Reference Manual

PlantPAx
Process Automation System

Rockwell Automation Library of Logix Diagnostic Objects

Version 3.1





Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	**WARNING:** Identifies information about practices or circumstances that may cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances may lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

Chapter 3

Logix Redundant Controller Monitor (L_Redun)

Chapter 4

Logix Task Monitor (L_TaskMon)

Notes:

This document is updated throughout for version 3.1 of the Rockwell Automation Library of Process Objects. Changes for this revision are marked by change bars shown in the left or right margins.

Software Compatibility and Content Revision

Table 1 - Summary of Changes

Topic	Page
Changed title from 'PlantPAx® Library of Logix Diagnostic Objects' to 'Rockwell Automation Library of Logix Diagnostic Objects'	Front Cover
Changed version of Rockwell Automation Library of Logix Diagnostic Objects from 3.0 to 3.1	7
Changed references to Knowledgebase Answer ID 62682 to Product Compatibility and Download Center	7, 11, 22, 44, 68
L_ChangeDet:	
Added Alias column to Input and Output Parameters tables	12, 13
Added Simulation section	15
L_CPU:	
Visualization Files - added Important note concerning the order files are to be imported	22
Added Alias column to Input and Output Parameters tables	24, 25
Added Simulation section	26
Added 'Important' note concerning memory allocation and non-display of memory sections	37
L_Redun:	
Changed '1756-RM Redundancy Modules' to '1756-RM2 Redundancy Modules'	44, 47, 50, 52, 54
Visualization Files - added Important note concerning the order files are to be imported	45
Input Parameter table - added Alias column and aliases	46
Output Parameters table:	49
added 'Err_', 'Alm_', 'Ack_', and 'Rdy_' parameter descriptions to bullet list	
added Alias column and aliases	
Added Simulation section	53
Added alarm location graphic	60
L_TaskMon:	
Visualization Files - added Important note concerning the order files are to be imported	68
Visualization File Types table - added optional file	69
Input Parameter table - added Alias column and aliases	70
Output Parameters table:	72
added 'Err_', 'Alm_', 'Ack_', and 'Rdy_' parameter descriptions to bullet list	
added Alias column and aliases	
Added Simulation section	75
Added alarm location graphic	82
Trends tab - replaced graphic	84

For the latest compatible software information and to download the Rockwell Automation Library of Process Objects, see the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

For general library considerations, see Rockwell Automation Library of Process Objects, publication PROCES-RM002.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

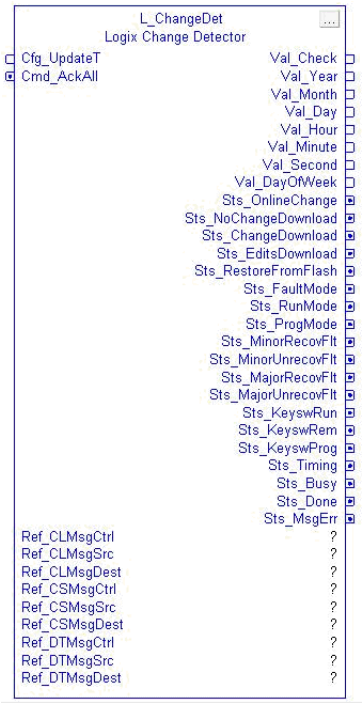
Resource	Description
PlantPAx Process Automation System Selection Guide, publication PROCES-SG001	Provides information to assist with equipment procurement for your PlantPAx system.
PlantPAx Process Automation System Reference Manual, publication PROCES-RM001	Provides characterized recommendations for implementing your PlantPAx system.
Rockwell Automation Library of Process Objects, publication PROCES-RM002	Provides general considerations for the PlantPAx system library of process objects.
FactoryTalk® View Machine Edition User Manual, publication VIEWME-UM004	Provides details on how to use this software package for creating an automation application.
FactoryTalk View SE Edition User Manual, publication VIEWSE-UM006	Provides details on how to use this software package for developing and running human-machine interface (HMI) applications that can involve multiple users and servers, distributed over a network.
Logix5000™ Controllers Add-On Instructions Programming Manual, publication 1756-PM010	Provides information for designing, configuring, and programming Add-On Instructions.
ControlLogix® Enhanced Redundancy System User Manual, publication 1756-UM535	Provides information for planning and implementing a ControlLogix enhanced redundancy system.
Rockwell Automation Library of Process Objects: Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002	Details how to monitor an input condition to raise an alarm. Information includes acknowledging, resetting, inhibiting, and disabling an alarm.

You can view or download publications at http:/www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Logix Change Detector (L_ChangeDet)

The L_ChangeDet (Logix Change Detector) Add-On Instruction monitors another Logix controller on the network, checking for changes that impact operation. Changes that can be monitored include downloads, online edits, I/O forcing, and controller mode changes.

No visualization elements are supplied with the L_ChangeDet instruction.



Guidelines

Use this instruction if you want to monitor a Logix controller for changes, to be sure that the correct application is being run for regulatory, quality, or security reasons.

Do **not** use this instruction in these situations:

- You have only one Logix controller. The L_ChangeDet instruction is intended to be run in a controller other than the one being monitored. Although the L_ChangeDet instruction can be configured to monitor the controller in which it is running, because it runs in controller logic, it cannot detect when the controller in which it is running is placed in Program mode.
- You have software, such as FactoryTalk AssetCentre, for monitoring controllers on a secured network. This software provides much more extensive change tracking and auditing than the L_ChangeDet Add-On Instruction.

Functional Description

The L_ChangeDet instruction includes a source protected Add-On Instruction for use with RSLogix™ 5000 software, version 18 or later, and Logix controllers. This instruction is intended to be used in one Logix controller to monitor another controller for changes.

Although this instruction must be executed in a Logix controller with firmware revision 18 or later, it can monitor controllers running firmware revision 12 or later.

The L_ChangeDet instruction monitors a Logix controller for the following types of changes:

- New entries being made in the change log, such as the following:
  - Modifying, inserting, or deleting logic in Run or Program mode
  - Accepting, assembling, or canceling edits
  - Enabling, disabling, or removing forces
  - Reconfiguring a module
  - Changing an output list
  - Sending a Set Attribute MSG or SSV to a controller object class or instance
  - Sending a Set Attribute List MSG to a controller object class or instance
  - Sending a Set Attribute All MSG to a controller object class or instance
  - Applying attributes to a controller object class or instance
  - Creating, deleting, or resetting a controller object instance
- Downloading a different application
- Partial import into an application
- Downloading of an application without logic changes (but saved configuration data that has changed)
- Downloading of an application containing offline edits

- Restoring an application from an external drive source, such as a Secure Digital (SD) card

This instruction also reports the following:

- Controller/application 'check' value for change detection
- Date and time on the controller clock (YYYY-MM-DD hh:mm:ss)
- Day of the week based on the controller date
- Controller keyswitch position and mode
- Major and minor fault indications

The L_ChangeDet instruction is provided as a rung import for installation. Importing this rung into your ladder diagram routine imports the Add-On Instruction definition, creates an instruction instance, and creates and fills in all of the required tags and data structures for the instruction.

IMPORTANT	Once the rung is imported, and prior to downloading and running the application, set the path in each of the referenced Message structures to point to the Logix controller to be monitored.

The interval at which this instruction checks for changes and updates its status is configurable, from 1...60 seconds.

Required Files

The L_ChangeDet_3_1-**00**_RUNG.L5X rung import file must be imported into the controller project for controller to be monitored. The service release number (boldfaced) can change as service revisions are created.

The import file for this Add-On Instruction can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

There are no visualization files because the L_ChangeDet object does not use display elements or faceplates.

Controller Code

This section describes the parameters for this Add-On Instruction.

Logix Change Detector InOut Structure

Input/Output parameters are used to link the Add-On Instruction to external tags containing necessary data for the instruction to operate. These external tags are brought in with the rung import.

Table 2 - L_ChangeDet InOut Parameters

Name	Data Type	Description
Ref_CLMsgCtrl	MESSAGE	MSG to get controller change log data.
Ref_CLMsgSrc	INT [8]	Data sent in controller change log MSG.
Ref_CLMsgDest	SINT [46]	Data received in controller change log MSG.
Ref_CSMsgCtrl	MESSAGE	MSG to get controller status data.
Ref_CSMsgSrc	INT [3]	Data sent in controller status MSG.
Ref_CSMsgDest	INT [4]	Data received in controller status MSG.
Ref_DTMsgCtrl	MESSAGE	MSG to get controller date and time data.
Ref_DTMsgSrc	INT [3]	Data sent in controller date and time MSG.
Ref_DTMsgDest	INT [17]	Data received in controller date and time MSG.

Logix Change Detector Input Structure

Input parameters include the following:

- Configuration data elements (Cfg_) are used to set configurable capabilities and features of the instruction.
- Command data elements (Cmd_) are used by program logic, operators, and maintenance personnel to request instruction actions.

Table 3 - L_ChangeDet Input Parameters

Input Parameter	Data Type	Default	Description
EnableIn	BOOL	1	**Ladder Diagram:** If the rung-in condition is true, the instruction's Logic routine executes. If the rung-in condition is false, the instruction's EnableInFalse routine executes. **Function Block Diagram:** If true, or not connected, the instruction's Logic routine executes. If the parameter is exposed as a pin and wired, and the pin is false, the instruction's EnableInFalse routine executes. **Structured Text:** No effect. The instruction's Logic routine executes.
Cfg_UpdateT	DINT	5	Update (poll) time for CPU data can be set from 1…60 seconds.
Cmd_AckAll	BOOL	0	Command to acknowledge all change detected bits.

Logix Change Detector Output Structure

Output parameters include the following:

- Value data elements (Val_) are numeric outputs of the instruction for use by the HMI. Values also can be used by other application logic or software packages.
- Status data elements (Sts_) are bit outputs of the instruction for use by the HMI. Status bits also can be used by other application logic.

Table 4 - L_ChangeDet Output Parameters

Name	Data Type	Description
EnableOut	BOOL	Enable output: The EnableOut signal is not manipulated by this instruction. Its output state always reflects EnableIn Input state.
Val_Check	DINT	Current application check-for-change value.
Val_Year		Current year on controller clock (local date/time).
Val_Month		Current month on controller clock (local date/time).
Val_Day		Current day on controller clock (local date/time).
Val_Hour		Current hour on controller clock (local date/time).
Val_Minute		Current minute on controller clock (local date/time).
Val_Second		Current second on controller clock (local date/time).
Val_Microsecond		Current microsecond on controller clock (local date/time).
Val_DayOfWeek		Current day of the week based on controller date: 0 = Sunday 6 = Saturday
Sts_OnlineChange	BOOL	Change detected: An online change or partial import.
Sts_NoChangeDownload		Change detected: The same application was downloaded (configuration data can change).
Sts_ChangeDownload		Change detected: A changed application was downloaded.
Sts_EditsDownload		Change detected: An application with offline edits was downloaded.
Sts_RestoreFromFlash		Change detected: The application was restored from the Compact Flash (CF) card or Secure Digital (SD) card.
Sts_FaultMode		1 = Controller is Faulted.
Sts_RunMode		1 = Controller mode is Run.
Sts_ProgMode		1 = Controller mode is Program.
Sts_MinorRecovFlt		1 = Controller has a minor recoverable fault.
Sts_MinorUnrecovFlt		1 = Controller has a minor unrecoverable fault.
Sts_MajorRecovFlt		1 = Controller has a major recoverable fault.
Sts_MajorUnrecovFlt		1 = Controller has a major unrecoverable fault.
Sts_KeyswRun		1 = Controller keyswitch is in the Run position.
Sts_KeyswRem		1 = Controller keyswitch is in the Remote position.
Sts_KeyswProg		1 = Controller keyswitch is in the Program position.
Sts_Timing		1 = Waiting for update time to finish before reading controller status.
Sts_Busy		1 = Instruction is getting controller status (MSGs busy).
Sts_Done	BOOL	1 = Data collection complete, status and values updated.
Sts_MsgErr		1 = Message error, unable to read at least one item (check path in MSG).
L_ChangeDet		Unique parameter name for auto-discovery.

