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MasterLogic-Experion Integration
User's Guide

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Notices and Trademarks

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About this document

This document describes how to integrate the MasterLogic 200R/200 IEC with Experion. The guide describes the installation, configuration, operations, and troubleshooting tasks associated with the MasterLogic PLC - Experion integration..

Intended Audience

The intended audiences for this guide include:

- Project Engineers
- Operators
- Service Engineers

Related documents

- For information about Experion, refer to Experion PDF Collection.
- For any changes in MLServer software, refer to *Experion Software Change Notice*.
- For information about PLC concepts and SoftMaster tool usage, see *ML200 CPU and SoftMaster User's Guide*.

How to use this guide

Here is a list of topics covered in this guide:

Topic
Introduction
Installation and removal of MLServer
Configuration of MLServer
Monitoring PLC status from Experion displays
Alarms and events
Maintenance and troubleshooting

Acronyms and Definitions

The following section describes some commonly used industry-wide and Honeywell-specific terminology:

Terminology	Description
MLServer	MasterLogic Server software which interfaces MasterLogic PLC with Experion.
MLPLC	MasterLogic Programmable Logic Controller.
MLGuard	A logging application which handles logs messages from all the components of MLServer.
MLGuard Launcher	A windows service which monitors the MLGuard application.
PLC	Programmable Logic Controller.
PV	Process variable parameter of a standard Point.
QDB	Quick Builder project file containing one or more Channels, Controllers and Points.
SM	SoftMaster PLC monitoring tool.
MLDP	MasterLogic Dedicated Protocol supported by MLPLC.
RTC	Real Time Clock data represents the current time in the PLC.
SP	Set point parameter for the Experion Analog point.
OP	Output parameter for the Experion Analog / Status point.
SCADA	Supervisory Control and Data Acquisition

Support and Other Contacts

https://www.honeywellprocess.com/en-US/contact-us/customer-support-contacts/Pages/default.aspx

Symbol Definitions

The following table lists the symbols used in this document to denote certain conditions:

Symbol	Definition
	**ATTENTION:** Identifies information that requires special consideration.
	**TIP:** Identifies advice or hints for the user, often in terms of performing a task.
	**REFERENCE -EXTERNAL:** Identifies an additional source of information outside of the bookset.
	**REFERENCE - INTERNAL:** Identifies an additional source of information within the bookset.
	**CAUTION:** Indicates a situation which, if not avoided, may result in work (data) on the system being damaged or lost, or may result in the inability to properly perform the process.
	**WARNING:** Indicates a potentially hazardous situation, which, if not avoided, could result in serious injury or death.

Contents

1. Introduction

1.1 Overview

MasterLogic PLC - Experion integration features

ATTENTION

- The term PLC used throughout this document refers to MasterLogic PLC.
- Client Station refers to Console/Flex Station for Experion.

The MasterLogic PLC-Experion integration solution unifies the MasterLogic PLCs with Experion. Experion integration gains special access to intricate areas of MasterLogic PLC through proprietary MLDP. The integration enables Experion to read/write PLC data and monitor PLC alarms and events from Experion Station.

The following are the features.

- Direct variables (%I Input image, %Q Output image, %M internal Memory variables)
- %R File Register variables (non-volatile memory variables – data retention)
- CPU, I/O module, communication Status and Alarms Flags (CPU error, Module error and so on)
- Real Time Clock (RTC) areas
- I/O Configuration parameters
- Sequence of events

The integration is achieved by connecting PLCs to Experion through FTE and mapping PLC data items to standard Experion Points as shown in the following figure.

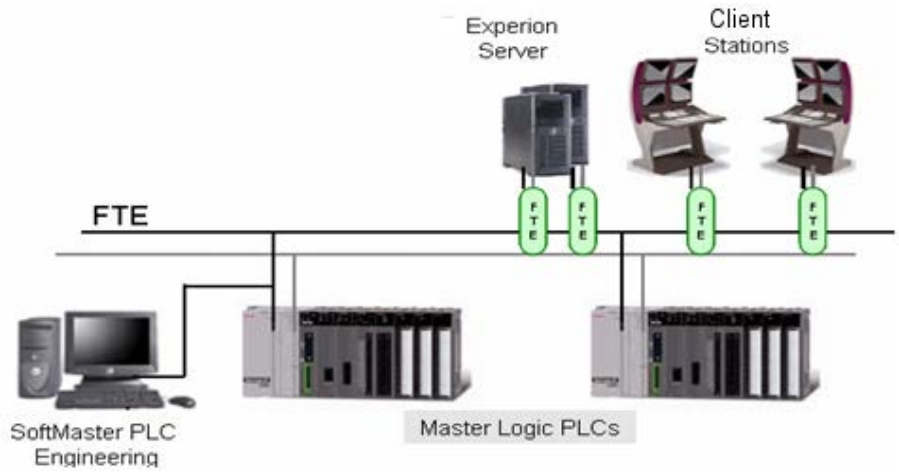


Figure 1.1-1: MasterLogic PLC - Experion Integration Architecture

ATTENTION

The MasterLogic PLC functions as a non-FTE node together with other FTE nodes on the network.

The following figure illustrates the software architecture of the MasterLogic PLC-Experion integration solution.

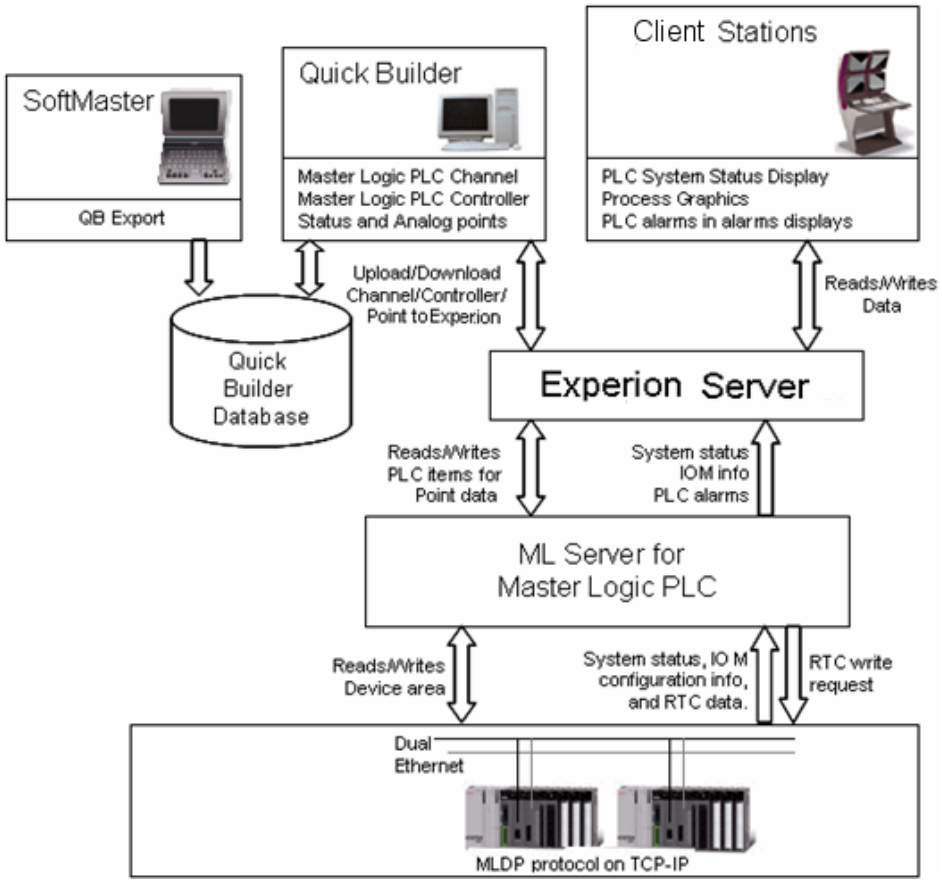


Figure 1.1-2: Components of MasterLogic PLC – Experion Integration solution

Features of MLServer

The following are MLServer features.

Single Channel

All the PLCs can be configured under single MLServer channel (same that of existing configuration). For example, if the site has 5 PLCs all the 5PLCs are assigned to single MLServer channel.

Multiple Channel
Each PLC can be configured under multiple channels. For example, if the site has 5 PLCs the 5PLCs can be assigned to individual MLServer channels. If any issue in one PLC, communication to that PLC might be affected as the same PLC is configured to individual channel. But, communication to other PLC's are not impacted.

ATTENTION

Honeywell recommends you to use multiple channel option.

- The maximum supported number of PLCs is 25.
- The maximum supported number of Channels is 15.
- The maximum supported number of MLServer points (OPC items) per PLC is 4050.
- The maximum supported number of MLServer points (OPC items) per Channel is 8050.

