

CX-Server

Runtime User Manual

Version 1.7

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.

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.

Other manual conventions are as follows:

- Windows-based applications provide users with a number of different ways to perform one operation. These are normally: from the application menu bar; using icons on a Toolbar; using keyboard shortcuts; using the right-mouse button to display a context-sensitive menu; dragging and dropping. Whilst recognising this, the manual provides user instructions employing the Toolbar and right-mouse button only. Use of the application menu bar or keyboard shortcuts are only included if no such alternatives exist.
- Access to the CX-Server middleware is normally via other software applications, such as CX-Programmer or CX-Protocol. This is noted in the manual by the term “invoking application”.
- This manual refers to two distinct types of project: CX-Server projects and application projects. A CX-Server project is defined in this manual. An application project is defined by the software application invoking CX-Server.

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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 application and its ability to control and monitor a range of OMRON 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 chapters:

- **Chapter 1 - Technical Specification.** This chapter describes CX-Server in general terms and introduces the user to the relationship between CX-Server and associated products. It also provides details of the operating environment, minimum configuration and installation procedures necessary for the satisfactory operation of CX-Server.
- **Chapter 2 - Introduction to CX-Server.** This chapter describes the concepts on which CX-Server is based including the definition of PLCs, points and groups.
- **Chapter 3 - Communications.** This chapter describes the communications supported by CX-Server.
- **Chapter 4 - Import/Export Tool.** This chapter describes the Import/Export Tool and its ability to add data from CVSS and LSS files to a CX-Server project.
- **Chapter 5 - DDE Manager Tool.** This chapter describes the DDE Manager and its ability to read and update point data via CX-Server.
- **Chapter 6 - Performance Monitor Tool.** This chapter describes the Performance Monitor Tool and the procedures involved when monitoring communications.
- **Appendix - A Network Availability.** The tables in this appendice indicate the network available to each PLC device group. FinsGateway has no network availability and is not described.
- **Appendix B - PLC Memory Area.** The tables in this appendice provide memory area details for each device group.
- **Appendix C - Toolbars and Keyboard Shortcuts.** The tables in this appendice summarise the toolbars and keyboard shortcuts available from each component tool.

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.
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CHAPTER 1

Technical Specification

This chapter describes the CX-Server software in general terms and introduces the user to the relationship between CX-Server and associated products. It also provides details of the operating environment, minimum configuration and installation procedures necessary for the satisfactory operation of CX-Server.

CX-Server Software

CX-Server is a communications management system in Microsoft Windows for OMRON PLCs. It provides facilities to maintain PLC device and address information and to communicate with OMRON PLCs and their supported network types.

CX-Server consists of the following components:

As well as acting as a server for other OMRON software, CX-Server includes other customer tools:

- ◆ **CX-Server DDE Manager** tool. A tool for allowing transference of data between PLCs and a client using DDE, for example Microsoft Excel.
- ◆ **CX-Server Import** tool. This tool is used for addresses and PLCs defined using the CVSS and LSS products. It allows definitions of addresses and PLCs to be used by importing them into a CX-Server project file.
- ◆ **CX-Server Performance Monitor** tool. A tool for monitoring communications throughput and for displaying CX-Server's current performance level (i.e. a check to see if CX-Server is becoming overloaded).

CX-Server operates on IBM compatible personal computers with Pentium or better central processors, including Pentium II. It runs in a Microsoft Windows environment (Microsoft Windows 95, 98, Millennium, 2000 or XP and NT4.0 with Service Pack 5 or later).

CX-Server comprises various executables, Dynamic Link Libraries (DLLs) and components. In order to use certain communication types (i.e. Ethernet, SYSMAC LINK, SYSMAC NET), some settings must be configured prior to use – separate to the software installation. Refer to *Chapter 3-Communications* for further details.

About this Manual

This User Manual acts as a reference for CX-Server by describing its various concepts and abilities. It also provides the basics of using its dialogs and supplied utilities.

Caution

This manual is referred to from other software that utilises CX-Server, for instance, CX-Programmer, CX-Protocol, CX-Supervisor or CX-Server OPC and CX-Server Lite. Subsequently, some topics contained in this user manual may not be relevant.

CX-Server comes with a context-sensitive online help system which is designed to complement this manual and to provide a quick reference at any point while using CX-Server when the manual is not to hand. This general help system uses a fast hypertext system which allows progressively detailed information about any topic to be obtained by selecting keywords within the descriptive text.

Throughout this manual it is assumed that the reader has a working knowledge of Microsoft Windows and know how to:

- ◆ use the keyboard and mouse;
- ◆ select options from Microsoft Windows menus;
- ◆ operate dialog boxes;
- ◆ locate, open and save data files;
- ◆ edit, cut and paste text;
- ◆ use the Microsoft Windows desktop environment.

If the installed version of Microsoft Windows has not been used before, it is recommended that the reader spends some time working with it using the Microsoft documentation before using CX-Server.

Features

CX-Server is the corner stone of the suite of applications collectively known as the CX-Automation Suite. The CX-Automation Suite is not one system but software that has been designed to dynamically evolve with every direction a manufacturer would like to take and to accommodate any implementation, improvement, adaptation or extension of any form of control or data acquisition in a manufacturing industry.

The software suite has been developed to serve you with powerful yet comprehensible software that builds and runs networks that simply control one machine or an entire manufacturing process. It comprises the following:

- ◆ CX-Programmer
- ◆ CX-Server Lite
- ◆ CX-Server OPC
- ◆ CX-Protocol
- ◆ CX-Motion
- ◆ CX-Supervisor

The CX-Automation suite is in itself highly adaptive. It completes the integration of process control and business information systems, by applying one and the same basic network architecture. For the user it means that data from both sources of information can be jointly reported in familiar applications such as spreadsheets, in which they can be recalculated in existing layouts or processed along usual spreadsheet procedures.

The architecture is based on standards that are widely maintained such as ActiveX and OPC (OLE for Process Control) and standard interfaces such as COM, DCOM and ODBC/ADO. This conformity also means that you can use standard interfaces and standard software.

System Requirements

CX-Server operates on IBM compatible personal computers with Pentium II or better central processor.. It runs in a Microsoft Windows environment (Microsoft Windows 95, 98, Millennium or 2000 and NT4.0 with Service Pack 5 or later).

Note: CX-Server is not guaranteed to be compatible with computers running Windows emulation (for example, Apple Macintosh).

The following configurations are the minimum system requirements for running CX-Server in Microsoft Windows 95, 98, Millennium, 2000 or XP and NT4.0 with Service Pack 5 or later).

Minimum System Requirements

Operating System	Minimum Specification				Recommended Minimum Specification			
	CPU Type	Memory (RAM)	HDD Space	Display	CPU Type	Memory (RAM)	HDD Space	Display
Windows 95 Windows 98 Windows NT (with SP 5)	Pentium Class 133MHz	32Mb	100Mb	800x600 SVGA	Pentium Class 200MHz	64Mb	150Mb	1024x768 SVGA
Windows 2000 Windows ME	Pentium Class 150MHz	64Mb	100Mb	800x600 SVGA	Pentium Class 200MHz	64Mb	150Mb	1024x768 SVGA
Windows XP Home Windows XP Professional	Pentium Class 300MHz	128Mb	100Mb	800x600 SVGA	Pentium Class 600MHz	256Mb	150Mb	1024x768 SVGA

Use of a mouse is highly recommended, although all operations can be performed using the keyboard. Refer to *Appendix C* for a list of keyboard shortcut commands.

The amount of RAM and hard disk space used depends upon the size of the PLC programs written – approximately 1K per step.

Communications Requirements

In order to use serial communication types SYSMAC WAY and Toolbus the following is required:

- ◆ RS232 connection via a standard serial port on the PC (COM1 etc.) or RS422 connection to a 422 serial board.
- ◆ In order to use SYSMAC LINK directly from the PC a SYSMAC LINK Network Service Board and FinsGateway Version 3 or higher is required.
- ◆ In order to use SYSMAC NET directly from the PC a SYSMAC NET Network Service Board and FinsGateway Version 3 are required. (Windows NT4 only)
- ◆ In order to use Controller Link directly from the PC a Controller Link Network Service Board (wired or optical) and FinsGateway Version 3 or higher are required.
- ◆ In order to use Ethernet an Ethernet card, Windows Sockets software and TCP/IP must be installed and correctly configured.
- ◆ In order to use an ISA board FinsGateway Version 3 or higher is required.
- ◆ Controller link PC NSB is supported using FinsGateway Version 3 or higher.
- ◆ SYSMAC LINK PC NSB is supported using FinsGateway Version 3 or higher.

In order to use FINSGateway with the CLK/SLK PCI board in the Windows 98 or 2000 operating system the appropriate drivers must be installed. These drivers can be found on the CX-Server CD under: CX-Server\WDM\CLK (PCI)\ or CX-Server\WDM\SLK (PIC)\

Refer to *Chapter 3- Communications* for more information and the appropriate hardware system manuals for full information about connecting and configuring these devices for the environment.

Installation

This describes the procedures involved in the installation of CX-Server on a standard workstation running Microsoft Windows 95, 98, Millennium, 2000 or XP and NT4.0 with Service Pack 5 or later.

The software is supplied on CD-ROM and is installed easily from within Microsoft Windows. The installation can be terminated at any point during the installation process.

If CX-Server is being installed as part of the CX-Programmer installation then on completion of the CX-Programmer installation a number of dialogs will prompt for information concerning the installation of CX-Server and its components.

Note: If using CX-Server under Windows 95, DCOM95 is required for correct operation. This is installed as part on the install process.

- 1, 2, 3...**
1. Insert the CD-ROM in the appropriate drive and select the *Run* option from the **Start** pushbutton on the taskbar.
 2. Click the **Browse** pushbutton and select the Setup.exe executable file in the CX-Server directory or from the CD-ROM drive.
 3. Click the **OK** pushbutton to start the installation then follow the on-screen instructions.

Starting CX-Server

CX-Server components are normally accessed from the invoking application. However, a number of tools can be accessed as stand-alone tools from the windows **Start** menu (on the Microsoft Windows taskbar).



Performance Monitor tool.



DDE Manager tool.



CX-Server Import / Export tool.

Help and How to Access it

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

- ◆ Context-sensitive help;
- ◆ Help Index (available on the *Help* menu);
- ◆ Help Contents (available on the *Help* menu);
- ◆ About (available on the *Help* menu);
- ◆ Status Bar tool button tips.

Help Topics

Select the *Help Contents* option on the *Help* menu. The Help system provides a standard look-up dialog under the *Contents* tab showing the contents of the CX-Server Help file. Click on an item to read the associated information.

Index

Use the following procedure to retrieve online help from the *Index* tab of the Help Topics dialog.

- 1, 2, 3... 1. Select the *Help Index* option from the *Help* menu.
2. Enter a text query into the first step field. The second step field is refreshed according to the query entered in the first step field.
3. Select an entry in the second step field and select the **Display** pushbutton, or double-click on the index entry.
4. If an entry is linked to two or more topics, the names of the topics are displayed in the Topics Found dialog. Select a topic and choose the **Display** pushbutton or double-click on the topic.

Find

Use the following procedure to retrieve on-line help from the *Find* tab of the Help Topics dialog.

- 1, 2, 3... 1. Select the *Help Index* option from the *Help* menu.
2. Select the *Find* tab.
3. Enter a text query into the first step field. The second step field is refreshed according to the query entered in the first step field. Previous text queries can be retrieved by selecting from the drop-down list in the first step field.
4. Select a word that matches the query – some words may be automatically selected. More than one word can be selected by pressing Shift and selecting another word to extend the selection, or by pressing Ctrl and selecting another word to add to the selection. The third step field is refreshed according to the word or words selected. The number of topics found are shown at the bottom of the dialog.
5. Select a topic from the third step field and select the **Display** pushbutton, or double-click on the topic from the third step field. Select the **Clear** pushbutton to restart the find operation.

The Find operation can be enhanced by the use of the **Options** pushbutton and **Rebuild** push-button. Refer to *Microsoft Windows 95 documentation* for further information.

Context-sensitive Help

CX-Server supports the use of context-sensitive help. The relevant online help topic is provided automatically by selecting the current area of the display responsible for carrying out those actions. Select the F1 function key to retrieve context-sensitive help. Some dialogs include a **Help** pushbutton when F1 cannot be accessed.

About CX-Server

Each CX-Server component contains an *About* option on the *Help* menu. The About CX-Server dialog supplies technical reference information about that component such as version and copyright information. It also contains the version number which is required for obtaining technical support.

Use the following procedure to view the About CX-Server dialog.

- 1, 2, 3... 1. Select *About* from the *Help* menu.
2. The About box is displayed. It provides a copyright statement and version number of the component or tool within CX-Server.

Status Bar

The Status Bar is displayed at the bottom of many of the CX-Server component and tool windows. It provides several helpful pieces of information while programming:

- ◆ *Instant Help.* A brief message appears in the Status Bar as menu commands and buttons are selected.
- ◆ *Online Status.* The online or offline status of the PLC.
- ◆ *PLC Mode.* When connected to a PLC, this shows the current PLC mode. Connection errors are also displayed here.
- ◆ *Connected PLC and CPU Type.* The currently connected PLC and associated CPU can always be referenced in the status bar.

The CX-Server Status Bar can be enabled and disabled from many components and tools by selecting the *Status Bar* option from the *View* menu.

Technical Support

If the installation instructions for this have been followed (refer to '*Installation*' above), no difficulties should be encountered. However, if there is a problem, contact Customer Services.

If a problem occurs, check that it does not relate to a fault outside CX-Server. Check the following:

- ◆ The PC is working correctly.
- ◆ The PLC is working correctly.
- ◆ The communications system is set up correctly.
- ◆ The errors are cleared in the PLC.

When Customer Services need to be contacted, keep the details shown in the following table 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 box to obtain the version number of the component.

Customer Services Required Information Table

Version number of CX-Server component or tool:	
Serial number of the software:	
Operating system and version number:	
Language of operating system:	
PLC type, model and CPU details:	
Type of communications in use:	
Serial	
Toolbus	
SYSMAC LINK	
SYSMAC NET	
Device NET	
Controller Link	
Ethernet	
Nature of the problem:	
Steps taken to reproduce problem:	
Other comments:	

CHAPTER 2

Introduction to CX-Server Projects

This chapter describes how data is identified within CX-Server projects (in terms of PLCs, points and groups). It also describes the CX-Server functions available for the purposes of configuring PLCs and points within a CX-Server project.

CX-Server Projects

CX-Server is a middleware package which allows other software to access OMRON automation devices (PLCs, temperature controllers, Memory Card Writer and PROM Writer) through various connection types. In order to co-ordinate these communications, it handles information detailing the PLC devices attached to the PC and the information being accessed on each device.

Such information is held in a CX-Server project file with a .CDM extension. This file contains all of the information about the PLCs, which CX-Server can connect to and the addresses of interest in each PLC which may be accessed.

Each CX-Server project file is separate and is similar in concept to a document. CX-Server can deal with many CX-Server project files at a time, although often only one CX-Server project is used by the client software at any time.

A number of steps are involved in the setting up of a CX-Server project. At a high-level, these can be regarded as:

- ◆ Identifying the PLCs which the PC is to communicate with;
- ◆ Identifying the addresses (points) within the PLC which are to be accessed during communications;
- ◆ Establish the type of network to be used.

CX-Server Project Concepts

CX-Server projects consist of PLCs, Connected Devices, Networks and Points. The following paragraphs describe the of PLCs, Networks and Points into a CX-Server project and introduce the Project Editor. Specific setup of PLCs and Networks are described in *Chapter 3 - Communications*.

PLCs

A CX-Server project file contains a list of PLCs which are (potentially) connected to the PC. These PLCs do not really have to be connected unless communications with them are to occur.

Each PLC has the following attributes:

- ◆ *Device Name*. A unique name with the CX-Server project file so that the PLC can be easily referenced (for example, 'PumpRoom1').
- ◆ *Comment*. A free-form long comment which is only used for information by the user that is attached to the unique device name.

- ◆ *Device Type.* The PLC device type (for example, CV500).
- ◆ *Connection Type.* How to connect to the PLC and the address of the PLC on the chosen network (for example, direct one-to-one connection or via a gateway PLC, one that is already defined in the CX-Server project).
- ◆ *Type Options.* A list of options which may be present on the PLC (for example, the amount of user-memory, clock, EM configuration and CPU type).
- ◆ *Connection Options.* A list of options which may be available on the chosen network (for example, the speed of communication on SYSMAC WAY, Toolbus, Modem configuration, or Network or Node configuration details).