Logix Change Detector Local Configuration Tags

Configuration parameters that are arrayed, string, or structure data types cannot be configured as parameters for Add-On Instructions. Configuration parameters of these types appear as local tags to the Add-On Instruction. Local tags can be configured through the HMI faceplates or in RSLogix 5000 software by opening the Instruction Logic of the Add-On Instruction instance and then opening the Data Monitor on a local tag. These parameters cannot be modified by using controller logic or RSLogix 5000 software export/import functionality.

Table 5 - L_ChangeDet Local Configuration Tags

Tag Name	Data Type	Default	Description
Cfg_Desc	STRING_40	'Logix Controller Change Detector'	Description for display on HMI.
Cfg_Label	STRING_20	'Change Detector'	Label for display on HMI.
Cfg_Tag	STRING_20	'L_ChangeDet'	Tag name for display on HMI.

Operations

Modes

The L_ChangeDet instruction has no commands or outputs intended to control equipment and therefore does not have any modes.

Alarms

The L_ChangeDet Add-On Instruction does not provide any alarms. If an alarm is required, connect the output status to be alarmed to a P_Alarm instruction.

Simulation

The L_ChangeDet Add-On Instruction does not have a Simulation capability.

Execution

The following table explains the handling of instruction execution conditions.

Condition	Description
EnableIn False (false rung)	No EnableIn False logic is provided. The L_ChangeDet instruction must always be scanned true. In Relay Ladder Logic, the L_ChangeDet instruction must be by itself on an unconditional rung. If the Rung Import provided with the Rockwell Automation Library is used to install this instruction, the proper rung is created for you.
Powerup (prescan, first scan)	On Prescan, any Commands received before First Scan are discarded. The update timer and internal polling status are reset.
Postscan (SFC transition)	No SFC Postscan logic is provided.

Refer to the Logix5000 Controllers Add-On Instructions Programming Manual, publication 1756-PM010, for more information.

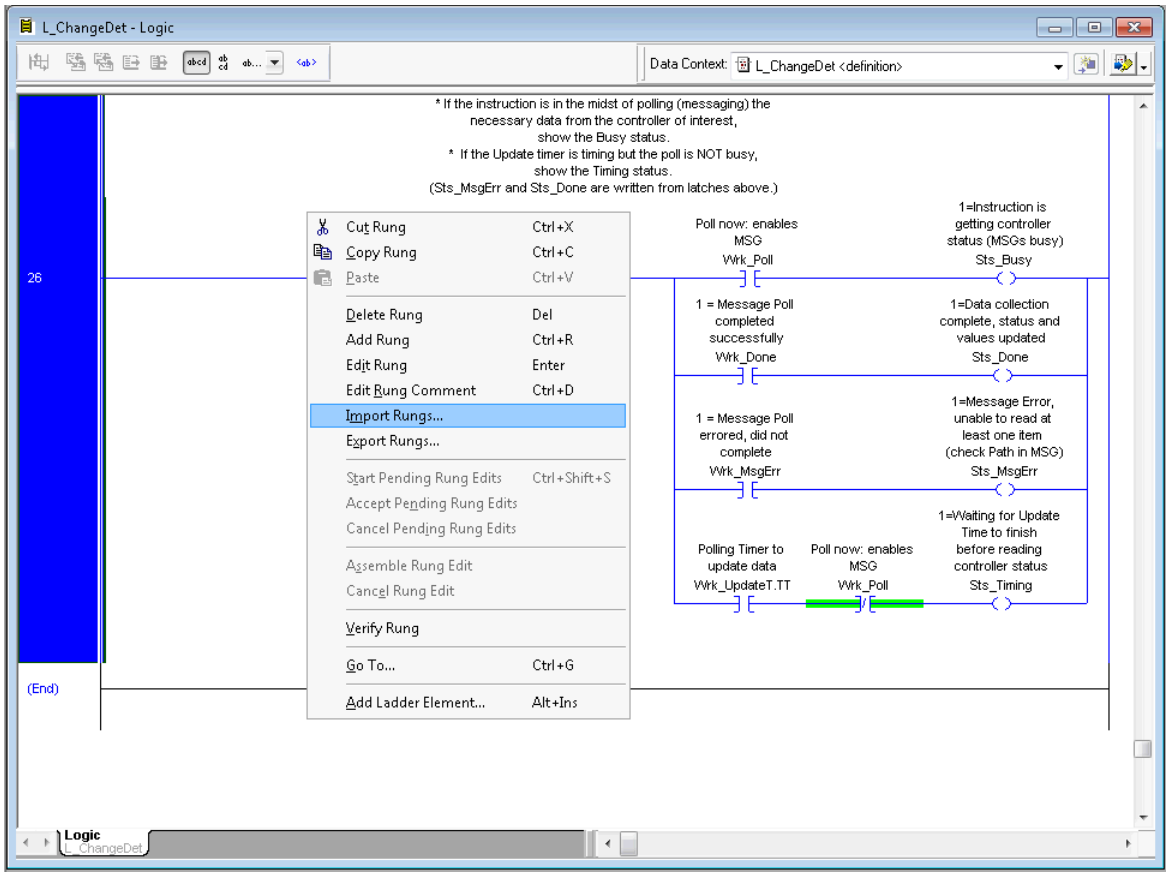
Programming Example

The L_ChangeDet instruction is provided fully configured as a rung import; so very little programming is required for the instruction to be used. This programming example shows how the rung import is used to instantiate the L_ChangeDet instruction.

As the L_ChangeDet instruction is a rung import, it needs to be created in a Ladder Diagram routine. By default, L_ChangeDet checks controllers for changes only every 5 seconds, so the ladder routine does not need to run in a fast periodic task.

The following steps describe how you instantiate L_ChangeDet in your routine.

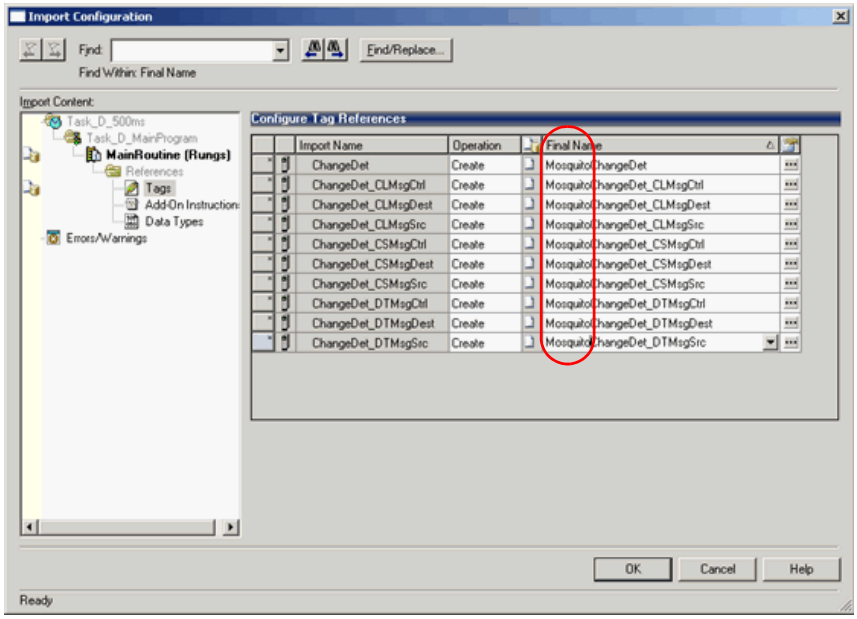
1. In your ladder routine, right-click where the rung is to be inserted and choose Import Rungs.



The Import Rungs dialog box appears.

2. Choose the L_ChangeDet rung import file named in Required Files on page 11.
3. Click Import.

The Import Configuration dialog box appears.



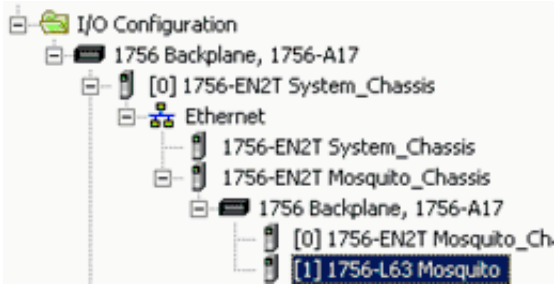
4. Rename the tags being imported to incorporate the name of the controller being monitored, such as 'Mosquito' in the example.

   One controller can monitor several others. Adding the controller name to the tag makes it easier to keep track of individual instances when monitoring multiple controllers.

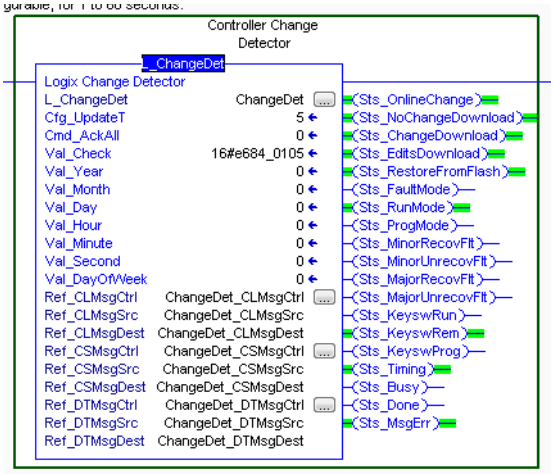
5. Click OK.

6. Change the path in each of the MSG control tags to point to the controller being monitored for changes.

   If you create a link to the controller in the I/O tree configuration, you need only to enter the name assigned to that controller.

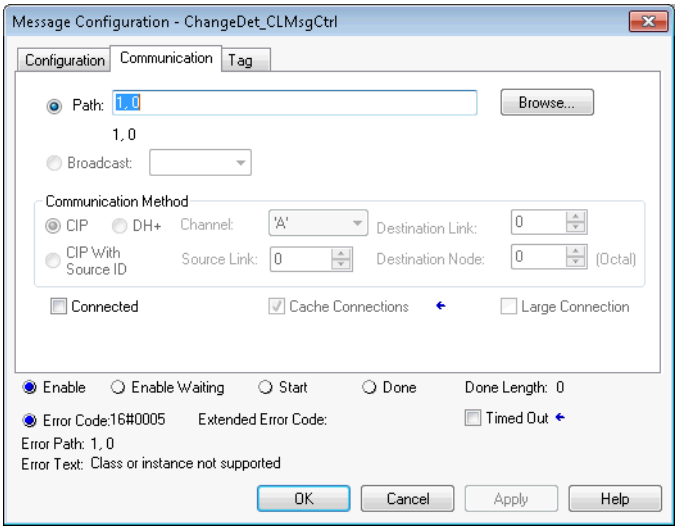


7. Complete the following steps for each of the three MSG control tags.
   a. Click the ellipsis button next to the MSG control tag.



   The Message Configuration dialog box appears.

   b. Click the Communication tab and change the path to the controller link created in the I/O tree.



   c. Click OK.