ATTENTION

If you are upgrading from previous MLServer software to latest MLServer, ensure to read Guidelines to configure MLServer and Quick Builder section before performing this procedure.

2. Installation and removal of MLServer

ATTENTION

MLServer interface is part of Experion media. The MLServer version, which is packaged with Experion media is not backward compatible with earlier versions of Experion. You cannot install/modify/uninstall MLServer alone since it is integrated with Experion R431. Refer to the *Experion Software Installation User's Guide* for installation and removal of MLServer interface component.

3. Configuration of MLServer

3.1 Overview

Configuring MLServer

To communicate with the PLCs, the MLServer must be configured with PLC information. This configuration involves the following tasks.

- Configuring MLServer and MLGuard using Configuration Tool
- Configuring SCADA points using Quick Builder

The following diagram depicts the configuration of MLServer:

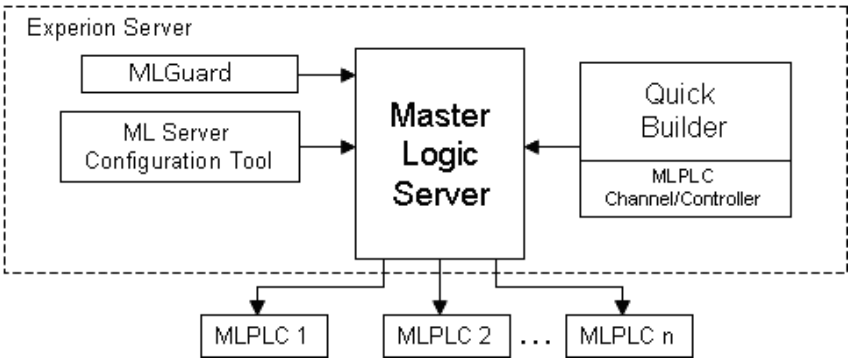


Figure 3.1-1: MasterLogic Server configuration

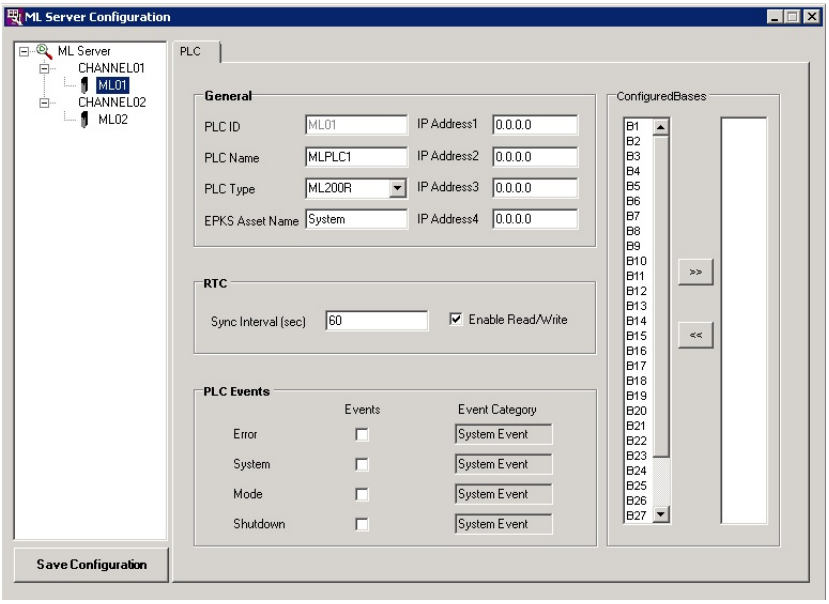
3.2 Configuring MLServer and MLGuard using Configuration Tool

The PLC information such as PLC Name, Id, Type, and IP Address must be configured for the MLServer using the MLServer Configuration Tool.

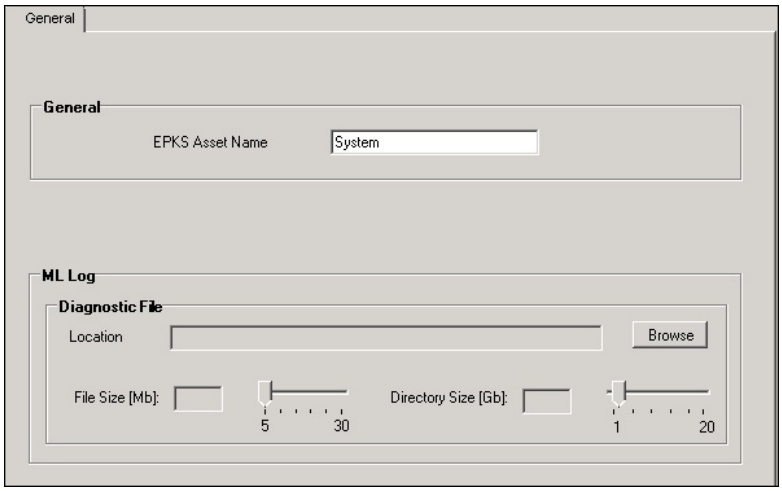
ATTENTION

- The configuration must be performed and saved in both primary and secondary server.
- Each time you open the tool to make changes to the configuration, you are prompted to enter the 'mngr' password.
- For all the configuration changes to reflect in the backup server, the replication of abstract folder and the database synchronization must be performed between the primary and backup servers.

To configure the MLServer general information, perform the following steps.

Step	Action
1	a) Click **Start** > **Programs** > **Honeywell Experion PKS** > **MLServer Configuration Tool**. b) If the **User Account Control** dialog box appears, click **Allow**/**Yes**. The **ML Server Configuration** dialog box appears.  **Note**: By default, Channel 01 assigned with ML01 and Channel 02 assigned with ML02.

Step	Action
2	In the left pane, click **ML Server**. The **General** tab appears.



3	Type the **EPKS Asset Name** for the general MLServer Alarms. All Alarms raised by the MLServer are available in this asset.
4	In **ML Log** under **Diagnostic File**, perform the following: a) Select the size for the log files. b) Select the size for the diagnostics directory.

ATTENTION

Ensure to have sufficient disk space before configuring the size for the diagnostic directory.

- The log folder location appears by default and it is recommended not to change the default location.
- You can specify the limit between 5 through 30 Mb (multiples of five) for log file size and 1 through 20 GB for diagnostics directory size.
- If the log file size exceeds beyond the specified limit, a new log file is created in the same location.
- If the size for the diagnostics directory exceeds the specified limit, older log files are removed.

Step	Action
5	To configure channel, • In the **ML Server Configuration** window, select the CHANNEL 01 from the left pane. The paranoid level has to be configured for each channel configured. The default paranoid level for a channel is 20. For more information about paranoid value refer to MasterLogic Server logs.
6	To configure PLC, • In the **ML Server Configuration** window, select the PLCID (ML01) from the left pane.
7	Type **PLC Name**. **ATTENTION** • The PLC Name is unique for each PLC. It is alphanumeric and there is no limit on the number of characters. • For each PLC, separate log entries are created in the log file based on PLC ID.
8	In the **PLC Type** list, select the PLC type.
9	Type **EPKS Asset Name**. **Note**: All the Alarms/Events raised by the MLServer are available in this asset.
10	Enter **IP Address1, IP Address2, IP Address3** and **IP Address4.** **Note:** **IP Address1-** Represents the IP address in Primary Network of CPUA (ML200R) or represents primary IP address of ML200IEC. **IP Address2-** Represents the IP address in secondary Network of CPUA (ML200R) or represents secondary IP address of ML200-IEC. **IP Address3-** Represents the IP address in Primary Network of CPUB (ML200R). **IP Address4-** Represents the IP address in secondary Network of CPUB (ML200R). The MLServer searches for a valid PLC connection in the following sequence: IP Address1, 2, 3 and 4.
11	Under **RTC**, perform the following to view the updated RTC time in Experion graphics display. Select **Enable Read/Write**.

Step	Action

ATTENTION

The PLC time must be synchronized with the Experion system time. The MLServer reads the PLC time and compares with the Experion system time, based on the settings in ML Server Configuration Tool. If there is a time difference, the PLC time is updated with the Experion system time. The RTC time read from the PLC appears in the **Config Info** graphics page.

Enable Read/Write	Select **Enable Read/Write** to allow the MLServer to read/write RTC time from/to PLC.
Sync Interval	Indicates the time frequency for reading the RTC time from the PLC. **Note:** If this value is zero then the RTC time is not read or written from/to the PLC.

12 If you want the events for the required PLC Log to be transferred to Experion server as Events, then select the **Events** check box.

13 The **Event Category** selection indicates the events to be transferred to Experion as events. The possible value is **System Event**.

