Honeywell

Experion PKS
Allen-Bradley Interface Reference

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Document	Release	Issue	Date
EPDOC-XXX3-en-431A	431	0	February 2015

Disclaimer

Contents

Planning considerations for installing and configuring Allen-Bradley controllers

This reference describes how to set up, configure, and test Allen-Bradley controller communications with the server.

Revision history

Revision	Date	Description
A	February 2015	Initial release of document.

How to use this guide

Steps for connecting and configuring an Allen-Bradley controller.

Complete each step before commencing the next.

Steps	Go to
Connect the controller to the server	Architectures for Allen-Bradley
Set the communication parameters	Communication settings for Allen-Bradley
Use Quick Builder to define channels	• *Quick Builder User's Guide* • Allen-Bradley channel and controller reference
Use Quick Builder to define controllers	• *Quick Builder User's Guide* • Allen-Bradley channel and controller reference
Download channel and controller definitions from Quick Builder to the server	*Quick Builder User's Guide*
Test the communications link	Testing Allen-Bradley communications with the server
Use Quick Builder to define points	Allen-Bradley points reference

Related topics

"Allen-Bradley processor support" on page 6
"Other documentation for Allen-Bradley" on page 8
"Allen-Bradley-specific terms" on page 9
"Architectures for Allen-Bradley" on page 10
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"KF2 settings" on page 29
"Allen-Bradley controller configuration and addressing" on page 31
"Allen-Bradley points reference" on page 47
"Testing Allen-Bradley communications with the server" on page 56

Allen-Bradley processor support

Attention

If you want to use named addressing with a ControlLogix controller, do not use this interface. Instead, use the Experion OPC Client Interface and the Allen-Bradley OPC server from MatrikonOPC to make use of the non-scanned parameters.

The server supports the following Allen-Bradley processors:

- PLC (supported in native mode)
- PLC-2 (supported in native mode)
- PLC-3 (supported via PLC-2 compatibility files)
- PLC-5 (supported in native mode)
- SLC 500 (supported in native mode)
- ControlLogix

Processor connections supported

Attention

- Rockwell RSLinx is required for all connection types except Serial.
- For ControlLogix Gateway connections, see the topic titled "ControlLogix Gateway."
- If the connection between the server and the Allen-Bradley controller is through a Honeywell Data Highway Port (DHP) and a TDC 3000 Data Hiway, the interface is configured as a TDC 3000 DHP. For details, see the *Honeywell TDC 3000 Data Hiway Interface Reference*.

Table 1: Supported connection types

PLC Type	Connection Type				
	Serial[1]	DH+[2]	DH485[3]	Ethernet	ControlNet[4]
PLC	Yes				
PLC–2	Yes				
PLC–3	Yes				
PLC–5	Yes	Yes		Yes	Yes
SLC 500	Yes	Yes	Yes	Yes	Yes
ControlLogix		Yes[5]		Yes[6]	Yes[7]

[1] **Both full and half duplex are supported.**

[2] **Can be connected via a serial connection to KF2, or direct DH+ connection through a KT interface card, or an Ethernet connection via a pyramid integrator for SLC and PLC-5.**

[3] **Can be connected via a serial connection to a KF3 module.**

[4] **A 1785 KTC or PCIC is required.**

[5] A 1756 DHRIO module is required.

[6] A 1756 ENET module is required.

[7] A 1756 CNET module is required.

Table 2: ControlLogix Gateway

Server Connection	PLC Connection		
	ControlNet	Ethernet	DH+
DH+	Yes	No	Yes
Ethernet	Yes	No	Yes
ControlNet	Yes	No	Yes

Related topics

“ControlLogix Gateway” on page 17

Other documentation for Allen-Bradley

Read the manuals that came with your Allen-Bradley processor before attempting to install or configure the interface.

If you are using Rockwell RSLinx or RSLinx OEM, see the RSLinx online help for details about how to configure a driver. Both versions are referred to as RSLinx in this guide.

Allen-Bradley-specific terms

Communications link	Data Hiway (DH), Data Hiway Plus (DH+), DH485, ControlNet, or Ethernet.
DE Module	The ProSoft 3700 DE Module (installed on an Allen-Bradley PLC-5) and ProSoft 3750 DE Module (installed on Allen-Bradley SLC 500) are required in order to communicate with Honeywell Smart Transmitters. The DE module address can only be used as a source address.
DEM Module	The ProSoft 3700 or 3750 DEM module. Similar in function to the DE module but uses less memory. The DEM memory mapping is a subset of the DE mapping. Consult the ProSoft 3700/3750 for further instructions.
File	The file is a block of words or some other structure in the PLC or SLC memory addressable as a unit. Allen-Bradley PLC-5 and SLC 500 use files instead of registers to store bits of information.
Hardware Diagnostic Scan	One scan per controller every diagnostic period for automatic recovery from communications failure with the PLC.
Mismatch Condition	If there is a mismatch between the read and write databases of the transmitter, the SCADA Controllers display in Station shows which transmitter values are mismatched and what their old and new values are. You can monitor mismatches by configuring alarms for points reading the smart transmitter values. By double-clicking the alarm on a Station display, the SCADA Controllers display is called up to display the mismatched values.
PD file	An Allen-Bradley PLC-5 uses files (similar to registers) to store information. A different file type is used for each data type (integer files, floating point files, and so on). The PD file type stores data for PID loops.
Periodic Data Acquisition Scan	A defined regular interval in which the server database acquires information from the data tables in the PLC and processes the values as point parameters. For the source address, the scan period assigned should reflect both the rate at which the value held in memory changes and its importance to the process (critical or noncritical). There is one periodic data acquisition scan per scan packet.
PID loop	(Proportional Integral and Derivative) control algorithm. A control loop that usually contains a set point (SP), output (OP), and mode (MD) values.
U6BCD Data Format	Two consecutive words of PLC memory are each used to hold three digits of the value (least significant word first). The three digits are in the least significant part of each word.

Architectures for Allen-Bradley

This section describes the supported architectures for Allen-Bradley controllers.

Serial full duplex connection to PLC on DH using 1770-KF2

A PLC-5 and a SLC 5/04 connected to a server using a 1770-KF2 Communications Interface Module.

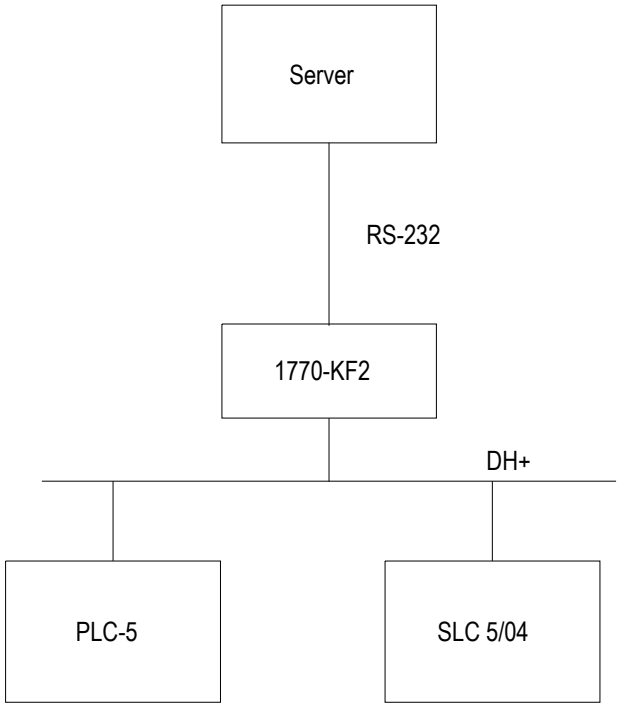

Figure 1: Allen-Bradley system architecture for a 1770-KF2 connection

Server to 1770-KF2 RS-232 cable

The following figures show the computer pinouts for a RS-232 connection using a 9-pin or 25-pin serial port, respectively.

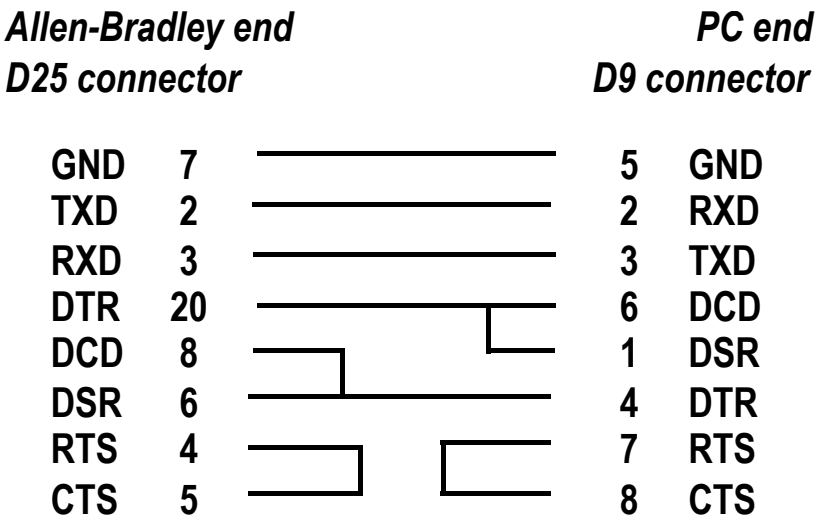

Figure 2: RS-232 connection to 9-pin serial port

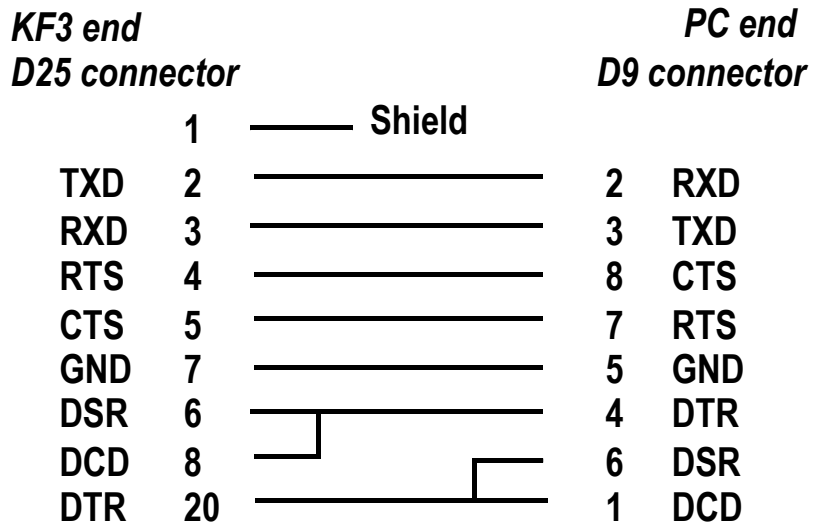

Figure 3: RS-232 connection to 25-pin serial port

Full duplex connection to PLC's serial port

"Figure 5: RS-232 connection to 9-pin serial port" shows a serial connection to a PLC-5 serial port.

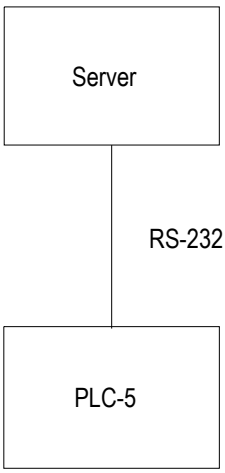

Figure 4: Server connection to PLC-5 using a RS-232 cable

Server to PLC-5 RS-232 cable

The following figures show the computer pinouts for a RS-232 connection using a 9-pin or 25-pin serial port, respectively.

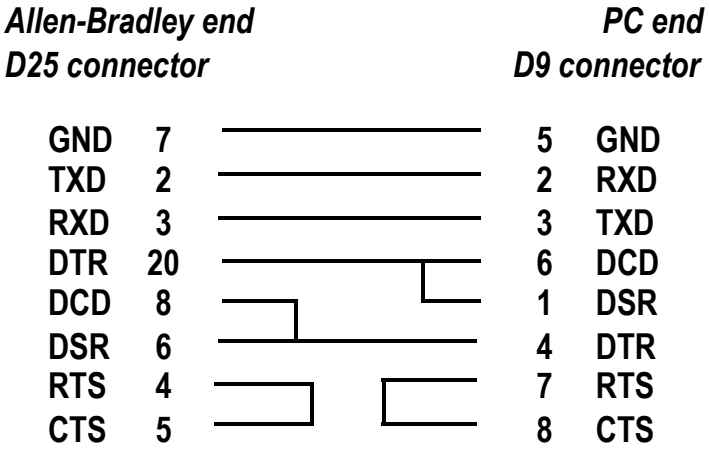

Figure 5: RS-232 connection to 9-pin serial port

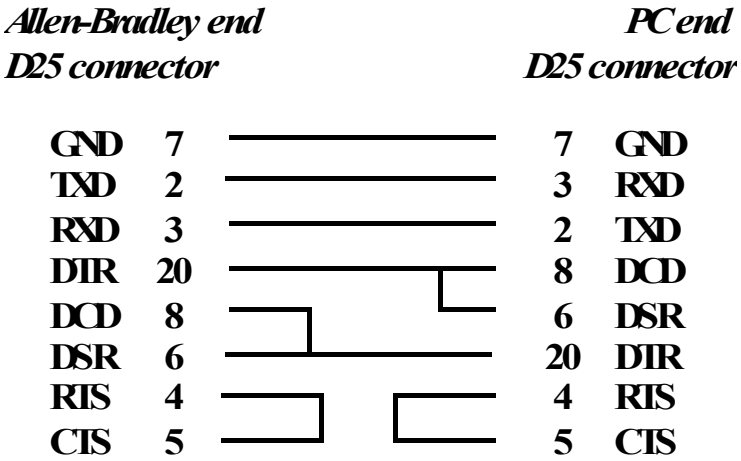

Figure 6: RS-232 connection to 25-pin serial port

PLC-5 serial port settings

Configure the serial port for DF1 point-to-point. For details, see the *Allen-Bradley PLC-5 Software Configuration Maintenance Manual*.