8. Place the controller in RUN mode.

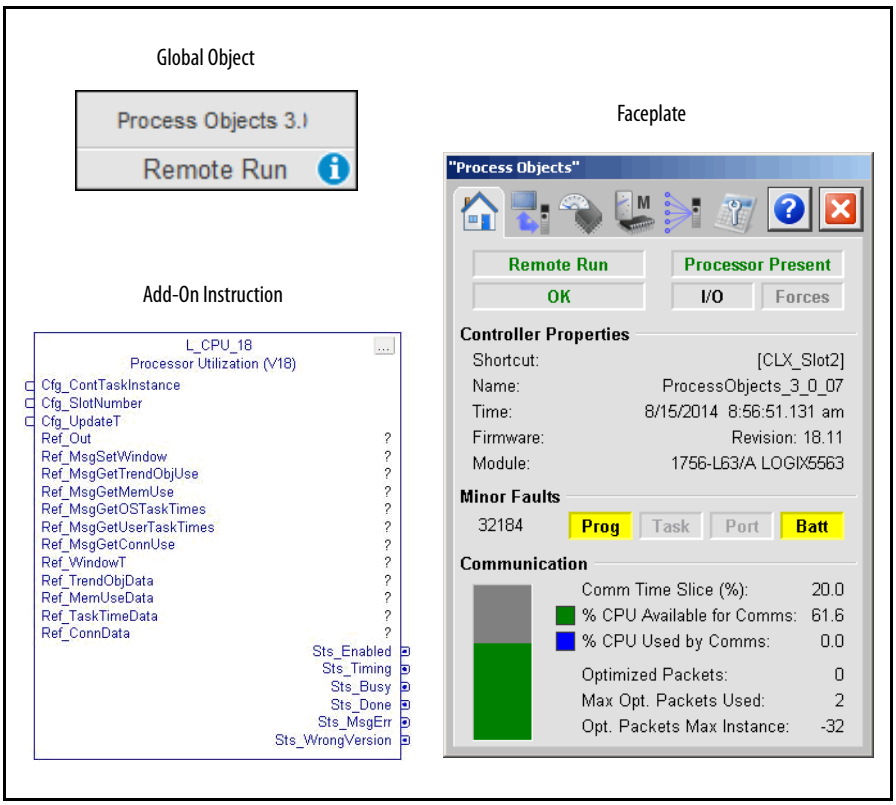
   Status bits on the L_ChangeDet instruction indicate changes made to the monitored controller. Set Cmd_AckAll to 1 to clear the latched-in detections.

Logix Controller CPU Utilization (L_CPU)

The L_CPU (Logix Controller CPU Utilization) Add-On Instruction monitors a Logix controller, and provides information on controller CPU utilization, communication usage, memory usage, task scan times, and other information. Data provided by the L_CPU instruction is useful in diagnosing communication or control responsiveness issues or in tuning the performance of control tasks for optimum controller performance.

The L_CPU instruction can be loaded as part of a control application and disabled (default) until needed. The instruction also can be enabled at a slow update rate for general controller monitoring. The update rate can be increased, if necessary, as directed by a Rockwell Automation Technical Support representative to aid in diagnosing controller performance issues.

The global object and faceplate shown below are examples of the HMI interface provided with this library object.



Guidelines

Use this instruction in these situations:

- Monitor general controller resource utilization:
  - Processor utilization
  - Memory usage
  - Communication capacity
  - Networking performance and connection usage
- Gather data to help resolve a specific issue under the direction of a Rockwell Automation Technical Support representative
- Tune the periods or priorities of multiple tasks in a controller to optimize control and observe how changes in task configuration affect CPU and other resource usage in the controller

Do **not** use this instruction at a high update rate on a continuing basis. The L_CPU instruction increases the communication load on the controller when it is polling for performance data. At high update rates, the resource load generated by the L_CPU instruction polling can impact control performance, especially if you already have a fully-loaded controller.

Functional Description

The L_CPU instruction collects and summarizes a variety of data from the Logix controller that is being monitored. This information includes the following:

- Processor Identity information:
  - Catalog number and description
  - Major and minor firmware revision numbers
- Communication Responsiveness information:
  - CPU% available for responding to communication requests
  - CPU% used for responding to communication requests
  - Optimized Packets used for responding to communication requests
- Memory usage (total and for each of several classes of memory):
  - Total memory size
  - Memory used
  - Memory available
  - Largest contiguous block of available memory

IMPORTANT The L_CPU instruction does not support SoftLogix™ 5800 or RSLogix™ Emulate 5000 controllers.

- CPU utilization (%):
  - Continuous task (or unused CPU, if no continuous task)
  - Periodic and Event tasks
  - Motion/synchronization
  - Safety tasks
  - Redundancy
  - Sending messages (MSG)
  - Responding to communication requests (such as from HMI)
  - System (I/O scan, timer updates, everything else)
- Communication connection usage:
  - Total connections available
  - Connections used for each of several classes of communication
  - Unconnected buffers and cached messages
- I/O Forcing status
- Controller minor faults
- Communication timeslice setting

The items listed above are displayed on several faceplate tabs, with summary information on the main (home) tab.

TIP We recommend that you access the L_CPU faceplate when you contact Rockwell Automation Technical Support. The information on the Operator (home) tab is often requested when you call. You'll also likely need your RSLogix 5000 software serial number or other license or support contract information. The Maintenance tab has a space for you to record this information for reference.

Required Files

Add-On Instructions are reusable code objects that contain encapsulated logic that can streamline implementing your system. This lets you create your own instruction set for programming logic as a supplement to the instruction set provided natively in the ControlLogix® firmware. An Add-On Instruction is defined once in each controller project, and can be instantiated multiple times in your application code as needed.

Controller Files

The following rung imports must be imported into the controller for each instance of L_CPU in your project:

- L_CPU_18_3_1-**00**_RUNG.L5X
- L_CPU_19_3_1-**00**_RUNG.L5X
- L_CPU_20_3_1-**00**_RUNG.L5X
- L_CPU_21_3_1-**00**_RUNG.L5X
- L_CPU_23_3_1-**00**_RUNG.1.5X

You select the appropriate file based on the revision of the controller being used (18, 19, 20, 21, or 23). The service release number (boldfaced) can change as service revisions are created.

The import file can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

Visualization Files

The following files for this Add-On Instruction can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

IMPORTANT	Files must be imported in the following order: image files, then global object files, and then graphic files. This order is required to properly configure the visualization files.

Table 6 - L_CPU Visualization File Types

Application Type	File Type	FactoryTalk View SE Software	FactoryTalk View ME Software	Description
Graphics - Global Objects	GGFX	(RA-BAS) Logix Faceplate Objects	(RA-BAS-ME) Logix Faceplate Objects	Global objects used on Logix Object faceplates.
		(RA-BAS) Logix Graphics Library	(RA-BAS-ME) Logix Graphics Library	Graphic objects used to build displays for all Logix Objects, including L_CPU.
		(RA-BAS) Common Faceplate Objects	(RA-BAS-ME) Common Faceplate Objects	Common global graphics used on Logix Objects faceplates.

Table 6 - L_CPU Visualization File Types

Application Type	File Type	FactoryTalk View SE Software	FactoryTalk View ME Software	Description
Graphics Files	GFX	(RA-BAS) L_CPU-Faceplate	(RA-BAS-ME) L_CPU Faceplate	The faceplate display used for the object.
		(RA-BAS) L_CPU-Help	(RA-BAS-ME) L_CPU Help	The help display used for the object.
		(RA-BAS) Common-AnalogEdit	(RA-BAS-ME) N/A	Faceplate used for analog input data entry. The FactoryTalk View ME faceplates use the native analog input data entry so no file is required.
Graphics - Images	PNG	All .png files in the images folder	All .png files in the images folder	These are the common icons used in the global objects and faceplates for all Process Objects. When PNG graphic formats are imported they are renamed like a BMP file but retain a PNG format.
HMI Tags	CSV	N/A	FTVME_PlantPAxLib_Tags_3_1_**00**.csv (1)	These tags must be imported into the FactoryTalk View ME project to support switching tabs on any Process Object faceplate.

(1) The service release number (boldfaced) can change as service revisions are created.

Controller Code

This section describes the parameter references for this Add-On Instruction.

Logix Controller CPU Utilization InOut Structure

Input/Output parameters are used to link the Add-On Instruction to external tags containing necessary data for the instruction to operate. These external tags are brought in with the rung import.

Table 7 - L_CPU InOut Parameters

Name	Data Type	Description
Ref_Out	L_CPU_Out	Tag to receive CPU data.
Ref_MsgSetWindow	MESSAGE	Message to set data collection window time.
Ref_MsgGetTrendObjUse		Message to get trend object usage.
Ref_MsgGetMemUse		Message to get memory usage.
Ref_MsgGetOSTaskTimes		Message to get Logix O/S task times/CPU utilization.
Ref_MsgGetUserTaskTimes		Message to get user task time/CPU utilization.
Ref_MsgGetConnUse		Message to get connection usage.
Ref_WindowT	DINT	Window time, in microseconds, to task metrics object.
Ref_TrendObjData	INT [16]	Raw trend object data from MSG (trending object).
Ref_MemUseData	INT [48]	Raw memory use data from MSG (UserMemory object).
Ref_TaskTimeData	DINT [131]	Raw task time data from MSG (TaskMetrics object).
Ref_ConnData	INT [80]	Raw connection data from MSG (PortCapacity object).

Logix Controller CPU Utilization Input Structure

Input parameters include the following:

- Configuration data elements (Cfg_) are used to set configurable capabilities and features of the instruction.
- Command data elements (Cmd_) are used by program logic, operators, and maintenance personnel to request instruction action.

Table 8 - L_CPU Input Parameters

Input Parameter	Data Type	Default	Description
EnableIn	BOOL	1	**Ladder Diagram:** If the rung-in condition is true, the instruction's Logic routine executes. If the rung-in condition is false, the instruction's EnableInFalse routine executes. **Function Block Diagram:** If true, or not connected, the instruction's Logic routine executes. If the parameter is exposed as a pin and wired, and the pin is false, the instruction's EnableInFalse routine executes. **Structured Text:** No effect. The instruction's Logic routine executes.
Cfg_ContTaskInstance	DINT	0	Instance number of Continuous task if it exists (0…31). Set to 0 if there is no Continuous task in this controller.
Cfg_SlotNumber		0	Controller slot number in local chassis. **IMPORTANT:** Changes to this configuration value take effect after a controller power cycle or PROG-to-RUN controller mode transition.
Cfg_UpdateT		5	Update (poll) time for CPU data (seconds).
Cfg_WindowT	REAL	1.0	Window time for collecting task data (seconds). For best reporting, this value can be set to a common multiple of the configured Periodic Task rates. For the Task configuration provided in the PlantPAx template applications, the default value of 1.0 seconds is appropriate. Values from 1.0 to 2.0 seconds can be used if possible. For example, your controller has Periodic Tasks configured for rates of 100, 400 and 800 milliseconds. Set Cfg_WindowT to 1.6 seconds (1600 ms). **IMPORTANT:** Changes to this configuration value take effect after a controller power cycle or PROG-to-RUN controller mode transition.
MCmd_Enable	BOOL	0	Maintenance command to enable or disable collection of data.
MCmd_Disable			

Logix Controller CPU Utilization Output Structure

Output parameters include the following:

- Status data elements (Sts_) are bit outputs of the instruction for use by the HMI. Status bits are also used by other application logic.
- Ready data elements (Rdy_) are bit outputs of the instruction used by the HMI to enable or disable Command buttons and Setting entry fields.