ATTENTION

It is recommended not to change the default settings and values (except for the configured bases).You must contact Honeywell TAC before changing the default event settings.

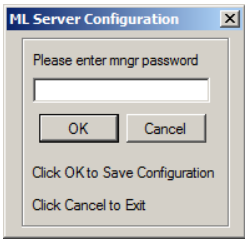
14 Under **Configured Bases**, select the available IO bases for each PLC.

Note: For ML200R, bases from 1 through 31 are available and for ML200IEC, bases 1 through 7 are available.

For example, to configure base, select Base2 from the left list and click >>. The Base2 appears on the right side of the list.

ATTENTION

IO base status is available in MLServer Station Display only if the bases are configured.

Step	Action
15	To add a channel or PLC, perform the following steps, • To add channel, right-click **ML Server** and then click **Add Channel**. A new channel is added to the tool. • To add a PLC, right-click the particular channel under which PLC is to be added and then click **Add PLC**. A new PLC is added under a channel. 
16	To delete a PLC or channel, perform the following steps. a) Right-click the **PLC ID** in the left pane and then click **Delete PLC**. A confirmation message appears. b) Click **Yes**. The selected PLC configuration information is deleted. c) Right-click the channel from the left pane and then click **Delete ML Channel**. A confirmation message appears. d) Click **Yes**. The selected channel is deleted. **ATTENTION** All the PLCs that are assigned to the channel are also deleted.
17	Click **Save Configuration**. **TIP** Each time you open the tool to make changes to the configuration, you are prompted to enter the 'mngr' password. 

Step	Action
	After the configuration is saved, a successful message appears.

ATTENTION

An error message appears for any configuration faults. Therefore, the point build also fails. The error details are available in the .out file. This file is created in the installation folder and the folder is mentioned in the error message. Refer to the error message, resolve the error and save the configuration again.

3.3 Configuring SCADA points using Quick Builder

Overview of Quick Builder components

The MLServer must be configured using the Quick Builder. The configuration involves the following tasks:

- Configuring the Quick Builder component manager
- Configuring a MasterLogic Channel
- Configuring a MasterLogic controller
- Configuring an Experion point

ATTENTION

ML_Sample.qdb is present in MasterLogic Server installation path at: \Honeywell\Experion PKS\MasterLogic Server.

Configuring the Quick Builder component manager

To enable configuring the MasterLogic Channel, MasterLogic Controller and Analog and Status Points in Quick Builder, the Quick Builder component manager must be configured.

To configure the Quick Builder component manager, perform the following steps.

Step	Action
1	Start **Configuration Studio**.
2	Click the **Control Strategy** tab and then click **Build Channels** under **SCADA Control**. The **Enable Components** dialog box appears. **Note**: The Enable Components dialog box appears only when you start Quick Builder for the first time.

Step	Action
	If the **Enable Components** dialog box does not appear, from the Quick Builder main window click **Tools** -> **Component Manager**.
3	Select Experion server from the **Server** drop-down list.
4	Click **Enable Components** tab and then click **UnSelect All**.
5	For Experion R431, select **MasterLogic** from **Device**.
6	Select **Analog Point** and **Status Point** from **Point** components.
7	Select **Server** from **Server** components.
8	Click **OK**.

Configuring a MasterLogic Channel

The MasterLogic Channel forms the interface between one or more MasterLogic Controllers and the MLServer.

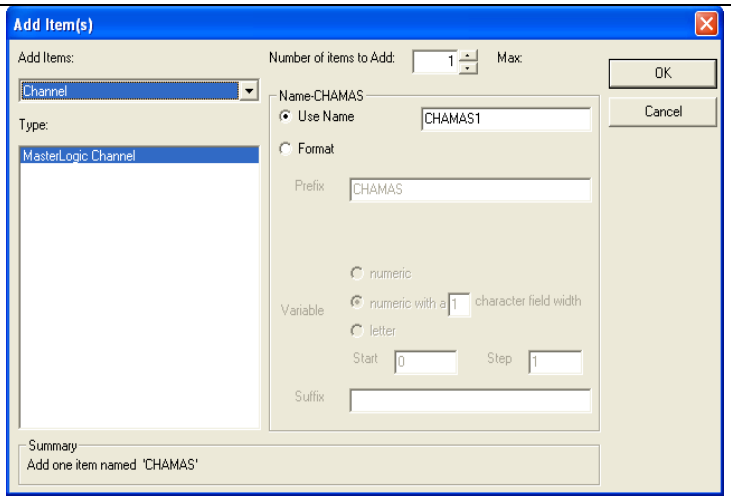
ATTENTION

All the PLCs can be configured under a single channel or under individual channel for each PLC. Honeywell recommends you to configure each PLC under individual channel.

To configure the MasterLogic Channel, perform the following steps.

Step	Action
1	Start **Quick Builder** from **Configuration Studio**.
2	Right-click the **Channel** icon from the right pane of the Quick Builder window and then click **Add Item**.  The following dialog box appears.

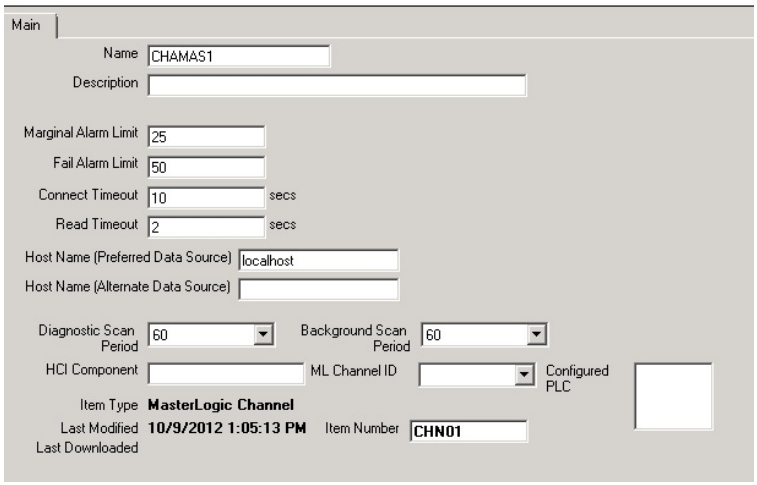
Step	Action



3 Select **Channel** and **MasterLogic Channel** type in the **Add Item(s)** dialog box.

4 Select **Channels** icon from the left pane of the Quick Builder window. From the right pane, select the channel that you want to configure.

5 To configure the **Main** tab of the channel, ensure that the **Host Name** contains **localhost**.



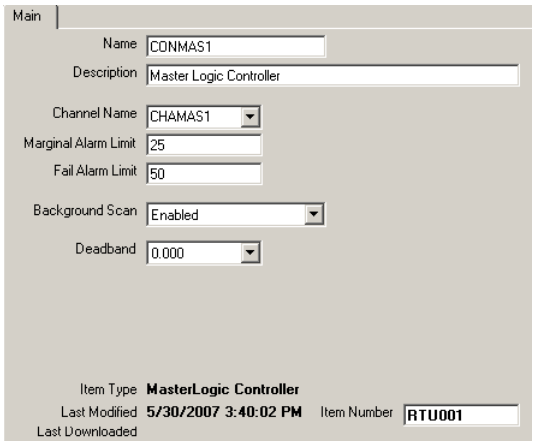
Step	Action
	ATTENTION • The **Channel Background Scan** period is used in association with the **Controller's Background Scan** parameter. It is recommended not to change the default value (60). • It is recommended to have Connect Timeout of 40 seconds for each channel. • If the Background Scan Period is lesser than PV/OP/SP Scan Period (points), then MLServer does not function properly.
6	Select the channel that has been configured in the **ML Server Configuration Tool** from the **ML Channel ID** dropdown list.
	ATTENTION • Ensure that the **Item Number** for the channel configured is unique. • If the number of ML channels configured in the Experion server is more than 5 or the number of ML controllers configured is more than 20, then increase the "Read Timeout" parameter to 3 seconds. • If ML Channel ID is configured, the respective PLCs that are assigned to that channel are listed on the right side.
7	Click to download the channel configuration to server. The channel gets downloaded successfully.

Configuring a MasterLogic controller

The Master Logic controller in Quick Builder is only a logical grouping of SCADA points and it does not represent a physical PLC controller.

To configure the MasterLogic controller, perform the following steps:

Step	Action
1	Create a new project in Quick Builder.
2	Add a MasterLogic Channel to the project.
	REFERENCE – INTERNAL For more details on adding a MasterLogic Channel, see Configuring a MasterLogic Channel.