Half duplex serial interface

The Half Duplex serial interface supports all types (except ControlLogix) of Allen-Bradley PLCs and Communication Interface Modules (CIM) currently supported by the server, providing that the PLC or CIM can be configured as a slave node communicating using the Allen-Bradley half duplex protocol.

The server connects to Allen-Bradley PLCs in a multi-drop fashion as shown in "Figure 7: Half duplex master/slave multi-drop architecture". The server and the PLCs (and/or CIM) are nodes on this half duplex communication network. The server acts as the master node and the PLCs (and/or CIM) are slaves.

Each node must have a unique node number between 0 and 254 (decimal). Node number 0 is always used by the server. The slave nodes must each have a unique node number between 1 and 254.

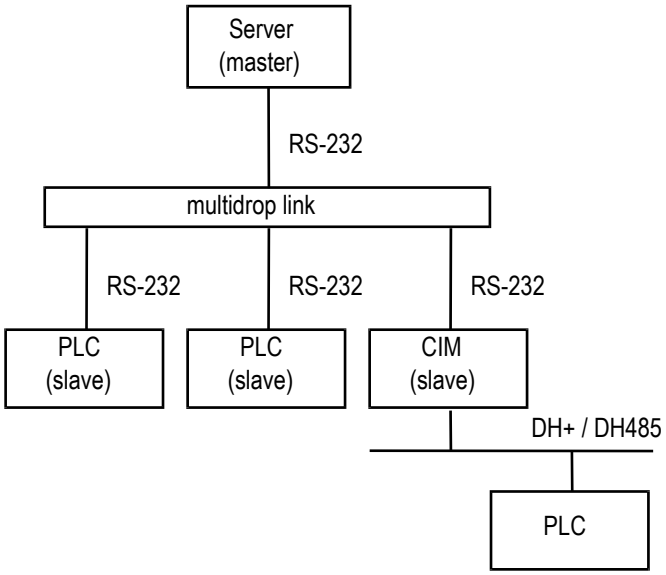

Figure 7: Half duplex master/slave multi-drop architecture

The multi-drop link can be implemented by different types of communication hardware. Examples of such are RS-232/RS-485 converters and radio/modem links.

Communications support

The Half Duplex interface supports communications with PLCs for server data acquisition and control requests as well as unsolicited messages from PLCs.

Setting half duplex communication protocols on PLC and CIM

For PLCs, use the appropriate Allen-Bradley programming loader software to configure the serial port of the PLC to use Half Duplex communications protocol and handshaking. Again using the loader software, assign a unique node number (between 1 and 254) to the PLC. See the programming loader software manual for more details.

For CIMs, use the dip switches to set the CIM to use Half Duplex communications protocol and handshaking and to set the node number. See the CIM manual for more details.

Multi-drop link setup

The multi-drop link setup depends on the hardware used. See the manuals that came with your communication hardware.

Serial connection to SLC 500 using 1770-KF3

An SLC 500 connects through the 1770-KF3 module to the server.

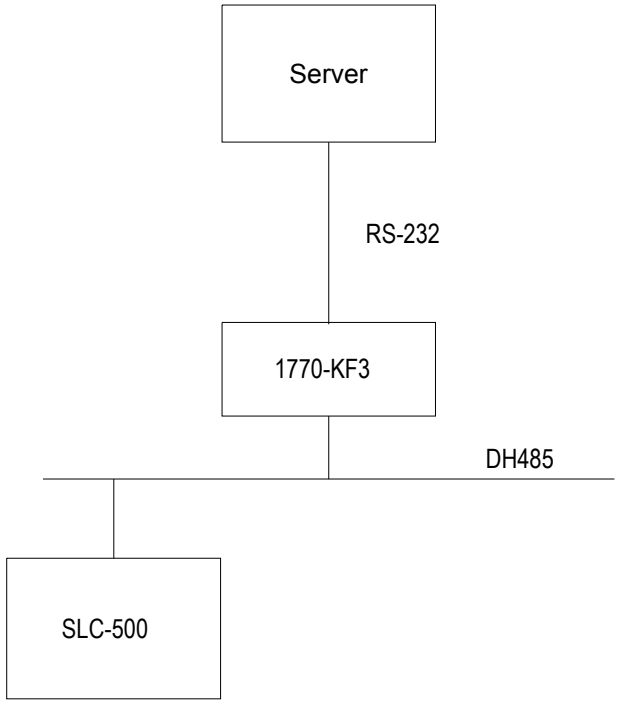

Figure 8: Serial connection to SLC 500

Server to 1770-KF3 RS-232 cable

The figures show the pinouts for a KF3 connection using the 25-pin or 9-pin serial port respectively.

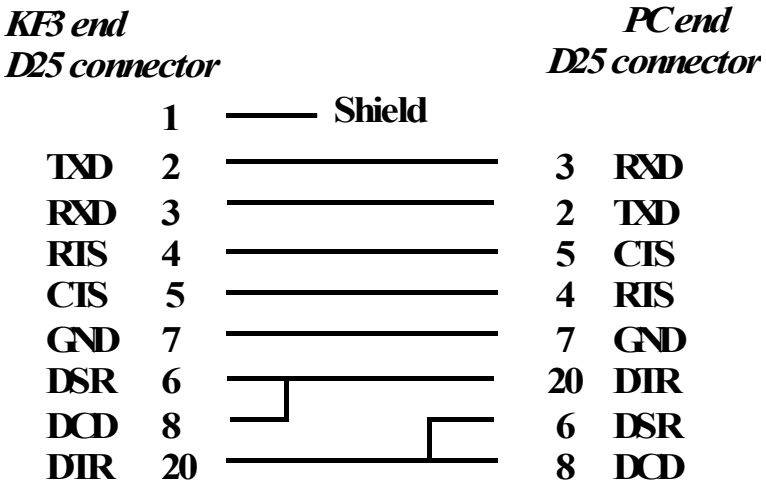

Figure 9: KF3 connection to computer 25-pin serial port

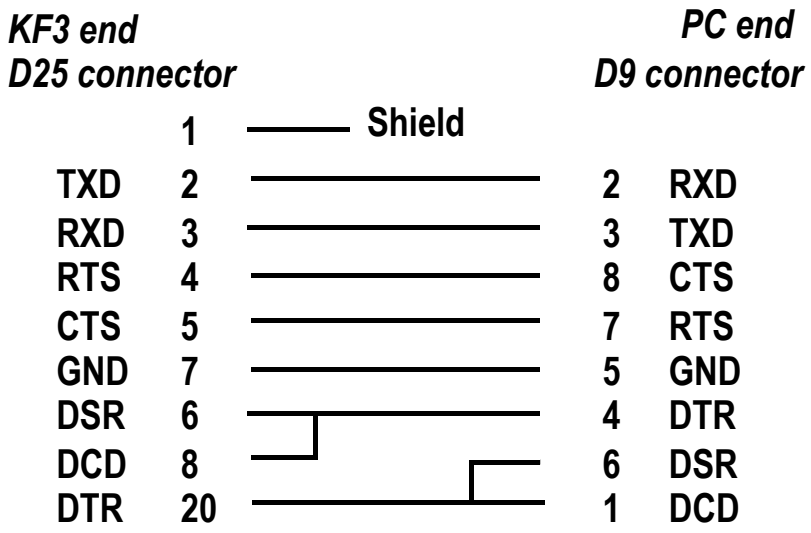

Figure 10: KF3 connection to computer 9-pin serial port

1770-KF3 communication settings

The recommended communication settings for the 1770-KF3 are the factory defaults.

The DH485 node address should be unique on the DH485 network. The default is *0*.

Ethernet connection to PLC-5 and SLC 500

"Figure 11: Ethernet connection to PLC-5 and SLC 500" shows a PLC-5 and SLC 500 connected locally to the Ethernet. It also shows a PLC-5 and SLC 500 connected to the Ethernet link through a Pyramid Integrator. This architecture requires the Rockwell RSLinx software.

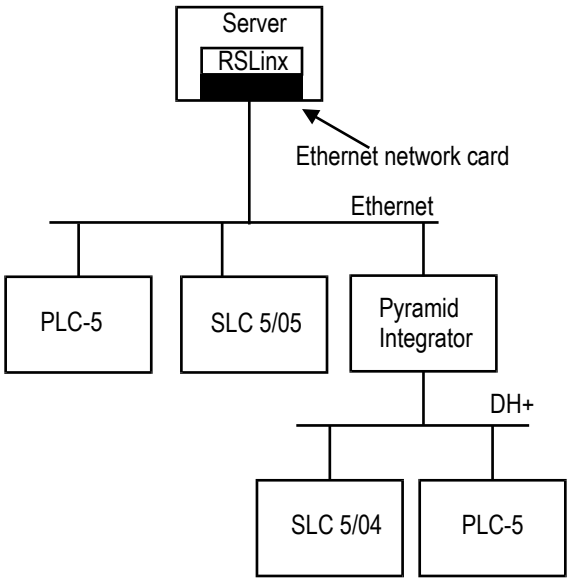

Figure 11: Ethernet connection to PLC-5 and SLC 500

RSLinx is required to communicate with PLCs connected by way of Ethernet, 1784-PKTX adapter, or Pyramid Integrator Gateway. See the *Supplementary Installation Tasks Guide* for information on installing RSLinx and the Ethernet adapter.

Setting up the PLC and Pyramid Integrator

Attention
RSLinx does not support unsolicited messages through a Pyramid Integrator gateway. Therefore, unsolicited messages cannot be sent to and from a PLC-5 if it is connected via a Pyramid Integrator.

For instructions on setting up the PLC Ethernet port or Pyramid Integrator, see the Allen-Bradley documentation.

When using a Pyramid Integrator, a boot server is required. Currently, there is no boot server program for Microsoft Windows. Instead, a 16-bit boot server program called *dt1bootw* is available from Rockwell. It can be downloaded from Rockwell's FTP site.

To use the boot server

1. Use the *bootptab* file to specify hosts (Pyramid Integrator) to be downloaded. It is configured similarly to the INTERCHANGE *bootptab.txt* file.
2. Add the *sm* (subnet mask) entry.
3. Start the executable, *dt1bootw.exe*.
   A window displays while the software listens for boot request from the Pyramid Integrator. Hosts that broadcast Ethernet hardware addresses located in the *bootptab* file are downloaded.

Direct DH+ connection using 1784-PKTX

A PLC-5 and a SLC 5/04 connected to the server through a 1784-PKTX.

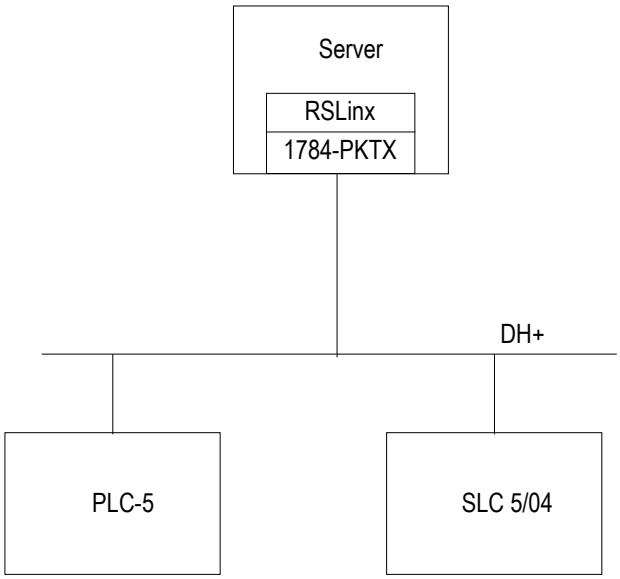

Figure 12: Server connection using a 1784-PKTX adapter

Installing the 1784-PKTX adapter

For installation details, see the *Allen-Bradley 1784-PKTX Network Interface Card User Manual*, available from the Rockwell Automation website.

Setting up RSLinx

In setting up RSLinx, a driver needs to be configured for the 1784-PKTX interface. For details, see the RSLinx online help.

Direct ControlNet connection to PLC-5

A PLC-5 connected to the server through a ControlNet Interface card.