A full description of the communications possibilities for C-series PLCs, CV-series PLCs and CS1-series PLCs is provided in Chapter 3 - Communications. Host Link Port and Peripheral Port settings are made via the PLC Setup Component, refer to *PLC Tools User Manual Chapter 4 - PLC Setup Component*. Once the network has been defined and configured, it can be tested to ensure that messages are being transmitted correctly.

The PLCs selected also affect which other setup procedures need to be performed; for example, the CV-series and CS1-series requires setting up the IO Table and using the PLC Setup Component to establish specific PLC characteristics. In addition it is possible to set up to three levels of networks and to communicate with these networks, the initial, direct connection must be to a PLC acting as a gateway. To ensure that messages from the PC reach the end connection PLC, the gateway PLC must contain the routing information which identifies this PLC. Procedures for configuration of the network is provided in the PLC Tools User Manual Chapter 8 - CX-Net Network Configuration Tool, Chapter 10 – Datalink Editor, Chapter 11 – Routing Tables.

Connection to the PLC requires the specification of the type of communications interface to be used to connect to the PLC. CX-Server supports two methods of communication: serial communications and network communications. Serial and network communications can be made using the Connection Type dialog although these are dependent upon the type of PLC being communicated with.

Points

The CX-Server project file also contains a list of addresses which may be accessed in the defined PLCs, each address being contained inside a *point*. Each point has the following attributes:

- ◆ *Name.* A unique label within its group so that the point can be easily referenced, similar to folders in Microsoft Windows Explorer (for example, 'Conveyor Position').
- ◆ *Comment.* A free-form long comment used only for reference by the user.
- ◆ *Address.* The location of the information inside the configured PLC:
 - ◆ including the PLC (by name, matching the label of the defined PLC),
 - ◆ address (for example, 'D0'),
 - ◆ the number of elements (for example, ten elements for ten channels) and type (for example, bit, channel, floating point).

Points are stored within the CX-Server project file in a hierarchical *group* structure. New groups may be added to the CX-Server project at any level of the hierarchy tree. Groups act as container objects (as folders contain files) for relevant points within a CX-Server project. Similar points may be banded together and stored within these groups.

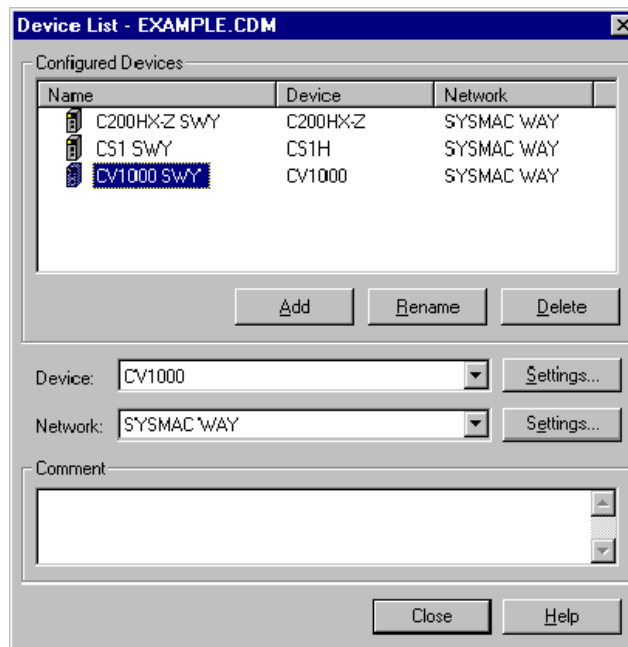
Editing a CX-Server Project PLC List





The Edit Project dialog allows the PLC or Points information in the currently opened CX-Server project to be modified, deleted or added. A CX-Server Project PLC list can be edited from either the Import/Export tool or the CX-Net tool by selecting the appropriate .cdm file and then selecting Edit from the Project menu. Alternatively from the Project Editor right click on Devices and select the Properties option or select Properties from the File menu.

Alternatively from the Project Editor right click on Devices and select the Properties option or select Properties from the File menu.

Click on the PLCs **Setup** pushbutton in the edit project dialog to edit the CX-Server project PLC list.

The Device List dialog is subsequently displayed; this is the central point for adding and setting up PLCs and lists all currently defined PLCs in the open CX-Server project file, their type, network details and any comments associated with each device.



-  This icon denotes a PLC.
-  This icon denotes a PLC also used as a gateway PLC.
-  This icon denotes that the device is open for communications. A device list cannot be opened whilst open for communications.
-  A PLC device cannot be deleted or have its network or device settings altered if it is open for communication (i.e. active). It cannot be modified in any way if the CX-Server project has been opened as read-only. It cannot be deleted or its device type changed if it is acting as a gateway.

Adding a PLC

The Device List dialog also permits addition of new PLCs to the open CX-Server project. Use the following procedure to add a PLC.

- 1, 2, 3... 1. Click on the **Add** pushbutton in the Device List dialog. An entry is made in the list of Configured Devices.
2. Enter a name in the *PLC Name* field. This has a maximum length of 32 characters and must be unique within the currently open CX-Server project file; it must *not* contain any of the following characters: `: / \ : ; , ? * & ! “` but can contain spaces and international characters. The *PLC Name* field is case sensitive, i.e. if a name is entered in upper case which already exists in lower case (and vice versa), a new PLC is created.
3. Select options for the *Device* field and *Network* field for the new PLC. The list of Configured Devices is updated. Clicking outside this new entry results in a confirmation dialog being displayed. If required select the associated **Settings** pushbutton to refine the Device Type Settings and Network Settings. *Refer to Chapter 3 - Communications for further information.*
4. If the **Close** pushbutton or another PLC name is selected, a dialog appears asking for confirmation of the changes just performed; select the **Yes** pushbutton to remove the dialog and save the new PLC. Select the **Cancel** pushbutton to abort the operation.

Note The default device name selected from the **Add** pushbutton in the Device List dialog is unique within the CX-Server project, for instance 'NewPLC1'.

Deleting a PLC

The Device List dialog also permits deletion of a PLC from an open CX-Server project. Use the following procedure to remove a PLC.

- 1, 2, 3... 1. Highlight the required PLC name in the Device List dialog and select the **Delete** button. A dialog is displayed asking for confirmation of the deletion.

2. Select the **Yes** pushbutton to confirm the deletion or the **No** pushbutton to cancel the operation.



It is not possible to delete a device that is open for communications, indicated by the Device Open icon, as it cannot be opened.



It is not possible to delete a device being used as a gateway device, indicated by the Gateway Device icon.

Renaming a PLC

The Device List dialog allows the name of a PLC to be altered. Use the following procedure to rename a PLC.

- 1, 2, 3... 1. Highlight the required PLC name in the Device List dialog and click on the **Rename** pushbutton.
2. Type in the new name, to a maximum length of 32 characters.

If the **Close** pushbutton or another PLC name be selected, a dialog appears asking for confirmation of the changes just performed; select the **Yes** pushbutton to remove the dialog and save the new name. Select the **Cancel** pushbutton to abort the operation.

Editing CX-Server Project

Points and groups within a CX-Server project can be edited via the CX-Server Project Editor which is accessed from the Import/Export tool or the DDE Manager. The Project Editor allows new points, groups and devices to be added, modified to and/or deleted from the CX-Server project.

A CX-Server Project can be edited by selecting *Edit* from the *Project* option on the menu bar of the Import / Export tool or by opening / editing a project in the DDE Manager. The option is not available to all tools and components and is further unavailable unless a CX-Server project has been opened or created.

Click on the Points **Setup** pushbutton in the edit project dialog to edit the CX-Server project. The information displayed includes the following:



A 'devices' view showing all devices configured in the CX-Server project and each device available memory areas. The complete group hierarchy of the CX-Server project, and details of the points (in their memory areas) within the CX-Server project.



A 'points' view showing details of the points (within their groups).

Comments (name and address comments) relating to a point are displayed when the appropriate element is highlighted.

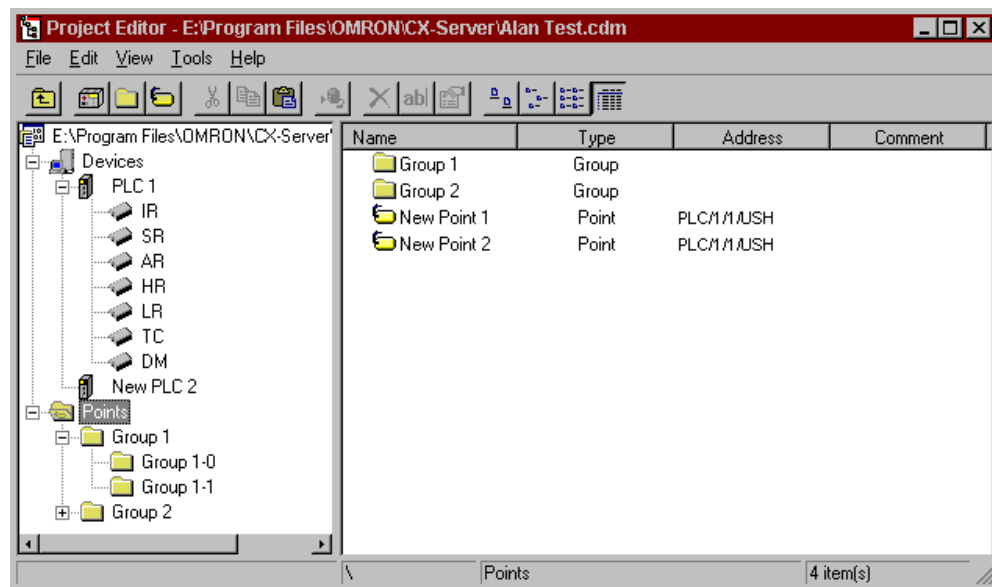
A point represents an input or output data area within a PLC; it can refer to a single bit of data (representing for example, "Hopper empty", "Activate Reject Solenoid"), or to a multiple bit word (representing for example, "Process Temperature").

Associated with each point is a name and address indicating its position within a PLC and a PLC's memory; comments can also be entered against a point's name and address.

The information held at a point can be read or updated by CX-Server. A third party can also access this point data by establishing a link between that and the PLC.



Note More than one point can have the same address, any comment entered against this address applies to all points at this location. Comments entered against the point name are unique to that point only. Points do not have to have a name, however, if a name is supplied it must be unique.

To access the Project Editor, open the CX-Server Import/Export tool and open or create a project. Then from the Project menu select Edit, this opens the Edit Project dialog. In Edit Project click the Points: Setup button.



The status bar provides instant help.

The Project Editor can be manipulated in a similar manner to Microsoft Windows Explorer. The left pane displays the content of the project in terms of Devices Networks and Points.

-  To expand the hierarchy in the left pane, select this icon.
-  To collapse the hierarchy in the left pane, select this icon.

To view the content of a particular branch in the hierarchy, double-click on the item in the left pane.



Select the **Up One Level** button from the toolbar to traverse back through the hierarchy toward the root.



Select the **Large Icons** button from the toolbar to display the content of the right pane as large icons.



Select the **Small Icons** button from the toolbar to display the content of the right pane as small icons.



Select the **List** button from the toolbar to display the content of the right pane as a list.



Select the **Details** button from the toolbar to display the content of the right pane with associated details.

The Toolbar and status bar can both be turned on or off. Select *Status Bar* from the *View* menu to control the display of the status bar. Select *Toolbar* from the *View* menu to control the display of the Project Editor toolbar.

If points are displayed in the right pane, the view can further be modified by setting certain preferences.

- ◆ Showing invalid points;
- ◆ Showing open points / PLCs;
- ◆ Automatic resizing of list column.

Use the following procedure to set point preferences.

- 1, 2, 3... 1. Click on the Points icon in the left pane to open the points view of the editor in the right pane.
2. Select *Options* from the *View* menu. The options dialog is displayed.
3. Amend point preferences from the General tab. Select the **OK** pushbutton to complete the operation. Select the **Cancel** pushbutton to abort the operation.

For moving, resizing, maximising, minimising and closing windows, refer to Microsoft Windows online help.



To save changes and close the Project Editor, select the **Close** button in the title bar.

Adding a Group

Points are saved within groups in a CX-Server project. When a CX-Server project is initially created it contains the root level group only. Groups can be created within a CX-Server project in hierarchical order from the root level. Points are saved within the root group or specified subsidiary groups within the hierarchy, similar to folders and files within the Microsoft Windows Explorer.

The Add Group dialog adds a new group under the currently selected group.

- 1, 2, 3... 1. Open the Project Editor, click on the branch of the CX-Server project hierarchy to which the group is to be added; for instance the Points root branch and add a group.



2. Select the **Add Group** button from the toolbar. The **New Group 'n'** will be added to the tree structure in the appropriate position.

Renaming a Group



To rename a group, select the group followed by the Rename button in the toolbar. Alternatively select Rename from the File menu option. or right click on the group and select the Rename option.

The new group name has a maximum length of 32 characters and must be unique within the group that it is being created. It must *not* contain any of the following characters: / \ : ; , ? * & ! “.

The group name field is case sensitive. For example, if a name is entered in upper case which already exists in lower case a new group name will be allowed.

Adding a Point

The Add Point dialog allows a new point within the currently open CX-Server project to be created and its name and address to be entered. Use the following procedure to add a point.

1, 2, 3...



1. Open the Project Editor, click on the Points branch in the tree.
2. Select the **Add Point** button from the toolbar. The Add Point dialog is displayed.
3. Select the *Logical Tab* and enter the new name in the *Name* field; this has a maximum length of 32 characters, it must be unique, and must *not* contain any of the following characters: / \ : ; , ? * & ! “ but can include an existing path to indicate the group to which it belongs (if it is to be added to a group other than that indicated above the name). A name is optional, but if supplied must be unique.
4. A comment can only be added to a point if a point name has been supplied. Enter text in the *Comment* field to be associated with the point name. This field is optional and is used simply for reference purposes.
5. Select the *Physical Tab* and select the PLC to be associated with the point in the *PLC* field. This field is mandatory but can be set to ‘None’ until a correctly configured PLC is added to the CX-Server project.
6. Enter the data location in the *Data Location* field identifying the area of memory to which this address applies; this value is dependent upon the type and configuration of the PLC and is mandatory if a PLC has been selected. Memory Area and Start Address must be supplied, for instance, ‘D0’ for a CV-series and CS1-series PLC or ‘DM0’ for a C-series PLC. Refer to *Appendix B PLC Memory Areas* for a complete list of valid PLC memory areas and ranges.
7. Enter the number of elements indicating the number of address units which start at the specified data location (i.e. the size of an array of addresses, for instance, ten for ten channels) in the *Elements* field. This field defaults to 1.






















8. Select the Internal Data Type in the *Internal Data Type* field, identifying the format of the data held at the PLC address (e.g. BCD or binary, WORD or double WORD). This allows CX-Server to automatically convert the PLC specific format of the data to a common format which the PC can use.
9. Select the Command Modifier required to access this address in the *Command Modifier* field. The modifiers available depend upon the data location chosen. An example of a modifier is *Forced Set* which forces a data location to be held with given data, overriding the PLC program's usage.
10. Select the **OK** pushbutton to save the point details or the **Cancel** pushbutton to discard the new point.

Note The fields in the *Address* chapter of the dialog are only enabled when a PLC has been selected and the values available in these fields (if any) also depend upon the PLC chosen.

If several points are to be added at a time, the *Leave Box* setting should be checked, this allows the dialog to stay active after the **Add** pushbutton is pressed. The fields remain populated with the previous point's settings allowing further modification. Select the **Close** pushbutton to remove the dialog.

A point can have a name and/or an address. It does not need to have both.

Points with valid addresses assigned are marked by an icon according to the Internal Data Type set as follows:

Internal Data Type	Icon	Internal Data Type	Icon
No type defined		Single Word Unsigned BCD	
Bit		Double Word Unsigned BCD	
Signed Character Binary		Quad Word Unsigned BCD	
Unsigned Character Binary		Single Word Signed BCD	
Raw Character Binary		Double Word Signed BCD	
Single Word Unsigned Binary		Quad Word Signed BCD	
Double Word Unsigned Binary		Double Word Float	
Quad Word Unsigned Binary		IEEE Float	
Single Word Signed Binary		Complex	
Double Word Signed Binary		LReal	
Quad Word Signed Binary			

Points with an invalid PLC address assigned to them are indicated by the associated icon.