Table 9 - L_CPU Output Parameters

Output Parameter	Data Type	Description
EnableOut	BOOL	Enable output: The EnableOut signal is not manipulated by this instruction. Its output state always reflects EnableIn Input state.
Sts_Enabled		1 = Maintenance has enabled CPU data collection.
Sts_Timing		1 = Instruction is waiting for Update Time to complete.
Sts_Busy		1 = Instruction is getting CPU data from controller.
Sts_Done		1 = Data collection complete, CPU data are in Ref_Out tag.
Sts_MsgErr		1 = Message error, unable to read at least one metric.
Sts_WrongVersion		1 = Wrong firmware version or controller is not supported. Make sure your version of L_CPU matches the firmware revision of the controller. **IMPORTANT:** The L_CPU instruction does not support SoftLogix™ 5800 or RSLogix™ Emulate 5000 controllers.
Rdy_Enable		1 = Ready to receive MCmd_Enable or MCmd_Disable (enable button).
Rdy_Disable		
L_CPU		Unique parameter name for auto-discovery.

Logix Controller CPU Utilization Local Configuration Tags

Configuration parameters that are array, string, or structure data types cannot be configured as parameters for Add-On Instruction. Local tags can be configured through the HMI faceplates or in RSLogix 5000 software by opening the instruction Logic of the Add-On Instruction instance and then opening the Data Monitor on a local tag. These parameters cannot be modified by using controller logic or RSLogix 5000 software export/import functionality.

Table 10 - L_CPU Local Configuration Tags

Configuration Parameter	Data Type	Default	Description
Cfg_Desc	STRING_40	'Logix CPU Utilization Monitor'	Description for display on HMI. This string is shown in the title bar of the faceplate.
Cfg_Label	STRING_20	'CPU Utilization'	Label for graphic symbol displayed on HMI. This string appears on the graphic symbol.
Cfg_SupportInfo	STRING_40	'Enter Software S/N or Support Contract #'	Type the RSLogix 5000 software serial number or your support contract number for reference if you contact Rockwell Automation Technical Support.
Cfg_Tag	STRING_20	'L_CPU'	Tag name for display on HMI. This string is shown in the title bar of the faceplate.

Operations

Modes

The L_CPU instruction has no commands or outputs intended to control equipment and therefore does not have any modes.

Alarms

The L_CPU Add-On instruction does not provide any alarms. If an alarm is required, connect the output status to be alarmed to a P_Alarm instruction instance.

Simulation

The L_CPU Add-On Instruction does not have a Simulation capability.

Execution

The following table explains the handling of instruction execution conditions.

Condition	Description
EnableIn False (false rung)	The L_CPU instruction has no EnableInFalse logic and does nothing on a false rung. Data associated with the instruction are left in their last state.
Powerup (pre-scan, first scan)	Logic is set up to be sure that the window time is sent to the controller when it transitions to Run mode. Previously active polling (prior to power down or transition to Program mode) is cancelled. High-water data stored in the instruction (not built in to the controller status registers) are cleared.
Postscan (SFC transition)	No SFC Postscan logic is provided.

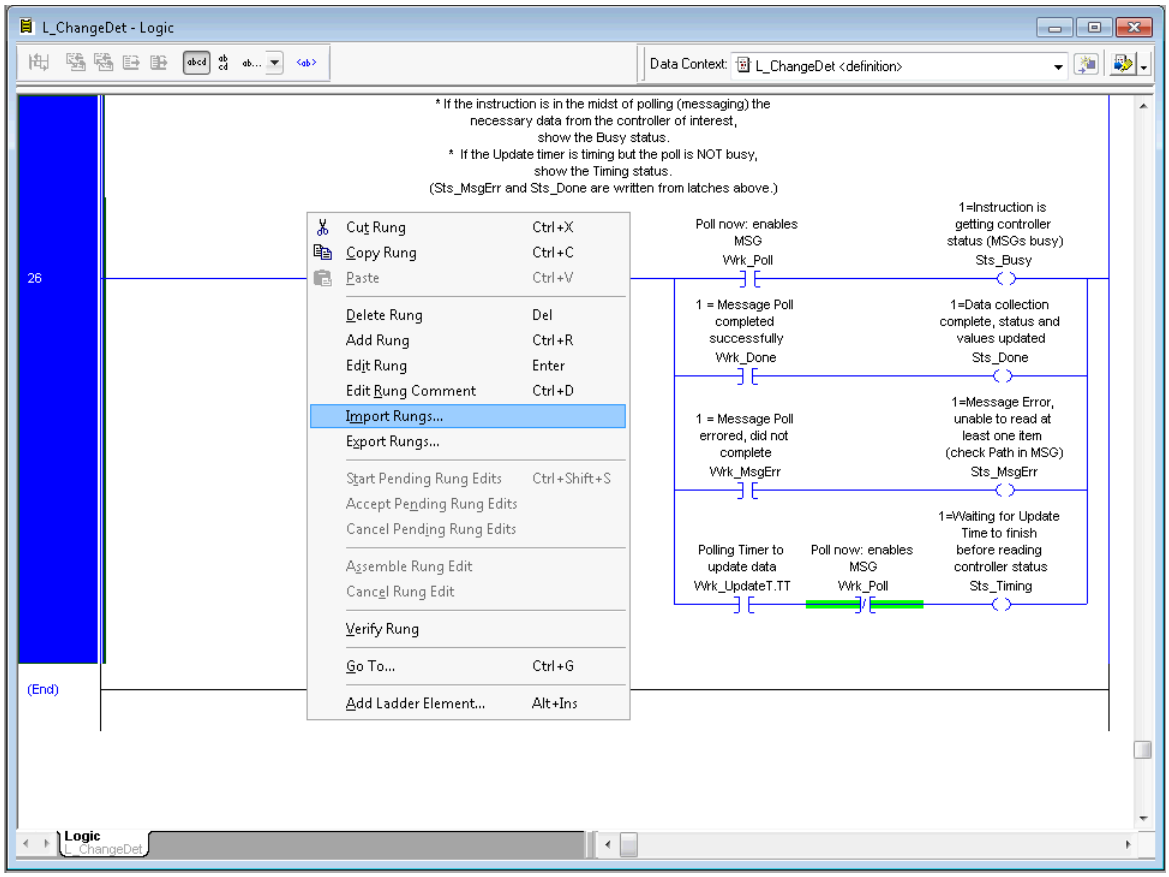
Refer to the Logix5000 Controllers Add-On Instructions Programming Manual, publication 1756-PM010, for more information on Add-On Instruction execution condition handling.

Programming Example

The L_CPU instruction is provided fully configured as a rung import; therefore, little programming is required for the instruction to be used. This programming example shows how the rung import is used to instantiate the L_CPU instruction.

Because L_CPU is a rung import, it needs to be created in a Ladder Diagram routine. The following steps describe how to instantiate L_CPU in your routine.

1. In your ladder routine, right-click where the rungs are to be inserted and choose Import Rungs.



The Import Rungs dialog box appears.

2. Choose the appropriate L_CPU rung import file named in Required Files on page 22.

   The import file is based on the firmware version of the controller being monitored.

3. Click Import.

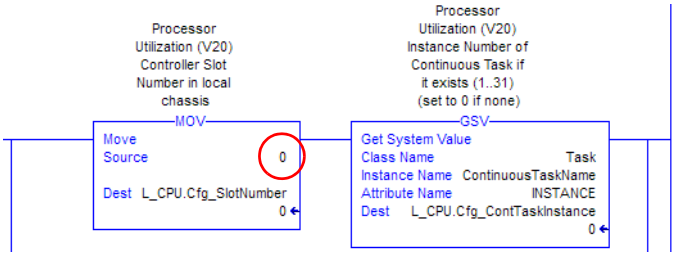
   The Import Configuration dialog box appears.

IMPORTANT Do not change tagnames in the Import Conconfiguration.

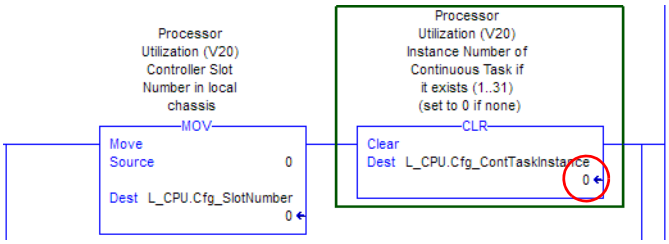
There must only be one instance of the L_CPU instruction in any controller project.

4. Click OK to create the instance of L_CPU.
5. Set the controller slot number in the Source of the first MOV (top branch).

   Set this value before putting the controller into Run mode. If the value is changed, it requires a transition from Program to Run on the controller for the new value to take affect.



6. If there is a continuous task in your application, put its name in the GSV as the 'Instance Name' (see above).

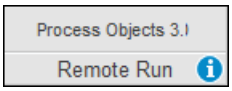


7. If there is no continuous task, replace the GSV with a CLR (clear) instruction and set L_CPU.Cfg_ContTaskInstance to zero (circled above).
8. Click the Finalize All Edits in Program icon.
9. Click Yes to finalize all of the edits.

Display Elements

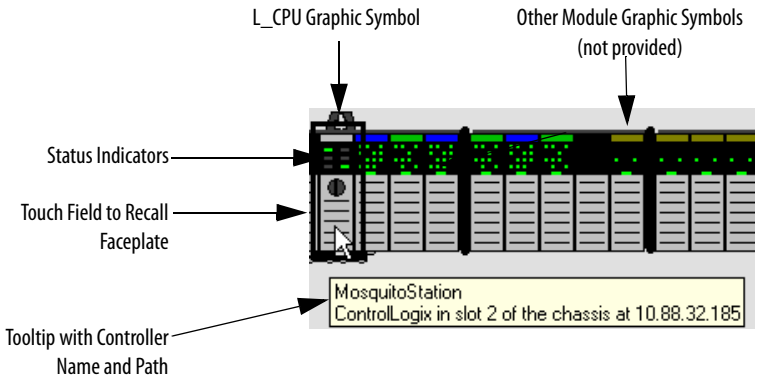
A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, in conjunction with tag structures in the ControlLogix system, aid consistency and save engineering time.

Table 11 - L_CPU Display Elements Description

Display Element Name	Display Element	Description
GO_L_CPU_Type0		This global object is used for 1756-L6*x* ControlLogix controllers.
GO_L_CPU_Type7x		This global object is used for 1756-L7*x* ControlLogix controllers.
GO_L_CPU		This display element is used to represent any Logix controller.

L_CPU Graphic Symbols have the following common attributes.

Figure 1 - L_CPU Graphic Symbols



Status/Quality Indicators

Each of these symbols appears when the described condition is true.

Graphic Symbol	Description
	Wrong Version.
	I/O Communication Fault.
	Controller minor fault, shown on the Operator tab of the faceplate.
No symbol displayed	I/O communication OK and configuration valid.