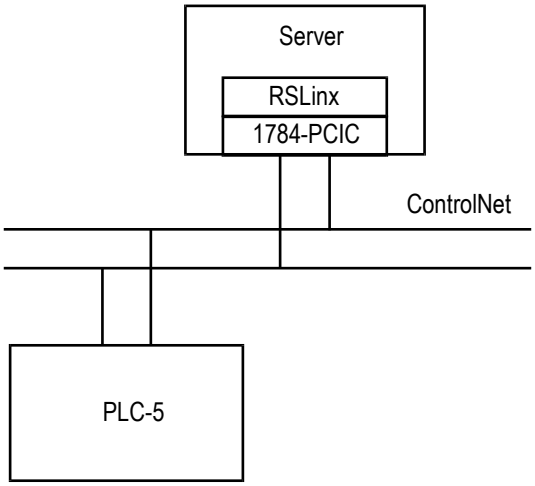

Figure 13: Connection using ControlNet

Communication setup

For information about installing the ControlNet adapter and RSLinx, see the topic titled "RSLinx configuration tasks" in the *Supplementary Installation Tasks Guide*.

In setting up RSLinx, a driver needs to be configured for the ControlNet interface. For details, see the RSLinx online help.

ControlLogix Gateway

A ControlLogix Gateway system is made up of Communication Interface modules (CIMs) residing in slots of a ControlLogix Gateway chassis. Different types of CIMs may reside in the chassis enabling communications between nodes on different networks.

Connection architecture

An example of a ControlLogix Gateway system with different CIM types.

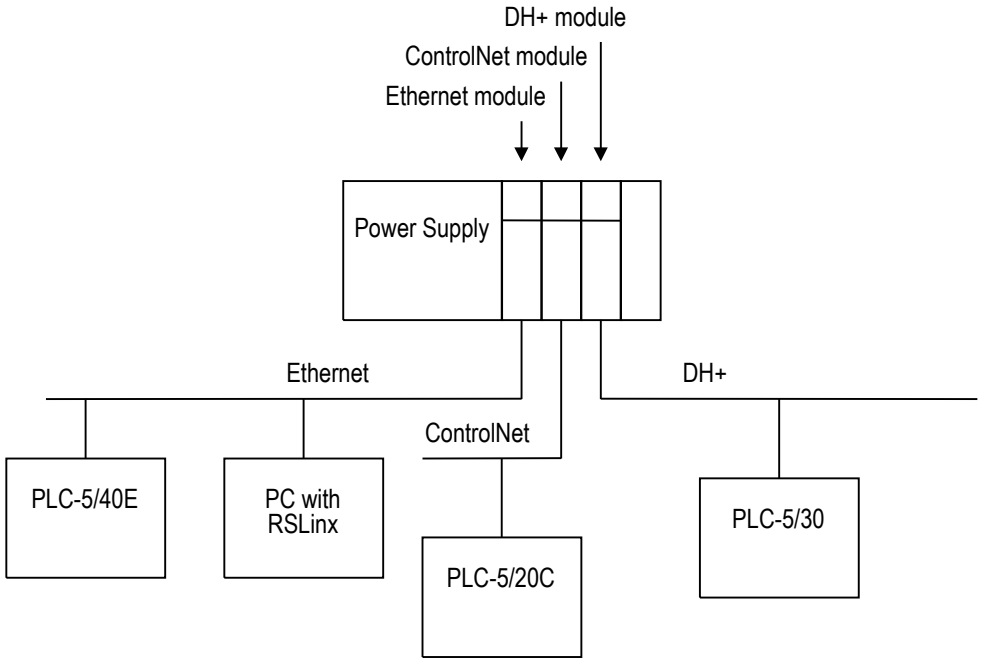

Figure 14: Example ControlLogix Gateway system

Many different ways of routing between nodes on different networks are possible with a ControlLogix Gateway system. See the appropriate Allen-Bradley ControlLogix Gateway documentation for configuration details of the ControlLogix Gateway CIMs.

The following figures show the supported architectures.