Step	Action
3	Right-click the **Controller** icon from the right-pane of the Quick Builder window and select **Add Item**. The **Add Item(s)** dialog box appears:
4	Select **Controller** and **MasterLogic Controller** in the **Add Item(s)** dialog box.
5	Select the **Controllers** icon from the left-pane of the Quick Builder window. From the right pane, select the controller that you want to configure.
6	Configure the **Main** tab of the controller as shown in the following figure. 
7	Select the appropriate Channel from **Channel Name** list.
8	Select **Enabled** from **Background Scan** drop-down list.
9	Select deadband value from **Deadband** drop-down list. **Note:** This deadband applies to all items referenced by Point parameters belonging to this controller. The unit of measurement is %.
10	Click  to download to server. The controller gets downloaded successfully.

Configuring an Experion point (Analog and Status point)

Analog and Status points are used for exchanging the MasterLogic data with Experion. The Quick Builder point parameter represents a mapping to an item on the MLServer.

Configuring the **Status Point** is similar to configuring an **Analog Point**. While creating a point, select the **Status Point** instead of **Analog Point**. Configuring address format is also same that of **Analog Point** except data type.
The following is the format of MLServer points (OPC items) configuration <Controller name> <PLC ID>.%<Memory area><Data type><Address>$<Command type>.

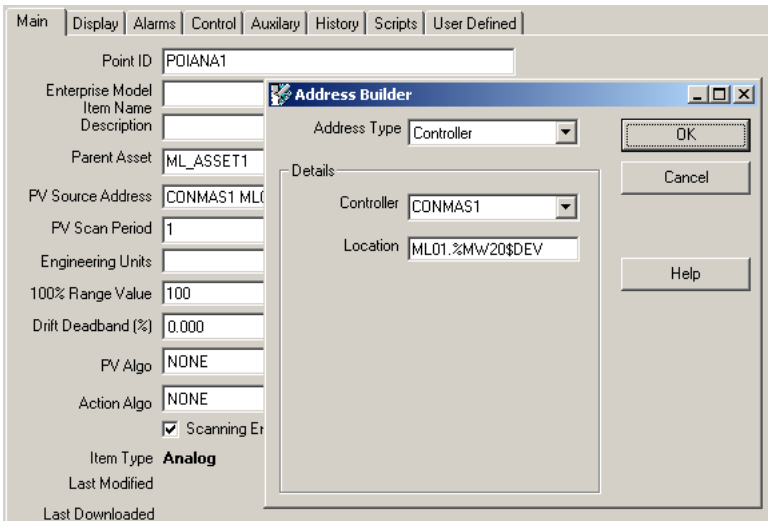
Example of Analog point: CONMAS1 ML01.%M**W**100$CON
Example of Status point: CONMAS1 ML01.%M**X**100$CON

To configure an Experion Point

The following procedure is only for Analog Point. The procedure for configuring Status Point is same as Analog Point.

Step	Action
1	Create a new project in Quick Builder.
2	Add a MasterLogic Channel and one (or more) MasterLogic Controller (s) corresponding to each PLC configured in the Plant.
3	Right-click the **Point** icon from the right-pane of the Quick Builder window and select **Add Item**. The **Add Item(s)** dialog box appears.
4	Select **Point** and **Analog Point** type in the **Add Item(s)** dialog box.
5	Select the **Points** icon from the left-pane of the Quick Builder window. From the right pane, select the point that you want to configure.
6	Configure the **Main** tab as follows:

Step	Action



7 Enter the **Parent Asset** for the point. All Alarms/Events raised by Experion (value change Events, Range checking Alarms, and so on.) is in this Asset.

8 Click the ellipse button next to **PV Source Address**.

The **Address Builder** dialog box appears.

9 a) Select **Controller** from **Address Type** drop-down list and appropriate controller name from **Controller** drop-down list.

b) Enter MLServer points (OPC items) with required format in **Location.**

REFERENCE – INTERNAL

- For more details on PLC Point name, refer to PLC Point configuration details.
- For more details on user-defined data format, see Defining data formats.

WARNING

If the user defined data format is configured in ML SCADA points but not defined in Experion, then the entire item is not recognized by the MLServer.

10 Select **PV Scan Period**.

Step	Action
	ATTENTION • To read data from PLC use **Source Address**. – Ensure **Scan Period** is selected when source address is configured. – **Scan Period** must not be equal to 0. The MLServer point (OPC item) cannot be scanned if scan period is configured as zero for any source address (PV, SP, or OP). • To write data to PLC use **Dest Address**.
11	Click  to download to server.

PLC Point configuration details

The PLC Point name configured in Quick Builder provides a way of addressing the location in PLC where the values are stored. The PLC Point name specifies the PLC ID, memory address, the command to be executed, and the data type. For example, **ML01.%MW95$CON**. The PLC Point name entered in the **Source Address** of Quick Builder for the Analog/Status Points is used for reading PLC data. The PLC Point name entered in the **Dest Address** is used for writing data into the PLC.

ATTENTION

Each memory address configured in SCADA point parameter is considered as one tag for MLServer.

For example: If an Analog SCADA point is named POIANA1 considering the following:

- PV is configured to ML01.%MW95$CON
- SP is configured to ML01.%RW100$CON

Both the memory address is considered as two MLServer points (OPC items).

After downloading standard Points to Experion, enable the Channel, Controller and Points from the Experion Station. This triggers the connections of the MLServer based on the configured channel, controllers and Points. The MLServer starts reading from or writing into PLCs using the commands embedded in the PLC Point name.

Supported memory areas

This section describes the various PLC Point name formats supported in ML200 IEC, ML200R and the commands used for reading or writing PLC information.

The following table lists the different memory areas supported in ML200R and its associated data type, range and read/write property:

Table 3.3-1: Memory areas supported in ML200R

Memory Area	BIT	BYTE	WORD	DWORD	LWORD	INT	DINT	LI NT	Range		Readable/ Writable
									Low	High	
I	✓	✓	✓	✓	✓	×	×	×	00.00.00	127.15.63	R
Q	✓	✓	✓	✓	✓	×	×	×	00.00.00	127.15.63	R/W
M	✓	✓	✓	✓	✓	×	×	×	00000	131071F	R/W
L	✓	✓	✓	✓	✓	✓	✓	✓	00000	11263F	R/W
F	✓	✓	✓	✓	✓	✓	✓	✓	00000	2047F	R
R	×	×	✓	✓	✓	✓	✓	✓	00000	32767	R/W
U	✓	×	✓	✓	✓	✓	✓	✓	00.00.00 0	31.15.511	R/W
W	×	×	✓	✓	✓	✓	✓	✓	00000	65535	R/W

The following table lists the different memory areas supported in ML200-IEC and its associated data type, range and read/write property:

Table 3.3-2: Memory areas supported in ML200-IEC

Memory Area	BIT	BYTE	WORD	DWORD	LWORD	INT	DINT	LI NT	Range		Readable/ Writable
									Low	High	
I	✓	✓	✓	✓	✓	×	×	×	00.00.00	127.15.63	R
Q	✓	✓	✓	✓	✓	×	×	×	00.00.00	127.15.63	R/W
M	✓	✓	✓	✓	✓	×	×	×	00000	131071F	R/W
L	✓	✓	✓	✓	✓	✓	✓	✓	00000	11263F	R/W
F	✓	✓	✓	✓	✓	✓	✓	✓	00000	2047F	R
R	×	×	✓	✓	✓	✓	✓	✓	00000	32767	R/W
U	✓	×	✓	✓	✓	✓	✓	✓	00.00.0	3F.31.F	R/W
W	×	×	✓	✓	✓	✓	✓	✓	00000	65535	R/W

Note: The R and W memory areas refer to the same storage locations for the first 32767 words. For example, %RW10 and %WW10 is referring to the same PLC memory address and therefore always have the same value.

The following table lists the various commands supported in ML200/ML200R:

Table 3.3-3: Commands supported in ML200R/ML200-IEC

Commands	Read	Write	Remarks
CON	Continuous Read command If the PLC Point name **ML01.%MW002$CON** and **ML01.%MW\K004$CON#REAL** are passed for read, a single **Continuous Read** command is used for reading the 2nd and 4th **Word** of **M** memory area from PLC **01**.	Continuous Write command If value is written to a Point's parameter that is configured as **ML01.%MW002$CON** and **ML01.%MW004$CON#REAL** a single **Continuous Write** command is used for writing the 2nd and 4th **Word** of **M** memory area in PLC **01**.	**Advantages:** 1) Useful when contiguous memory addresses must be read from the PLC. Up to 1400 bytes can be read / written in a single packet. However, multiple CON packets can be created serving more number of points. 2) This is the recommended method for ML200 when some continuous memory locations must be read from PLC. **Disadvantages:** This command is not useful when a number of variables must be read, where: • The addresses are not contiguous. Or • Belongs to different memory areas.
DEV	Device Area Read If the PLC Point name **ML01.%MW95$DEV** is passed for read, the **Device Area Read** command is used for reading the **95th Word** of **M** memory area from PLC **01**.	Device Area Write If value is written to a Point's parameter that is configured as **ML01.%MW95$DEV**, the **Device Area Write** command is used for writing the **95th Word** of **M** memory area in PLC **01**.	**Advantages:** This command is useful for reading/writing a few variables from/to different memory areas of the PLC. It reads/writes up to 80 variables in a single packet. However, multiple DEV packets can be created serving more number of points.