Maintenance Bypass Indicator

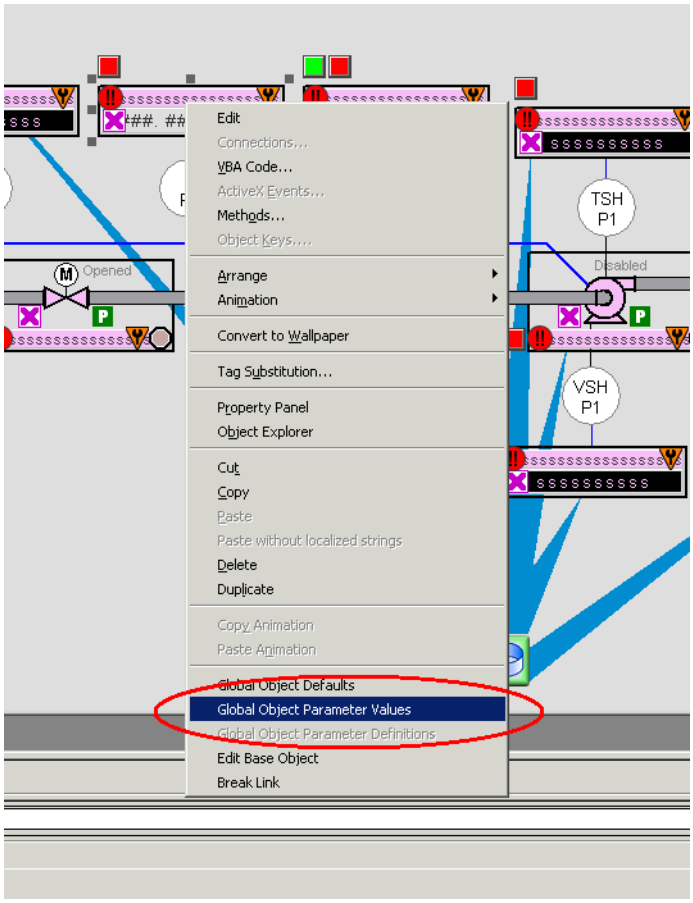
This symbol appears to the right of the label to indicate that a maintenance bypass has been activated.

Graphic Symbol	Description
	I/O Forcing is active.
No symbol displayed	No maintenance bypass active.

Using Display Elements

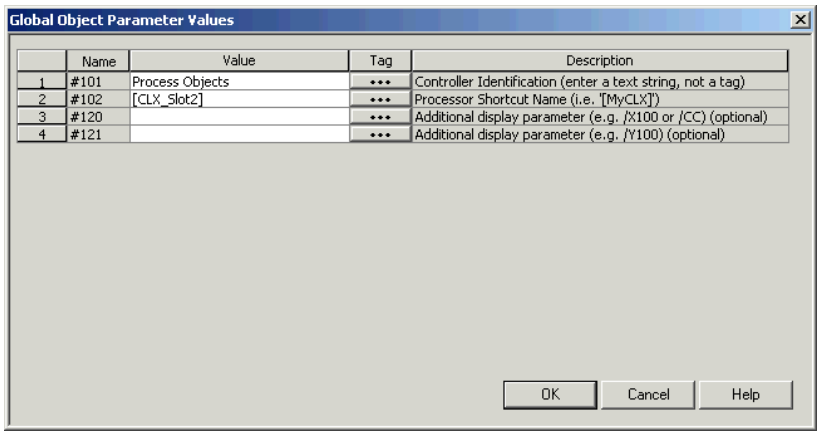
The global objects for L_CPU can be found in the global object file (RA-BAS) L_CPU Graphics Library.ggfx. Do the following to use a global object.

1. Copy it from the global object file and paste it in the display file.



2. In the display, right-click the global object and choose Global Object Parameter Values.

   The Global Object Parameter Values dialog box appears.



The global object parameters are as follows.

Parameter	Required	Description
#101	Y	Controller Identification (enter a text string, not a tag)
#102	Y	Enter the FactoryTalk View communication shortcut to the controller, including the square brackets.
#120	N	Additional parameter to pass to the display command to open the faceplate. Typically used to define position for the faceplate.
#121	N	Additional parameter to pass to the display command to open the faceplate. if defining X and Y coordinate, separate parameters so that X is defined by #120 and Y is defined by #121. This lets these same parameters to be used in subsequent display commands originating from the faceplate.

3. Type the tag or value in the Value column as specified in the Description column.

   TIP You can click the ellipsis (. . .) to browse and select a tag.
   Values for items marked '(optional)' can be left blank.

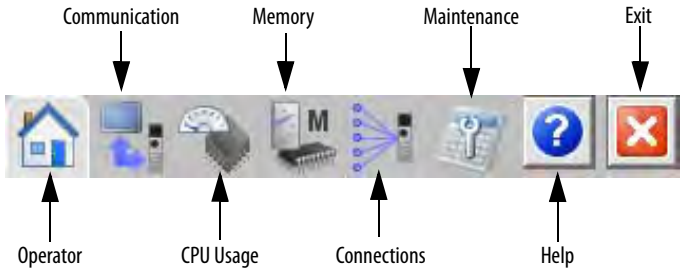
4. Click OK.

Faceplate

The L_CPU faceplate consists of six tabs and each tab consists of one or more pages.

The title bar of each faceplate contains the value of 'Cfg_Desc' local configuration tag.

The Operator tab is displayed when the faceplate is initially opened. Click the appropriate icon at the top of the faceplate to access a specific tab.

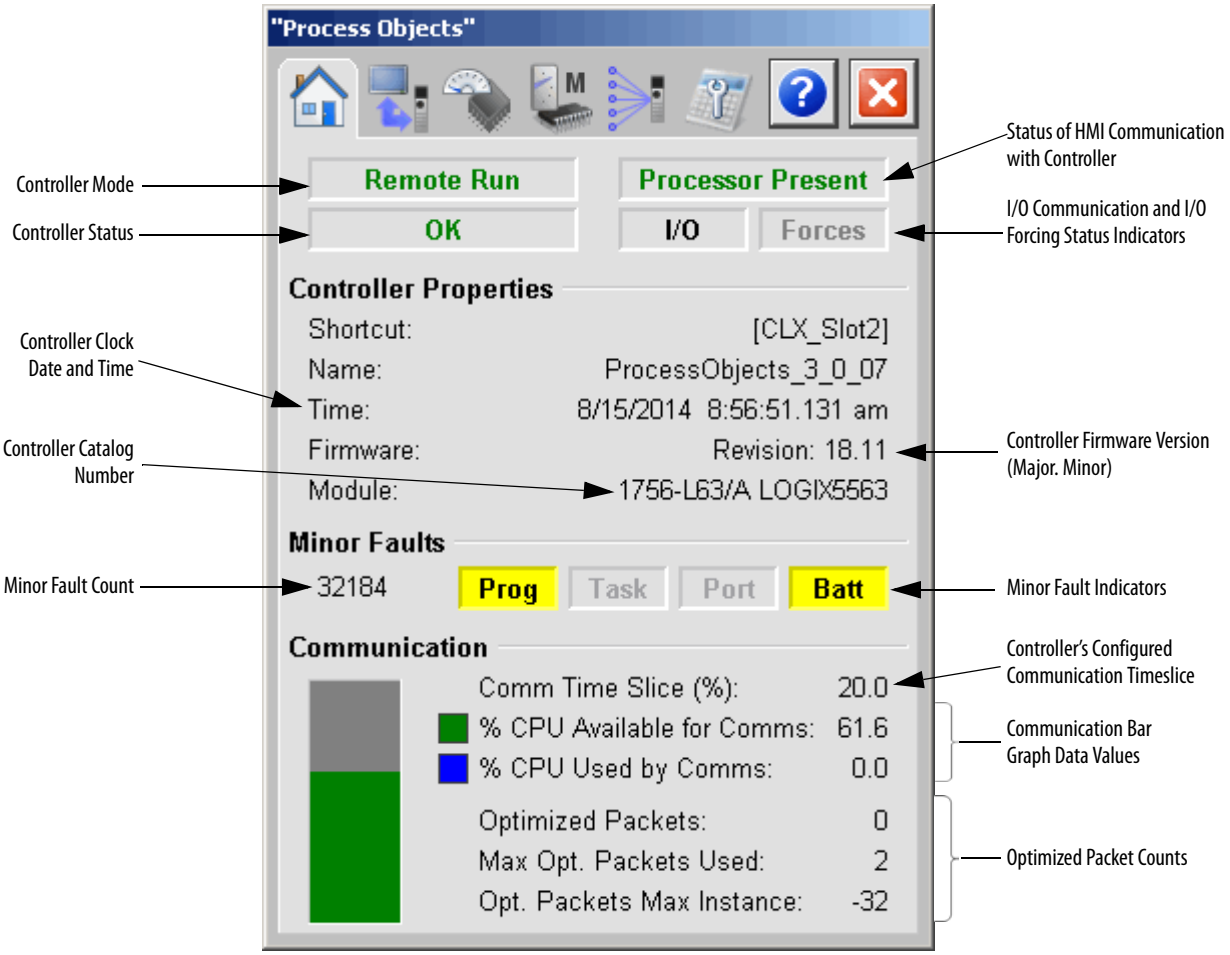


Operator Tab

The Faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the general controller status.

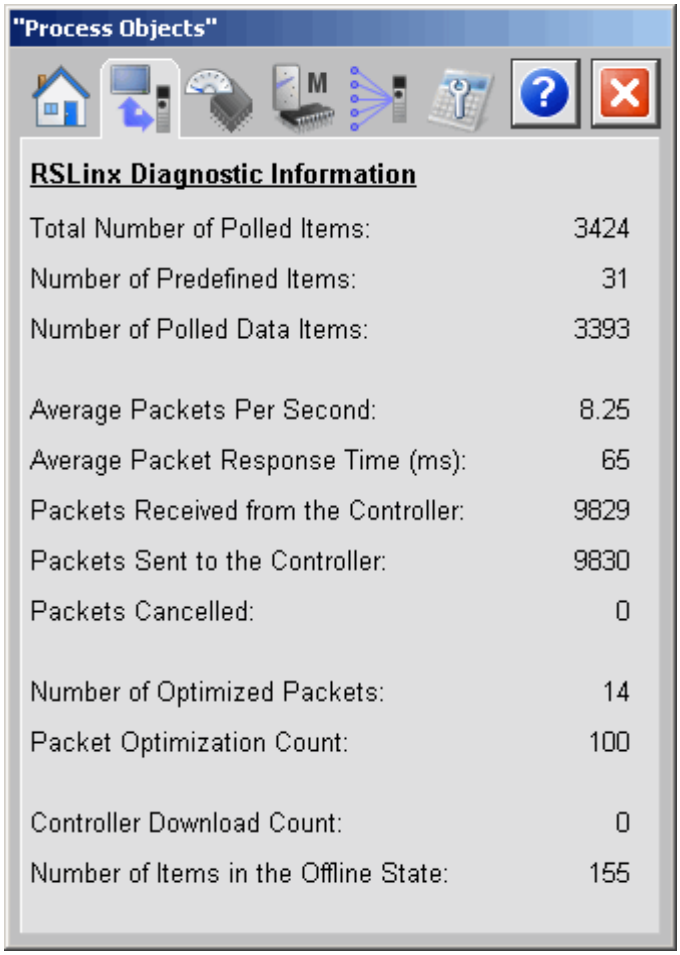
The Operator tab shows the following information:

- Controller mode
- Controller status
- Status of HMI communication with the controller
- I/O communication and I/O forcing status indicators
- Controller redundancy status (displayed only for a controller in a redundant configuration)
- Controller identity information, including catalog number and firmware major and minor revisions
- Count of minor fault occurrences, and indicators for currently active minor faults of specific classes
- Controller's configured communication timeslice value
- Nested bar graph and numeric displays that show the approximate percent CPU available for responding to communication requests from the HMI (outer bar), and the approximate percent CPU that is actually being used for responding to communication requests (inner bar). The outer bar graph changes color from green to yellow when CPU availability for communication is low, and inner bar graph changes color from blue to red when nearly all CPU availability for communication is being used.
- Count of RSLinx® optimized packets currently used, the high-water value of optimized packets used, and the largest optimized packet instance number used in the controller