Ethernet to DH+

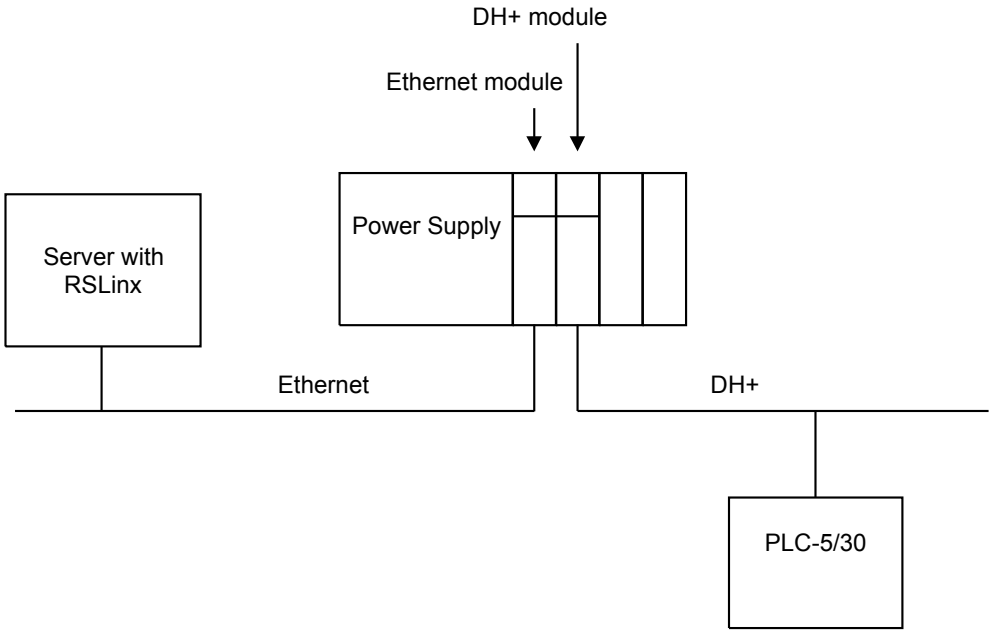

Figure 15: Communication to PLCs on DH+ via Ethernet

Ethernet to ControlNet

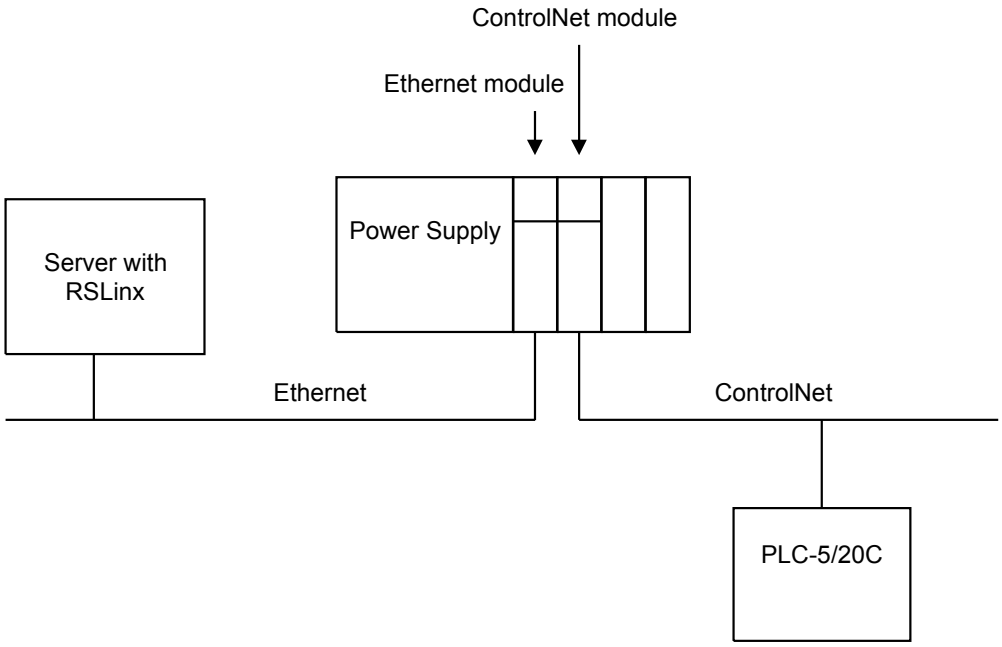

Figure 16: Communication to PLCs on ControlNet via Ethernet

ControlNet to DH+

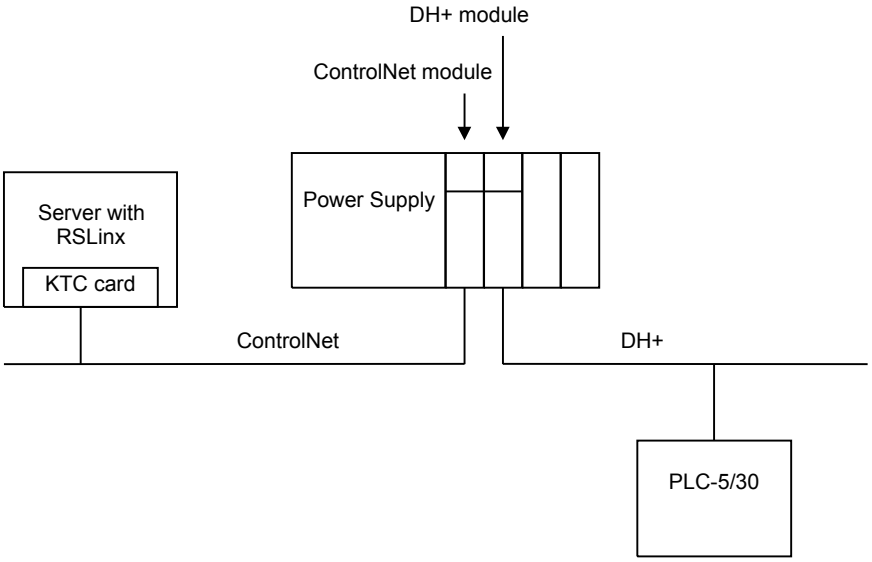

Figure 17: Communication to PLCs on DH+ via ControlNet

ControlNet to ControlNet

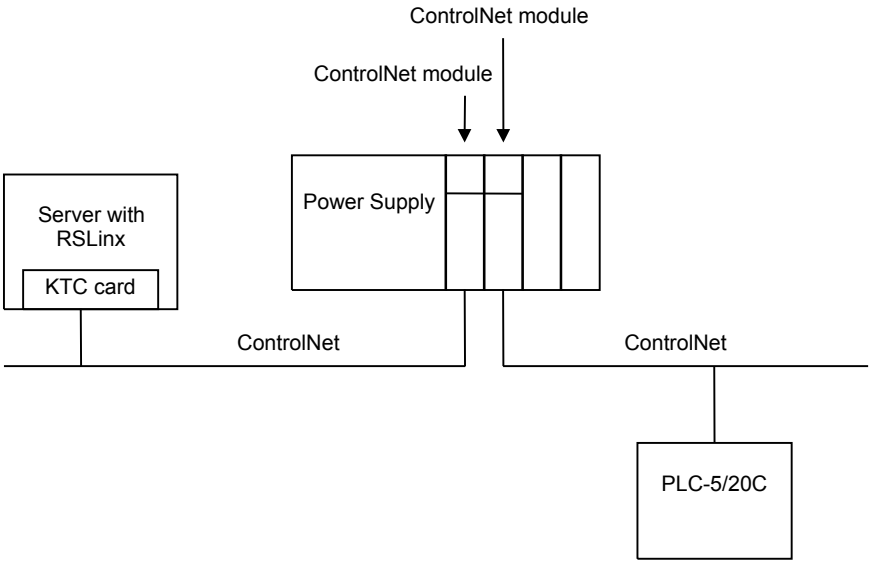

Figure 18: Communication to PLCs on ControlNet via ControlNet

DH+ to DH+

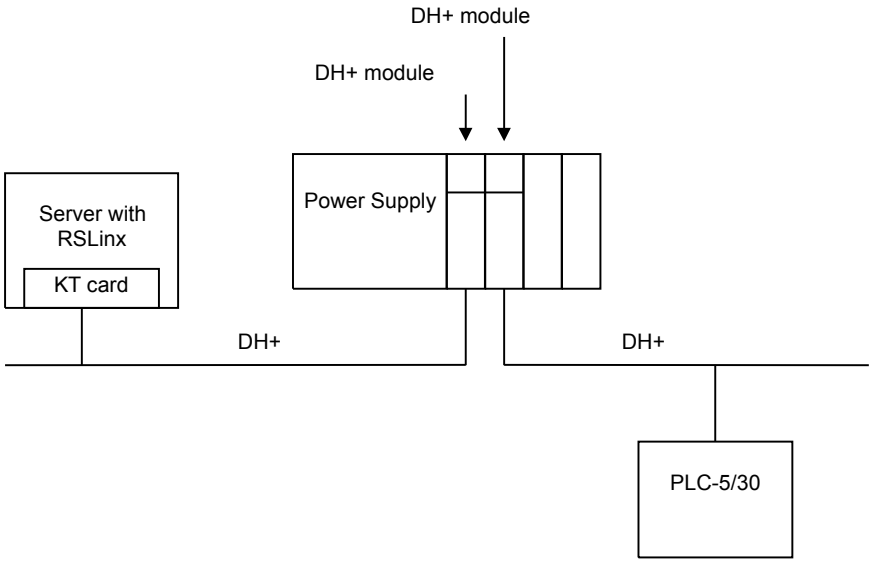

Figure 19: Communications to PLCs on DH+ via DH+

DH+ to ControlNet

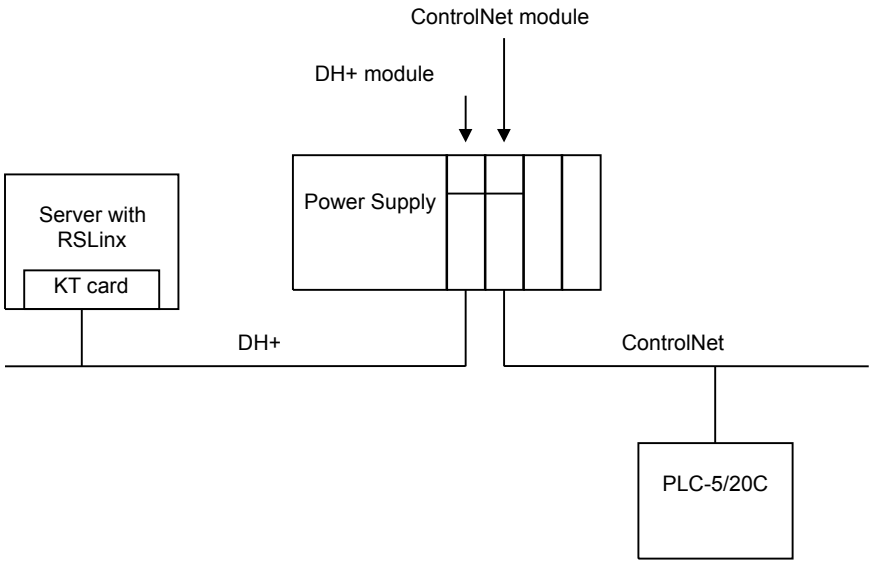

Figure 20: Communication to PLCs on ControlNet via DH+

Related topics

"Allen-Bradley processor support" on page 6

ControlLogix architecture

A ControlLogix controller may reside in any slot in an Allen-Bradley ControlLogix chassis. Communication interface modules (CIMs) residing in other slots of the same chassis provide communication to the ControlLogix controller via the backplane.

For communications to a ControlLogix controller, Rockwell Software RSLinx is required. Install RSLinx on the server.

Install the appropriate communication interface card in the server. See the communication interface card's installation documentation for details.

Install the CIM and the ControlLogix controller in the ControlLogix chassis. Connect the communication interface card and the CIM module to the appropriate common network.

Configure an appropriate driver under RSLinx for the communication interface card. See the RSLinx online help for details. RSwho in RSLinx can then be used to verify the connection.

At present the following architectures are supported.

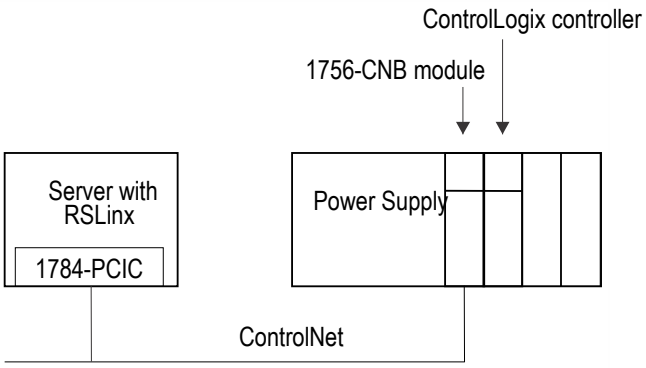

Figure 21: Connection through 1756-CNB module

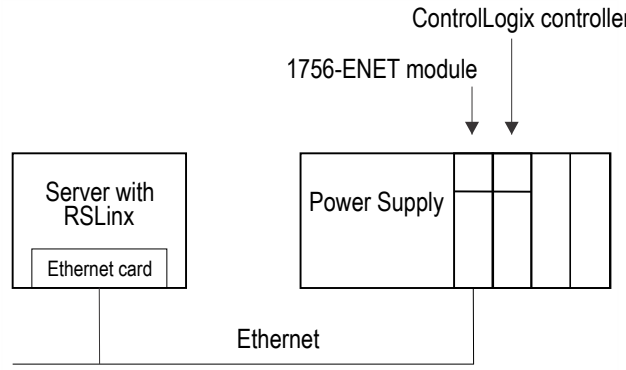

Figure 22: Connection through 1756-ENET module

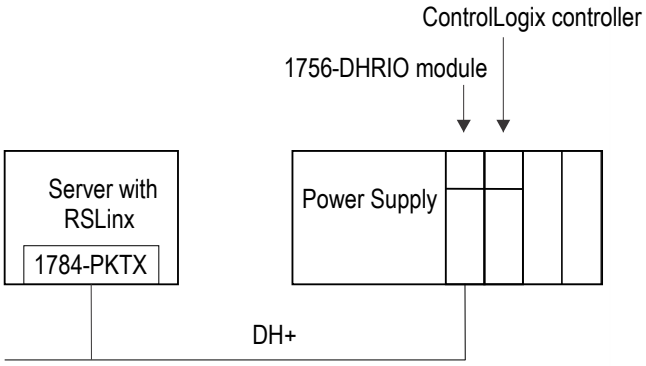

Figure 23: Connection through 1756-DHRIO module

Communication settings for Allen-Bradley

This section describes the supported communication settings for an Allen-Bradley controller.

Related topics

"Serial connection" on page 23
"Connections using RSLinx" on page 23
"Using an SLC 500 for Smart Transmitter access" on page 23
"Using a PLC-5 for Smart Transmitter access" on page 24

Serial connection

Each PLC is considered to be a station on the Data Highway and must have a unique station address (or station ID) configured.

When using a KF2 module to connect the server to the Data Highway, it must also have a unique station ID on the Data Highway. To communicate with the PLCs on the Data Highway, the server takes on the KF2 station ID.

These parameters must also be configured on the KF2:

- Baud
- Parity
- Protocol (RS-232)
- Full/Half Duplex

Attention
The KF2 must be configured so that diagnostic commands are not passed through to the server and that embedded responses are disabled. See the Installation Manual for the recommended KF2 switch settings.

Connections using RSLinx

When using Rockwell RSLinx software, you need to configure a driver for each connection type. The server uses the RSLinx driver name to identify the driver. Always use the default driver name when adding a new driver.

In a redundant server system, both servers must be configured identically.

For more information about how to install RSLinx and how to activate the OEM key, see the *Supplementary Installation Tasks Guide*.

Using an SLC 500 for Smart Transmitter access

By installing a ProSoft DE Module (3750 DEM) in the SLC 500, up to eight Smart Transmitters can be accessed. Information transfer is accomplished using ladder logic provided by the ProSoft 3750 DE Module (3750 DEM) to files within the SLC 500. These files act as the master database to the transmitters, with the SLC 500 as the database owner.

These files can be uploaded, downloaded, or modified from a Station display. See the topic titled "Viewing and modifying Smart Transmitter variables" for more information.

Related topics

"Viewing and modifying Smart Transmitter variables" on page 62

Using a PLC-5 for Smart Transmitter access

By installing a ProSoft DE Module (3700 DEM) in the PLC-5, up to 16 Smart Transmitters can be accessed. Information transfer is accomplished using ladder logic provided by the ProSoft 3700 DE Module (3700 DEM) to files within the PLC-5. These files act as the master database to the transmitters, with the PLC-5 as the database owner.

Attention
The Firmware revision for the DE module should be 1.33.

These files can be uploaded, downloaded, or modified from a Station display. See the topic titled "Viewing and modifying Smart Transmitter variables" for more information.

Related topics

“Viewing and modifying Smart Transmitter variables” on page 62

Configuring tags on ControlLogix PLCs

Attention

If you want to use named addressing with a ControlLogix controller, do not use this interface. Instead, use the Experion OPC Client Interface and the Allen-Bradley OPC server from MatrikonOPC to make use of the non-scanned parameters.

Using the RSLogix 5000 programming software, configure tags with data types of integer, double integer, or real (floating point) as required.

After the tag arrays are created and mapped to PLC-5 data table addresses, you can build points to reference elements within different tag arrays.

Data acquisition and control requests sent to the ControlLogix controller can be made in its native protocol or using a subset of the Allen-Bradley DF-1 protocol. The ControlLogix Controller Interface uses the later method, employing PLC-5 type of addressing, commands, and functions. Using this method, the ControlLogix controller only supports reading values from and writing values to tags with data types of integer (16-bit), double integer (32-bit), or floating point. Tag to data table address mapping must also be configured in the ControlLogix controller. This is done through the programming software of the ControlLogix in offline mode and then downloaded to the ControlLogix controller.

You use Quick Builder to define and configure points to reference data in ControlLogix PLCs. The address format for points referencing ControlLogix tags are similar to those used for PLC-5. See the topic titled "Address syntax for Allen-Bradley controllers."

To configure tags on ControlLogix PLCs

1. Start ControlLogix in offline mode.
2. From the menu, select **Logic** > **Map PLC/SLC Message**.
3. In the dialog box, specify the PLC-5 file number to ControlLogix tag mapping.
4. Download to the controller.

Related topics

“Address syntax for Allen-Bradley controllers” on page 48

Configuring unsolicited messages

This section describes configuring unsolicited messages for Allen-Bradley controllers.

Related topics

"Configuring ControlLogix for unsolicited messages" on page 26
"Configuring PLC-5 for unsolicited messages" on page 26

Configuring ControlLogix for unsolicited messages

The Allen-Bradley ControlLogix Controller Interface supports PLC-5 type of unsolicited messages from a ControlLogix controller.

To configure unsolicited messages

1. Create one tag of type message (message control structure) for each MSG instruction.
2. Add a MSG instruction in the appropriate place in a ladder logic rung.
3. Configure the MSG instruction. Under the Configuration tab, in the Message Type field select PLC-5 Typed Write. In the Source Tag field select the source tag. Specify the number of elements from the source tag to be sent in the Number Of Elements field. In the Destination Element field specify the PLC-5 address to receive the data.
4. Select the Communication tab. Select the **CIP with Source ID** radio button under Communication Method. Specify the CIP (ASA) path. CIP path numbers specified in RSLogix 5000 are separated by commas.

The CIP path specifies the path the unsolicited message takes to reach the server from the ControlLogix controller. See your Allen-Bradley documentation for more information about CIP path.

Table 3: ControlNet connection details

Item	Description
1st ASA path number	*1*, indicating that the message will go out through the backplane.
2nd ASA path number	The slot number of the CNB module.
3rd ASA path number	*2*, indicating that the message should leave the CNB module through its ControlNet port.
4th ASA path number	The MAC ID of the KTC card in the server.
5th and 6th ASA path numbers	*1* and *0* respectively. This indicates the internal backplane port and the pseudo slot number used by RSLinx.
Source Link	The MAC ID of the CNB module that passes the message to the server.
Destination Link	The virtual link ID configured in RSLinx. The virtual link ID is found in RSLinx by selecting from the menu, **Communications** > **Configure Client Applications** > **Virtual Link ID**.
Destination Node	The number *77*.

Configuring PLC-5 for unsolicited messages

This topic gives a brief description of the process to configure a PLC-5 for unsolicited messages. For a detailed description of the MSG instruction, see the *Allen-Bradley PLC-5 Programming Software-Instruction Set Reference Manual*.

For the MSG instruction, a control block of file type Integer (*N*) or Message (*MG*) is required. The *MG* file type is only available for some PLC-5 processor types.

To configure the PLC-5 to send unsolicited messages to the server, use the following settings for control block fields. These settings are applicable to all connection/architecture types supported by the server.

Table 4: PLC-5 control block fields

Control Block Fields	Settings
Communication Command	Set to PLC-5 Typed Write
PLC-5 Data Table Address	Starting word of the source file
Size in Elements	The number of elements to be transferred
Destination Data Table Address	The same as the PLC-5 Data Table Address

Example

To send the data in Integer file *N12* from element 0 to element 9 in the server, you would use the following settings:

Table 5: Example of PLC-5 control block fields

Control Block Fields	Settings
Communication Command	*PLC-5 Typed Write*
PLC-5 Data Table Address	*N12:0*
Size in Elements	*10*
Destination Data Table Address	*N12:0*

The MSG instruction sends data in packets. For PLC-5s on DH+ the maximum data size per packet is 244 bytes. The number of elements per packet depends on the file type. If the size in elements specified in a MSG instruction results in more than 244 bytes of data, the PLC automatically generates multiple packets.

For example, if a MSG instruction is configured to send 100 consecutive elements of a floating point file (4 bytes per element), the PLC generates two packets to send the values for all the 100 elements.

For Ethernet PLC-5s, MSG instructions that send data through the Ethernet port can have packet data size greater than 244 bytes.

Control block field settings relevant to specific connection/architecture types are described in the following tables.