Editing a Point

The Edit Point dialog displays the current configuration for a selected point allowing these details (including the name) to be amended. The Edit Point dialog operates in the same manner as the Add Point dialog described above.

- 1, 2, 3...**
1. Select the point to be edited.



2. Select the **Properties** button from the toolbar. The Edit Point dialog is displayed. This is identical to the Add Point dialog.



A point's address or PLC cannot be modified if it is currently active, i.e. open for communications, indicated by the Device Open icon in the Project Editor.

Deleting a Point or Group

Use the following procedure to delete a point or a group.

- 1, 2, 3...**
1. Highlight the point or group to be deleted



2. Select the **Delete** button from the toolbar to delete the point or group.

A confirmation dialog is displayed provided this option has been set in the Options dialog.



Any points or groups contained within a group being deleted are also removed, unless any points within the group or children of the group are open for communications, in which case the points and the groups they are contained within are not deleted.

Points which are currently active cannot be deleted.

Note The root group cannot be deleted.

Moving and Copying Points and Groups

The Project Editor allows standard Microsoft Windows drag and drop procedures permitting points and groups to be copied or moved within the Points group.

Moving is achieved by clicking on an item and then dragging the mouse to the item's new position. A confirmation dialog is displayed. Copying is similar except that the Ctrl key must be kept depressed.

Use the following procedure to copy or move information from or in the Project Editor.

- 1, 2, 3...**
1. Select an item in the right pane of the Project Editor, for example a point. More than one item can be selected by pressing Shift and selecting another item to extend the selection, or by pressing Ctrl and selecting another item to add to the selection.



2. Select the **Copy** button from the toolbar to copy the item, or the **Cut** button from the toolbar to move the item.

3. Select an area in the Project Editor to copy or move the items to, for instance copying a point into a new group.



4. Select the **Paste** button from the toolbar to paste the item. A Paste operation can be performed several times without copying again.

Adding a Device

The Project Editor also permits devices to be added into the CX-Server project as an alternative to the Device List (*refer to Chapter 2 - Adding a PLC for details*). Use the following procedure to add a device.

1, 2, 3...



1. Open the Project Editor, click on the Devices branch in the tree.
2. Select the **Add PLC** button from the toolbar. The Change PLC dialog is displayed. *Refer to Chapter 3 - Communications for details regarding device setup.*

CHAPTER 3

Communications

This chapter describes the communications options available to CX-Server and is confined to software aspects and the associated CX-Server interface; more detailed information relating to each hardware product is to be found in its associated OMRON commercial manual.

Supported Communications

Communications between CX-Server and target PLC's are achieved by a combination of different network connection types. SYSMAC WAY, SYSMAC LINK, SYSMAC NET, Controller Link, Toolbus, Ethernet, Memory Card Writer, PROM Writer, and Modem. Each network connection has different capabilities. SYSMAC NET is specially suited for medium to large scale systems where connecting PLCs to computers is included. SYSMAC LINK provides the necessary capabilities of an industrial network: SYSMAC WAY operates at a much simpler level, its primary functions are for monitoring and diagnostics. SYSMAC WAY and Toolbus both provide Modem connection facilities.

The combination employed depends upon the requirements of the system. The network connection types used will determine the maximum speed of data transfer rates and frame lengths that can be used. When the PLC network is first set, the default connection should be used to determine the maximum frame length and baud rates.

CX-Server controls communications with target PLCs, formats messages into the correct protocol and then transmits them to the device (normally a PLC but it can be a memory card); messages are also received from the PLC containing data to be transmitted to applications, for example CX-Programmer, CX-Protocol and CX-Net Network Configuration tool. The type of messages transmitted include requests to update point data or to download programs.

When a PLC is being configured, as discussed in Chapter 2 - Introduction to CX-Server Projects, CX-Server automatically provides a list of the possible network types associated with the selected device; *PLC Tools User Manual Chapter 8 - CX-Net Network Configuration Tool* describes how to create the actual PLC/network communications links (including the creation and modification of associated Routing and Data Link Tables).

Device Setup

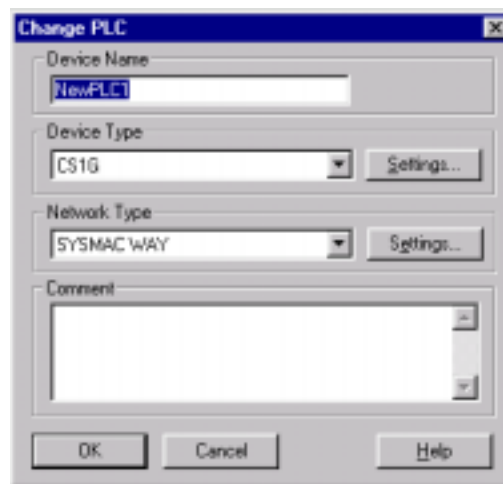
PLC Settings

Each CX-Server project can contain a list of devices. A device can be a PLC which can be configured to map on to a physical connection (either directly or via an existing gateway connection). A correctly configured connection allows connections to the PLC.

Each device added to the CX-Server project must be given a unique name within the CX-Server project file; the device type and network connection should also be given, for example: 'CV500', 'SYSMAC WAY'.

The Change PLC dialog allows a new PLC to be added to the CX-Server project and its device type and network settings to be defined. It is also used to edit existing PLC details. It is accessed from the invoking application or from CX-Server CX-Net tool. It can also be accessed from the Project editor by expanding the device list, selecting the appropriate PLC and then clicking the properties button in the toolbar or selecting Properties from the File menu.

Note A PLC cannot be created unless a CX-Server project has been opened. Whilst PLCs are added to the CX-Server project via this dialog, the CX-Net Network Configuration Tool must be used to set up routing tables for those PLCs acting as a gateway. Refer to the *PLC Tools User Manual Chapter 8 - CX-Net Network Configuration Tool* for further information.



Use the following procedure to change the PLC settings:

- 1, 2, 3... 1. Enter a name in the *Device Name* field. A device name must consist of no more than 32 characters and must be unique.
2. Select the device type of the PLC in the *Device Type* field. If the device requirement does not appear in the list then CX-Server does not support it.
3. Further configure the device type (e.g. CPU number) by selecting the Device Type **Settings** pushbutton. Refer to *Chapter 3 - Device Type Settings* for further details.
4. Select the network type of the PLC in the *Network Type* field. This list may include other PLCs in the CX-Server project that can be used as gateway devices, depending upon the device type chosen. A full list of connection types are provided below.
5. Further configure the network settings (e.g. node number) if applicable by selecting the Network Type **Settings** pushbutton. Refer to *Chapter 3 - Network Communications (End Connection)* for further details.

6. Optionally, enter a comment relating to this unique PLC in the *Comment* field.
7. Select the **OK** pushbutton to save the new PLC or the **Cancel** pushbutton to abort the operation.

Note The Device Name must *not* contain any of the characters: : / \ : ; , ? * & ! “ but may include spaces and international characters. The Device Name is case sensitive, i.e. if a name is entered in upper case which already exists in lower case, a new PLC is created. The contents of the Network field depend upon the device type settings of the new PLC. The Device Type **Settings** pushbutton is disabled for the following devices: C20, FinsGateway, Memory Card Writer and Programmable Read Only Memory (PROM) Writer, since these devices do not have options. Any PLCs which have been set up and can act as a gateway device appear in the *Device Type* field.

A full list of connection methods is as follows:

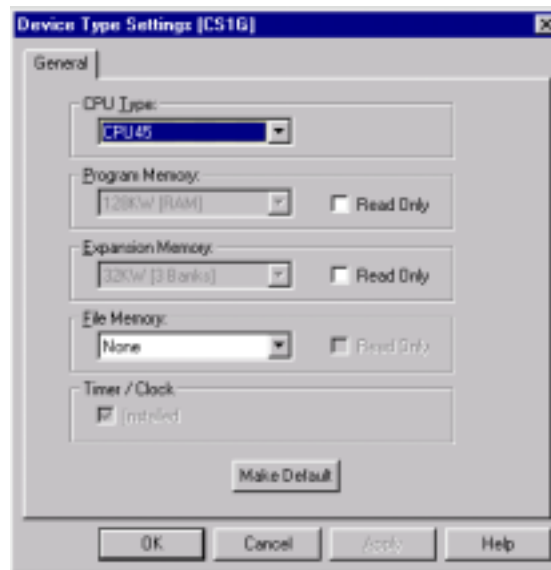
- ◆ *SYSMAC WAY*.
- ◆ *Toolbus*. Toolbus on the CS1-series PLCs allows CX-Server auto-baud rate detection up to 115,200 bps. Toolbus on the CS1-series PLCs supports full *n* clients and *n* destinations.
- ◆ *Modem via SYSMAC WAY*. Modem is supported through SYSMAC WAY communications via Windows TAPI configuration.
- ◆ *Modem via Toolbus*. Modem is supported through Toolbus communications via Windows TAPI configuration.
- ◆ *Ethernet via TCP/IP*. Ethernet is only supported for CS1-series PLCs, CV-series PLCs and C200HE/G/X/E-Z/G-Z/X-Z series PLCs. All Ethernet connections now also support full *n* clients and *n* destinations via CX-Server Ethernet driver. CX-Server also utilises FinsGateway Version 3 Ethernet driver if the required PLC connection UDP port is locked open by FinsGateway active running services.
- ◆ *Controller Link for OMRON NSB*. Controller Link is supported through FinsGateway Version 3 when installed via CX-Server installation and services are activated. CS1-series PLC Optical Controller Link is supported via FinsGateway Version 3 when Controller Link is installed.
- ◆ *SYSMAC LINK for OMRON NSB*. SYSMAC LINK is supported through FinsGateway Version 3 when installed via CX-Server installation and services are activated.
- ◆ *SYSMAC NET for OMRON NSB*. SYSMAC NET communications are supported on Windows NT only through FinsGateway Version 3 when installed via CX-Server installation and services are activated.
- ◆ *FinsGateway CPU unit connection and Gateway connection combinations*.
- ◆ *CS1 Board for Omron CS1 PCI board*. PCI Board is supported through FinsGateway version 3.12 when installed via CX-Server installation and services are activated.

Device Type Settings

The Device Type Settings dialog allows further configuration of the selected PLC. This is important since the behaviour of the PLC depends upon details such as CPU type (e.g. the network options available to a C200HS require CPU31 or CPU33 setting to be specified). Device type settings cannot be adjusted for an open PLC or a gateway PLC.

The *General* tab of the Device Type Settings dialog allows:

- ◆ Selection of *CPU Type*;
- ◆ Allocation of *Program Memory* or protection from writing;
- ◆ Allocation of *Expansion Memory* or protection from writing;
- ◆ Allocation of *File Memory* or protection from writing;
- ◆ Installation of a *Timer/Clock*.



When settings cannot be selected, the PLC is fitted with the standard settings as shown on the Device Type Settings dialog and cannot be reconfigured. Similarly, if Expansion Memory cannot be selected for CV-Series PLCs, EM memory cannot be configured.

In each instance, availability of *CPU Type* and memory depends upon the device type selected (and also the amount of expansion memory purchased for the PLC). Changing CPU type automatically changes the amount of memory available on some devices.

For SRM1 PLCs, only *CPU Type* can be selected.

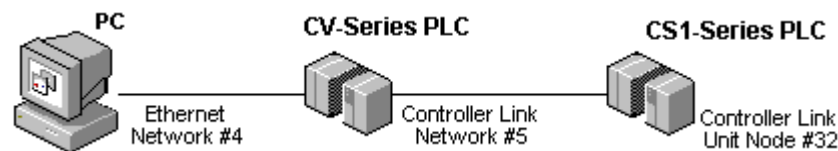
For CV-series PLCs, CS1-series PLCs and IDSC, *File Memory* allows selection of the amount of EPROM or EEPROM. A *Timer/Clock* can be installed.

Defining Connections and Gateway PLCs

It is possible to communicate with PLCs which are not directly connected to the computer via PLC network configuration and gateway abilities of PLCs. Generally, a directly connected PLC or the network NSB as a gateway is used to route to the required PLC by use of its routing table and networking capability. In order to specify the link information, a network type (e.g. SYSMAC LINK) and PLC addressing information is needed (i.e. target network, node and unit).

Connection can be directly made to any PLC type. Direct connections are established with SYSMAC WAY, Toolbus, Modem, Ethernet through a network card or SYSMAC NET, Controller Link or SYSMAC LINK via an OMRON NSB.

It is also possible to gateway from a direct connection on to another type of network that cannot be connected to directly.



Use the following procedure to define a gateway connection.

- 1, 2, 3... 1. Open the Change PLC dialog.
2. Select the Gateway PLC (i.e. the direct connection). If necessary configure the CPU type by selecting the associated **Settings** pushbutton.
3. Select the *Network type* and click on the associated **Settings** pushbutton. The above example uses Ethernet as the network.
4. The Network Settings dialog is displayed. Set up the address and Node number. For Ethernet, also enter the IP address.
5. Select the **OK** pushbutton to proceed from the Network Settings dialog.
6. Select the **OK** pushbutton to proceed from the Change PLC dialog.

Use the following procedure to define a target connection.

- 1, 2, 3... 1. Add a PLC Device to the CX-Server project. The Change PLC dialog is reopened. Select the PLC type for the target PLC. If necessary configure the CPU type by selecting the associated **Settings** pushbutton.
2. Select the PLC to be used as the Gateway PLC from the list in the *Network Type* field and click on the **Settings** pushbutton.
3. The Network Settings dialog is displayed. Set up the Source Network and Destination Network and Node number.
4. Select the **OK** pushbutton to proceed from the Network Settings dialog.
5. Select the **OK** pushbutton from the Change PLC dialog to complete the operation or the **Cancel** pushbutton to abort the operation.

Serial Communications (Direct Connection)

The computer involved in establishing communications has at least one serial (RS232) port; the first port is normally called COM1. If in doubt check the configuration of your PC. Only a single PLC can be connected to an RS232 port.

For CS1-series PLCs, if Toolbus is being used as the direct connection, multiple destinations are permitted.

To establish a serial connection to several PLCs, Link Adapters are required that convert from RS232 to RS422. Link Adapters would be connected in the serial line between the computer and the PLC or between the remote Modem and the PLC. Multiple connections are permitted from an RS422 port.

If problems are experienced when making a serial connection, check the serial port on the computer is enabled and that a mouse driver is not loaded or connected to the same port.

For PLCs with direct serial connections on the CPU, default communications settings can also be set by changing the DIP switches on the front of the CPU. The default protocol settings are 9,600 baud, 7 data bits, even parity and 2 stop bits. Older PLCs have a default baud rate of 2,400. For PLCs not supporting this feature, settings are configured via the PLC Setup component. *Refer to the PLC Tools User Manual Chapter 4 - PLC Setup Component for details of the PLC Setup component.*

SYSMAC WAY

SYSMAC WAY provides a simple means of connecting a computer to a PLC for monitoring and diagnostic purposes. It has a slower transmission path than SYSMAC LINK, SYSMAC NET, Controller Link or Ethernet.

Communications are achieved by either:

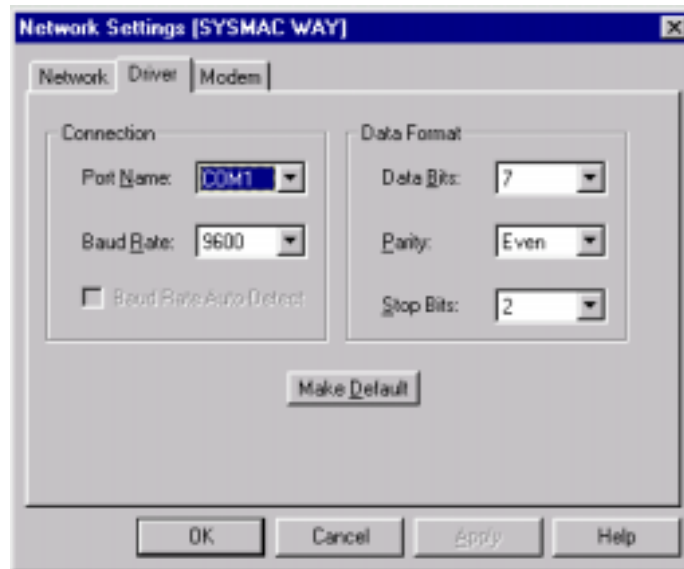
- ◆ Employing the RS232 serial communications interface for communicating with individual PLCs.
- ◆ Employing the RS422 interface for communicating with multiple PLCs.