Commands	Read	Write	Remarks
	Device area read is also used to configure DISOE module points. For example, ML01.U1.0.0$DEV #BIT@SOE. Here, device area read is used for reading 1st bit of U1.0.0 word.		**Disadvantages:** It is not useful for a larger number of variables. (For example: 500 variables.)

Note: A single **Continuous Read/Write** command is used for reading or writing data together for multiple addresses within the same memory area.

TIP

It is recommended to use the commands in the following order.

a) **CON**: This command is recommended to be used for all PLC memory area except %**U** memory.

b) **DEV**: This command must be used for %**U** memory area.

Direct Variable

The following figure depicts the Direct Variable format:

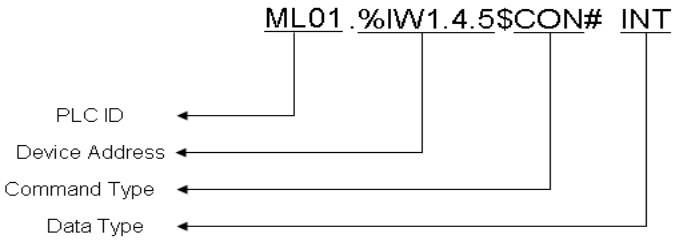


Figure 3.3-1: Direct Variable

- **PLCID**: This refers to the PLC. It is a two digit number ranging from 01 through 99 and always prefixed by ML. This must be configured in MLServer Configuration Tool.

- **MemoryAddress**: This refers to the address within the PLC memory area where information is stored.

Format: %<MemoryArea><DataType><Offset>

  - In ML200-IEC, for I and Q memory areas <Offset> are <Base>.<Slot>.<Position>. For other areas, it represents the address within the memory area.

REFERENCE – INTERNAL

For more details on memory areas supported in ML200R, see Table 3.3-1.

For more details on memory areas supported in ML200-IEC, see Table 3.3-2.

- **Command Type:** This refers to the different commands used for reading/writing data from/to PLC by MLServer. For more details on command types, see Table 3.3-3.
- **Data Type:** This refers to the PLC data type.

ATTENTION

Only the following combinations of data types can be used in a Direct Variable.

Data type in Memory Address	**Data type at the end of the PLC point name** (after #)
X	BIT
B	BYTE
W	WORD and INT
D	DWORD, DINT and REAL
L	LWORD, LINT and LREAL

The request is sent to PLC with the data types configured in the memory address part (that is X, B, W, D and L) of the PLC point name. After receiving the responses, the MLServer converts it to the data type configured after #.

If no data type is configured in the PLC point name (that is no # part), by default the corresponding basic data type is used by the MLServer. For example, if the PLC point is configured as ML01.%MW90$CON then it is assumed as ML01.%MW90$CON#WORD.

The following table contains a list of examples for Direct Variable.

Table 3.3-4: Examples of Direct Variable

Direct Variable	
Examples	• **ML01.%MB105$CON** – This denotes the 1st Byte of the 53rd Word in the Internal memory area of PLC ML01. Continuous Read / Write is used for communication with PLC.
	• **ML01.%IW2.3.1$CON#INT** – This denotes the 1st word in 3rd slot of Base2 in the Input memory area of PLC ML01. Continuous command is used for getting values from the PLC. The data is converted by MLServer and available as a signed integer value on the Experion side.
	• **ML01.%RD80$CON#REAL** – This denotes the 80th double word (that is 160th and 161st words) in R memory area of PLC ML01. The Continuous command is used for communication with the PLC. The data is converted by MLServer and available as a decimal (or REAL) value on the Experion side.

Defining data formats

Data formats are defined for converting PLC field values into engineering values. Experion provides default data formats for converting these field values. You also can define customized data formats.

To create a customized data format, perform the following:

TIP

The following is a sample procedure which explains how to create a user-defined data format.

Step	Action
1	Go to **System Configuration** menu from the Experion Station.
2	Select **User-Defined Data Formats** in **Application Development.**
3	Click an empty data format row.
4	Enter data format name in **Name**.
5	Select data type from **Data Type** drop-down list. For Example INT2.

Step	Action
6	Enter the minimum and maximum field values in **Minimum** and **Maximum.** For Example 0 and 16000 respectively.
7	Enter **Field value** and corresponding **Converted value** for **Point 1** and **Point 2** to define the conversion. For Example 0 and 1000 respectively. Example: If the field value is 8000, the corresponding converted value must be 500.

ATTENTION

While configuring the Points in Quick Builder,

If 100% Range value is…	Converted value ranges from…
1000	0 to 1000
100	0 to 100

3.4 Verifying the configuration

After downloading Points to the Experion, enable the Channel and Controller from the Experion Station**.**

To enable the ML Channel through Channel Summary page, perform the following steps.

Step	Action
1	Open the Experion Station.
2	Click **View > System Status > Channels**. The Channel Summary page appears.
3	Select the check box corresponding to the Channel to enable it.

ATTENTION

The Channel status OK corresponds to the communication status between MLServer and Experion server (OPC Communication). It does not correspond to the communication with PLC. If communication is lost with PLC, the alarm for corresponding IP is raised and all the point status is in inverted state.

After enabling the Channel and Controller, the following events occur.

- The MasterLogic server starts communicating with the PLCs using the configuration information from the Experion server database. A connection is established with the MLServer based on the Channel configuration.
- MLServer establishes communication with the PLCs using the IP Address & other PLC specific details configured using the configuration tool.
- The MLServer reads data from the PLC and transfers the values to the corresponding parameters in Experion Points. The data values written into these parameters are written into the appropriate memory locations in the PLC.
- Based on the status of the PLCs, the alarms/events are raised by the MLServer, in the Experion.
- The data, alarms raised by the PLCs and change of event in the PLCs can be monitored from the Experion Station.

Verifying data exchange between PLC and Experion

The Point Detail display in the Experion Station helps in monitoring the online status of each parameter for a particular Point and the data exchange between the PLC and the Experion server.

- The parameter values set in the Point Detail display reflects in the Address monitoring window of the SoftMaster tool.
- The parameter values set in the Address monitoring window reflects in the Experion station.

The following procedure is an example to verify data exchange between the PLC and the Experion.

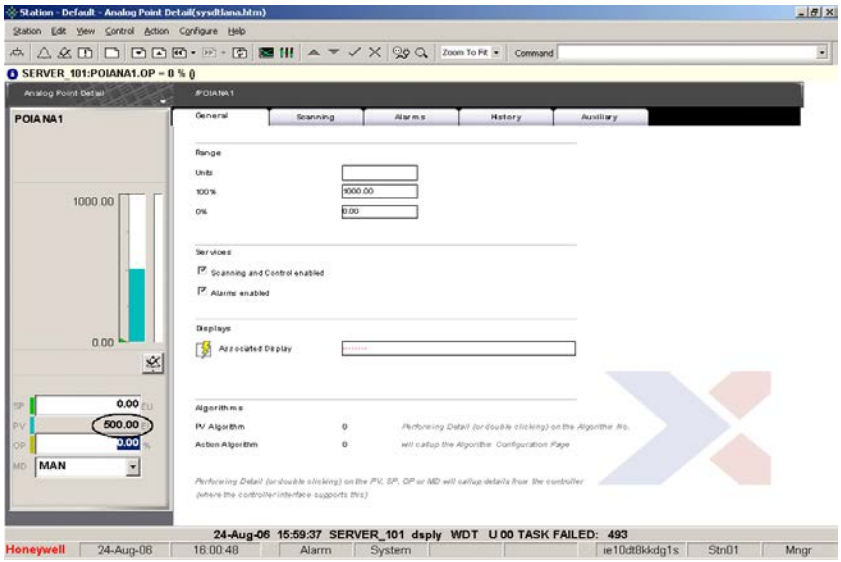
Step	Action
1	Configure the PLC information using the ML Server Configuration Tool.
2	Configure the MasterLogic Channel, MasterLogic Controller, Status and Analog Point in the Quick Builder and download to the Experion Server. **Note:** Consider a standard Analog Experion Point configured in Quick Builder as follows: • PV source address as **ML01.%MW10$DEV ML16K** • SP source and destination address as **ML01.%MW80$DEV ML16K** The user-defined data format **ML16K** is used here to convert between the field value (0 to 16000) and the engineering value (0 to 1000).
3	Download the MasterLogic Channel, MasterLogic Controller and Point to the Experion Server.
4	Enable the Channel from the **Channel Summary** page in the **Station**.

