem in MyGroup would be stopped.

OnData

This event is sent back to the container (e.g. Excel) when data has changed. This is either data started by calling GetData, or by calling Read or Write in asynchronous mode.

Example

```
Private Sub OPCComms1_OnData(ByVal Group As String, ByVal
                              Item As String, ByVal Value As Variant,
                              ByVal BadQuality as Boolean)
          TextBox1 = Item
          Segment1 = Value
End Sub
```

In this example, the CX-Server 7 Segment component is set to the value of the point and a text box is set to display the name of the item.

If BadQuality is set to True then the value may be inaccurate e.g. from a device which has been disconnected.

The OnData routine can be enhanced to include logical expressions on the incoming Item name and then update the correct graphical object etc. for example:

```
Private Sub OPCComms1_OnData(ByVal Group As String,
                              ByVal Item As String, ByVal Value As
                              Variant, ByVal BadQuality as Boolean)
          If Item = "MyItem" then
                    Segment1 = Value
          Else if Item = "MyOtherItem" then
                    Cells(1,1) = Value
          End if
End Sub
```

EnableGroup

Enables (or disables) the active state of the specified OPC group

Examples

```
OPCComms1.EnableGroup  "MyGroup1", True

OPCComms1.EnableGroup  "MyGroup2", False
```

In the first example, the group MyGroup1 would be made active. In the second example MyGroup2 would be made inactive (stopping communication and subscription callbacks)

EnableItem

Enables (or disables) the active state of the specified OPC item

Examples

OPCComms1.EnableItem “MyGroup”, “MyItem1”, True

OPCComms1.EnableItem “MyGroup”, “MyItem2”, False

In the first example, the item Myitem1 would be made active. In the second example MyItem2 would be made inactive (stopping communication and subscription callbacks)

IsBadQuality

Checks if an item is currently indicating “Bad Quality”.

Example

bBad = OPCComms1.IsBadQuality(“MyGroup”,“MyItem”)

The boolean variable bBad is set True if the item “MyItem” is indicating “Bad Quality” (e.g. the associated PLC is disconnected).

AboutBox

Brings up the About Box.

Example

OPCComms1.AboutBox

Help

Brings up the Help information.

Example

OPCComms1.Help

ConnectToServer

Connects to an OPC Server, optionally adding client group and item definitions to the Server. Note: it is usually not necessary to call this method, as many other methods automatically call it first if it is required.

Example

OPCComms1.ConnectToServer(True) ‘ connects and informs server of groups and items

Disconnect

Disconnects from the OPC Server. Note: it is usually not necessary to call this method, as many other methods automatically call it if it is required.

Example

```
OPCComms1.Disconnect
```

ListGroups

Returns a list of the groups in an OPC project

Examples

```
Dim A as Variant
A = OPCComms.ListGroups
For Count = 1 To UBound(A)
   ComboBox1.AddItem (A(Count))
Next Count
```

This example fills a combo box with the names of groups in the current project.

VBScript (CX-Supervisor) Example

```
Dim arrayOfGroups
Dim nUbound, nLbound
arrayOfGroups = Comms1.ListGroups
nLbound = LBound(arrayOfGroups)
nUbound = UBound(arrayOfGroups)
For Count = nLbound To nUbound
            ‘Do something with list here
Next
```

ListItems

Returns a list of the items in an OPC group

Example 1

```
Dim v as Variant
v = Comms1.ListItems(“Group1”)
```

Example 2

```
Dim A as Variant
A = Comms1.ListItems(ComboBox1.Text)
For Count = 1 To UBound(A)
   ComboBox2.AddItem (A(Count))
Next Count
```

The example above fills ComboBox2 with the names of points in the group shown in ComboBox1.

VBScript (CX-Supervisor) Example

```
Dim arrayOfItems
Dim nUbound, nLbound
arrayOfItems = Comms1.ListItems(sGroup)
nLbound = LBound(arrayOfItems)
nUbound = UBound(arrayOfItems)
For Count = 1 To UBound(arrayOfItems)
        ‘Do something with items list here
Next
```

VarType

Returns the data type of an OPC variable as a variant containing a long value that can be compared against the standard Visual Basic data types (i.e. vbArray, vbBoolean, vbByte, vbChar, vbCurrency, vbDate, vbDecimal, vbDouble, vbEmpty, vbInteger, vbLong, vbNull, vbObject, vbSingle, vbString, vbUserDefinedType and vbVariant). See Visual Basic (or VBScript) help for more information on these data types.

Example

```
Dim v as variant
v = OPCComms1.VarType("Group1", "Item1")
‘ the returned data type v can now be compared with standard VB data types
```

Appendix C
Temperature Controller Support

Parameter support

The following table outlines the temperature controller points available from the CX-Server points editor. Cross-reference this information with the support offered by your specified device.