The following connections are required:

- ◆ RS232 connection via a standard serial port on the computer (COM1 etc.)
- or
- ◆ RS422 connection to a 422 serial board.

These connections can also be made via a Modem. Refer to standard Microsoft Windows documentation for details on Modem configuration and setup.

The *Driver* tab of the Network Settings dialog allows the configuration information to be entered; this information ensures that data is transmitted correctly over the network.



Use the following procedure to apply Network Settings.

- 1, 2, 3... 1. Click on the associated **Settings** pushbutton in the Change PLC dialog.
2. In the *Network* tab, check the Unit No, usually 0 for connecting to a single PLC or the multi drop number for an RS422 connection.
3. In the *Driver* tab, check the port on the computer for connection to the PLC and enter it in the *Port Name* field.
4. Select the *Baud Rate*, *Parity*, *Data Bits* and *Stop Bits* from the drop-down lists available for the selected port.
5. For the *Modem* tab, refer to Microsoft Windows documentation.
6. Select the **OK** pushbutton to save these settings, or select the **Cancel** pushbutton to abort the operation.

Note For CS1-series PLCs, SYSMAC WAY dip switch five on the front panel must be set to 'OFF'.

Toolbus

Toolbus operates in a similar manner to SYSMAC WAY. The connection is made to a PLC using its peripheral port.

The following connection is required:

- ◆ RS232 connection via a standard serial port on the computer (COM1 etc.) using either CIF01 or CIF02 cable.

The *Driver* tab is similar to that belonging to SYSMAC WAY; however, for some PLCs fixed values are entered and these cannot be altered (see table below). The SC1-Series PLC Toolbus configuration ensures successful connection to the PLC every time, independently of the rate specified by the user provided the *Auto Baud Rate Detection* setting has been checked.

PLC	Fixed	Data Bits	Parity	Stop Bits
CS1/CJ1 Series	Yes	8	None	1
CV/CVM Series	Yes	8	Odd	1
C Series	No	---	---	---
CPM1/CPM1A	---	---	---	---
SRM1/SRM1-V2	---	---	---	---
CPM**/CPM2*-S*	---	---	---	---
CQM1/CQM1H	---	---	---	---

Serial Networks

When connecting a computer to a serial network of PLCs, each PLC needs to be configured so that it has a different Unit number. The Unit number for C-series PLCs should be configured as follows:

CPU-mounted Host Link unit:	DIP switches on back of unit
Rack-mounted Host Link unit:	Rotary switches on front of unit
Direct CPU RS232 port:	Internal DM settings
Direct CPU Peripheral port:	Internal DM settings

The Unit number for CV-series PLCs and CS1-series PLCs should be configured as follows:

Rack-mounted Host Link unit:	Unit Setup dialog
Direct CPU RS232 port:	Host Link settings dialog
Direct CPU Peripheral port:	Fixed as Unit 0
Remote SYSBUS/2 Peripheral port:	Fixed as Unit 0

Note The unit number rotary switches on the top of CV-series SIO units are the unit number of that Special I/O Unit on that PLC rack and not the Unit number of the PLC on the serial network.

Network Communications (End Connection)

Each network supports a protocol (or set of rules) determining the manner in which a message is transmitted. Requests sent by an are formatted into the relevant protocol with each message being validated and prioritised according to the rules associated with that protocol.

Once a connection has been established between a device and CX-Server, a set of routing rules and tables are defined which organise the connection between these two processes. The manner of routing depends upon the protocol (identified with each network type) involved in communicating with the PLC.

The Routing Tables are created via offline table editors but they can also be manipulated online using the CX-Net Network Configuration tool. These tables, although they vary in format, contain the network, memory and node address information required to ensure that information is directed correctly across the relevant network. They also allow the connections to be defined for PLCs which are to act as gateways. *Refer to the PLC Tools User Manual Chapter 8 - CX-Net Network Configuration Tool for further information.*

When employing SYSMAC LINK, Controller Link and SYSMAC NET networks, each PLC must be configured on each network to have different Node numbers. If two or more networks are joined together, Routing Tables must be created and each network given a unique Network number in order to establish communications between them.

FinsGateway is also needed to establish Controller Link, SYSMAC LINK and SYSMAC Net on NT; refer to the FinsGateway Manual for further information.

When the Routing Tables have been set up, communications are possible from all the computers to all PLCs. Although each network is given a specific number, the local network can always be addressed as network 0. If a serial connection has been made to a CV-series PLC, network 0 refers to the network that is connected to the lowest numbered Special I/O Unit and the local PLC can be addressed as Node 0.

Note Remember that the Unit number that is specified in the communications dialog is not related to the Special I/O Unit number as set by the rotary switches on the top of CV-series SIO units.

DeviceNet

The DeviceNet conforms to the DeviceNet open field network specification, which means that devices (Master and Slave) produced by other manufacturers can be connected to the Network. A wide range of field-level applications can thus be supported by combining valve devices, sensors, and other devices.

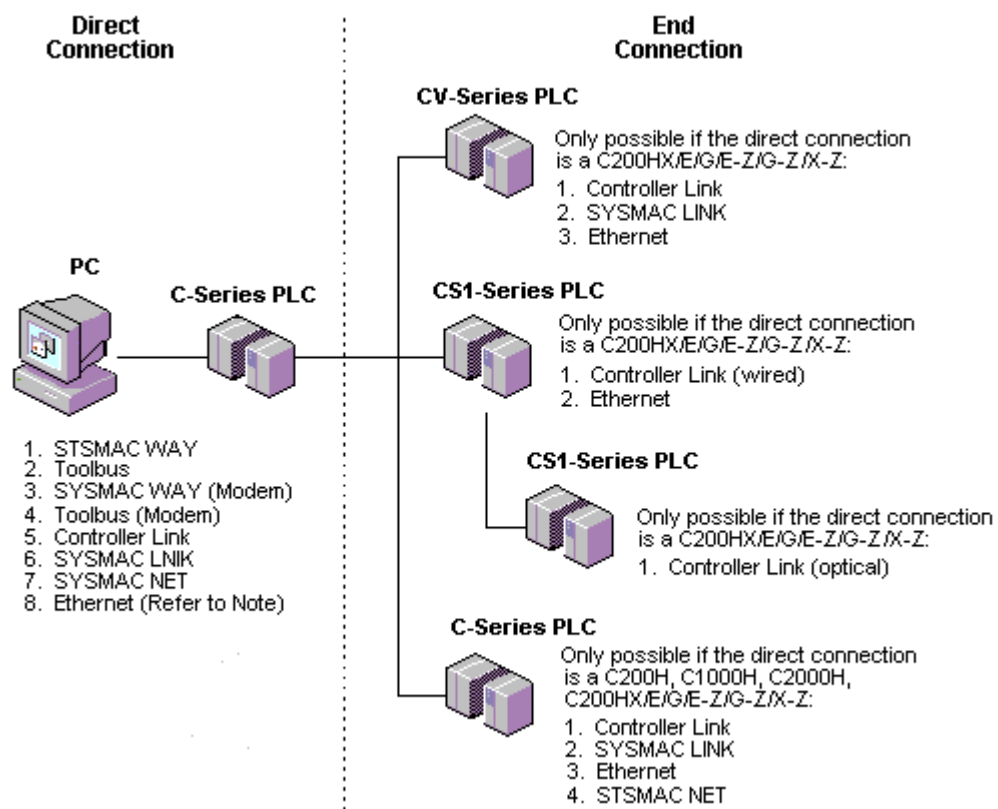
Two types of communications are supported: 1. – Remote I/O master communications that automatically transfer I/O between Slaves and the CPU Unit without any special programming in the CPU Unit and 2. – Message communications that read/write messages, control operations, or perform other functions for Master Units, CPU Units to which a Master Unit is mounted.

Differences between DeviceNet Network as FINS Network and other PLC Networks are as follows:

1. Maximum Node number and Maximum number of Nodes are 63.
2. No Datalink functionality.

- There are specific system setting areas and values for DeviceNet Network. Other application software (DeviceNet Configurator) will support these settings so CX-Net 1.7/CX-P 3.0 does not need to support the system setting.

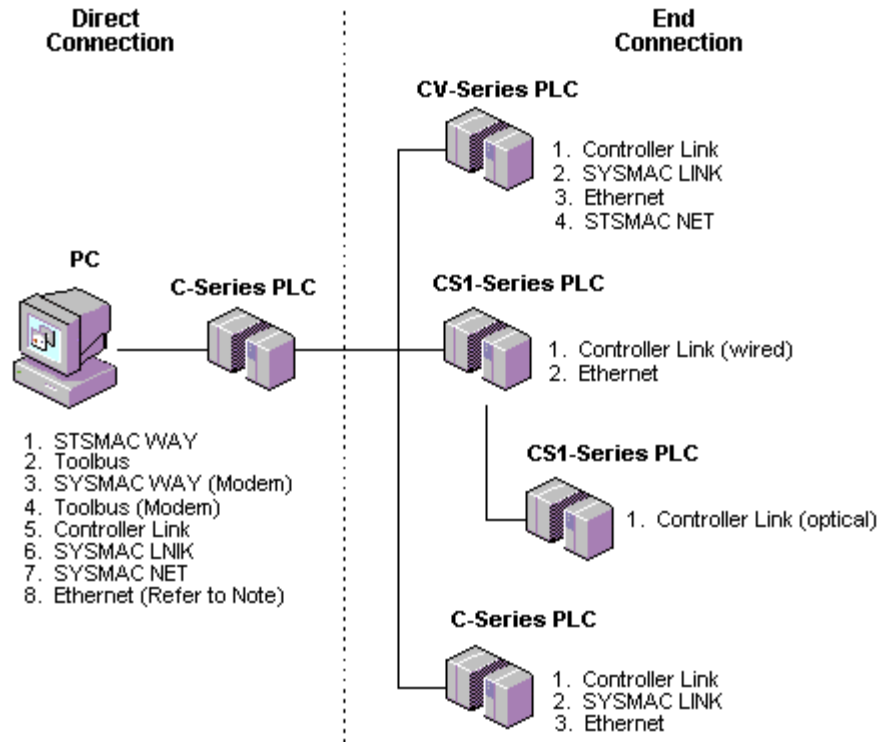
The following diagram illustrates the connection options available to the C-series PLC.



Possible Network Combinations - C-series PLC

Note Only the following C-series PLCs can be used as a gateway: C200H/HX/E/G/E-Z/G-Z/X-Z, C1000H/HX/E/G/E-Z/G-Z/X-Z, C2000H. The C200HS PLC cannot be used as a gateway connection. For Ethernet, multiple destination access is possible.

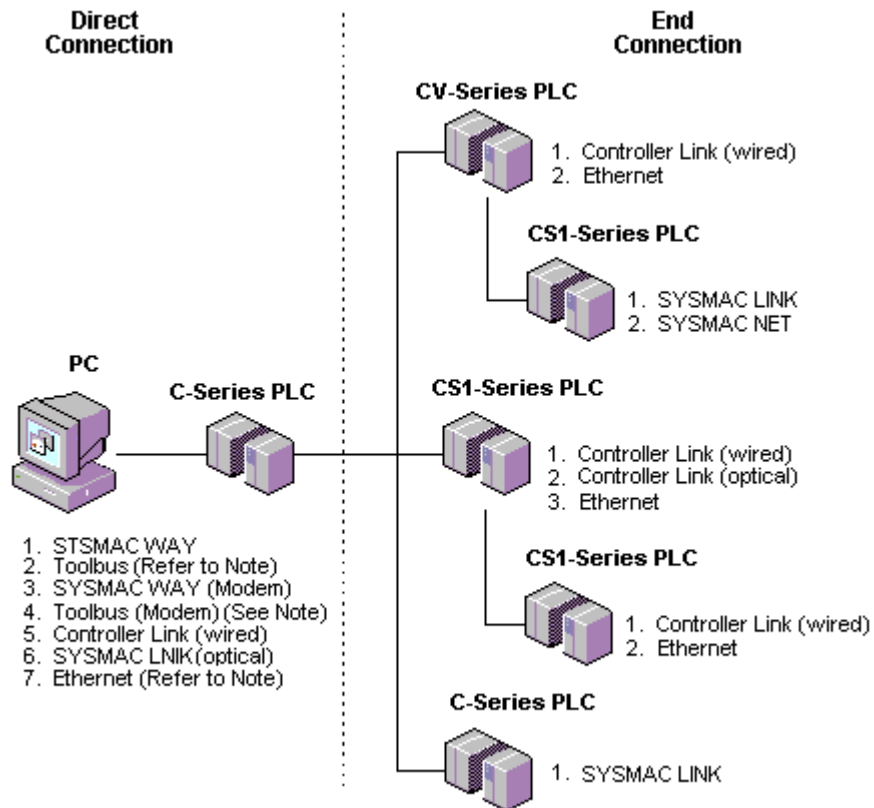
The following diagram illustrates the connection options available to the CV-series PLC.



Possible Network Combinations - CV-series PLC

Note For Ethernet, multiple destination access is possible.

The following diagram illustrates the connection options available to the CS1-series PLC.



Possible Network Combinations – CS1-series PLC

Note For Toolbus (Modem) and Ethernet, multiple destination access is possible.

SYSMAC LINK

SYSMAC LINK is a high speed (2Mbits/sec) industrial network supporting the connection of multiple C-series, CV-series, CS1 series and CJ1 series PLCs and one or more computers (so enabling the interchange of information between these devices).

Communications are achieved by either Co-axial or Fibre Optic cabling and employing a SYSMAC LINK Network Service Board (NSB), and Microsoft Windows device drivers.

Use the following procedure to configure SYSMAC LINK.

- 1, 2, 3...** 1. Ensure the Network Type is SYSMAC LINK.
2. Click on the associated **Settings** pushbutton in the Change PLC dialog.
3. In the *Network* tab, define the *FINS Destination Address* by entering the *Network* and *Node*.
4. Set the *Response Timeout(s)* to adjust for a slow network as necessary.
5. Enter the Frame Length in the *Frame Length* field. Refer to *SYSMAC LINK documentation* for further information.
6. In the *Driver* field, select the appropriate options from the *Shared RAM address* and *Interrupt level* fields. Refer to *SYSMAC LINK documentation* for further information.
7. Select the **OK** pushbutton to save the settings or select the **Cancel** pushbutton to abort the operation.

SYSMAC NET

SYSMAC NET is a high speed (2Mbits/sec) LAN employed within medium/large scale systems (C-series PLCs and CV-series PLCs only).

Connections between the various PLCs and computers is achieved by fibre optics in a ring or loop configuration allowing the exchange of data between the attached devices. The link is achieved by an NSB and employment of Microsoft Windows device drivers. Refer to the SYSMAC NET Network Support Board manual for details on installation.

Use the following procedure to configure SYSMAC NET.

- 1, 2, 3...** 1. Ensure the Network Type is SYSMAC NET.
2. Click on the associated **Settings** pushbutton in the Change PLC dialog.
3. In the *Network* tab, define the *FINS Destination Address* by entering the *Network* and *Node*.
4. Set the *Response Timeout(s)* to adjust for a slow network as necessary.
5. Enter the Frame Length in the *Frame Length* field. Refer to *SYSMAC NET documentation* for further information.
6. Select the **OK** pushbutton to save the settings or select the **Cancel** pushbutton to abort the operation.

Controller Link

The Controller Link is an Factory Automation network that can send and receive large data packets flexibly and easily among the PLCs and IBM PC/AT or compatible computers.

The Controller Link supports data links that enable data sharing and a message service that enables sending and receiving data when required. Data link areas can be freely set to create a flexible data link system and effectively use data areas using the CX-Net Network Configuration tool. Refer to the *PLC Tools User Manual Chapter 8 - CX-Net Network Configuration Tool* for further details.

The network is connected using shielded twisted-pair cable and high-volume data transmissions at high speed enable construction of a wide range of networks, from low level systems to high. The link between attached devices and the network is achieved by an OMRON Controller Link NSB (PCI and ISA) and FinsGateway Version 3. Refer to the Controller Link operation manual for further details on installation.

CS1-Series PLCs support the wired Controller Link and the new optical Controller Link network.

Use the following procedure to configure Controller Link.