Table 6: Serial connection via KF2 module

Control Block Fields	Settings
Local Remote	Set to Local
Local Node	Set this to the DH+ address of the KF2 module
Port Number	Set this to be the DH+ port number on the PLC-5

Table 7: Direct DH/DH+ connection using KT card

Control Block Fields	Settings
Local Remote	Set to Local
Local Node	Set this to the address of the KT Card

Control Block Fields	Settings
Port Number	Set this to be the DH+ port number on the PLC-5

Table 8: Direct ControlNet connection using KT card

Control Block Fields	Settings
Local Remote	Set to Local
Local Node	Set this to the MAC address of the KT Card
Port Number	Set this to 2 (see the topic titled "ASA path")

Table 9: Ethernet connection - local

Control Block Fields	Settings
Internet (IP) Address	Set this to the IP address of the server
Port Number	Set this to be the Ethernet port number of the PLC-5

Table 10: Ethernet connection - remote via Pyramid Integrator

Control Block Fields	Settings
Local Remote	Set to Local
Local Node	Set this to be the address of the Ethernet port of the Pyramid Integrator
Port Number	Set this to be the DH+ port number on the PLC

Table 11: Direct serial connection

Control Block Fields	Settings
Local Remote	Set to Local
Port Number	Set to 0
Controller Station Id	Set to the DH+ port number on the PLC

The conditions under which an unsolicited message is to be sent from the PLC-5 to the server depends on the application. For example, an unsolicited message may be sent to the server periodically. Consider the following:

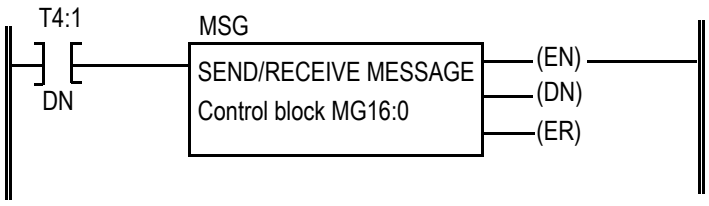

Figure 24: Unsolicited message transmission

An unsolicited message is sent when the DN bit of timer T4:1 is set. This means that the frequency of sending of messages depends on the period of the timer.

Related topics

“ASA path” on page 40

KF2 settings

DIP switch recommended settings

You set up the KF2 module's characteristics on the DIP switches that are located on the underside of the module.

Switch group SW1 — asynchronous link features

With the serial connection architecture, the Allen-Bradley PLC server interface only supports both the full-duplex and half-duplex mode of communications. Note that embedded responses must be disabled.

Table 12: Allen-Bradley 1770-KF2 switch group 1 settings

Protocol	Error Check	Parity	Embedded Response	Switch				
				1	2	3	4	5
Full Duplex	BCC	None	No	Off	Off	N/A	N/A	Off
Full Duplex	BCC	Even	No	On	Off	N/A	N/A	Off
Half Duplex	BCC	None	No	Off	Off	N/A	N/A	On
Half Duplex	BCC	Even	No	On	Off	N/A	N/A	On
Half Duplex	CRC	None	No	On	On	N/A	N/A	On

Switch groups SW2, SW3, and SW4 — node number

The KF2 module must have a unique network node number (ID) on the Data Highway/Data Highway Plus network.

Switch groups SW2, SW3 and SW4 are used to set the network node number. Each switch group is used to represent an octal digit with SW2 representing the most significant (left-most) digit and SW4 representing the least significant (right-most) digit. Individual switches in a switch group represent a bit: OFF is *0* (zero) and ON is *1*, with the left-most switch representing the most significant bit.

For Data Highway, the node number is a 3-digit octal number. Valid node numbers for the KF2 module on a Data Highway are 010 to 077 and 110 to 376 octal.

For Data Highway Plus, the node number is two digits. Both switches in switch group SW2 must be set to off. Valid node numbers for the KF2 module on a Data Highway Plus are 00 to 77 octal.

Switch group SW5 — network communication rate

Both switches should be set to ON.

Switch group SW6 — asynchronous communication rate and diagnostic commands

Switches 1 to 3 specify the communication rate. Switch 4 determines how the KF2 module treats diagnostic commands sent to it by a remote node. This switch must be set to ON to prevent any diagnostic commands being passed on to the server.

Table 13: Allen-Bradley 1770-KF2 switch group 6 settings

Bits/second	Switch			
	1	2	3	4
110	Off	Off	Off	On
300	On	Off	Off	On
600	Off	On	Off	On
1200	On	On	Off	On
2400	Off	Off	On	On
4800	On	Off	On	On
9600	Off	On	On	On
19,200	On	On	On	On

Switch group SW-7 — network link selection

Table 14: Allen-Bradley 1770-KF2 switch group 7 settings

Network	Switch	
	1	2
Data Highway	Off	Off
Data Highway Plus	On	Off

Switch group SW-8 — selection of RS-232 or RS-422

Table 15: Allen-Bradley 1770-KF2 switch group 8 settings

Network	Switch	
	1	2
RS-232	Off	On
RS-422	On	Off

Allen-Bradley controller configuration and addressing

This section describes the configuration and addressing information specific to Allen-Bradley channels and controllers.

In addition to the information contained in this reference, and for help to build channels and controllers, see the section titled "Building controllers or channels" in the *Quick Builder User's Guide*.

Related topics

“Main properties for an Allen-Bradley channel” on page 32

“Port properties for an Allen-Bradley channel” on page 34

“Main properties for an Allen-Bradley controller” on page 36

“ASA path” on page 40

“Defining a PLC-5 controller using base file number of files and offset” on page 43

“Optimizing Allen-Bradley scanning performance” on page 44

“Planning considerations for installing and configuring Allen-Bradley controllers” on page 5

Main properties for an Allen-Bradley channel

Use the Main tab to enter the basic channel properties for an Allen-Bradley channel.

For information about how to create a channel, see the topic titled "Building controllers and channels" in the *Quick Builder User's Guide*.

Property	Description
Name	The unique name of the channel. A maximum of *10* alphanumeric characters (no spaces or double quotes). Note: In Station displays, underscore characters (_) appear as spaces.
Description	(Optional) A description of the channel. A maximum of *132* alphanumeric characters, including spaces.
Associated Asset	The Tag Name of the Asset to be associated with the alarm group.
Marginal Alarm Limit	The communications alarm marginal limit at which the channel is declared to be marginal. When this limit is reached, a high priority alarm is generated. To change the priority of the alarm system wide, see the topic titled "Configuring system alarm priorities" in the *Server and Client Configuration Guide*. To change the priority of the alarm for one channel, see the topic titled "About configuring custom system alarm priorities for an individual channel or controller" in the *Server and Client Configuration Guide*. A channel barometer monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer increments by two or more, depending on the error, and decrements for each good call. To calculate an acceptable marginal alarm limit, use the formula: Square root of the number of controllers on the channel × Marginal Alarm Limit defined on those controllers (Normally, you specify the same value for all controllers on a channel). For example, if there are 9 controllers on the channel and their Marginal Alarm Limit is set to *25*, the value would be *3* (which is the square root of 9) *x 25 = 75*.
Fail Alarm Limit	The communications alarm fail limit at which the channel is declared to have failed. When this barometer limit is reached, an urgent alarm is generated. To change the priority of the alarm system wide, see the topic titled "Configuring system alarm priorities" in the *Server and Client Configuration Guide*. To change the priority of the alarm for one channel, see the topic titled "About configuring custom system alarm priorities for an individual channel or controller" in the *Server and Client Configuration Guide*. Set this to double the value specified for the channel Marginal Alarm Limit.
Half Duplex Protocol	Check this box if the server communicates via a serial link to the Allen-Bradley PLC and the PLC is configured for Half-Duplex protocol. Half-Duplex protocol is typically used where the server communicates to the PLC over a radio link.
Primary PLC Check Rate	The rate at which the Allen-Bradley interface will check for the primary status of the controller. Use this when configuring redundant ControlNet PLC–5 support.
Write Delay	If the channel is on a serial port, the length of time (in milliseconds) that the server waits before writing to any controller on the channel. The default value is *10* milliseconds. A write delay is usually specified only if: • The server communicates to the controller over a half-duplex radio link and the radio system requires time to key in each direction before the server or controller can send data. • The radio system implements *RTS/CTS* handshaking. If there is a communications problem and the controller does not respond to writes from the server, try changing this setting to *11* milliseconds or more. This should allow the controller enough time to become ready to receive data from the server.

Property	Description
Diagnostic Scan Period	The period, in seconds, between diagnostic scans that verify communications integrity with the controller. The default value is *60* seconds. The diagnostic scans continue even if a controller is marked as failed, thus enabling the system to detect return-to-normal communications. If there are multiple controllers configured on a channel, the diagnostic scan rate should be set to *60* seconds multiplied by the number of controllers on that channel. For example, if there are five controllers configured on the channel, the diagnostic scan rate should be set to *300* seconds. Diagnostic scans occur at the set scan rate per controller. Therefore, with five controllers and a default value of *60* seconds, the diagnostic scans will occur every *12* seconds.
Connect Timeout	The length of time that the server attempts to connect to the controller. The server will stop trying to connect to the controller once the timeout period passes. The default value *10* seconds. Use the default value unless the communications line has a high error rate, or unless you are using modems.
Read Timeout	The length of time that the server will wait for a reply from the controller. The server will stop waiting once the timeout period passes. The default value is *2* seconds. Use the default value unless the communications line has a high error rate, or unless you are using modems.
Item Type	The type of channel specified when this item was created.
Last Modified	The date and time the channel properties were modified.
Last Downloaded	The date and time the channel was last downloaded to the server.
Item Number	The unique item number currently assigned to this channel, in the format *CHNcc*, where *cc* is the channel number. You can change the item number if you need to match your current server database configuration. The number must be between *01* and the maximum number of channels allowed for your system. For more information about setting the maximum value, see the topic titled "Adjusting sizing of non-licensed items" in the *Supplementary Installation Tasks Guide*.

Port properties for an Allen-Bradley channel

The Port tab defines the communication-related properties for a channel. The **Port Type** for Allen-Bradley can be:

- *Serial*. A serial communications interface, such as RS-232. See the section below titled "Serial port properties."
- *TerminalServer*. A communications link that enables controllers with a serial interface to be connected to a LAN. See the section below titled "TerminalServer port properties."
- *RSLinx*. A communication link through RSLinx. See the section below titled "RSLinx port properties."

Serial port properties

The Serial Port settings must match the settings on your communication devices.

Property	Description
Serial Port Name	The device name of the serial port.
Baud	The number of data bits per second. The default is *9600*.
Number of Data Bits	The number of data bits used for transmission. The default is *8*.
Stop Bits	The number of stop bits used for transmission The default is *1*.
Parity	Defines parity verification of each character and must match configuration on the end device. The default is *NONE*.
Checksum	The type of checksum error detection used for the port. Select the value that matches the setting on the communication device. • *CRC16_0* (if Cyclic Redundancy Check (CRC) is set) • *TWOSCOMP* (if Longitudinal Redundancy Check (LRC) is set)
XON/XOFF	The type of XON/XOFF software flow control used to stop a receiver from being overrun with messages from a sender. The types are: • *Input* (use XON/XOFF to control the flow of data on the receive line) • *None* (default) • *Output* (use XON/XOFF to control the flow of data on the transmit line)
Handshaking Option RS-232	These options are applicable to the RS-232 link: • **Enable RTS/CTS flow control**. Select this if you want to use RTS/CTS for flow control to stop a receiver from being overrun with messages from a sender. • **Detect DCD**. Select this if the Data Carrier Detect communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status line is not high—for example, on a dial-up link connection for a modem. • **Detect DSR**. Select this if the Data Set Ready communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status is not achieved.

TerminalServer port properties

Property	Description
Terminal Server TCP Host Name Terminal Server TCP Port No	The name and port number of terminal server to which the channel is connected. You can specify either a TCP host name or an IP address, but it must match the TCP host name used when you installed and internally configured the terminal server.
Idle Timeout	The time, in seconds, the channel waits for a successful connection to the server before closing the connection. A value of *0* indicates that the connection is never closed.
Checksum	The type of checksum error detection used for the port. Select the value that matches the setting on the communication device. • *CRC16_0* (if Cyclic Redundancy Check (CRC) is set) • *TWOSCOMP* (if Longitudinal Redundancy Check (LRC) is set)

RSLinx port properties

A RSLinx channel requires the following Allen-Bradley specific entries:

Property	Description
Driver Name	The name of the RSLinx driver. Example: *AB_ETH-1* (default RSLinx Ethernet driver name)

Attention

- When communicating via an Ethernet module on a ControlLogix system, use the RSLinx driver type (configured under RSLinx) 'Remote Devices via Linx Gateway,' not the 'Ethernet devices.' The 'Ethernet devices' driver type should only be used for Ethernet PLC-5s.
- Do not change the name of the RSLinx driver chosen by RSLinx. The Allen-Bradley interface uses the driver name to determine if the connection is Ethernet, KTC, or PCIC. It only recognizes the default.

Redundant port properties

A communication port used as a redundant link has the same channel name but a requires a different port name to its twin. All other entries are identical to those of the primary port.

Main properties for an Allen-Bradley controller

Use the Main tab to define the basic properties for an Allen-Bradley controller.

For information about how to create a controller, see the topic titled "Building controllers and channels" in the *Quick Builder User's Guide*.