Step	Action

- The MasterLogic Server starts communicating with the PLC using the configuration information.
- The MasterLogic Server reads data from the PLC and transfers the values to the corresponding parameters in Experion Points. The data values written into these parameters are written into the appropriate memory locations in the PLC.

In the **Address Monitoring** window of the SoftMaster tool, assume that the data value stored in the 10th word of M memory area is 8000.

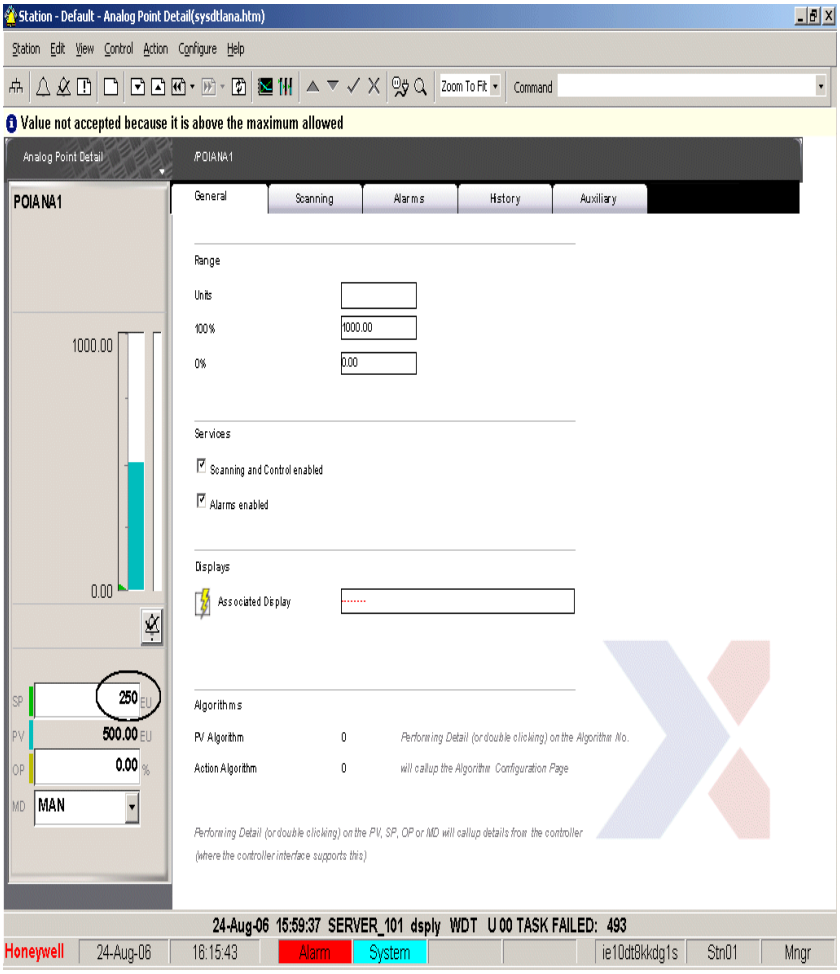
The raw value (8000) is converted to the engineering value (500) because of the ML16K data format and updated in the PV parameter. This value appears in the **Station** as shown in the following figure.



5 In **Address Monitoring** window of the SoftMaster tool, change the value of 10th Word of M memory area to 12000.

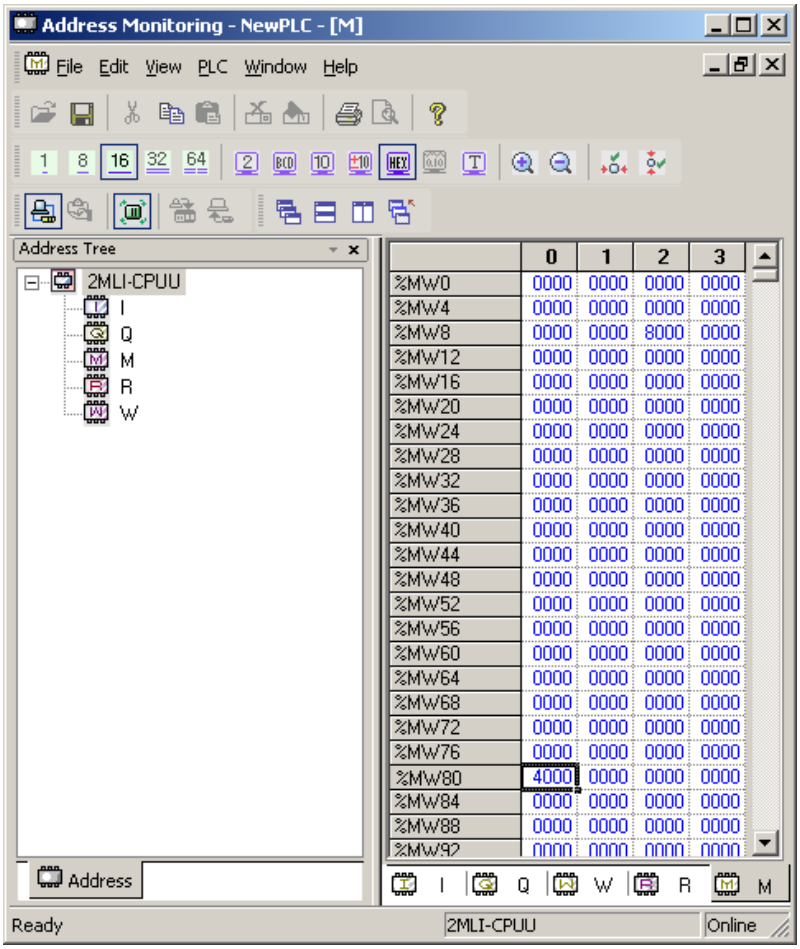
The raw value (12000) is converted to the engineering value (750) because of the ML16K data format and updated in the PV parameter. This value is displayed in the **Station**.

Step	Action
6	Set a value 250 to SP parameter in the Station as shown in the following image.



Step	Action

The engineering value (250) is converted to the raw value (4000) and updated in the %MW80 memory location. This can be observed in the Address Monitoring window of the SoftMaster tool as shown in the following figure.



4. Monitoring PLC status from Experion displays

4.1 Experion displays

The Experion standard Station displays and the system displays are used for monitoring the PLC status.

The following are the Experion standard Station displays.

- Channel Summary page
- Point Detail display

The following is the Experion system display.

- PLC System Status display

ATTENTION

Ensure that the IO bases are configured in ML Server Configuration Tool to view the bases in displays.

4.2 Using Experion system displays

The PLC information appears in the Experion Station using system displays.

For using displays in Experion R431, perform the following steps:

Step	Action
1	Start Configuration Studio.
2	Go to Stations and Consoles.
3	Select Configure server wide station settings.
4	On the **Security** tab, ensure **Disable writes via the Network API** is not selected.

The following are the two tabs available in the system displays used for viewing the PLC information:

Tab name	File name	Description
Config Info	MLPLC_Config.htm	This page displays the basic PLC information and diagrammatic representation of the modules with base/slot information.

Driver Info	MLPLC_Driver.htm	This page displays the MLServer interface driver diagnostics information.

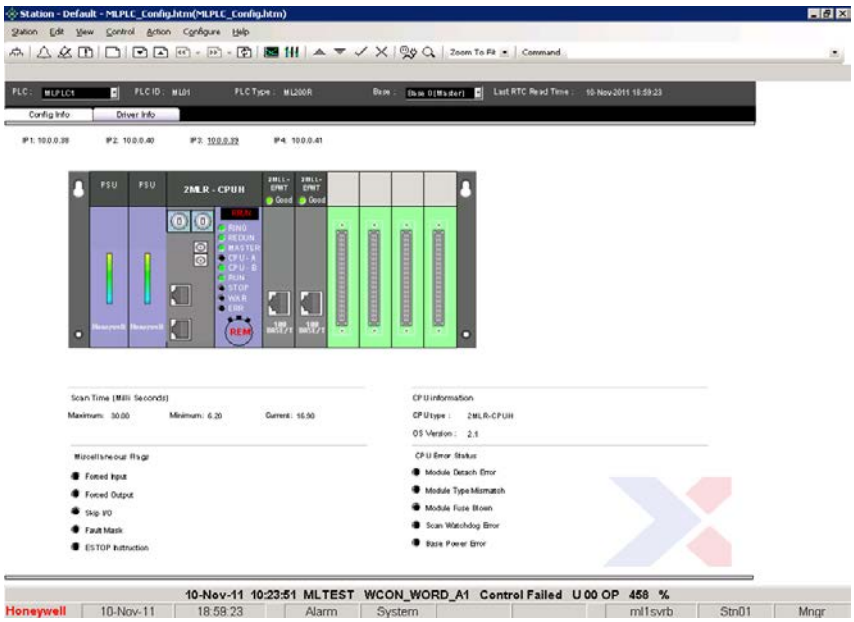
Config Info

The **Config Info** page is used for monitoring the base slot information of each PLC and the status of the communication between the PLC and the Experion server.