- 1, 2, 3...** 1. Ensure the Network Type is Controller Link.
2. Click on the associated **Settings** pushbutton in the Change PLC dialog.
3. In the *Network* tab, define the *FINS Destination Address* by entering the *Network* and *Node*.
4. Set the *Response Timeout(s)* to adjust for a slow network as necessary.
5. Enter the Frame Length in the *Frame Length* field. Refer to *Controller Link documentation* for further information.
6. In the *Driver* tab, set the appropriate setting for the *Shared RAM Address*, *Interrupt Level* and *Baud Rate* fields. Refer to *Controller Link documentation* for further information.
7. Select an appropriate *Node* and *Unit* for the Network address.
8. Select the **OK** pushbutton to save the settings or select the **Cancel** pushbutton to abort the operation.

Ethernet

Ethernet is a commonly used network capable of achieving a high rate of data transmission.

An NIC board must be installed inside the computer and TCP/IP protocols must be added and configured.

Use the following procedure to configure Ethernet.

- 1, 2, 3...** 1. Ensure the Network Type is Ethernet.
2. Click on the associated **Settings** pushbutton in the Change PLC dialog.
3. In the *Network* tab define the *FINS Source Address: Network* field by entering the Network Address.

4. Check the *Network* and *Node* addresses for the PLC and enter them in the *FINS Destination Address: Network* field and *Node* field respectively.
5. Set the *Response Timeout(s)* to adjust for a slow network.
6. Enter the Frame Length in the *Frame Length* field.
7. In the *Driver* tab, check the Workstation Address and enter it in the *Workstation: Node Number* field. Alternatively, select the *Auto Detect* setting to automatically determine the workstation address.
8. Check the PLC IP address and enter it in the *PLC: IP Address* field.
9. Check the FINS UDP Port Number and enter it in the *PLC: Port Number* field.
10. Select the **OK** pushbutton to accept the settings. Select the **Cancel** pushbutton to abort the operation.

Note: If using a subnet mask which is not 255.255.255.0 you will need to add the IP Address of the PC wishing to connect, into the Ethernet unit. Do this using the I/O table.

PROM Writer

PROM Writer is a device allowing Programmable Read Only Memory (PROM) to be written to.

The following connection is required:

- ◆ RS232 connection via a standard serial port on the computer (COM1 etc.).

The *Driver* tab of the Network Settings dialog is similar to that belonging to SYSMAC WAY, however, the transmission conditions should be set to:

- ◆ Baud Rate = 9600
- ◆ Data Bits = 8
- ◆ Parity = none
- ◆ Stop Bits = 1
- ◆ or those of the particular PROM writer unit being used.

CHAPTER 4

Import/Export Tool

This chapter describes the use of the CX-Server Import/Export tool, which allows FinsServer database files and CVSS and LSS definitions of addresses and PLCs to be imported into CX-Server project files. SYSWIN Text files can also be imported.

A CX-Server project file contains definitions of addresses and PLCs which may be accessed. The concept of address and PLC definitions is not unique to CX-Server – the OMRON products CVSS and LSS have similar concepts.

The Import/Export tool allows these definitions to be used by importing them into a CX-Server project file.

Once these definitions of the PLCs and points (addresses) have been imported for use with CX-Server, they may be used by a CX-Server client. For example, the addresses used in a CVSS program could be used by the supervisory program SYSMAC-SCS.



The status bar provides instant help.

The Import/Export tool main window provides all the menu options for importing CVSS, LSS, text and FinsServer files into a CX-Server project file.

The main window shows the status of any import or export event which occurs. It shows any decision which the Import/Export tool makes about importing into a CX-Server project.



The main window is continually updated with information as import and export procedures are performed. This information can be cleared by selecting the **Clear Screen** button from the toolbar.

For moving, resizing, maximising, minimising and closing windows, refer to Microsoft Windows online help for further information.



To access the Import/Export tool click the **Start** pushbutton on the Microsoft Windows taskbar and select *Programs/Omron/CX-Server/Import/Export* from the menu.



To close the Import/Export tool, select the **Close** button in the title bar.

Supported Import/Export Data

Data which can be imported/exported varies according to the method used to create it.

CVSS creates information about PLCs and addresses. There are many types of file generated by CVSS which have different filename suffixes and have different uses:

- ◆ *PCN*. This is a definition of a PLC, containing a name, network number and node number.
- ◆ *SBL*. This is a table of names with addresses, similar to a CX-Server point definition.
- ◆ *CMT*. This is a table of address comments. The addresses listed usually match those used in the SBL file.
- ◆ *CUS*. This contains the definitions of custom prefixes for data-areas and CIO groups which are defined for the program.

LSS generates a single file (with the suffix .DAT) which contains details about many PLC programs. The file's information is organised into records about a single program. The only information stored about the program which is useful in CX-Server is a table of address comments. Both LSS v3 and LSS v6 files can be imported.

Text files are similar to Microsoft Windows '.INI' files in structure. Headers within this file identify a chapter of addresses and a chapter of PLC information. Addresses can be imported from the text file for a CX-Server project PLC. Address definitions (points) inside a chosen CX-Server project PLC that are contained in a single CX-Server project point group can be exported.

FinsServer files are tagged database files (with the suffix '.MDB') containing node, PLC and network details.

Note FinsServer tagged database utilities must be installed on the PC to import/export '.MDB' files.

CX-Server Project Selection

In order to import information you must first open an existing CX-Server project file. The *Project* menu contains options for selection and editing of a CX-Server project. The importing operations then affect this CX-Server project. Only one CX-Server project is selected at any one time.

Use the following procedure to create a new CX-Server project.

- 1, 2, 3...**
1. Select the **New** button in the toolbar. The Create Project dialog is displayed.
 2. The CX-Server project must be saved before it can be edited. Enter a file name in the *File name* field. An existing CX-Server project can be overwritten by selecting a .CDM file displayed in the Create project dialog.
 3. Select the **Save** pushbutton to save the new project or the **Cancel** pushbutton to abort the operation. CX-Server files have a .CDM extension.



Use the following procedure to open an existing CX-Server project.

- 1, 2, 3...**
1. Select the **Open** button from the toolbar to open a CX-Server project file.
 2. A standard File Open dialog is displayed. Select a file from the Open dialog, followed by the **Open** pushbutton. PLC Memory files have a .CDM extension.
 3. Select the *Edit* option from the *Project* menu to edit a CX-Server project. Refer to Chapter 2 - Introduction to CX-Server Projects for further details.
 4. Select *Close* from the *Project* menu to close the currently open CX-Server project.



The content of the Import/Export tool can be printed. Use the following procedure to print details.

- 1, 2, 3...**
1. Select the **Print** button from the toolbar. A standard Print dialog is displayed.
 2. Set up the required printer settings. Select the **OK** pushbutton to print the PLC Memory details or the **Cancel** pushbutton to abort the operation.



Import

The following paragraphs describe the methods available for importing data into a CX-Server project.

Importing from CVSS

Use the following procedure to import from CVSS.

- 1, 2, 3...**
1. Select the **Import CVSS** button from the toolbar. A standard File Open dialog is shown; select a CVSS file to import and select the **Open** pushbutton or select the **Cancel** pushbutton to abort the operation. Specific CVSS file types can be selected from the *Files of Type* field: either *CVSS PLCs*, *CVSS Memory*, *CVSS IO Names* or *CVSS IO Comments*. Once the **Open** pushbutton has been selected, the CVSS Import Options dialog is displayed.
 2. To import points, (i.e. any addresses and address comments contained in the selected files) select a destination PLC from the *Destination PLC* field for the new addresses to use. The device type and CPU of the currently selected PLC is shown below the *Destination PLC* field. Alternatively, select a PLC from the *Default Type* field. Once imported, a message is displayed indicating that conversion is complete.



Note The *Imported Points* option or the *Imported PLCs* option is only available if the relevant type of object is found in the files chosen.

PLC details can be edited via the **Edit** pushbutton. The procedure for doing this is described in *Chapter 2 - Introduction to CX-Server Projects*.

Importing from LSS

Use the following procedure to import from LSS.

- 1, 2, 3...
1. Select the **Import LSS** button from the toolbar. A standard File Open dialog is shown: select a LSS file to import and select the **Open** pushbutton or select the **Cancel** pushbutton to abort the operation. The LSS Import Options dialog is displayed, listing the programs detailed in the file.



2. Select a program from the *Imported Program* field.
3. Select the destination PLC from the *Destination PLC* field to which any addresses and comments found in the chosen program are to be added. The type of PLC that has been selected (device and CPU number) is shown below the drop-down list box.
4. Once imported, a message is displayed indicating that conversion is complete.

PLC details can be edited via the **Edit** pushbutton. The procedure for doing this is described in *Chapter 2 - Introduction to CX-Server Projects*.

Importing from Text Files

Use the following procedure to import from Text.

- 1, 2, 3...
1. Select the **Import LSS** button from the toolbar. A standard File Open dialog is shown: select a text file to import and click on **OK** or select the **Cancel** pushbutton to abort the operation. The Import Text File dialog is displayed.



2. Select a PLC for which the address definitions in the file can be linked. The PLC type that is given in the file is shown.
3. Select a matching device type from the list of PLCs which are contained in the current CX-Server project. This ensures that any imported addresses are valid on the chosen PLC. Once a file has been selected, the Import Text File dialog is displayed. Once imported, a message is displayed indicating that conversion is complete.

PLC details can be edited via the **Edit** pushbutton. A PLC can be added if none are suitable for the import operation. Refer to *Chapter 2 - Introduction to CX-Server Projects* for further information.

Importing from FinsServer

Use the following procedure to import from FinsServer.

- 1, 2, 3...
1. Select the **Import from TagDB** button from the toolbar. Provided FinsServer tagged database utilities has been correctly installed, the FinsServer Import Option dialog is displayed.



2. Select the TagDB PLC name in the *Node in TagDB* field. Details of tags, device type and network nodes are displayed below the list box.
 - + The plus icon indicates that tagged data is assigned to the PLC listed in the *Node in TagDB* field.
 - – The minus icon indicates that there is no tagged data assigned to the PLC listed in the *Node in TagDB* field. It is not possible to import a node which has no tag data.
1. If required, enter a CX-Server project group name in the *Group Name* field ensuring that the name does not exceed 64 characters. By default, the field is set to 'FinsServer'.
2. Enter a PLC comment to be written to each imported tag data in the *Comment* field. By default, the field is set to 'Imported by FinsServer'.
3. Set the *Import to same name PLC* field to ON to use the PLC in the current CX-Server project. Deselect the *Import to same name PLC* field to select a specific PLC from the *PLC in Project* field. If necessary, PLC details can be edited via the **Edit Project** pushbutton. Refer to *Chapter 2 - Introduction to CX-Server Projects* for further information.
4. Select the **Import Tag** pushbutton, an 'Imported' message is displayed once the operation has concluded.
5. Select the **Close** pushbutton. The success or failure of the import operation is displayed in the Import/Export tool status dialog. Select the **OK** pushbutton to proceed.

Note The **Import Tag** pushbutton is disabled if the destination and source PLC types are different. If there are other differences (apart from PLC type), the import can proceed but no Export Log is generated.

The maximum size of a TagDB is as follows:

- ◆ Network: 20;
- ◆ Node: 100;
- ◆ Tag: 200 per Node.

The maximum size of a CX-Server project is as follows:


- ◆ PLC: 100;
- ◆ Points: 200 per PLC.

Export

PLC data can be exported to either text or FinsServer files, for example symbol definitions can be exported as a FinsServer ('.MDB') file which can be read by Microsoft Excel (text files can also be imported into Microsoft Excel).


Exporting Data to Text Files

Use the following procedure to export all of the points from a particular point group, which are linked to a particular PLC (i.e. the point addresses refer to the PLC) to text file.

- 1, 2, 3...
1. Select the **Export Text** button from the toolbar. The Export Text File dialog is displayed.
 -  2. Select a PLC from the *Source PLC* field.
 3. It is possible to extract only partial data by inserting a path for a particular point by entering a pathname in *Source Point Group* field.
 4. Select the **OK** pushbutton to accept the settings. Select the **Cancel** pushbutton to abort the operation. Select the **Edit Project** button to edit the CX-Server project's PLC. Point definitions can also be added to the CX-Server project if desired, before export from this function. Refer to Chapter 2 - Introduction to CX-Server Projects for further information. Once the OK pushbutton has been selected, the Export Data File dialog is displayed. This is a standard Microsoft Windows File Open dialog.
 5. Insert a filename to export in the *File name* field and click on **OK** or select the **Cancel** pushbutton to abort the operation.
 6. A message is displayed in the Import/Export tool that the export is beginning. Another message is shown indicating the success of the export. The device details of the chosen PLC are copied to the selected file if the export is successful.

Exporting Data to FinsServer Files

Use the following procedure to export data to FinsServer files.

- 1, 2, 3...
1. Select the *Export to TagDB* button from the toolbar. The FinsServer Export Option dialog is displayed.
 -  2. Select the PLC from the *PLC in Project* field. Details of tags, device type and network nodes are displayed below the list box.
 - + The plus icon indicates that tagged data is assigned to the PLC listed in the *Node in TagDB* field.
 - - The minus icon indicates that there is no tagged data assigned to the PLC listed in the *Node in TagDB* field.
 3. Set the *Export to same name PLC* field to use the PLC in the current CX-Server project. Deselect the *Export to same name PLC* field to select a specific PLC from the *PLC in Project* field. If necessary, tag details can be edited via the **Edit TagDB** pushbutton. Details of device type and network nodes are displayed below the drop-down list.

4. Select the **Export Point** pushbutton. The **Export Point** pushbutton is disabled if the destination and source PLC types are different. If there are other differences (apart from PLC type) the export can proceed but no Export Log is generated.
5. Select the **Close** pushbutton. The success or failure of the import operation is displayed in the Import/Export tool status dialog. Select the **OK** pushbutton to proceed.

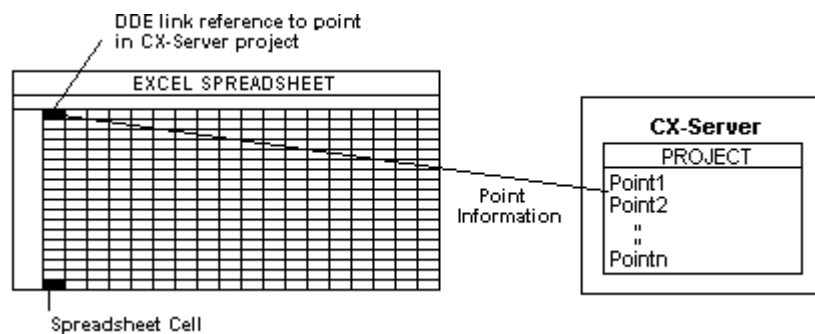
CHAPTER 5

DDE Manager Tool

This chapter introduces the CX-Server DDE Manager tool and describes its use in providing the interface to other Microsoft Windows-based applications.

The DDE Manager tool permits CX-Server to communicate with other Microsoft Windows programs via the Microsoft Windows Dynamic Data Exchange Management Library (DDEML) facility. The links established by the DDE Manager tool allows a Microsoft Windows application, such as Microsoft Excel or Lotus 123, to transmit instructions to CX-Server in order to update points or to obtain information about a PLC address. This functionality is achieved without the necessity of additional programming (although macro programming may be required in order to update information in a PLC address, depending on the used).

The creation of such a link establishes a client/server relationship between the application and the CX-Server project, where the application is (usually) the client and CX-Server is the server.



The dialogs available via the DDE Manager tool are the same as those illustrated in *Chapter 2 - Introduction to CX-Server Projects*; this chapter should be referred to for further information.

The *Restore* option and *Maximise* option from the *DDE Manager* menu are not used.



The DDE Manager tool is accessed from the **Start** pushbutton on the Microsoft Windows taskbar and appears as only a pushbutton in the taskbar.

To close the DDE Manager tool, select the DDE Manager tool in the taskbar with the right-mouse button and click on *Close*.

Establishing DDE Links

For an application to obtain information from a PLC, a CX-Server project must first be set up via the DDE Manager tool. The project file should contain details of the PLC and the points which are to be referenced (an existing CX-Server project can also be used); the application references the CX-Server project via the point names within the project.

When this information has been configured, the application which is requesting the point data must be opened in order to link it with CX-Server. The link can either be manually entered in the application or the reference can be copied from the CX-Server project. The manner in which such links are established within a Microsoft Windows application (supported by the DDE facility) varies according to the application used and so the appropriate reference manual must be consulted.