You need to define a separate controller for each PLC. Depending on how much data you want to address in the PLC, you might need to define multiple logical controllers to address different areas of one PLC's memory.

Property	Description
Name	The unique name of the controller. A maximum of *10* alphanumeric characters (no spaces or double quotes). Note: In Station displays, underscore characters (_) appear as spaces. For LAN–connected controllers, the name is used to look up the IP address in the TCP/IP database if you do not specify an **IP Address** property.
Description	(Optional) A description of the controller. A maximum of *132* alphanumeric characters, including spaces.
Associated Asset	The Tag Name of the Asset to be associated with the alarm group.
Channel Name	The name of the channel on which the controller communicates with the server. (You must have already defined a channel for it to appear in this list.)
Marginal Alarm Limit	The communications alarm marginal limit at which the controller is declared to be marginal. When this limit is reached, a high priority alarm is generated. To change the priority of the alarm system wide, see the topic titled "Configuring system alarm priorities" in the *Server and Client Configuration Guide*. To change the priority of the alarm for one controller, see the topic titled "About configuring custom system alarm priorities for an individual channel or controller" in the *Server and Client Configuration Guide*. A controller barometer monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer increments by two or more, depending on the error, and decrements for each good call. The default value is *25*.
Fail Alarm Limit	The communications alarm fail limit at which the controller is declared to have failed. When this barometer limit is reached, an urgent alarm is generated. To change the priority of the alarm system wide, see the topic titled "Configuring system alarm priorities" in the *Server and Client Configuration Guide*. To change the priority of the alarm for one controller, see the topic titled "About configuring custom system alarm priorities for an individual channel or controller" in the *Server and Client Configuration Guide*. Set this to double the value specified for the controller Marginal Alarm Limit. The default is *50*.
Dynamic Scanning Fastest Scan Period	Select the **Dynamic Scanning** check box to enable dynamic scanning of all point parameters on this controller. The default setting for this check box is selected. Define the fastest possible scan period (in seconds) that dynamic scanning will scan point parameters on this controller. The default is *15* seconds. The dynamic scanning period does not affect the static scanning rate for a parameter. For example, if the scanning rate for a parameter is 10 seconds, and the dynamic scanning rate for the controller is 15 seconds, the parameter will still be scanned at a period of 10 seconds.
PLC Type	Select the PLC type from the list.

Property	Description
PLC Station ID	The PLC Station ID depends on the way the controller is connected. For PLC's on DH+ or DH485 network this is the node number of the PLC on the network. For PLC's on ControlNet this is the MAC address of the PLC. For direct Ethernet connection this is the station number used in the RSLinx Ethernet driver to map to the PLC's IP address. For ControlLogix this is the slot number of the ControlLogix Gateway chassis where the controller resides. For half duplex slave controllers, this is the slave node number of the controller's serial port.
Offset	The address offset. The default is *0*, no offset. **PLC-5**. Enter the address offset for the first address of every file referenced by this controller. You must also enter a value for the Number of Files and the Base File to complete the address range definition of this controller.
Number of Files	(Only applicable to PLC-5, SLC 500, and ControlLogix.) Enter the number of PLC-5 or SLC 500 files configured for the controller. The default is *10*, the maximum is *32*. **Note:** You cannot modify this value after downloading the controller definition to the server unless you delete the controller definition from the server first.
Data Table Area	(Only applicable to PLC-5.) Enter the PLC-5 data table area number. The default is *0*.
Base File	(Only applicable to PLC-5, SLC 500 and ControlLogix.) Enter the file number of the first addressable file. The default is *0*. **Note:** For a PLC-5, the address space per file (addressable by the controller) equals the size of the hardware cross-reference record divided by the number of files (maximum number of files = 32) configured for the controller. For detailed explanations of base file, number of files, and offset entries for a PLC-5 see the topic titled "Defining a PLC-5 controller using base file, number, and offset."
No Midnight Reinitialization	Select to disable midnight re-initialization. By default, the server re-initializes all controllers at midnight. Controller re-initialization might not be desirable when there are a large number of controllers built on a channel or the entire bandwidth of the channel is being utilized.
Diagnostic on Fail Only	Select to set the diagnostic scan to occur only when the controller is in a FAILED state. This might be desirable if the entire bandwidth of the channel for this controller is being utilized.
Communications Gateway	This property is only visible if **RSLinx** is selected as the port type for the channel to which this controller belongs. Select one of the following: • *None* • *Pyramid Integrator* • *ControlLogix*
Redundant PLC-5	This property is only visible if the following properties are set: • **RSLinx** is selected as the port type for the channel to which this controller belongs • **PLC-5** is selected as the **PLC Type** • **None** or **ControlLogix** is selected as the **Communication Gateway** This indicates the controller is representing a redundant ControlNet PLC-5 pair. **Note**: 1785-CHBM required.

Property	Description
Backup PLC ID	This property is only visible if the following properties are set: • **RSLinx** is selected as the port type for the channel to which this controller belongs • **PLC-5** is selected as the **PLC Type** • **None** or **ControlLogix** is selected as the **Communication Gateway** • **Redundant PLC-5** check box is checked This indicates the ControlNet MACid of the backup PLC-5 of a redundant pair. **Note:** The MACid's used for a redundant PLC-5 pair must be consecutive and that the lower MAC address must be odd.
Primary/Backup status Indicator Address	This property is only visible if the following properties are set: • **RSLinx** is selected as the port type for the channel to which this controller belongs • **PLC-5** is selected as the **PLC Type** • **None** or **ControlLogix** is selected as the **Communication Gateway** • **Redundant PLC-5** check box is checked Specifies the file address within the PLC-5 which indicates the primary/backup status of the PLC. This should be no more than 6 characters. The file number does not have to fall within the file range as defined by Base File and Number of Files for the controller.
CIM Slave Node Number	This property is only visible if **Serial** is selected as the port type and the Half Duplex Protocol check box is checked for the channel to which this controller belongs. Type in the CIM Slave Node Number. Valid numbers range from 1 to 254.
PI Station ID	This property is visible only if **RSLinx** is selected as the port type for the channel to which this controller belongs and the communications gateway selected is Pyramid Integrator. Type in the station ID assigned to the Pyramid Integrator in RSLinx.
PI Module	This property is visible only if **RSLinx** is selected as the port type for the channel to which this controller belongs and the communications gateway selected is Pyramid Integrator. From the drop-down list, select the module type on the Pyramid Integrator used by the server to communicate with the PLC-5, either RM or KA.
PI Pushwheel	This property is visible only if **RSLinx** is selected as the port type for the channel to which this controller belongs and the communications gateway selected is Pyramid Integrator. Type in: • 0 for an RM Module • 1 through 4 for a KA Module
PI Channel	This property is visible only if **RSLinx** is selected as the port type for the channel to which this controller belongs and the communications gateway selected is Pyramid Integrator. From the list of channels, select the Pyramid Integrator channel.
ASA Path	This property is visible only if RSLinx is selected as the port type for the channel to which this controller belongs and the communications gateway selected is ControlLogix. This is a series of numbers, separated by dashes, that defines the route to the PLC. See the topic titled "ASA path."
PLC Connected to DHRIO Module	Select to indicate the PLC is connected to a DHRIO module in a ControlLogix Gateway system.
Item Type	The type of controller specified when this item was created.
Last Modified	The date and time the controller properties were modified.
Last Downloaded	The date and time the controller was last downloaded to the server.

Property	Description
Item Number	The unique item number currently assigned to this controller, in the format *RTUnnnnn*. You can change the item number if you need to match your current server database configuration. The number must be between *01* and the maximum number of controllers allowed for your system. For more information about setting the maximum value, see the topic titled "Adjusting sizing of non-licensed items" in the *Supplementary Installation Tasks Guide*.

Related topics

“Defining a PLC-5 controller using base file number of files and offset” on page 43
“ASA path” on page 40

ASA path

An ASA path specifies the communication path to take to reach a particular destination. Such a path must be specified when building a controller in the server for a ControlLogix or a PLC connected through a ControlLogix Gateway system. An ASA path is represented by a series of numbers. The length of the series is variable. When using Quick Builder to build a controller, the numbers in the series are separated by dashes.

The following table shows the ASA path segments to be used for ControlLogix.

Table 16: ASA path segments

Connection Type	1st ASA number	2nd ASA number	3rd ASA number
DH+	0	DH+ address of the DHRIO module	1 for backplane
Ethernet	1	N/A	N/A
ControlNet	2	MAC address of the CNB module	1 for backplane

The following tables show the ASA path segments to use for PLC's connected through a ControlLogix Gateway system. The ControlLogix Gateway module to which the server is connected is referred to as the 'IN' module and the ControlLogix Gateway module to which the PLC is connected is referred to as the 'OUT' module.

Table 17: ASA path segments number for different IN module types

IN Module Type	1st ASA number	2nd ASA number	3rd ASA number	4th ASA number	5th ASA number
DH+	0	IN module's DH+ address	1 for backplane	OUT module's slot number	[8]
Ethernet	1	OUT module's slot number	[8]	N/A	N/A
ControlNet	2	IN module's ControlNet MAC address	1 for backplane	OUT module's slot number	[8]

Table 18: ASA path segments number for different OUT module types

OUT module type	ASA number
DH+	2 for Channel A; 3 for Channel B
ControlNet	2 for the ControlNet port

Attention
Slot number in a ControlLogix Gateway chassis starts with zero and increases from left to right. Slot zero is the slot next to the power supply.

Here are three examples of ASA Paths.

Ethernet to DH+ connection

For the following architecture, the controller definition to be specified in Quick Builder should be:

```
2 NAME=PLC530 ID=5 CLG_DHRIO
ASA_PATH=1-1-3
```

[8] See “Table 18: ASA path segments number for different OUT module types” for different OUT module types.

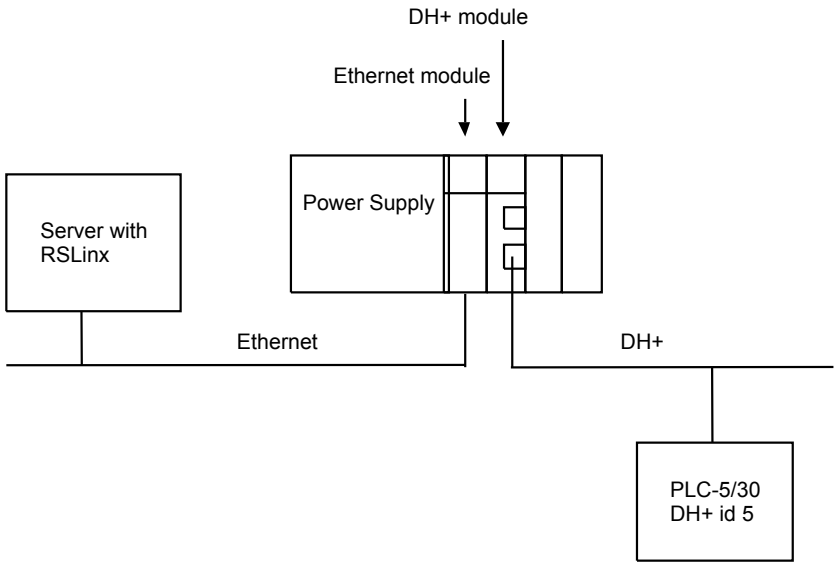

Figure 25: Ethernet to DH+ connection example

ControlNet to ControlNet connection

For the following architecture, the controller definition to be specified in Quick Builder should be:

```
2 NAME=PLC520C ID=3 ASA_PATH=2-9-1-1-2
```

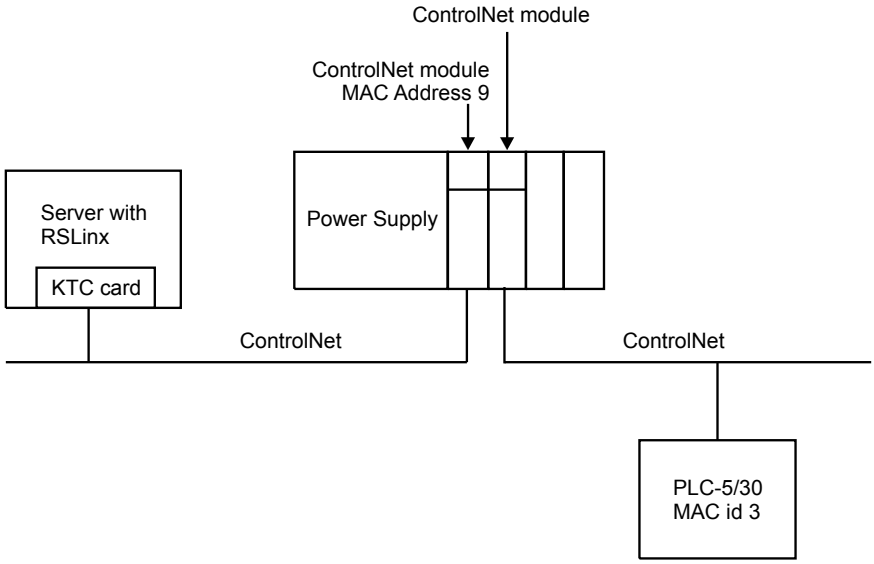

Figure 26: ControlNet to ControlNet connection example

Ethernet to ControlNet connection

For the following architecture, the controller definition to be specified in Quick Builder should be:

```
2 NAME=PLC520C ID=3 ASA_PATH=1-1-2
```