ATTENTION

The PLC information such as PLC Name, PLC ID, PLC Type, Base number, Last RTC time, and diagrammatic representation of the modules with base/slot information appears in the **Config Info** page.

To view the general PLC and base/slot information in the Experion station, perform the following steps.

Step	Action
1	In the **Command** zone of Experion station, enter **`MLPLC_config.htm`** and press **Enter**. The following page appears for ML 200R. 

Step	Action
2	Select the name of a PLC from the **PLC** drop-down list. The PLCIDs of the channels that are enabled are only listed. • The PLC ID, PLC Type, Base, IP Addresses and Last RTC Read Time are displayed. **Note:** All the fields in the page (except the **PLC Name** and **Base Number)** are not editable. The **IP Address** indicated in underline is the active IP Address.
3	To view the status of IO base, select the **Base number** from the **Base** drop list. **Note:** Base zero is selected by default.

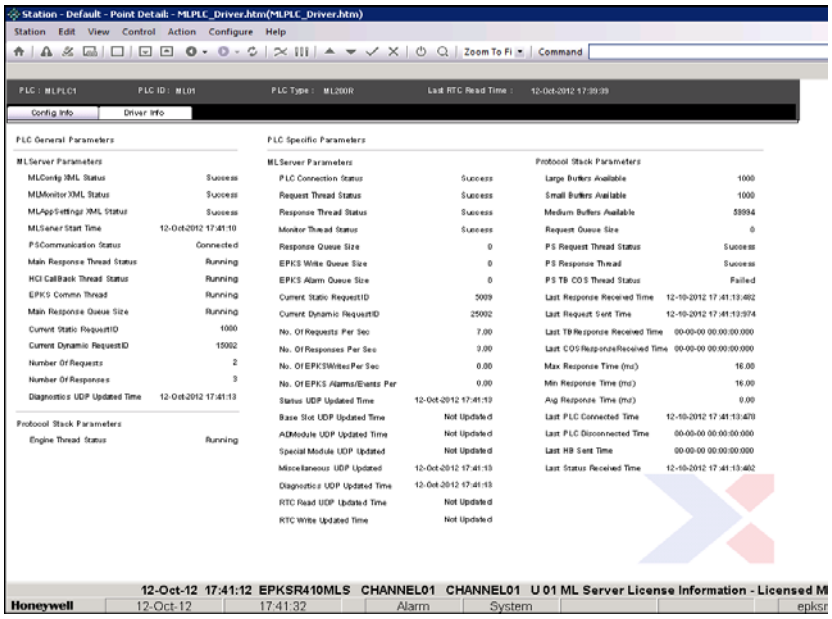
Driver Info

The MLServer diagnostic parameter information appears in the **Driver Info** page. This page is used for viewing the status of communication between the MLServer, PLC, and the Experion.

To view the MLServer diagnostics information, perform the following steps.

Step	Action
1	Open **MLPLC_Config.htm** from the Experion Station and select the PLC for which you want to view the Driver Diagnostics information. See Config Info for detailed procedure.

Step	Action
2	Select **Driver info** tab. The following page appears.



The details which appear in **Driver Info** are for troubleshooting purposes.

ATTENTION

The option of selecting another PLC is not available in **Driver Info** page. To view another PLC's driver diagnostics, select a PLC name from **Config Info** page and click **Driver Info** tab.

4.3 Bad quality items

Experion Point parameters are configured in Quick Builder with PLC Points for data exchange between PLC and Experion. The quality of the Experion Point parameter indicates the status of the data in PLC or the data communication with Experion.

MasterLogic-Experion integration enables the monitoring of analog input signal failures such as transmitter failure or disconnection of input signal. All channels of all analog input modules are constantly monitored for input signal failure. If the input signal fails, all Experion points configured for this input channel is set to BADPV status for safer control of the plant.

The BADPV setting is applicable for the following modules:

- 2MLF-AV8A
- 2MLF-AC8A
- 2MLF-AD8A
- 2MLF-AD16A

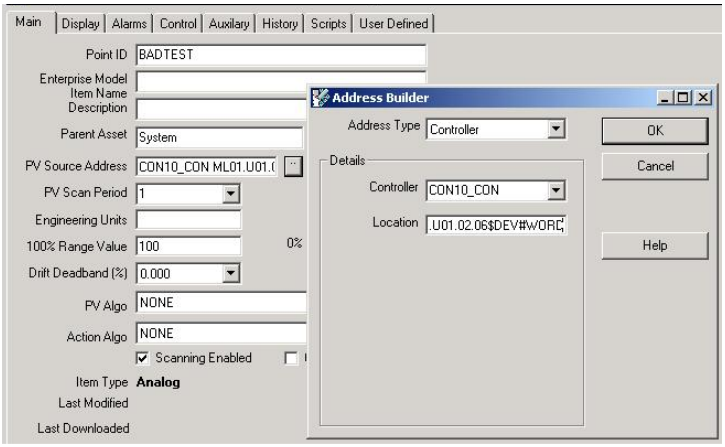
The following explains the two ways of setting quality for the Point parameter:

- Setting quality for Channel disconnection in the field.
- Setting quality for the item based on the PLC Read command responses.

Viewing bad quality item in Point Detail display

To view the bad quality for Analog Input modules data in the Point Detail display, perform the following steps:

Step	Action
1	Ensure that the channel of Analog Input module is enabled in the IO parameter in SoftMaster.
2	Configure a PLC Point as ML01.U01.02.06 in Quick Builder and download to the Experion server.



Note: The PLC point must be configured with U01.02.06, where 01is Base No1, 02 is Slot no 2, and 06 for Channel no 4. This can be identified from the Global variable in SoftMaster.

ATTENTION

Ensure to follow the following format.

ML01.U01.03.06$DEV#WORD

Step	Action
3	Enable the Channel containing the configured PLC Point.
4	Connect the input signal to Channel 4 (first Channel is 0) of the IO Module. • View the status of the data communication in the Station display.
5	Disconnect the input signal from Channel 4. • View the status of the data communication in the Station display. **Note:** The previous example is for Channel 4. If you want to test with a different channel in the IO module, ensure that the data item configured in Experion is also changed appropriately. • Alarm is raised corresponding to the disconnected channel with Base number and Slot number.

5. Alarms and events

5.1 Types of alarms and events

The following are the two types of Alarms raised by the MLServer:

- **PLC Status diagnostics Alarms** – These alarms are raised based on the current PLC Status.
- **Error indicating Alarms** – Any abnormalities from PLC, it is raised as an alarm by MLServer into Experion System alarm summary.

The PLCs record the following four different types of events:

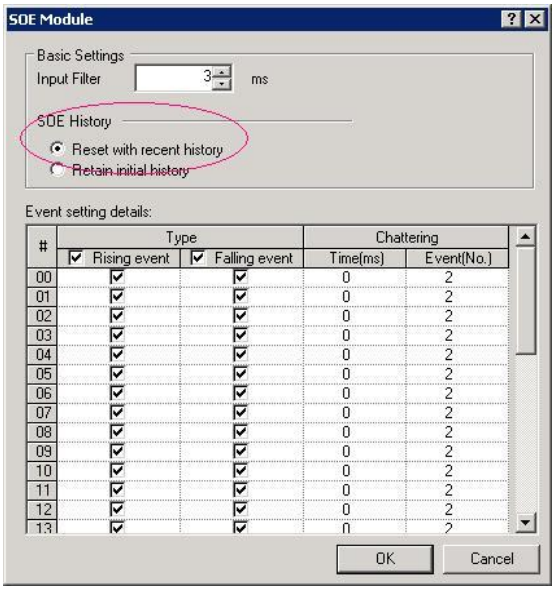
Event Type	Description	Buffer Size in CPU
Error log	This log provides information about the errors generated during the operation. The error code, date, time and error details are saved in this file.	2048 events
Shutdown log	This log provides the time details of ON/OFF information of the system. The date, time and the ON/OFF state are saved in this file.	1024 events
Mode log	This saves the changed CPU mode information and time in case there is a change in mode of operation.	1024 events
System log	This saves the operation history of system events that occur during operation.	2048 events
DISOE	These are the sequence of events in the DISOE module captured by CPU.	3000 events