Defining a Link

The information contained within the link reference required by the DDE Manager tool must include service, topic and item identifiers.

Service

The service name indicating where the data is held is identified by the application specifier. Within CX-Server this is always 'CDMDDE'.

Topic

The CX-Server project name and the path by which it is accessed in CX-Server is identified by the topic specifier. The CX-Server project name is identified by the '.cdm' extension; for example, "C:\CX-Server\factory.cdm" identifies the CX-Server project 'factory' in the "C:\CX-Server" directory.

Item

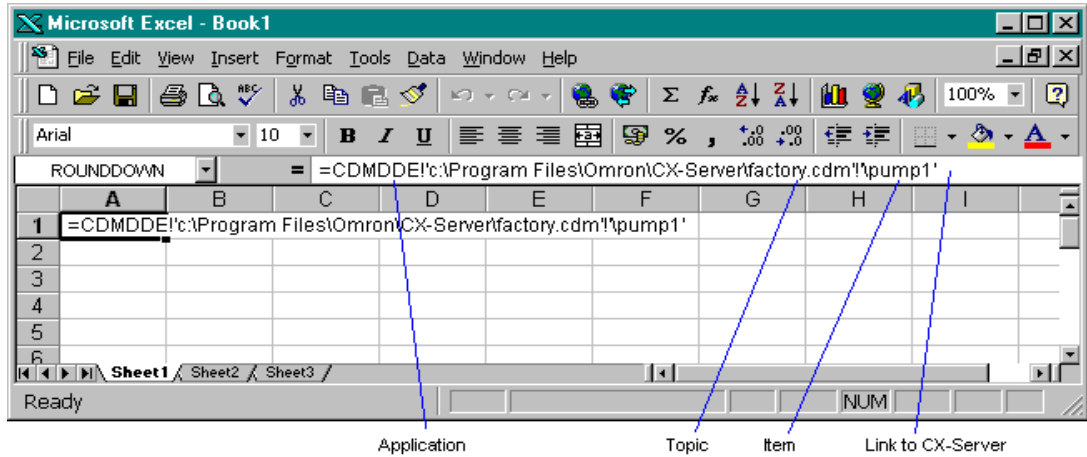
The point to be referenced by the CX-Server project is identified by the item specifier, (this must also include the group path); for example "\pump1".

The complete reference for this point (defined by 'factory.cdm') would include the following information:

- ◆ Service = "CDMDDE"
- ◆ Topic = "C:\CX-Server\factory.cdm"
- ◆ Item = "\pump1"

Its interpretation into a link reference and the format this takes depends upon the application requesting the information (in which case it is necessary to refer to the appropriate application user manual); for example in Microsoft Excel the link would be entered in a cell as:

```
"=CDMDDE!'C:\CX-Server\factory.cdm'!\pump1'".
```

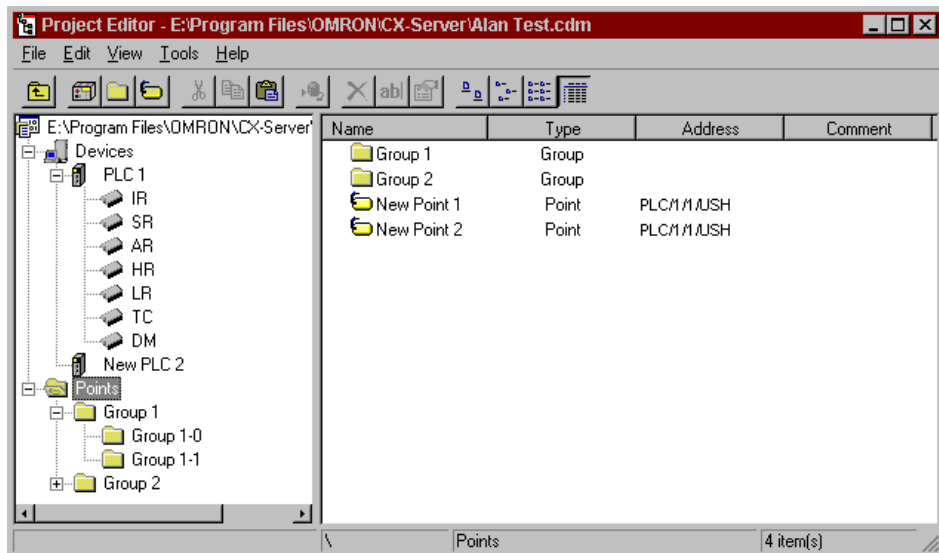


Note The address information for a point is held in the CX-Server project file indicated by the topic identifier.

Copying a Point

Although it is possible to enter details of a link in a client manually, it may be quicker to use the DDE Manager tool facility to format the link details automatically.

The Project Editor (DDE Manager) allows a point to be linked to an application so that the contents of the point can be displayed within that application; it is obtained via the *Copy Selection* option on the *DDE Manager* menu.



Use the following procedure to copy a point:

- 1, 2, 3... 1. Into another application, i.e. Microsoft Excel.
 - (a) Open the *DDE Manager* and navigate to the appropriate location.
 - (b) Select the point from the list displayed. If necessary select the required group from the Group hierarchy.
 - (c) Select the *Edit/Copy* option or click the copy button to copy the selected point to the Microsoft Windows Clipboard.
 - (d) Open the required application and position the cursor at the point in the application where this information is to be pasted; for example a Microsoft Excel cell.
 - (e) Select the *Paste* option in the application to insert the copy. The exact nature of the *Paste* option varies according to the application and may take the form of a *Paste Special* option.
2. Into another Device or Group:
 - (a) Open the *DDE Manager* and navigate to the appropriate location.
 - (b) Select the point from the Tree view. If necessary select the required group from the Group hierarchy.
 - (c) Select the *Edit/Copy* option or click the *Copy Selection* button in the toolbar.
 - (d) Navigate to the point where the information is to be pasted and select *Edit/Paste* or click the *Paste Selection* button.

Note that attempting to paste a copied point into the same location will warn you that a point of the same description already exists.

Details about a point can be displayed by right clicking on the point and selecting the Properties option from the menu.

Automatic versus Manual Updates

The links created between an application and the CX-Server project can be defined as ‘active’, in which case the entry in the application file referencing that point is updated automatically with point data, or the link can be ‘manual’, i.e. the user controls when and if point data in an application is updated.

Automatic Updates

The application requesting data relating to a specific point is updated by the DDE Manager tool whenever the point data changes; this occurs at defined time intervals when the DDE Manager tool examines the PLC address associated with the point to see whether the information it contains has changed or not. The update rate can be specified when the CX-Server project is created, alternatively the DDE Manager tool uses a default update rate if one has not been set.

Update rates can be included when defining the item specifier chapter of the DDE link; for example, a time interval of 5 seconds for the item specified by “\pump1” is expressed as “\pump1,5”. The full DDE link becomes: “=CDMDDE1 ‘C:\CX-Server\factory.cdm’!\pump1,5”

An update rate indicated in this manner overrides the default rate.

Manual Updates

If a manual link has been specified between an application and the CX-Server project, the information contained within the application is not updated until the appropriate action is taken by the user.

Within Microsoft Excel, this would be achieved by highlighting the cell containing the link and selecting *Calculate Now* from the *Options* menu to update the displayed contents of the cell.

Defining Update Intervals

The Update Interval dialog allows a default update rate (in seconds) to be assigned to new data requests. Use the following procedure to define an update interval:

- 1, 2, 3... 1. Select the *Update Interval* option from the *DDE Manager* menu.
2. Enter the required update rate (in seconds) in the *Interval* field; this has a maximum value of 65535.
3. Select the **OK** pushbutton to save the setting and close the dialog.

The new rate applies to those points which are activated after this rate has been set. Currently active points are not affected.

Note The default time interval for the DDE Manager tool (when it is initially installed) is set to 15 seconds.

Special Data Types

The LREAL data type is now supported by the Points Editor for the CS1H-H and CJ1H-H PLCs. Support for the LREAL type is as the IEEE754 Double precision (1.7E +308/-307) as defined by Microsoft®.

CHAPTER 6

Performance Monitor Tool

The Performance Monitor tool provides a facility to monitor system performance of active connections and can also display the limits of performance against user instructions.

Particularly, it allows monitoring of communications. For example, a SYSMAC WAY connection configured at 9,600 baud, 7 data bits, even parity and 2 stop bits, transmits 10 bits per byte at 9,600 bits per second; this means that the absolute maximum throughput of the cable is 960 bytes per second. Requesting or transmitting data at this rate results in slow response times. The Performance Monitor tool has been engineered to show this throughput figure for PLC connections.

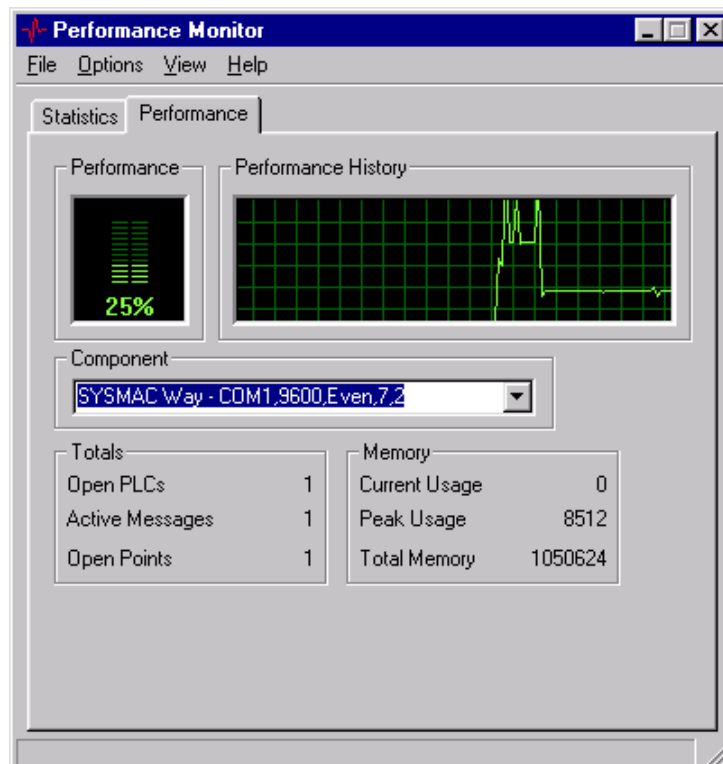
The Performance Monitor tool can be set so that it is not obscured by other windows by selecting *Always on top* from the Options menu.



To access the Performance Monitor tool select the CX-Server Performance Monitor tool from the **Start** pushbutton on the Microsoft Windows taskbar.



To close the Performance Monitor tool, select the **Close** button in the title bar.

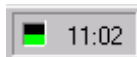


The *Performance* tab displays an automated performance history and performance load for the selected active connection in the *Component* option or for the overall performance. Details of activity are described in terms of the number of open PLCs, active messages and open points in the *Totals* field.

The *Statistics* tab displays the number of bytes being transmitted and received by the selected active connection. The limit to the number of characters that can be processed per second is described by the *Theoretical CPS* field. The number of characters currently active is described by the *Active CPS* field. The *PLC Average Latency (ms)* option shows how long it is taking the PLC to process the information in milliseconds.

Watching the Performance Monitor tool fluctuate between for example, 0% and 135%, indicates that it is actually not possible to retrieve all the data requested in the time required according to the connected baud rate.

If the actual characters per second is greater than the theoretical maximum characters per second then performance decreases. The performance load will fluctuate and the PLC average latency will increase. At this point attention is required to the user instructions that are responsible for slowing performance.



The taskbar setting provides an at-a-glance indication of performance. The more the icon is filled green, the greater the performance load. If the icon begins to fill red, then the actual characters per second is greater than the theoretical maximum characters per second load.

To refresh the Performance Monitor tool details, select the *Refresh Now* option from the *View* menu.

The performance Monitor tool can be hidden from the desktop by minimising the window, and can be hidden from the taskbar in its minimised state by selecting *Hide on Minimise* option from the *Options* menu. Once hidden, the Performance Monitor tool can be restored by clicking the taskbar pushbutton or click the right-mouse button and from the menu select restore.

APPENDIX A

Network Availability

The following tables indicate the network available to each PLC device group. FinsGateway has no network availability and is not described

Note Modem connection is also available by Toolbus or SYSMAC WAY if a Modem device has been configured in Microsoft Windows. Any device supporting Toolbus or SYSMAC WAY also supports Modem connections. Refer to standard Microsoft Windows documentation for details on configuring a Modem device.

Note Where DeviceNet is indicated as an available network type for a given PLC, direct connection from a PC is not possible (No NSB support). Instead, connect via a Serial Port (COM1 etc.), or an another network type.

C**H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C20H	Yes	-	-	-	-	-	-
C28H	Yes	-	-	-	-	-	-
C40H	Yes	-	-	-	-	-	-
C60H	Yes	-	-	-	-	-	-

C**K Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C20K	Yes	-	-	-	-	-	-
C28K	Yes	-	-	-	-	-	-
C40K	Yes	-	-	-	-	-	-
C60K	Yes	-	-	-	-	-	-

C**P Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C20P	Yes	-	-	-	-	-	-
C28P	Yes	-	-	-	-	-	-

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C40P	Yes	-	-	-	-	-	-
C60P	Yes	-	-	-	-	-	-

C1000H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	-	Yes	Yes	-	-	-

C20 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C20	Yes	-	-	-	-	-	-
C20	Yes	-	-	-	-	-	-

C2000H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	-	Yes	Yes	-	-	-
C2000	Yes	-	Yes	-	-	-	-

C200H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	-	-	-	-	-	-
CPU02	Yes	-	-	-	-	-	-
CPU03	Yes	-	-	-	-	-	-
CPU21	Yes	-	-	-	-	-	-
CPU21	Yes	-	-	-	-	-	-
CPU22	Yes	-	-	-	-	-	-
CPU23	Yes	-	-	-	-	-	-
CPU11	Yes	-	Yes	Yes	-	-	-
CPU31	Yes	-	Yes	Yes	-	-	-

C200HE Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU11	-	Yes	-	-	-	-	-
CPU32	-	Yes	Yes	Yes	Yes	Yes	-
CPU42	Yes	Yes	Yes	Yes	Yes	Yes	-

C200HE-Z Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU11	Yes	Yes	-	-	-	-	-
CPU32	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU42	Yes	Yes	Yes	Yes	Yes	Yes	-

C200HG Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU33	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU43	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU53	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU63	Yes	Yes	Yes	Yes	Yes	Yes	-

C200HG-Z Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU33	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU43	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU53	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU63	Yes	Yes	Yes	Yes	Yes	Yes	-

C200HS Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	Yes	-	-	-	-	-
CPU03	Yes	Yes	-	-	-	-	-
CPU11	Yes	Yes	Yes	Yes	-	-	-
CPU13	Yes	Yes	Yes	Yes	-	-	-

C200HX Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU34	-	Yes	Yes	Yes	Yes	Yes	-
CPU44	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU54	-	Yes	Yes	Yes	Yes	Yes	-
CPU64	Yes	Yes	Yes	Yes	Yes	Yes	-

C200HX-Z Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU34	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU44	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU54	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU64	Yes	Yes	Yes	Yes	Yes	Yes	-

C500 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C500	Yes	-	Yes	-	-	-	-
C250	Yes	-	-	-	-	-	-
C120	Yes	-	-	-	-	-	-
C50	Yes	-	-	-	-	-	-

CJ1G Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU45	Yes	Yes	-	-	Yes	Yes	Yes
CPU44	Yes	Yes	-	-	Yes	Yes	Yes

CJ1G-H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU45	Yes	Yes	-	-	Yes	Yes	Yes
CPU44	Yes	Yes	-	-	Yes	Yes	Yes
CPU43	Yes	Yes	-	-	Yes	Yes	Yes
CPU42	Yes	Yes	-	-	Yes	Yes	Yes

CJ1H-H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU66	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU65	Yes	Yes	-	Yes	Yes	Yes	Yes

CJ1M Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU12	Yes	Yes	-	-	Yes	Yes	Yes
CPU13	Yes	Yes	-	-	Yes	Yes	Yes
CPU22	Yes	Yes	-	-	Yes	Yes	Yes
CPU23	Yes	Yes	-	-	Yes	Yes	Yes

CPM1 (CPM1A/CPM2*) Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU10	Yes	Yes	-	-	-	-	-
CPU20	Yes	Yes	-	-	-	-	-
CPU30	Yes	Yes	-	-	-	-	-

CPM2*-S* Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
N/A	Yes	Yes	-	-	-	-	Yes

CQM1 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU11	Yes	Yes	-	-	-	-	-
CPU21	Yes	Yes	-	-	-	-	-
CPU41	Yes	Yes	-	-	-	-	-
CPU42	Yes	Yes	-	-	-	-	-
CPU43	Yes	Yes	-	-	-	-	-
CPU44	Yes	Yes	-	-	-	-	-

CQM1H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU11	Yes	Yes	-	-	-	-	-
CPU21	Yes	Yes	-	-	-	-	-
CPU51	Yes	Yes	-	-	Yes	-	-
CPU61	Yes	Yes	-	-	Yes	-	-

CS1G/CS1G-H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU45	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU44	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU43	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU42	Yes	Yes	-	Yes	Yes	Yes	Yes

CS1H/CS1H-H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU67	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU66	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU65	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU64	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU63	Yes	Yes	-	Yes	Yes	Yes	Yes

IDSC Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C01	Yes	Yes	-	-	-	-	-
C02	Yes	Yes	-	-	-	-	-

SRM1 – SRM1 V2 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C01	Yes	Yes	-	-	-	-	-
C02	Yes	Yes	-	-	-	-	-

CV1000 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	Yes	Yes	Yes	Yes	Yes	-

CV2000 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	Yes	Yes	Yes	Yes	Yes	-

CV500 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	Yes	Yes	Yes	Yes	Yes	-

CVM1 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU11	Yes	Yes	Yes	Yes	Yes	Yes	-

CVM1-V2 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU11	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU21	Yes	Yes	Yes	Yes	Yes	Yes	-

APPENDIX B PLC Memory Areas

The following tables provide memory area details for each device group.