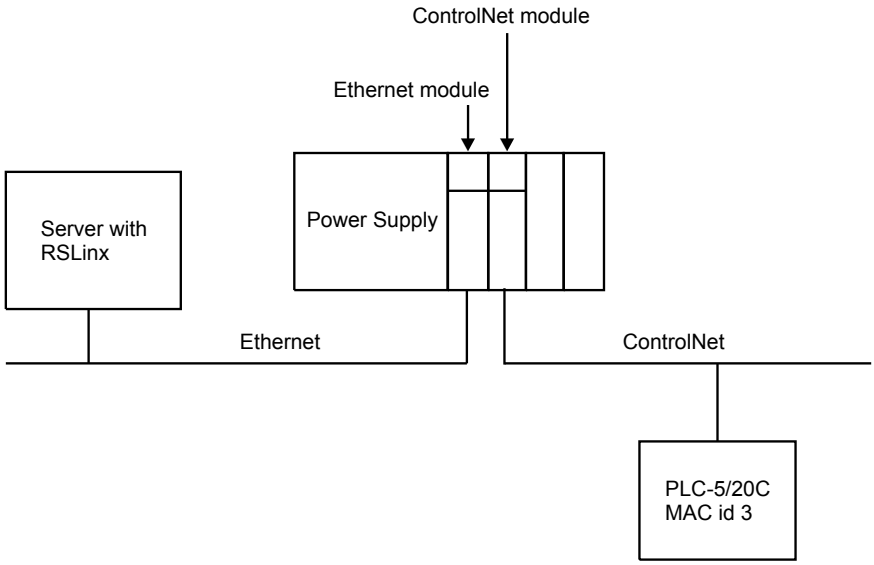

Figure 27: Ethernet to ControlNet connection example

Related topics

“Configuring PLC-5 for unsolicited messages” on page 26
“Main properties for an Allen-Bradley controller” on page 36

Defining a PLC-5 controller using base file number of files and offset

When defining a PLC-5 controller, the default entries are:

- Base File = *0*
- Offset = *0*
- Number of Files = *10*

Calculating address space for a PLC-5 controller definition

The address space size of a server controller is 32,766 words. This controller address space is divided evenly into the Number of Files (default is *10*) specified when configuring the controller. With the default Base File of 0 and Number of Files of 10 the server controller can address file 0 through to file 9 in the PLC-5 with 3,276 words in each PLC-5 file being addressable by the server controller.

The number of elements that the server controller can address within a certain PLC-5 file depends on the file type.

- If file 7 is an integer file, which has an element size of 1 word, the server controller can address 3,276 elements within this file.
- If file 8 is a floating point file, which has an element size of 2 words, the server controller can address 1,638 elements within this file.

The offset specifies the starting element number in each PLC-5 file that the server controller addresses.

If multiple controllers are configured on the same channel to address the same PLC-5, the range of PLC-5 files that each controller addresses must be mutually exclusive. Define controllers to look at different file ranges and element coverage by setting the base file, number of files, and offset values appropriately.

Related topics

“Main properties for an Allen-Bradley controller” on page 36

Optimizing Allen-Bradley scanning performance

An Allen-Bradley DH or DH+ scan packet can consist of up to 122 16-bit words. A DH485 packet can consist of up to 45 16-bit words.

An Allen-Bradley scan packet can be located anywhere along the full address range of the controller.

Two types of scan packets are built for an Allen-Bradley interface:

- Hardware diagnostic scan
- Periodic data acquisition scan

Attention
The server accepts unsolicited data from both PLC-5 and PLC-2.

To achieve satisfactory system performance, three configuration strategies are recommended:

- Lower scanning rates using unsolicited data
- Database organization
- Additional channels

Lower scanning rates using unsolicited data

Besides normal periodic data acquisition, the server accepts unsolicited data from PLC-5 and PLC-2 devices. By taking advantage of unsolicited data, you can reduce the rate of periodic scanning required. Unsolicited messages can be used for slow moving data and to notify of sudden changes in critical values.

When the server receives an unsolicited message, all point parameters referencing the address of the value contained in the message are updated with the new value. The data must be received as per normal Allen-Bradley message protocol. The application-layer message commands accepted by the server are:

- Typed write—valid for PLC-5 type devices
- Unprotected write—valid for PLC-2 type devices (or other devices in compatibility mode)
- Protected write—valid for PLC-2 type devices (or other devices in compatibility mode)

See Allen-Bradley programming manuals (for the relevant PLC type) for details on how to send unsolicited messages from the PLC. The *Installation Guide* describes how to configure unsolicited messages for a PLC-5. Additional information about configuring both PLC-2 and PLC-5 for unsolicited messages can be found in the *Allen-Bradley Programming Software Instruction Set Reference Manual* for the relevant PLC.

If using RSLinx, in order to receive unsolicited messages in a timely fashion you need to configure the RSLinx service to start when the server is switched on. That is, the service should be made automatic. Otherwise, if RSLinx is started as a foreground application it might slow message transfer from the PLC to the server scanning subsystem.

Database organization

The PLC database should be arranged so that the maximum number of points of the same scan frequency are packed together in discrete areas of PLC memory. In this way a block of words can be read quickly as the space available is maximized.

By organizing the database in a more efficient fashion, overall system performance can be enhanced.

Additional channels

Some systems can have more than one link to the Allen-Bradley Data Highway. This helps to alleviate any I/O bottlenecks that might occur on a single 1770-KF2 module.

If PLC-3 processors are being accessed through more than one 1770-KF2, compatibility files will have to be taken into consideration. A separate compatibility file must be used for the second and each subsequent 1770-KF2. See the topic titled "PLC-2 compatibility file."

PLC-2 compatibility file

A file that mimics the flat address space of the PLC/PLC-2.

The server can only interface with a PLC-3 through compatibility files. If a PLC-3 detects PLC/PLC-2 protocol for incoming messages, it operates through a compatibility file, mimicking the PLC/PLC-2 main memory, and returning responses using PLC/PLC-2 protocol.

The PLC-3 scrutinizes the incoming message and determines from which station it originated. Each message contains the ID of the originating station. Based on the station ID, the PLC-3 determines which compatibility file to use. For example, if the server request message originated through a 1770-KF2 module with octal station ID 30 then, for a PLC-3 input file, octal number 30 is used, giving the address I30.

If a PLC-3 is accessed through more than one 1770-KF2, a separate compatibility file must be used for the second and each subsequent 1770-KF2.

When using compatibility files, the PLC-3 software must map the file contents to and from the real I/O. You can configure your system in different ways depending on how much data is being transmitted and how much data space is needed.

Consult the Allen-Bradley programming documentation for the PLC-3 before creating compatibility files.

Allen-Bradley points reference

This section describes how to configure points for an Allen-Bradley controller using Quick Builder.

In addition to the information contained in this reference, and for help to build points, see the section titled "Building and configuring points" in the *Quick Builder User's Guide*.

Related topics

“Address syntax for Allen-Bradley controllers” on page 48
“Planning considerations for installing and configuring Allen-Bradley controllers” on page 5
“Testing Allen-Bradley communications with the server” on page 56

Address syntax for Allen-Bradley controllers

For source and destination addresses the format for an Allen-Bradley controller address is:

ControllerName Address

Part	Description
ControllerName	The name of the Allen-Bradley controller.
Address	The address in the controller where the value is recorded. The syntax depends on the Allen-Bradley controller type.

If you would like help with the address, you can use the Address Builder. To display the Address Builder, click ... next to **Address**.

Related topics

"Configuring tags on ControlLogix PLCs" on page 25

PLC, PLC-2, and PLC-3 addressing

The address syntax is:

OctalWord [*DataFormat*]

Part	Description
OctalWord	Octal word address for the PLC. For example, the address for a point referencing octal word 16 would be *16*.
DataFormat	(Optional) Data format. If you do not specify a data format, the default for PLC and PLC-2 points is U4095. See the section "Data format definitions" in the topic titled "PLC-5 and SLC 500 direct logical addressing" for more information.

Related topics

"PLC-5 and SLC 500 direct logical addressing" on page 48

PLC-5 and SLC 500 direct logical addressing

The PLC-5 and SLC 500 have a structured address space and cannot be defined as a memory location. Direct logical addressing lets you identify a bit number, an element, or a data file. The address format varies depending on the type of address.

Attention
Files of type Status require I/O addressing. For Status File addressing, see the section below titled "Status file addressing."

Address syntax for direct logical addressing:

Xf:*e.s/b* [*DataFormat*]

Part	Description	Go to
X	File type identifier	File types
f	File number	Default file numbers

Part	Description	Go to
e	Element number	Element numbers
s	Sub-element mnemonic	Sub-element numbers
b	Bit number	Bit numbers for timer, counter, or control address
DataFormat	(optional) Data format. If you do not specify a data format, the default for: • PLC-5 points is 0 (no data conversion or scaling) • PLC-5 floating point file variables is IEEEFP (no scaling)	Data format definitions

Delimiters

The file elements are separated using special delimiters:

- Colon (*:*) separates file and element numbers.
- Period (*.*) is used only with sub-element mnemonics in counter, timer, and control file types.
- Slash (*/*) separates bit numbers from element or sub element numbers.

File types

File Type	Description
B	bit
F	floating point (PLC-5 only)
N	integer
R	control
T	timer
DE	DE module
DEM	DE module (minimal)
C	counter
I	input
O	output
S	status
PD	PID

Default file numbers

File Number	Description
0	output
1	input
2	status
3	bit
4	timer
5	counter
6	control
7	integer

File Number	Description
8	floating point
9 to 999	for additional file storage
3 to 999	for PID file type

For file type DE or DEM the file number value must be the number of the first of the three files used to store the information from the DE Module. The controller must be configured to be able to access these three files.

Element numbers

Element No.	Number Format	File Type
0 to 37	octal	for PLC-5 I/O files
0 to 999	decimal	for all other file types

For an address of file type DE or DEM, the element number must represent a DE or DEM module channel respectively.

Element address:

- *F8:58* (addresses an element in a floating point file—element 58 of floating point file 8)
- *S:3* (addresses a word in a status file—element 3 of status file)

Sub-element mnemonic

Used with timer, counter, control, PD, or DE/DEM file types. Word addresses in timer, counter, and control files use the period delimiter and mnemonic according to the file type.

Attention
DE and DEM are available for PLC-5 but only DEM is available for SLC 500. For an explanation of DE and DEM file mnemonics and the parameters they represent, consult the ProSoft 3700 and 3750 DEM user manuals.

Sub-element mnemonic address:

- *DE30:3.PV* (addresses the PV of the 4th transmitter connected to the DE module)
- *T4:12.ACC* (addresses a word in a timer file—accumulated value of timer 12 in file 4)

Mnemonics by file type

T file	C file	R file	PD file	DE file	DEM file
ACC	ACC	LEN	ADDR1	CfgCount	CfgCount
PRE	PRE	POS	ADDR2	CfgDbAvl	CfgDbAvl
EN	CU	EN	BIAS	CfgDbUpd	CfgDbUpd
TT	CD	EV	CA	CfgMode	CfgMode
DN	DN	DN	CL	ColdJunct	ColdJunct
	OV	EM	CT	ConfigMismatch	ConfigMismatch
	UN	ER	DB	Damping	Damping
		UL	DBNA	ErrCount	FnDone
		IN	DO	FnDone	FnPassed

T file	C file	R file	PD file	DE file	DEM file
		FD	DVDB	FnPassed	Freq
			DVN	Freq	Function
			DVP	Function	LRL
			DVPA	LRL	LRV
			EN	LRV	MisColdJunct
			ERR	MisColdJunct	MisDamping
			EWD	MisDamping	MisDeConf
			INI	MisDeConf	MisFreq
			KD	MisFreq	MisLRV
			KI	MisLRV	MisNumPVs
			KP	MisNumPVs	MisOpenTherm
			MAXI	MisOpenTherm	MisPVChar
			MAXO	MisPVChar	MisPVNum
			MAXS	MisPVNum	MisSensor
			MINI	MisSensor	MisTagId
			MINO	MisTagId	MisURL
			MINS	MisURL	MisURV
			MO	MisURV	Name
			OLH	Name	NumberPVs
			OLL	NumberPVs	OpenTherm
			OUT	OpenTherm	PV
			PE	PV	PVBadFlag
			PV	PVBadFlag	PVchar
			PVDB	PVchar	PVCount
			PVH	PVCount	PVNumber
			PVHA	PVNumber	PVoutput
			PVL	PVoutput	Pvupdate
			PVLA	Pvupdate	Sensor
			PVT	RawPV	SpecialDB
			SO	Sensor	Status1
			SP	sfc_det	Status2
			SPOR	SpecialDB	Status3
			SWM	Status1	SV
			TIE	Status2	Svupdate
			UPD	Status3	URL
				SV	URV
				SVCount	
				Svupdate	
				URL	
				URV	

Bit numbers

Bit Number	Format	File Type
0 to 17	octal	I/O files
0 to 15	decimal	All file types other than I/O, including status
0 to 15, 999	decimal	(Optional) For bit type files when not specifying the element number

Attention
Bit addresses in timer, counter, or control files access only particular bit numbers or mnemonics. See the section below titled "Bit numbers for timer, counter, or control addresses."