	Word Addressing	Bit Addressing	Read/Write
SETPOINT	√	X	√
PROPORTIONAL	√	X	√
INTEGRAL	√	X	√
DERIVATIVE	√	X	√
OUTPUT	√	X	X
LOWER_LIMIT	√	X	X
UPPER_LIMIT	√	X	X
PROCESS	√	X	X
STRENGTH	√	X	√
SCALE1	√	X	√
SCALE2	√	X	√
ALARM	√	√	√
SHIFT	√	√	√
SHIFT_LOWER	√	√	√
SHIFT_UPPER	√	√	√
BURNOUT	√	√	√
HEATER	√	X	X
ALARM1	√	√	√
ALARM2	√	√	√
ALARM3	√	√	√
COOLING	--	--	--
DEADBAND	--	--	--
VALVE	--	--	--

To access these values via the CX-Lite component add the appropriate temperature controller device. Add a point using the value from the Data Location column in the table above. You can then access this information as you would with any point.

Device support

The following table outlines the temperature controller points available for each of the devices supported by CX-Server.

	E5AF-A	E5AF-AH	E5EF-A	E5EF-AH	E5EF-BA	E5EF-BAH	E5AX-A	E5Ax-AH	E5AX-D	E5AX-LA	E5AX-MA	E5AX-PRR	E5AX-V	E5AJ-A	E5EJ-A	E5AK-AA	E5AK-PRR
SETPOINT	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
PROPORTIONAL	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
INTEGRAL	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
DERIVATIVE	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
OUTPUT	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
LOWER_LIMIT	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
UPPER_LIMIT	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
PROCESS	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
STRENGTH	√	√	√	√	√	√	--	--	--	--	--	--	--	√	√	--	--
SCALE1	√	√	√	√	√	√	--	--	--	--	--	--	--	√	√	--	--
SCALE2	√	√	√	√	√	√	--	--	--	--	--	--	--	√	√	--	--
ALARM	√	√	√	√	√	√	√	√	√	√	√	√	√	--	--	--	--
SHIFT	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	--	--
SHIFT_LOWER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	√	√
SHIFT_UPPER	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	√	√
BURNOUT	--	√	--	√	--	√	--	√	--	--	--	--	--	√	√	√	√
HEATER	--	√	--	√	--	√	--	√	--	--	--	--	--	√	√	√	√
ALARM1	--	--	--	--	--	--	--	--	--	--	--	--	--	√	√	√	√
ALARM2	--	--	--	--	--	--	--	--	--	--	--	--	--	√	√	√	√
ALARM3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	√	√
COOLING	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	√	√
DEADBAND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	√	√
VALVE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	√	√

In addition to the previous table, a special value of PARMxx can be used to refer to any E5AK parameter, where xx is replaced by a number that corresponds to the number of the parameter given in the E5AK manual. For example, the special address PARM45 would refer to the 'SP ramp set value'.

Refer to the Temperature Controller manual for descriptions of each special address.

Glossary of Terms

ActiveX

A component technology developed by Microsoft allowing components to communicate with **applications**.

Application

A software program that accomplishes a specific task. Examples of applications are **CX-Supervisor**, **CX-Programmer, CX-Server, Microsoft Word** and **Microsoft Excel**

Communications Driver

The relevant communications management system for OMRON PLCs in conjunction with **Microsoft Windows**, providing facilities for other CX Automation Suite software to maintain PLC device and address information and to communicate with OMRON PLCs and their supported network types.

Event

User action, e.g. mouse click or System action, e.g. timer tick which may cause a script to execute.

GUI

Graphical User Interface. Part of a program that interacts with the user and takes full advantage of the graphics displays of computers. A GUI employs pull-down menus and dialog boxes for ease of use.

I/O type

Input / Output type. An attribute of a **point** that defines the origin and destination of the data for that **point**. The data for a **point** can originate (be *input* from) and is destined (is *output* to) to the internal computer memory, a **PLC** or a target application

Icon

Pictorial representations of computer resources and functions

Microsoft Excel

A spreadsheet **application**.

Microsoft Windows

The most common operating system used by Personal Computers.

CX-Server OPC will run only under Microsoft Windows.

Microsoft Word

A word processing **application**.

OLE

Object Linking and Embedding. Used to transfer and share information between **Microsoft Windows** based **applications** and accessories.

OPC

Abbreviation for **OLE** for Process Control. Open standard for the exchange of data between **OPC Servers** and **OPC Clients** used within the process control industry.

OPC Client

A software **application** that uses OPC interfaces to exchange data with an **OPC Server**.

OPC Group

A collection of **OPC Items**.

OPC Item

A single piece of data e.g. a **PLC** memory area stored with an **OPC Server**.

OPC Server

A software **application** that uses OPC interfaces to provide data to **OPC Clients**.

PC

Abbreviation for Personal Computer.

Pixel A single displayable point on the screen from which a displayed image is constructed. The screen resolution of the computer's Visual Display Unit (VDU) is defined by the number of pixels across and the number of pixels down (e.g. 1024 x 768).

PLC Abbreviation for Programmable Logic Controller.

Point A point is used to hold a value of a predefined type **-** Boolean, Integer, Text, etc. The contents of a point may be controlled by an object or I/O mechanism such as **DDE**. The contents of a point may control the action or appearance of an object, or be used for output via an I/O mechanism.

SVGA mode A mode of video display that provides 800 × 600 **pixel** resolution (or higher) with 16 or more colours and is supported on Super Video Graphics Adapter systems.

Windows Desktop An integral part of **Microsoft Windows**that allows Microsoft Windows based **applications** to be started from **icons** and for all **applications** to be organised.

Index