"Process Objects"
Remote Run
Processor Present
OK
I/O
Forces
Controller Properties
Shortcut: [CLX_Slot2]
Name: ProcessObjects_3_0_07
Time: 8/15/2014 8:56:51.131 am
Firmware: Revision: 18.11
Module: 1756-L63/A LOGIX5563
Minor Faults
32184
Prog
Task
Port
Batt
Communication
Comm Time Slice (%): 20.0
% CPU Available for Comms: 61.6
% CPU Used by Comms: 0.0
Optimized Packets: 0
Max Opt. Packets Used: 2
Opt. Packets Max Instance: -32
Controller Mode
Controller Status
Controller Clock Date and Time
Controller Catalog Number
Minor Fault Count
Status of HMI Communication with Controller
I/O Communication and I/O Forcing Status Indicators
Controller Firmware Version (Major. Minor)
Minor Fault Indicators
Controller's Configured Communication Timeslice
Communication Bar Graph Data Values
Optimized Packet Counts

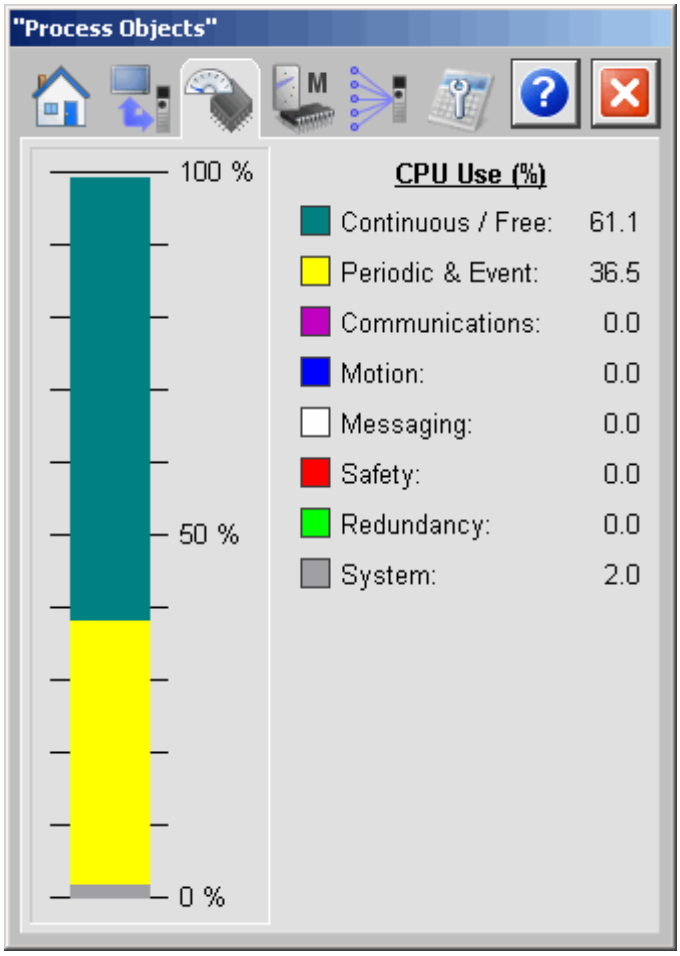
Communications Tab

The Communication tab displays diagnostic counters for the RSLinx Enterprise software driver that is being used by the HMI to communicate with the controller.



CPU Usage Tab

The CPU Usage tab shows the approximate CPU percentage that is used by each of the controller's major activities. If there is a Continuous task running in the controller, the top segment of the bar graph shows the CPU used by the Continuous task. If there is no Continuous task, the top segment shows the percentage CPU free (unused). The CPU percentages do not necessarily add up to 100% because of the variability between execution cycles of the listed tasks and rounding errors.

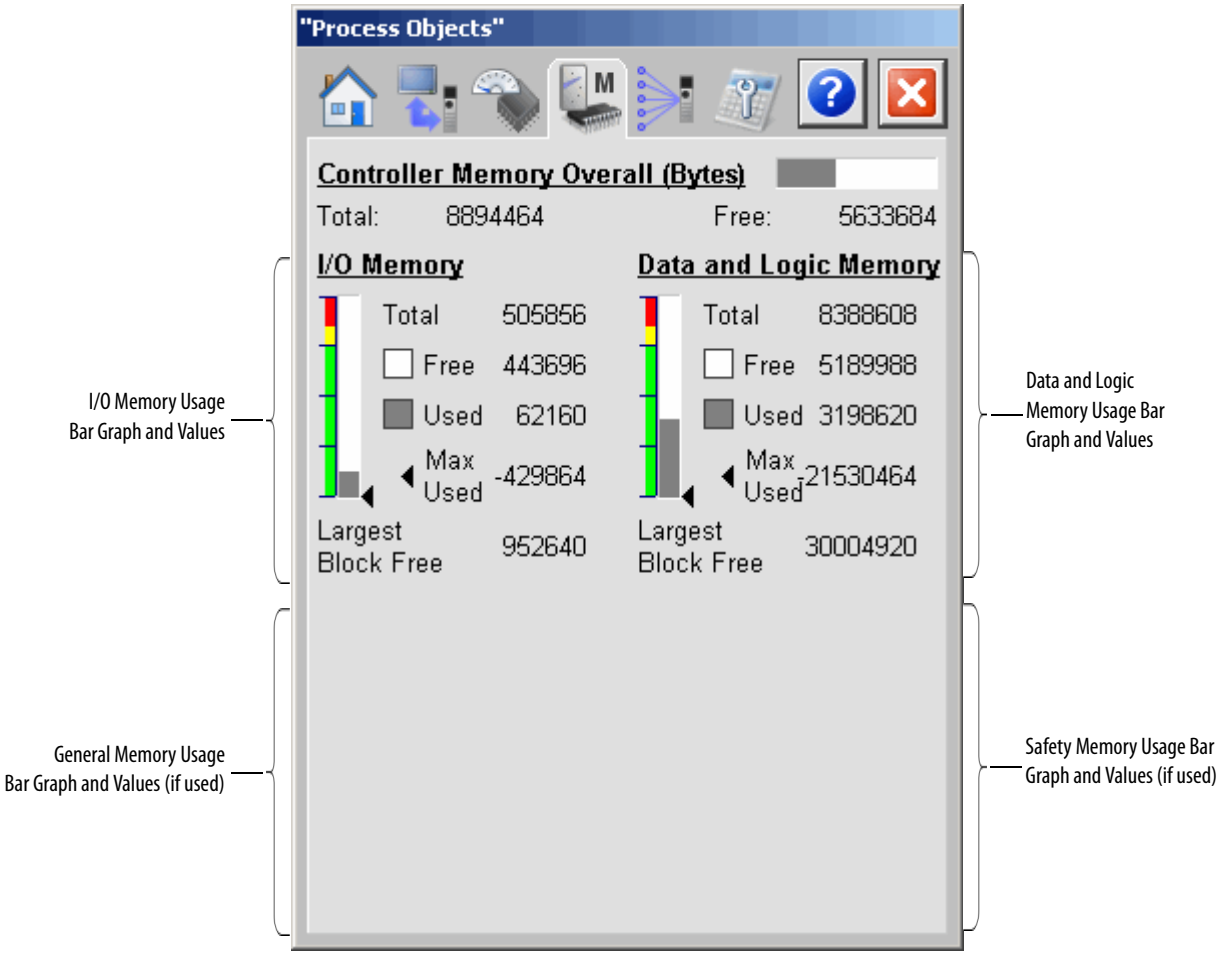


Memory Tab

Each section (I/O Memory, Data and Logic Memory, General Memory, and Safety Memory) is visible on the tab only if the controller returns a size for it that is non-zero.

The Memory tab displays the size of overall controller memory and the amount free. For each memory section displayed, the data includes the following:

- Total memory allocated to that section
- Amount of memory in that section that is used and unused
- Maximum ('high-water') amount of memory used
- Largest contiguous block of unused memory

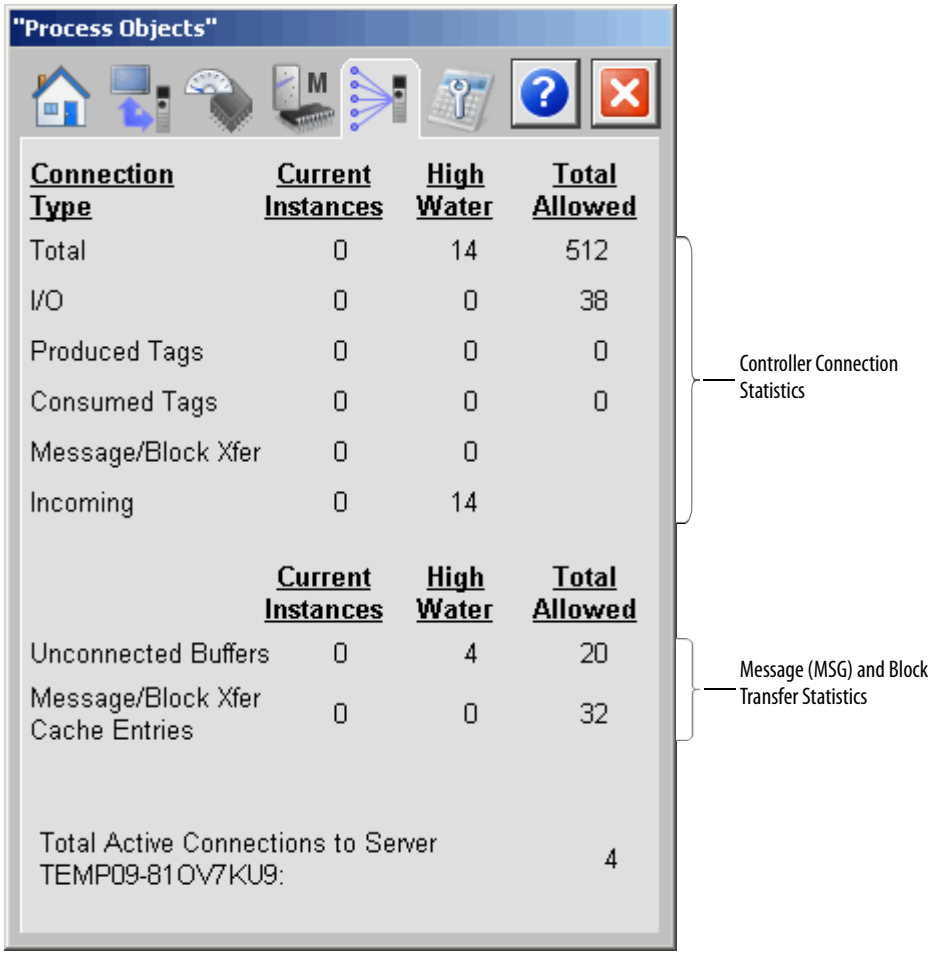


IMPORTANT Memory sections are shown only for those memory areas that 'exist', that is, the areas that are allocated memory. If an area is not allocated, its size is returned as zero and it is not displayed.

In the image above, the General Memory and Safety Memory areas have not been allocated.