5.2 Transferring SOE events from PLC to Experion Station

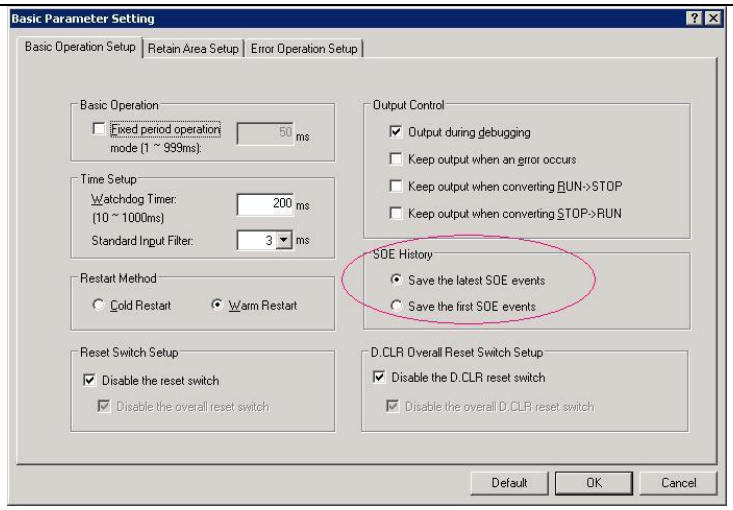
ATTENTION

DO NOT modify the SOE points when MLServer is running. In case, if SOE points are modified online then MLServer needs to be restarted. After modifying QDB, restart MLServer by disabling and enabling the ML channel specific to DISOE points.

The Experion Station can be used for viewing a summary of the sequence of events generated in the PLC. To transfer the PLC events to Experion/Log file, perform the following steps.

Step	Action
1	Connect to PLC with DISOE module using SoftMaster.
2	In the **I/O Parameter Setting** dialog box, select the SOE module base and slot.
3	Configure the SOE module by selecting the type of events to be captured by the PLC, chattering time and others. In the **I/O Parameter Setting** dialog box, double-click the SOE module or click **Details**. The **SOE Module** dialog box appears.
4	Under SOE History, click Reset with recent history. 
5	In the **Basic Parameter Setting** dialog box, click **Save the latest SOE events**. Note: Ensure Write to PLC after changing these parameters.

Step	Action



7 In Quick Builder, configure a status point in the device area format.

8 Configure a PLC Point as ML01.U1.2.6$DEV#BIT@SOE in Quick Builder and download to the Experion server.

Note: The PLC point must be configured with U1.2.6, where 1 is Base No1, 2 is Slot no 2, and 4 for Channel no 4. Also, @SOE must be added to string at the end to indicate that the point is an SOE module point. You must not configure PLC point as ML01.U01.02.06$DEV#BIT@SOE in Quick Builder.

ATTENTION

All the SOE points must be configured with DEV command and #BIT type. Ensure that base number, slot number, and channel number does not precede with '0'.

9 Enable the Channel containing the configured PLC Point. The SOE events are transferred to the Experion server SOE summary page.

11 To view a summary of events, select **View > Events > SOE Summary** from the Experion Station Display.

12 Double-click the SOE event. The **Point's detailed display** page appears.

ATTENTION

DISOE physical I/O points must be configured as SOE SCADA point in Quick Builder to view the corresponding SOE events in Experion Station.

6. Maintenance and troubleshooting

6.1 Guidelines to configure MLServer and Quick Builder

This section provides the guidelines to configure MLServer and Quick Builder when moving from the existing MLServer to current MLServer version, which is packaged with Experion R431.

The following are the primary features of MLServer:

Single channel
All the PLCs are configured under single MLServer channel (same that of existing configuration). For example, if the site has 5 PLCs all the 5PLCs are assigned to single MLServer channel.

There is no change required for existing points and controller configuration in Quick Builder. Change is required only for MLServer channel configuration.

Multiple channel
Each PLC can be configured under multiple channels. For example, if the site has 5 PLCs the 5PLCs can be assigned to individual MLServer channels.

ATTENTION

- On-process migration is not supported.
- **Configuring multiple channels**: To configure each PLC under individual MLServer channel, the complete ML SCADA database in Experion must be deleted, reconfigured according to your requirement and then reloaded to the server. This is similar to reengineering of complete SCADA database.

The following are the guidelines for upgrading from the existing MLServer with single channel configuration to current MLServer version, which is packaged with Experion R431.

ATTENTION

- Ensure that you have taken back up of existing Quick Builder database.
- This procedure is applicable for retaining the existing MLServer configuration (one channel for all the PLCs).

Guidelines for upgrading non-redundant server

Step	Action
1	Disable the ML Channel.
2	Open the ML PLC configuration form, and configure the IP address and PLC configuration details.

Step	Action
3	Save the ML configuration.
4	Open the existing ML Quick Builder (qdb) file.
5	If the **Quick Builder file migration** dialog box appears, click **Next** to perform the migration.
7	Open Quick Builder and then select the ML channel.
8	In **ML Server Configuration** tool, for each channel, select the appropriate ML channel ID from the drop-down list.
9	Click  to download the channel configuration to server.
10	Open the Experion **Station**.
11	Choose **View** > **System Status** > **Channels**. The **Channel Summary** page appears.
12	Select the check box corresponding to the ML channel to enable it.

Guidelines for upgrading Redundant Servers

ATTENTION

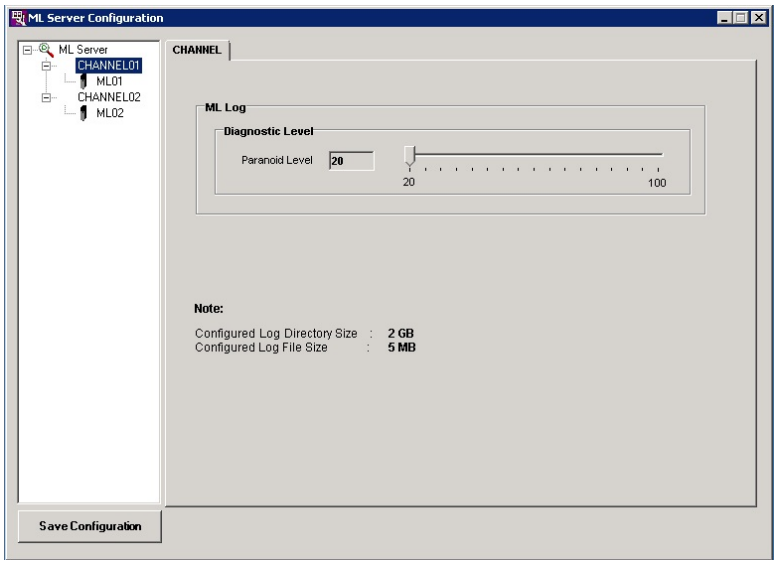
Ensure that the Experion Redundant Servers are in sync.

Step	Action
1	Open the ML PLC configuration form on Primary Server, and configure the IP address, Parent Asset and PLC Configuration Details.
2	Save the ML configuration. The ML Configuration should be saved successfully without any errors.
3	Open Quick Builder and then select the ML channel.
4	In **ML Server Configuration** tool, for each channel, select the appropriate ML channel ID from the drop-down list.
5	Click  to download the channel configuration to server.
6	Configure the ML Controller and the ML points, and then download configuration to the Server.
7	Open the Experion Station and enable the ML channel.

Step	Action
8	Perform server switchover. The existing backup becomes Primary server. Perform server synchronization between Experion redundant servers.
9	Open the ML PLC Configuration form on the new Primary server.
10	Save the ML configuration. The ML configuration should be saved successfully without any errors.
11	If server A needs to be Primary, perform a server switch over.

6.2 MasterLogic Server logs

MLGuard handles the MLServer logs and all the log messages are logged to a single file. The log files appear in the location that the user specifies in ML Log Settings or in the Diagnostics folder present in the installed folder.



The list of logs generated by the MLServer components varies for each channel based on the paranoid level specified. The paranoid level based logging for each channel.

Logs	Paranoid value
Activity	20

OPCValues	25
DIAG & AE Values	30
Request & Response	40
Entry & Exit	50
Trace	60
Hex	80

The default paranoid value is 20. The logs are generated based on the paranoid value selected. For example, if you select paranoid value as 40, then logs of 40, 30, 25, and 20 are generated. Similarly, if you select paranoid value as 30, then logs of 30, 25, and 20 are generated.

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