Bit address:

- *N7:64/00* (bit address in integer file 7, element 64, bit 0)
- *B3:15/5* (bit address for bit 5, in word 15, of file number 3)
- *I:02/10* (I/O status bit for input file, word 2, bit 10 octal)

Bit numbers for timer, counter, or control addresses

Attention
Do not use any other bit numbers or mnemonics for timer, counter, or control addresses.

Bit No	Timer	Counter	Control
15	EN (enable)	CU (up enable	EN (enable)
14	TT (timing)	DC (down enable)	EU (unload enable)
13	DN (done)	DN (done)	DN (done)
12	-	OV (overflow)	EM (empty)
11	-	UN (underflow)	ER (error)
10	-	-	UN (unload)
09	-	-	IN (inhibit)
08	-	-	FD (found)

When using the general address syntax *xf*:*e.b* or *xf*:*e*/*b*

- *C5:8.CU* and *C5:8/15* are the same address.
- *C5:8.ACC/00* is a legitimate address.

Status file addressing

The format for status files addressing differs from the general format.

To address a status file:

- Address syntax for addressing a word:

  S:*e* [*DataFormat*]
- Address syntax for addressing a bit:

  S:*e*/*b* [*DataFormat*]

Part	Description
S	status
e	element number
b	bit number (0 to 15)
DataFormat	Data format

Data format definitions

Enter a format if you do not want to use the default format. The data format you select will depend what you want to do with the value:

- To scale
- To read raw value
- To configure a mode (2-bit integer or PD file only)

If you want to use a user-defined data format, you must define the format on the server. See the section titled "About user-defined data formats" in the *Server and Client Configuration Guide* for more information.

To scale

U and S range data format types are scaled by the point range values.

Format	Counts
U3BCD	0–999 BCD
U4BCD	0–9999 BCD
U6BCD acquisition only	0–999999
U8BCD	0–99999999
UBCD12	0–409 BCD
UBCD16	0–4095 BCD
U4095	0–4095
U999	0–999
U9998	0–9998
U9999	0–9999
U100	0–100
U1023	0–1023
S16B	-32768–32767
S8B	-128–127
S9999	-9999–9999
U8B	0–255
U14B	0–16383
U15B	0–32767
U16B	0–65535
U32B	0–4294967296
SLC_AI	3277–16384
SLC_AO	6242–31208

Formats and unreasonable limit alarms

The Allen-Bradley scan task masks data, hence there is no overflow or underflow. for example, if you use U4095 and the value is 4098, it shows up as 3 in the server. This implies that no unreasonable limit alarms will be generated for Allen-Bradley points.

To read raw value

Enter **IEEEFP** to read IEEE single precision floating point.

Enter **0** to read 16 bits (that is a number from 0 to 65,535).

If no scaling is done, the point range values are used for PV indicator display height only on the Point display.

To configure a mode (2-bit integer or PD file only)

Enter **MODE** to configure a mode for a mode parameter (MD) source or destination address.

For an integer file (N) address, 2 bits are accessed with the following meaning:

- 00 (Man)
- 01 (Auto)
- 10 (Case)

For a PD file address, a single bit is accessed with the following meaning:

- 1 (Auto)
- 0 (Man)

ControlLogix addressing

Attention
Bit level addressing is only supported for the N file type.

File Type	Description
N	integer (16-bit)
DN	double integer (32-bit)
F	floating point (32-bit)

Related topics

“PLC, PLC-2, and PLC-3 addressing” on page 48

Troubleshooting Allen-Bradley issues

This section describes troubleshooting tasks for Allen—Bradley that you can perform either on the server or from any Station.

Related topics

“Testing Allen-Bradley communications with the server” on page 56
“Troubleshooting Allen-Bradley communication errors” on page 57
“Troubleshooting Allen-Bradley point address errors” on page 58
“Viewing status data for PLC-5 and SLC 500 without configuring points” on page 59
“Viewing PD file configuration” on page 60
“Automatic status fault alarming” on page 61
“Viewing and modifying Smart Transmitter variables” on page 62

Testing Allen-Bradley communications with the server

You use the Allen-Bradley test utility, **abrtst**, to test communications between the server and the Allen-Bradley controller after you have downloaded channel and controller definitions to the server database.

Prerequisites

- Set up the controller.
- Connect all cables.
- Define the controller and channel in Quick Builder.
- Download the Quick Builder definitions to the server, without errors.
- Ensure the channel is out of service.

If there is a PLC or SLC Programming Terminal with the system, it should be used to ensure that the PLC or SLC is operating correctly.

To run the abrtst test utility

1. Open a Command Prompt window.
2. Type **abrtst** and then press Enter.
3. Follow the directions as prompted.
   For a list of possible commands and their syntax, type **?** and then press Enter.

Results

After you verify that the server is communicating with the Allen-Bradley controllers you can configure points. See the topic titled "Allen-Bradley points reference."

Related topics

“Planning considerations for installing and configuring Allen-Bradley controllers” on page 5
“Allen-Bradley points reference” on page 47

Troubleshooting Allen-Bradley communication errors

Check the server log file for errors.

Diagnostic check

C302 - Remote node does not acknowledge message

Cause

- PLC does not exist on DH/DH+.
- PLC disconnected.
- PLC not powered on or not functioning.

Solution

Verify that the ID defined for the PLC is correct.

Ensure that the PLC is on the DH/DH+ and is functioning.

Diagnostic check

C507 - File is wrong size

Cause

Point(s) addressing a nonexistent element in a file.

Solution

Check the PLC-5 or SLC 500 memory map for file sizes.

Check point address definitions for a mismatch.

Diagnostic check

Transaction time outs occur in log file.

Cause

The read timeout value is too low. Read timeout is the timeout between a request being made for data, and the request coming back to the PLC.

Solution

Specify a greater read timeout value for the channel.

Troubleshooting Allen-Bradley point address errors

The following error codes apply specifically to Allen-Bradley.

Error code	Description
8641	Verify that the data format (for a given file type) is a valid format.
C400 - Invalid A-B Address specification	Verify that your PLC-2 type address is in octal.
C401 - Invalid A-B number string	Verify that the correct decimal file number string follows file type.
C403 - Invalid A-B Bit number string	Verify that you have specified the bit number correctly (octal in I/O files and decimal for others).
C404 - Invalid A-B file number	Verify that the file number is within the file number range specified for the controller.
C405 - A-B file type redefinition	You have used the same file number previously, for a different file type. Deleting a point will not reset the file type specification of a file. It is necessary to delete the controller and add it again.
C406 - A-B file word address overflow	Your file word address has exceeded the maximum allowed address space for a file in the controller.
C407 - Invalid A-B element number	Verify that you have specified the element number correctly (octal for I/O files, decimal for others).
C408 - A-B Element number missing	You must specify an element number in the file for every address.

Viewing status data for PLC-5 and SLC 500 without configuring points

Without the need for any points to be defined, the server can read and display system status information for a configured PLC-5 or SLC 500 controller provided that the status file for the controller is within the address range of the server.

Status data belongs to a subset of the PLC-5 or SLC 500 processor status data held in the respective PLC-5 or SLC 500 status file and includes:

- Processor status and flags
- Major fault bits
- Fault code (for PLC-5 only)
- Minor fault bits
- Rack fault and rack queue full bits (for PLC-5 only)

To view status data

1. Run Station and either double-click the controller name or select the controller name and then click the Detail tool.

   A configuration menu for the controller is displayed.
2. Click the status menu item you want to view.

Related topics

“Automatic status fault alarming” on page 61
“Viewing PD file configuration” on page 60

Viewing PD file configuration

For each PD file to be scanned by the server, a single point referencing a single element is required.

Example

If a PLC-5 has a PD file within its addressing range with file number 12, to build a point to reference this file, the PV source address would be *PD12:0.PV*.

To display the PD file configuration information at a Station

1. From the Controller Reference Summary display on Station, either double-click the PLC-5 controller name, or select PLC-5 controller name and go to the Station toolbar and click the Details tool. The SCADA Controllers display appears showing the PLC-5 configuration menu.
2. Select the PD file you want to view.

Alternatively:

1. Call up the Point Detail display on Station for the PV of the PD file, then double-click the PV.
2. Use the SCADA Controllers display for the PD file to configure parameters in the PD file element. Note that while the PLC is in RUN mode, the following parameter cannot be changed:
   - PID equation
   - Maximum and minimum scaling
   - Derivative action

If faults are detected in more than one fault category, only one alarm is raised for the highest priority fault category, a lower priority fault alarm being replaced by a higher priority fault alarm in the next scan.

For this feature to be active, at least one controller must be built that includes the Allen-Bradley status file (file 2) in its range.

To find specific faults, see the topic titled "Viewing status data for PLC-5 and SLC 500 without configuring points."

Related topics

“Viewing status data for PLC-5 and SLC 500 without configuring points” on page 59

Automatic status fault alarming

Without the need for any points to be built, the server can generate status fault alarms for every configured PLC-5 and SLC 500 controller that has the respective PLC-5 or SLC 500 status file within its addressing range.

See the topic titled "Viewing status data for PLC-5 and SLC 500 without configuring points" for information about how to find specific faults.

Related topics

“Alarming for PLC-5 and SLC 500” on page 61

“Alarming for SLC 500” on page 61

“Viewing status data for PLC-5 and SLC 500 without configuring points” on page 59

Alarming for PLC-5 and SLC 500

The server periodically scans the PLC-5 for major and minor rack faults. The diagnostic scan period is 60 seconds.

If faults are detected in more than one fault category, only one alarm is raised per category. Also on the Controller Status page in Station, the word *MAJ*, *MIN*, or *RACK*, indicating major, minor or rack fault respectively, is shown as the controller status.

For this feature to be active, at least one controller must be built that includes the Allen-Bradley status file (file 2) in its range.

Alarming for SLC 500

The server periodically scans the SLC 500 for major and minor rack faults. The diagnostic scan period is 60 seconds.

Viewing and modifying Smart Transmitter variables

Using either the ProSoft DE Module (3700 DEM) or ProSoft DE Module (3750 DEM), you can monitor the value of Honeywell Smart Transmitter variables and configure their writable parameters.

For information about communications settings for the ProSoft 3700 or 3750 DEM, see the *ProSoft 3700/3750-DE User's Manual*.

Related topics

"Viewing DE/DEM parameters" on page 62
"Navigating DE/DEM parameters" on page 62
"Using a PLC-5 for Smart Transmitter access" on page 24
"Using an SLC 500 for Smart Transmitter access" on page 23

Viewing DE/DEM parameters

There are three ways to view the DE/DEM parameters:

- From the Station SCADA Controllers display, double-click the name of the controller.
- From the Station SCADA Controllers Details display, double-click the controller name.
- From a Station Point Detail display, double-click the point parameter that references a DE/DEM parameter.

The SCADA Controllers display will appear for the selected controller.

Attention
The update rate of the SCADA Controllers display is, by default, every five minutes. You can force an update by pressing the ESC key. Values are also updated when you modify any value using this display.

Navigating DE/DEM parameters

Item	Description
PAGE UP	Displays previous DE/DEM channel for same DE/DEM module.
PAGE DOWN	Displays next DE/DEM channel for same DE/DEM module.
Scroll arrow Up	Scrolls up one parameter.
Scroll arrow Down	Scrolls down one parameter.

To modify a value

Type a new value in any field that is writable (Tag Name, for example).

This will create a mismatch condition that is reflected by the display. Both the current value in the transmitter and the new value are displayed.

Attention
The downloading process downloads all values for the transmitter, not just the last changed value. To avoid changing more than the values you have just modified, always perform an upload of the transmitter data before you attempt any modifications. This will ensure that the only values changed in the transmitter data when you download are those you changed after the upload.

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How to report a security vulnerability

For the purpose of submission, a security vulnerability is defined as a software defect or weakness that can be exploited to reduce the operational or security capabilities of the software.

Honeywell investigates all reports of security vulnerabilities affecting Honeywell products and services.

To report a potential security vulnerability against any Honeywell product, please follow the instructions at:

https://honeywell.com/pages/vulnerabilityreporting.aspx

Submit the requested information to Honeywell using one of the following methods:

- Send an email to security@honeywell.com.

  or

- Contact your local Honeywell Process Solutions Customer Contact Center (CCC) or Honeywell Technical Assistance Center (TAC) listed in the “Support and other contacts” section of this document.

Support

For support, contact your local Honeywell Process Solutions Customer Contact Center (CCC). To find your local CCC visit the website, https://www.honeywellprocess.com/en-US/contact-us/customer-support-contacts/Pages/default.aspx.

Training classes

Honeywell holds technical training classes on Experion PKS. These classes are taught by experts in the field of process control systems. For more information about these classes, contact your Honeywell representative, or see http://www.automationcollege.com.

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