Connections Tab

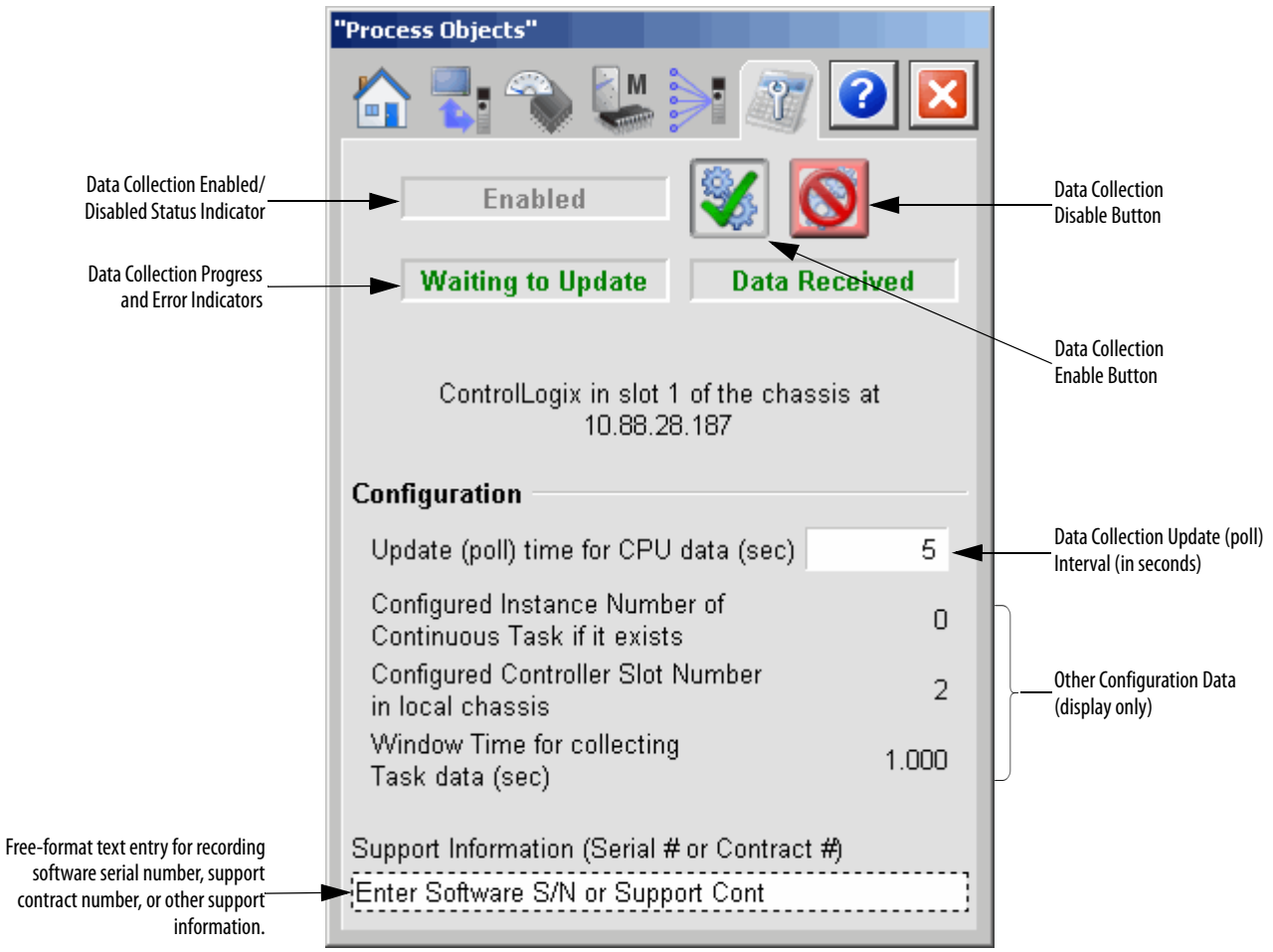
The Connections tab displays the number of connections that are being used, the highest number used, and the total available connections for several types of data transfers. Data also includes statistics for MSG instructions that are using unconnected buffers and message cache entries.



Maintenance Tab

The Maintenance tab shows the following information:

- An indicator to show whether L_CPU data collection (polling) is enabled or disabled
- An indicator to show when the L_CPU instruction is waiting before the next data collection (poll) and when a poll is in progress
- An indicator to show when a poll is busy or the result of the last poll (Data Received or Error)
- Configuration values, some of which cannot be changed from the faceplate



The following table lists the functions on the Maintenance tab.

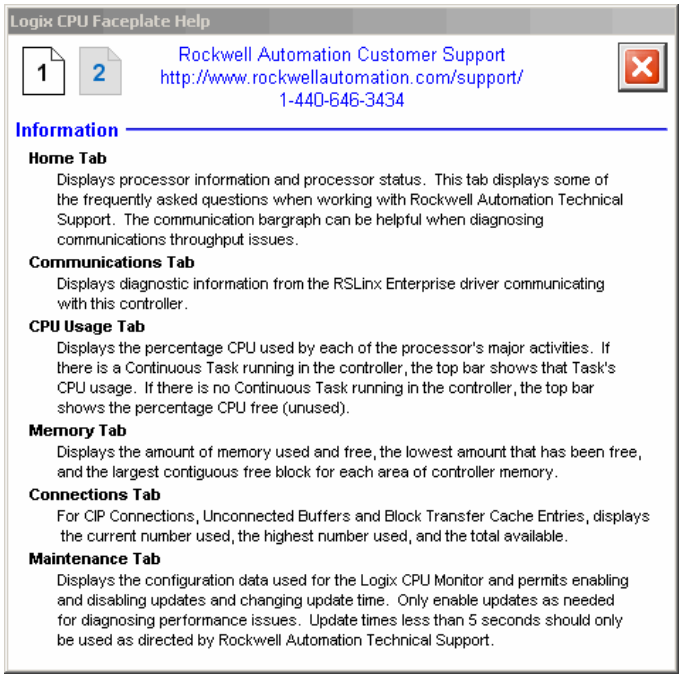
Table 12 - Maintenance Tab

Function	Action	Security	Configuration Parameters
	Click to enable collection of controller data. **IMPORTANT**: The L_CPU instruction accomplishes its data collection by using MSG instructions to the controller (MSG to self), that uses some controller communication resources. You can leave data collection disabled until it is needed. Some faceplate data is monitored without using the polling messages and still is displayed.	Equipment Maintenance (Code C)	None
	Click to disable collection of controller data. Only data collection via MSG instructions is disabled. Other data can still be updated and displayed on the faceplate. Data not updated when collection is disabled is not displayed.		
Update (poll) time for CPU data (sec)	Type the interval used to collect and update data displayed on the other faceplate tabs. **IMPORTANT**: Setting this parameter too low can result in a flood of messages to the controller, possibly impacting control performance. Do **not** use a value less than 5 seconds unless instructed to do so by a Rockwell Automation Technical Support specialist.		Cfg_UpdateT
Support Information (Serial # or Contract #)	Type a serial number for your RSLogix 5000 software or the contract number for your TechConnect or other technical support contract so it is available for ready reference if you call Rockwell Automation Technical Support.	Engineering Configuration (Code E)	Cfg_SupportInfo

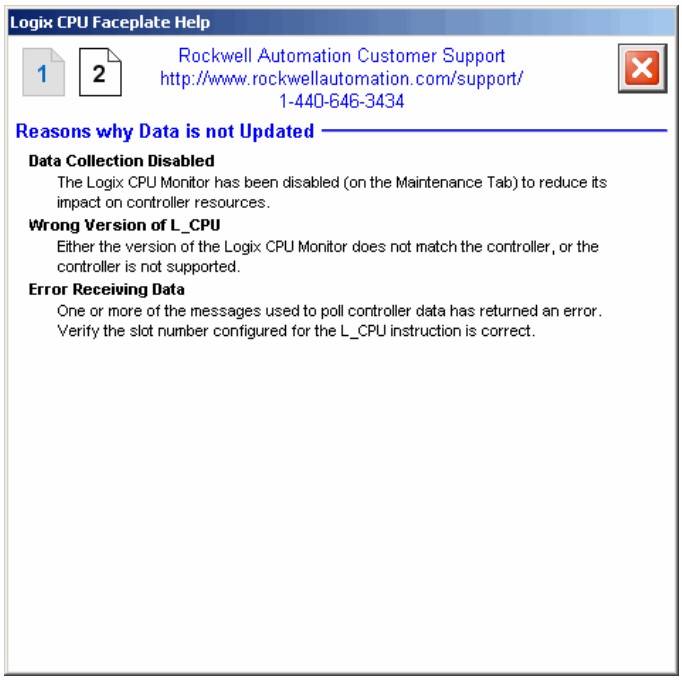
Logix CPU Faceplate Help

The Faceplate Help is divided into two pages.

Faceplate Help Page 1



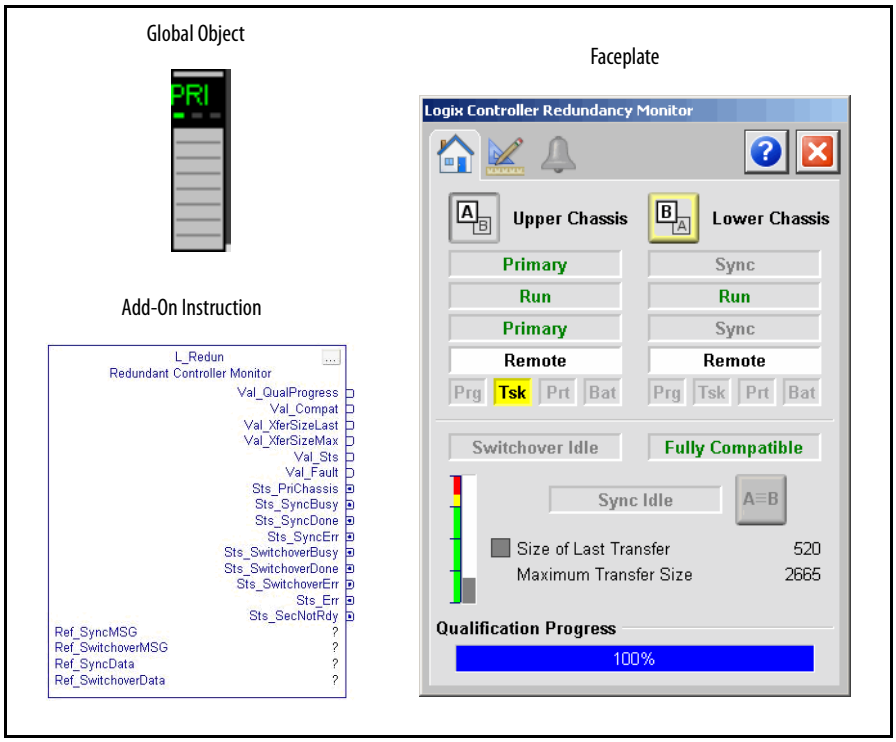
Faceplate Help Page 2



Notes:

Logix Redundant Controller Monitor (L_Redun)

The L_Redun (Logix Redundant Controller Monitor) Add-On Instruction monitors one redundant pair of Logix controllers, checking primary and secondary controller status that can impact the ability of the system to switch to the back-up controller on a failure of the primary.



Guidelines

Use this instruction in these situations:

- You are using Logix controllers in a redundant configuration.
- You want to monitor the status of the redundant controller pair.
- You want to display this status to operators, maintenance personnel, or engineers.