Some tables indicate special addresses. These can be as follows:

- ◆ *CLOCK*. This allows reading/writing of a PLC's real-time clock.
- ◆ *BANKNO*. This allows reading/writing of a PLC's extended memory bank number.
- ◆ *MODE*. This allows reading/writing of a PLC's run-mode.

C**H Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
TC	0	511	Present Value	Status	Yes	F C
DM	0	1999	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	252	Yes	Yes	Yes	F C
IR (opt)	253	255 (bit 7)	Yes	Yes	No	
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	247	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

Special addresses *CLOCK*, *MODE*.

C**K Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
TC	0	47	Present Value	Status	Yes	F C
DM	0	63	Yes	No	Yes	
HR	0	9	Yes	Yes	Yes	F C
IR (opt)	0	18 (bit 7)	Yes	Yes	Yes	F C
SR (opt)	18 (bit 8)	19 (bit 7)	No	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

CP Device Group**

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
TC	0	47	Present Value	Status	Yes	F C
DM	0	63	Yes	No	Yes	
HR	0	9	Yes	Yes	Yes	F C
IR (opt)	0	18 (bit 7)	Yes	Yes	Yes	F C
SR (opt)	18 (bit 8)	19 (bit 7)	No	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

C1000H Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
TC	0	511	Present Value	Status	Yes	F C
DM	0	4095	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	236	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	237	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

Special addresses: MODE.

C20 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
TC	0	47	Present Value	Status	Yes	F C
HR	0	9	Yes	Yes	Yes	F C
IR (opt)	0	18 (bit 7)	Yes	Yes	Yes	F C
SR (opt)	18 (bit 8)	19 (bit 7)	No	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

C2000H Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
TC	0	511	Present Value	Status	Yes	F C
DM	0	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	236	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	237	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

Special addresses: MODE.

C200H Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	1999	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C

Special addresses: CLOCK, MODE.

C200HE Device Group

General Memory Areas

Memory Areas for any CPU.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	4095	Yes	No	Yes	
DM	6000	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	FC
TR	0	0 (bit 7)	No	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TC	0	511	Present Value	Status	Yes	F C

CPU 32/42 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
DM	4096	5999	Yes	No	Yes	

Special addresses: CLOCK, MODE.

C200HE-Z Device Group

General Memory Areas

Memory Areas for any CPU.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	4095	Yes	No	Yes	
DM	6000	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	FC
TR	0	0 (bit 7)	No	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TC	0	511	Present Value	Status	Yes	F C

CPU 32/42 Device Group

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
DM	4096	5999	Yes	No	Yes	

Special addresses: CLOCK, MODE.

C200HG Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C
EM	0	6143 * 1	Yes	No	Yes	-n

Special addresses: CLOCK, MODE, BANKNO.

C200HG-Z Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C
EM	0	6143 * 1	Yes	No	Yes	-n

Special addresses: CLOCK, MODE, BANKNO.

C200HS Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TC	0	511	Present Value	Status	Yes	F C
TR	0	0 (bit 7)	No	Yes	No	

Special addresses: CLOCK, MODE.

C200HX Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C
EM	0	6143 * 3	Yes	No	Yes	-n

Special addresses: CLOCK, MODE, BANKNO.

C200HX-Z Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C
EM	0	6143 * 3	Yes	No	Yes	-n

CPU 65 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
EM	0	6143 * 8	Yes	No	Yes	-n

CPU 85 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
EM	0	6143 * 16	Yes	No	Yes	-n

Special addresses: CLOCK, MODE, BANKNO.

C500 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
TC	0	127	Present Value	Status	Yes	F C
DM	0	511	Yes	No	Yes	
HR	0	31	Yes	Yes	Yes	F C
IR (opt)	0	57	Yes	Yes	Yes	F C
LR	0	31	Yes	Yes	Yes	F C
SR (opt)	58	60	Yes	Yes	Yes	F C
SR (opt)	61	63 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

CJ1G Device Group

General Memory Areas

General Memory Areas for all CPUs 44 and 45.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
IR	0	15	Yes (double)	No	Yes	
DR	0	15	Yes	No	Yes	f c
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	f c
H	0	511	Yes	Yes	Yes	
W	0	511	Yes	Yes	Yes	
CIO(opt)	0	6143	Yes	Yes	Yes	f c
T	0	4095	Present Value	Status	Yes	F C
C	0	4095	Present Value	Status	Yes	F C
D	0	32767	Yes	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 44 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 1	Yes	No	Yes	-n

CPU 45 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 3	Yes	No	Yes	-n

Special addresses: (all CPUs): CLOCK, MODE.
(CPU 44/45): BANKNO.

CJ1G-H Device Group

General Memory Areas

General Memory Areas for all CPUs 42, 43, 44 and 45.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
IR	0	15	Yes (double)	No	Yes	
DR	0	15	Yes	No	Yes	f c
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	f c
H	0	511	Yes	Yes	Yes	
W	0	511	Yes	Yes	Yes	
CIO(opt)	0	6143	Yes	Yes	Yes	f c
T	0	4095	Present Value	Status	Yes	F C
C	0	4095	Present Value	Status	Yes	F C
D	0	32767	Yes	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 42 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 1	Yes	No	Yes	-n

CPU 43 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 1	Yes	No	Yes	-n

CPU 44 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 1	Yes	No	Yes	-n

CPU 45 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 3	Yes	No	Yes	-n

Special addresses: (all CPUs): CLOCK, MODE.
(CPU 44/45): BANKNO.

CJ1H-H Device Group

General Memory Areas

General Memory Areas for all CPUs 65 and 66

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
CIO(opt)	0	6143	Yes	Yes	Yes	fc
DR	0	15	Yes	No	Yes	fc
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	fc
H	0	511	Yes	Yes	Yes	fc
W	0	511	Yes	Yes	Yes	
T	0	4095	Present Value	Status	Yes	FC
C	0	4095	Present Value	Status	Yes	FC
D	0	32767	Yes	No	Yes	
IR	0	15	Yes (double)	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 65 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*3	Yes	No	Yes	-n

CPU 66 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*7	Yes	No	Yes	-n

CJ1M Device Group

General Memory Areas

General Memory Areas for all CPUs 12, 13, 22 and 23.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
IR	0	15	Yes (double)	No	Yes	
DR	0	15	Yes	No	Yes	f c
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	f c
H	0	511	Yes	Yes	Yes	
W	0	511	Yes	Yes	Yes	
CIO(opt)	0	6143	Yes	Yes	Yes	f c
T	0	4095	Present Value	Status	Yes	F C
C	0	4095	Present Value	Status	Yes	F C
D	0	32767	Yes	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPM1 (CPM1A) Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	15	Yes	Yes	Yes	F C
DM	0	1023	Yes	No	Yes	
DM	6144	6655	Yes	No	Yes	
HR	0	19	Yes	Yes	Yes	F C
IR (opt)	0	19	Yes	Yes	Yes	F C
IR (opt)	200	231	Yes	Yes	Yes	F C
LR	0	15	Yes	Yes	Yes	F C
SR (opt)	232	252	Yes	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	No	
TC	0	127	Present Value	Status	Yes	F C

Special addresses: MODE.

CPM2*/CPM2*-S* Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	23	Yes	Yes	Yes	F C
DM	0	2047	Yes	No	Yes	
DM	6144	6599	Yes	No	Yes	
DM	6600	6655	Yes	No	No	
HR	0	19	Yes	Yes	Yes	F C
IR (opt)	0	49	Yes	Yes	Yes	F C
IR (opt)	200	227	Yes	Yes	Yes	F C
LR	0	15	Yes	Yes	Yes	F C
SR (opt)	228	252	Yes	Yes	Yes	F C
SR(opt)	253	255	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	127	Present Value	Status	Yes	F C

Special addresses: MODE.

CQM1 Device Group

Memory Areas

Memory Areas for all CPUs.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	1023	Yes	No	Yes	
DM	6144	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	243	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	244	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C

CPU 41/42/43/44/45 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
DM	1024	6143	Yes	No	Yes	

Special addresses: CLOCK, MODE.

CQM1H Device Group

Memory Areas

Memory Areas for all CPUs.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	243	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	244	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C

CPU 11/21 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
DM	0	3071	Yes	No	Yes	
DM	6144	6655	Yes	No	Yes	

Special addresses: CLOCK, MODE.

CPU 51 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
DM	0	6655	Yes	No	Yes	

Special addresses: CLOCK, MODE.

CPU 61 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
DM	0	6655	Yes	No	Yes	
EM	0	6143 * 1	Yes	No	Yes	

Special addresses: CLOCK, MODE.

CS1G Device Group

General Memory Areas

General Memory Areas for all CPUs 42, 43, 44 and 45.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
IR	0	15	Yes (double)	No	Yes	
DR	0	15	Yes	No	Yes	f c
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	f c
H	0	511	Yes	Yes	Yes	
W	0	511	Yes	Yes	Yes	
CIO(opt)	0	6143	Yes	Yes	Yes	f c
T	0	4095	Present Value	Status	Yes	F C
C	0	4095	Present Value	Status	Yes	F C
D	0	32767	Yes	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 44 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 1	Yes	No	Yes	-n

CPU 45 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 3	Yes	No	Yes	-n

Special addresses: (all CPUs): CLOCK, MODE.
(CPU 44/45): BANKNO.

CS1G-H Device Group

General Memory Areas

General Memory Areas for all CPU 42, 42, 44 and 45

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
CIO(opt)	0	6143	Yes	Yes	Yes	fc
DR	0	15	Yes	No	Yes	fc
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	f
H	0	511	Yes	Yes	Yes	FC
W	0	511	Yes	Yes	Yes	
T	0	4095	Present Value	Status	Yes	FC
C	0	4095	Present Value	Status	Yes	FC
D	0	32767	Yes	No	Yes	
IR	0	15	Yes (double)	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 42 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*1	Yes	No	Yes	-n

CPU 43 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*1	Yes	No	Yes	-n

CPU 44 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*1	Yes	No	Yes	-n

CPU 45 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*3	Yes	No	Yes	-n

CS1H Device Group**General Memory Areas**

General Memory Areas for all CPUs 63, 64, 65, 66 and 67.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
IR	0	15	Yes (double)	No	Yes	
DR	0	15	Yes	No	Yes	f c
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
A	448	959	Yes	Yes	Yes	f c
H	0	511	Yes	Yes	Yes	
W	0	511	Yes	Yes	Yes	
CIO(opt)	0	6143	Yes	Yes	Yes	f c
T	0	4095	Present Value	Status	Yes	F C
C	0	4095	Present Value	Status	Yes	F C
D	0	32767	Yes	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 64 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 1	Yes	No	Yes	-n

CPU 65 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 3	Yes	No	Yes	-n

CPU 66 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 7	Yes	No	Yes	-n

CPU 67 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32765 * 13	Yes	No	Yes	-n

Special addresses: (all CPUs): CLOCK, MODE.
(CPU 64/65/66/67): BANKNO.

CS1H-H Device Group

General Memory Areas

General Memory Areas for all CPU 63, 64, 65, 66 and 67

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
CIO(opt)	0	6143	Yes	Yes	Yes	fc
DR	0	15	Yes	No	Yes	fc
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	fc
H	0	511	Yes	Yes	Yes	fc
W	0	511	Yes	Yes	Yes	
T	0	4095	Present Value	Status	Yes	FC
C	0	4095	Present Value	Status	Yes	FC
D	0	32767	Yes	No	Yes	
IR	0	15	Yes (double)	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 63 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*1	Yes	No	Yes	-n

CPU 64 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*1	Yes	No	Yes	-n

CPU 65 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*3	Yes	No	Yes	-n

CPU 66 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*7	Yes	No	Yes	-n

CPU 67 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*13	Yes	No	Yes	-n

IDSC Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	1023	Yes	No	Yes	
DM	6144	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	243	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	244	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C

Special addresses: CLOCK, MODE.

SRM1 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	15	Yes	Yes	Yes	F C
DM	0	2047	Yes	No	Yes	
DM	6144	6655	Yes	No	Yes	
HR	0	19	Yes	Yes	Yes	F C
IR (opt)	0	23	Yes	Yes	Yes	F C
IR (opt)	200	252	Yes	Yes	Yes	F C
LR	0	15	Yes	Yes	Yes	F C
SR (opt)	232	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	127	Present Value	Status	Yes	F C

Special addresses: MODE.

SRM1 V2 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	15	Yes	Yes	Yes	F C
C	0	127	Yes	Yes	Yes	F C
DM	0	2047	Yes	No	Yes	
DM	6144	6655	Yes	No	Yes	
HR	0	19	Yes	Yes	Yes	F C
IR	0	23	Yes	Yes	Yes	F C
IR	200	239	Yes	Yes	Yes	F C
LR	0	15	Yes	Yes	Yes	F C
SR	240	253	Yes	Yes	Yes	F C
SR	253	254	Yes	Yes	No	
SR	254	255	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	127	Present Value	Status	Yes	F C

Special addresses: MODE.

CV1000 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
A	0	255	Yes	Yes	Yes	F C
A	256	511	Yes	Yes	No	
AC	0	2047	No	Yes	No	
C	0	1023	Present Value	Status	Yes	F C
CIO (opt)	0	2555	Yes	Yes	Yes	F C
D	0	24575	Yes	No	Yes	
DR	0	2	Yes	No	Yes	
G	0	255	Yes	Yes	Yes	F C
IR	0	2	Yes	No	Yes	
ST	0	1023	Yes	Yes	Yes	
T	0	1023	Present Value	Status	Yes	F C
TN	0	1023	No	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	Yes	F C
E	0	32765 * 2/4/8	Yes	No	Yes	- n

Special addresses: BANKNO, CLOCK, MODE.

CV2000 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
A	0	255	Yes	Yes	Yes	F C
A	256	511	Yes	Yes	No	
AC	0	2047	No	Yes	No	
C	0	1023	Present Value	Status	Yes	F C
CIO (opt)	0	2555	Yes	Yes	Yes	F C
D	0	24575	Yes	No	Yes	
DR	0	2	Yes	No	Yes	
G	0	255	Yes	Yes	Yes	F C
IR	0	2	Yes	No	Yes	
ST	0	1023	Yes	Yes	Yes	
T	0	1023	Present Value	Status	Yes	F C
TN	0	1023	No	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	Yes	F C
E	0	32765 * 2/4/8	Yes	No	Yes	- n

Special addresses: BANKNO, CLOCK, MODE.

CV500 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
A	0	255	Yes	Yes	Yes	F C
A	256	511	Yes	Yes	No	
AC	0	1023	No	Yes	No	
C	0	511	Present Value	Status	Yes	F C
CIO (opt)	0	2555	Yes	Yes	Yes	F C
D	0	8191	Yes	No	Yes	
DR	0	2	Yes	No	Yes	
G	0	255	Yes	Yes	Yes	F C
IR	0	2	Yes	No	Yes	
ST	0	511	Yes	Yes	Yes	F C
T	0	511	Present Value	Status	Yes	F C
TN	0	511	No	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	Yes	F C

Special addresses: MODE, CLOCK

CVM1 Device Group

General Memory Areas

Memory Areas for any CPU.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
A	0	255	Yes	Yes	Yes	F C
A	256	511	Yes	Yes	No	
DR	0	2	Yes	No	Yes	
CIO (opt)	0	2555	Yes	Yes	Yes	F C
G	0	255	Yes	Yes	Yes	F C
IR	0	2	Yes	No	Yes	
TR	0	0 (bit 7)	No	Yes	Yes	F C

CPU 01 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
C	0	511	Present Value	Status	Yes	F C
D	0	8191	Yes	No	Yes	
T	0	511	Present Value	Status	Yes	F C

CPU 11 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
C	0	1023	Present Value	Status	Yes	F C
D	0	24575	Yes	No	Yes	
T	0	1023	Present Value	Status	Yes	F C

Special addresses: (all CPUs): CLOCK, MODE.

CVM1-V2 Device Group

General Memory Areas

Memory Areas for any CPU.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
A	0	255	Yes	Yes	Yes	F C
A	256	511	Yes	Yes	No	
DR	0	2	Yes	No	Yes	
CIO (opt)	0	2555	Yes	Yes	Yes	F C
G	0	255	Yes	Yes	Yes	F C
IR	0	2	Yes	No	Yes	
TR	0	0 (bit 7)	No	Yes	Yes	F C

CPU 01 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
C	0	511	Present Value	Status	Yes	F C
D	0	8191	Yes	No	Yes	
T	0	511	Present Value	Status	Yes	F C

CPU 11 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
C	0	1023	Present Value	Status	Yes	F C
D	0	24575	Yes	No	Yes	
T	0	1023	Present Value	Status	Yes	F C

CPU 21 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
C	0	1023	Present Value	Status	Yes	F C
D	0	24575	Yes	No	Yes	
T	0	1023	Present Value	Status	Yes	F C
E	0	32765 * 2/4/8	Yes	No	Yes	-n

Special addresses: (all CPUs):
(CPU 21):

CLOCK,
MODE.
BANKNO.

FinsGateway CPU Unit

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
CIO(opt)	0	32767	Yes	Yes	Yes	
D	0	32767	Yes	No	Yes	

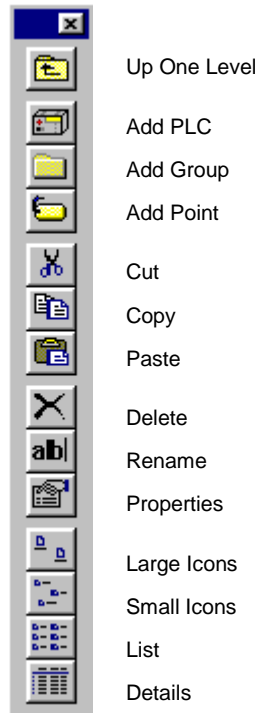
APPENDIX C

Toolbars and Keyboard Shortcuts

The following tables summarise the toolbars and keyboard shortcuts available from each component and tool. The F1 function key is common across all components and tools and provides context help.

Project Editor

Toolbar



Keyboard Shortcuts

Delete	Delete
Alt+F4	Close
Ctrl+X	Cut
Ctrl+C	Copy
Ctrl+V	Paste
Ctrl+A	Select All
F5	Refresh
Ctrl+F	Find

GLOSSARY OF TERMS

Actual IO Table	The real hardware configuration of the PLC units and slots on power-up.
Address	A location in memory where data or programs are stored. It can also identify a location of a node on a network.
Application	A software program that accomplishes a specific task. Examples of applications are CX-Server, CX-Programmer, CX-Protocol and Microsoft Excel.
Baud rate	The speed of data transmission in terms of the number of bits per second that are being sent.
BCD	Binary Coded Decimal.
Binary	A data format supported by CX-Server. A number system format to the base 2, i.e. employing the digits 0 and 1.
Bit	A digit used in binary notation which can take the value 0 or 1. The value of a bit, or combination of bits, can represent the status of a device or can be used in programming.
Bus	A communications path along which data can be transmitted or received between the units connected to it.
Command modifier	An optional part of an address string indicating the modification to be performed on the data at that address (within PLC memory) when it is accessed.
Components	CX-Server is made up of six components accessible from an invoking application.
Controller Link	A network that can send and receive large data packets flexibly and easily among the OMRON PLCs.
CPU type	The type of CPU available to a specific device, the amount of memory available to a PLC varies according to the CPU involved.
CPU	Central Processing Unit.
CVSS	A file format supported by the CX-Server Import tool. CVSS has several file types which have different information contained in them.
CX-Net Network Configuration tool	This CX-Server tool consists of a suite of programs allowing the management of Routing Tables and Data Link Tables in OMRON PLCs.
CX-Server	An advanced communications management system for OMRON PLCs providing facilities for software to maintain PLC device and address information and to communicate with OMRON PLCs and their supported network types. CX-Server supports CS1-series PLCs.
CX-Server Project	A definition of an OMRON PLC network configuration. It identifies all devices and networks within a particular configuration including the areas of PLC memory (points) that can be read from or written to.

Data area	An area of PLC memory allocated to the storage of data (not programs).
Data bits	Bits representing each character to be transmitted.
Data link	A software connection establishing common data areas between PLCs on a network allowing data to be between these devices.
Data link table	A table of the common data memory areas used by the PLCs in a Data Link.
Data location	An area of memory identified by an address.
DDE	Dynamic Data Exchange. A channel through which correctly prepared programs can actively exchange data and control other applications within Microsoft Windows. CX-Server, through the use of the DDE Manager tool, allows extensive use of DDE functionality. See also Item, Server, server application and Topic.
DDE management library	A dynamic link library within Windows which allows dynamic data exchange to be employed.
DDE Manager tool	A CX-Server tool for allowing transferral of data between PLCs and a client application using DDE, for example Microsoft Excel.
DDEML	Dynamic Data Exchange Management Library.
Default	A value automatically set by a program in the absence of user input or on initial entry to an application; such values can be overwritten.
Device group	A class of devices which share similar properties, each group can be subdivided into device types.
Device type	A type of OMRON PLC.
Device	A type of OMRON automation device, either a PLC, Temperature Controller, Memory Card Writer or PROM Writer.
Dialog	A window asking for some form of response from the user, usually in the form of either entering requested information, selecting displayed data, or confirming an operation.
DLL	Dynamic Link Library. A program file that although cannot be run stand-alone as an executable, can be utilised by one or more applications or programs as a common service. DLL files have a *.DLL extension. DLL's comprise a number of stand-alone functions.
Double Floating Point	Double Floating Point (LREAL) type is as the IEEE754 Double precision (1.7E +308/-307) as defined by Microsoft®.
Download	Refer to Transfer to PLC.
Drag	The act of moving an item on the screen by selecting it with the mouse, and keeping the mouse button depressed, moving the mouse until the item has reached the required location. The mouse button is then released.

Driver	The software which controls the communications between a computer and PLC, translating any information passed between them into a format that the receiving Device can understand.
Dynamic Data Exchange	The method of transferral of data (and possibly instructions) between applications via the establishment of reference links between them.
EEPROM	Electrically Erasable Programmable Read Only Memory.
Elements	The number of address units which start at a specified data location.
End Connection	The final communication link between computer and PLC, or in the case of a Network configuration, gateway PLC to PLC.
Ethernet	A 10 MB baseband local area network with each Device attached to the network having equal status and therefore the ability to transmit as, and when, required (provided the line isn't busy).
Even parity	The number of 1s in a data transmission is even.
Expansion memory	The memory available to a CPU in addition to conventional memory.
File memory	An area of CPU memory allocated to the storage of data.
FINS	Factory Intelligent Network Service.
FinsGateway	An OMRON communication type supported by CX-Server.
Floating Point	A data format supported by CX-Server.
Folder	A structure which organises the files in computer memory or on disk. Also known as a 'directory'.
Frame length	The waiting time before data is transmitted across the network
Gateway device	A Device connecting two networks of different architectures together.
Gateway PLC	A PLC which acts as a link to another network.
Group	A sub-directory within a CX-Server project hierarchy which contains points and/or further (subsidiary) groups.
Hard disk	A disk permanently mounted on its drive.
Hierarchy	The structure of a CX-Server project from the root directory down through any sub-directories (groups) to individual points contained within those groups.
Host link unit	The interface between a PLC and a host computer.
Icon	Pictorial representations of computer resources and functions. Many icons are used by CX-Server components and tools as part of the GUI.
IDSC device type	An OMRON PLC device supported by CX-Server.
Import tool	This CX-Server tool is used for addresses and PLCs defined using the CVSS and LSS products.
Input	The signal sent to a PLC from an external device.
Instruction	A statement indicating an operation to be performed and identifies any data involved in this operation.

Intel Hex	A PLC device also known as a PROM Writer.
Interface	Hardware or software employed to link the elements within a system, including networks, programs and computers.
Internal data type	The format of the data held at an address in PLC memory; for example, bit or signed character binary.
Invoking application	An application such as CX-Programmer and CX-Protocol that utilises components and tools belonging to CX-Server.
IO Table component	This CX-Server component retrieves configured PLCs rack and address data.
IO	Input /Output.
IP address table	A table containing the IP addresses for all the devices on the Ethernet.
IP address	An address for a device on the Ethernet.
IP	Internet Protocol.
Item	A unique name for a data item within a topic.
LAN	Local Area Network.
Link system	A system that links PLCs together.
Link unit	A unit which connects a device to the network.
Link	A connection between two units established either by software or a hardware device.
Load	Placing a program or data into an area of computer or PLC memory.
LREAL	LREAL (Double Floating Point) type is as the IEEE754 Double precision (1.7E +308/-307) as defined by Microsoft®.
LSS	A file format supported by the CX-Server Import tool.
Mb	Megabites – A means of defining computer memory size.
Memory area	Addressable area of storage space in a device.
Memory Card Writer	A device which writes data to a memory card.
Memory card	A data storage medium which can hold both programs and data.
MHz	Megahertz.
Microsoft Excel	A spreadsheet application.
Microsoft Windows Explorer	A file handling application part of the Microsoft Windows suite.
Microsoft Windows	A windowing environment that is noted for its GUI, and for features such as multiple typefaces, desk accessories (such as a clock, calculator, calendar and notepad), and the capability of moving text and graphics from one application to another via a clipboard. CX-Server runs only under Microsoft Windows. DDE functions communicating with other applications supported by CX-Server use Microsoft Windows as a basis.

Modem	A device with the ability to convert digital data from a computer into analogue form and transmit it over a telecommunications line and also to convert received analogue signals into digital form.
n	A variable number.
Network Service Board	An interface which connects devices (not PLCs) to the network.
Network	<ol style="list-style-type: none">1. Part of the PLC configuration, based on the device type. The number of Networks available is dependant on the device type.2. A number of computers linked together with a central processing point known as a Server which is accessible to all computers. Networks affect CX-Server in that further Network associated options are available if the computer is Network connected.
Node number	Number identifying the device located at a particular node on the network. The number can be between 1 and 126, the maximum number of nodes available on an OMRON network.
Node	A position at which a device can be located on the network, consisting of a link unit mounted to a device or PLC which in turn interfaces with a peripheral device or a computer.
NSB	Network Service Board.
Offline	The status of a device when it is not being controlled by a computer (although it may be physically connected to it).
OLE	Object Linking and Embedding. Used to transfer and share information between Microsoft Windows based applications and accessories.
Online	The status of a device when it is under the direct control of a computer.
Output	The signal sent from a PLC to an external device.
Packet	A unit of information transmitted across the network containing source and destination address information together with the actual data.
Parity	A type of validation check performed on transmitted information; data can be tested for either even, odd, none, mark or space parity. The type of parity check involved is indicated by the status of the parity bit.
Path	The location of a file including the drive, directory name plus any subdirectories and the file name together with its associated extension.
Peripheral	A device which aids system operation rather than being central to its functioning.
Performance Monitor tool	A CX-Server tool for monitoring communications throughput and for displaying CX-Server's current performance level (i.e. a check to see if CX-Server is becoming overloaded).
Ping test	A standard Ethenet communications test.
PLC Error component	This CX-Server component displays and manages PLC errors.

PLC Memory component	This CX-Server component allows the user to view, edit and monitor either channels (words) or individual bits in areas of the PLC.
PLC Setup component	This CX-Server component permits the configuration of PLC settings.
PLC	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.
Port	A device connection point allowing data entry and exit.
Program	A set of instructions which are performed by a computer or PLC.
Program memory	An area of PLC memory reserved for the storage of programs.
Program mode	PLC mode of operation during which the device can be programmed.
Programmable Read Only Memory	An area of memory which can be updated with programs and data only once after manufacture; once this area has been written to, it can only be read, not modified.
Project	OMRON configuration file inherited from the invoking application. Refer also to CX-Server Project.
PROM writer	A device which writes the programs and data into PROM.
PROM	Programmable Read Only Memory.
Protocol	A set of rules governing the transmission of data.
Rack	The apparatus to which a unit is fixed.
RAM	Random Access Memory.
Registered IO Table	The internal PLC table: this is the one used by the PLC when running, regardless of the state of the actual hardware. It can be read and, for CV-series PLCs, written to by the CX-Server software.
Root	The highest level of a directory.
Root group	The highest level group in a CX-Server project.
Rotary switch	Indicates the method of calling a device by generating a series of pulses.
Routing table	A table containing the information necessary to allow communications between different networks including local and gateway network address details.
Routing	The direction of data across a network from its source to its destination.
RS232	Industrial interface standard for serial communications.
RS422	Industrial interface standard for serial communications employing balanced line circuits.
Serial Connection	A direct connection between computer and PLC.

Server	<ol style="list-style-type: none">1. Server is used in DDE functions to contain a link to an outside application. Using DDE functions, CX-Server allows the manipulation of an outside application as specified as the Server. Refer also to Server application.2. A Server is the central processing point of a Network which is accessible to all computers. Networks affect CX-Server in that further associated options are available if the computer Network is connected.
Slots	Free areas within a rack to which units can be fixed.
Stop bits	Bits indicating the end of transmission of each set of data bits; normally one or two bits, they indicate the delay time between sending successive characters down the line.
Symbol	An address that has been given a name to make the address information more flexible. Symbols are inherited by CX-Server by the invoking application.
SYSMAC LINK	OMRON high speed industrial network (either co-axial or fibre optic).
SYSMAC NET	OMRON high speed optical LAN which can be of type C SYSMAC NET or CV SYSMAC NET.
SYSMAC WAY	OMRON network.
System area	An area of memory used for controlling and managing a unit.
System configuration	An arrangement of units, for example network, computers and PLCs.
Tagged database	A file format supported by the CX-Server Import tool. The Tagged database is also an export format of the CX-Server Import tool.
Target PLC	The PLC to which information or instructions are directed.
Taskbar	An integral part of Microsoft Windows which allows Microsoft Windows based applications to be started. CX-Server tools are run from the Taskbar.
TCP/IP	Transmission Control Protocol/Internet Protocol.
Temperature Controller	An OMRON device.
Temporary Relay Area	An area of PLC memory containing instructions which can be loaded at a later point for use with other instructions.
Text	<ol style="list-style-type: none">1. A file format supported by the CX-Server Import tool. The Text is also an export format of the CX-Server Import tool.2. A data format supported by CX-Server.
Timer area	An area of PLC memory containing program timers and their related completion flags.
Toolbus	A network, either C-Toolbus or CV-Toolbus, allowing communications with a device via the serial COM port of a personal computer (in a similar manner to SYSMAC WAY). Data is transmitted along the network in binary format.
Tools	CX-Server is made up of four tools.

Transfer from PLC	The transfer of a program or data to a host (either a computer or a programming device) from a lower-level (or slave) device.
Transfer to PLC	The transfer of a program or data from a host (either a computer or a programming device) to a lower-level (or slave) device.
UDP	User Datagram Protocol.
Unit number	A number identifying an individual component of an OMRON PLC system configuration.
Units	A component of an OMRON PLC system configuration.
User Datagram Protocol	Protocol which directs information across a network to port numbers rather than to IP addresses.
Word	A 16 bit unit of data memory.

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