Do **not** use this instruction in these situations:

- You are using single Logix controllers, not in a redundant configuration. The L_Redun instruction is designed around the ControlLogix Enhanced Redundancy System architecture, by using information from the 1756-RM2 Redundancy Modules. The L_Redun Add-On Instruction does not verify in a non-redundant system because the data items it monitors do not exist in a non-redundant configuration.
- Your controllers are in an accessible location and the indicators on the controllers, network modules, and redundancy modules provide sufficient information about redundancy status.

For more information, refer to the ControlLogix Enhanced Redundancy System User Manual, publication 1756-UM535.

Functional Description

The L_Redun instruction is provided as a rung import for installation. Importing this rung into your Ladder Diagram routine imports the Add-On Instruction definition, creates an instruction instance, and creates and fills in all of the required tags and data structures for the instruction. Once the rung is imported, and prior to downloading and running the application, set the path in each Message tag referenced by the input/output parameters of the instruction to point to slot containing the 1756-RM2 module in the local chassis ('1, <slot>').

Required Files

Add-On Instructions are reusable code objects that contain encapsulated logic that can streamline implementing your system. This lets you create your own instruction set for programming logic as a supplement to the instruction set provided natively in the ControlLogix firmware. An Add-On Instruction is defined once in each controller project, and can be instantiated multiple times in your application code as needed.

Controller File

The L_Redun_3_1-**00**_RUNG.L5X rung import file must be imported into the controller project to be able to be used in the controller configuration. The service release number (boldfaced) can change as service revisions are created.

The import file is available from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

Visualization Files

The following files for this Add-On Instruction can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

IMPORTANT Files must be imported in the following order: image files, then global object files, and then graphic files. This order is required to properly configure the visualization files.

Table 13 - L_Redun Visualization File Types

Application Type	File Type	FactoryTalk View SE Software	FactoryTalk View ME Software	Description
Graphics - Global Objects	GGFX	(RA-BAS) Common Faceplate Objects	(RA-BAS-ME) Common Faceplate Objects	Common global graphics used on Logix objects faceplates.
		(RA-BAS) Logix Faceplate Objects	(RA-BAS-ME) Logix Faceplate Objects	Global objects used on Logix Object faceplates.
		(RA-BAS) Logix Graphics Library	(RA-BAS-ME) Logix Graphics Library	Graphic objects used to build displays for all Logix Objects, including L-Redun.
		(RA-BAS) Process Alarm Objects	(RA-BAS-ME) Process Alarm Objects	Common global objects used for alarming on all Process Object faceplates.
Graphics Files	GFX	(RA-BAS) L_Redun-Faceplate	(RA-BAS-ME) L_Redun Faceplate	The faceplate display used for the object.
		(RA-BAS) L_Redun-Help	(RA-BAS-ME) L_Redun Help	The help display used for the object.
		(RA-BAS) Common-AnalogEdit	N/A	Faceplate used for analog input data entry. The FactoryTalk View ME faceplates use the native analog input data entry so no file is required.
		(RA-BAS) P_Alarm-Faceplate	(RA-BAS-ME) P_Alarm-Faceplate	The alarm faceplate display used for the object.
		(RA-BAS) P_Alarm-Help	(RA-BAS-ME) P_Alarm-Help	P_Alarm Help information that is accessed from the L_Redun Help faceplate.
Graphics - Images	PNG	All .png and .bmp files in the images folder	All .png and .bmp files in the images folder	These are the common icons used in the global objects and faceplates for all Process Objects. When PNG graphic formats are imported they are renamed like a BMP file but retain a PNG format.
HMI Tags	CSV	N/A	FTVME_PlantPAxLib_Tags_3_1_**00**.csv (1)	These tags must be imported into the FactoryTalk View ME project to support switching tabs on any Process Object faceplate.

(1) The service release number (boldfaced) can change as service revisions are created.

Controller Code

This section describes the parameter references for this Add-On Instruction.

Logix Redundant Controller Monitor InOut Structure

Input/Output parameters are used to link the Add-On Instruction to external tags containing necessary data for the instruction to operate. These external tags must be of the data type shown.

Table 14 - L_Redun InOut Parameters

Name	Data Type	Description
Ref_SyncMSG	MESSAGE	Message control for MSG to sync secondary to primary.
Ref_SwitchoverMSG		Message control for MSG to initiate switch to secondary.
Ref_SyncData	DINT	Data for MSG to initiate sync of secondary to primary.
Ref_SwitchoverData		Data for MSG to initiate switch to secondary.

Logix Redundant Controller Monitor Input Structure

Input parameters include the following:

- Input data elements (Inp_) are typically used to connect field inputs from I/O modules or signals from other objects.
- Configuration data elements (Cfg_) are used to set configurable capabilities and features of the instruction.
- Command data elements (PCmd_, OCmd_, MCmd_) are used by program logic, operators, and maintenance personnel to request instruction actions.

Table 15 - L_Redun Input Parameters

Name	Data Type	Alias For	Default	Description
EnableIn	BOOL		1	**Ladder Diagram:** If the rung-in condition is true, the instruction's Logic routine executes. If the rung-in condition is false, the instruction's EnableInFalse routine executes. **Function Block Diagram:** If true, or not connected, the instruction's Logic routine executes. If the parameter is exposed as a pin and wired, and the pin is false, the instruction's EnableInFalse routine executes. **Structured Text:** No effect. The instruction's Logic routine executes.
Inp_Reset	BOOL		0	1 = Reset alarm requiring reset.
Cfg_AllowOCmdSync	BOOL		1	1 = Allow OCmd_Sync to initiate sync of secondary to primary.
Cfg_AllowMCmdSwitchover	BOOL		0	1 = Allow MCmd_Switchover to initiate switch to secondary.
Cfg_Select_A_B	BOOL		0	Selects which chassis is A and which is B; if reversed on HMI, flip this bit.
Cfg_RackSize	SINT		7	Number of slots in redundant chassis (4, 7, 10, 13, 17). Documentation purposes only; not used by the code.

Table 15 - L_Redun Input Parameters

Name	Data Type	Alias For	Default	Description
Cfg_Slot00	SINT		5	Type of module in slots 0…16: 0 = Filler 1 = ControlLogix 2 = 1757-SRM Redundancy Module 3 = 1756-RM2 Redundancy Module 4 = ControlNet 5 = EtherNet Documentation purposes only; not used by the code.
Cfg_Slot01			1	
Cfg_Slot02			3	
Cfg_Slot03			4	
Cfg_Slot04			0	
Cfg_Slot05			0	
Cfg_Slot06			0	
Cfg_Slot07			0	
Cfg_Slot08			0	
Cfg_Slot09			0	
Cfg_Slot10			0	
Cfg_Slot11			0	
Cfg_Slot12			0	
Cfg_Slot13			0	
Cfg_Slot14			0	
Cfg_Slot15			0	
Cfg_Slot16			0	
Cfg_PCmdClear	BOOL		0	When this parameter is 1, program commands are cleared once they are acted upon. When set to 0, program commands remain set until cleared by the application program logic. **IMPORTANT:** Clearing this parameter online can cause unintended program command execution.
Cfg_HasSecNotRdyAlm	BOOL	SecNotRdy.Cfg_Exists	0	1 = Secondary Not Ready alarm exists and is checked.
Cfg_SecNotRdyResetReqd		SecNotRdy.Cfg_ResetReqd	0	1 = Secondary Not Ready alarm is latched in, requires Reset command to clear.
Cfg_SecNotRdyAckReqd		SecNotRdy.Cfg_AckReqd	1	1 = Secondary Not Ready, alarm must be acknowledged.
Cfg_SecNotRdySeverity	INT	SecNotRdy.Cfg_Severity	750	This parameter determines the severity of the secondary not ready alarm. This drives the color and symbol used to indicate alarm status on the faceplate and the global object. The following are valid values: 1…250 = Low 251…500 = Medium 501…750 = High 751…1000 = Urgent **IMPORTANT:** For FactoryTalk View software version 7.0, this severity parameter drives only the indication on the global object and faceplate. The FactoryTalk Alarms and Events definition of severity drives the color and symbol used on the alarm banner, alarm summary, and the value returned by FactoryTalk Alarms and Events display commands.
PCmd_Reset	BOOL		0	Program command to reset all latched alarms.

Table 15 - L_Redun Input Parameters

Name	Data Type	Alias For	Default	Description
PCmd_SecNotRdyAck	BOOL	SecNotRdy.PCmd_Ack	0	• Set PCmd_<Alarm>Ack to 1 to Acknowledge alarm • This parameter is reset automatically
PCmd_SecNotRdySuppress		SecNotRdy.PCmd_Suppress		When Cfg_PCmdClear is 1: • Set PCmd_<Alarm>Suppress to 1 to suppress alarm • Set PCmd_<Alarm>Unsuppress to 1 to unsuppress alarm • These parameters reset automatically When Cfg_PCmdClear is 0: • Set PCmd_<Alarm>Suppress to 1 to suppress alarm • Set PCmd_<Alarm>Suppress to 0 to unsuppress alarm • PCmd_<Alarm>Unsuppress is not used • These Parameters do not reset automatically
PCmd_SecNotRdyUnsuppress		SecNotRdy.PCmd_Unsuppress		
PCmd_SecNotRdyUnshelve		SecNotRdy.PCmd_Unshelve		• Set PCmd_<Alarm>Unshelve to 1 to Unshelve alarm • This parameter is reset automatically
OCmd_Sync	BOOL		0	Operator command to initiate sync of secondary to primary.
MCmd_Switchover	BOOL		0	Maintenance command to initiate switch to secondary.
OCmd_Reset	BOOL		0	Operator command to reset all latched alarms.
OCmd_ResetAckAll	BOOL		0	Operator command to reset and acknowledge all alarms.

Logix Redundant Controller Monitor Output Structure

Output parameters include the following:

- Error data elements (Err_) are outputs of the instruction that indicate a particular configuration error. If any Err_ bit is set then the Sts_Err configuration error summary status is set and the Invalid Configuration indicator is displayed on the HMI.
- Alarm data elements (Alm_) are outputs of the instruction that indicate a particular alarm has occurred.
- Acknowledge data elements (Ack_) are outputs of the instruction that indicate the corresponding alarm has been acknowledged.
- Value data elements (Val_) are numeric outputs of the instruction for use by the HMI. Values also can be used by other application logic or software packages.
- Status data elements (Sts_) are bit outputs of the instruction for use by the HMI. Status bits can also be used by other application logic.

- Ready data elements (Rdy_) are bit outputs of the instruction used by the HMI to enable or disable command buttons and set data entry fields.

Table 16 - L_Redun Output Parameters

Name	Data Type	Alias For	Description
EnableOut	BOOL		Enable output: The EnableOut signal is not manipulated by this instruction. Its output state always reflects EnableIn Input state.
Val_ChasStateA	INT		Chassis A and chassis B state: 1 = Unknown 2 = Primary 3 = Primary with disqualified secondary 4 = Primary with no secondary 8 = Synchronized 9 = Disqualified
Val_ChasStateB			
Val_CtrlrStateA			Controller A and controller B state: 1 = Unknown 2 = Primary 3 = Primary with disqualified secondary 4 = Primary with no secondary 6 = Synchronizing 7 = Synchronizing 8 = Synchronized 9 = Disqualified 14 = None
Val_CtrlrStateB			
Val_CtrlrModeA	DINT		Controller A and controller B mode: 0 = Powerup 1 = Program 2 = Run 3 = Test Run 4 = Faulted 5 = Run to Program 6 = Test to Program 7 = Program to Run 8 = Test to Run 9 = Run to Test 10 = Program to Test 11 = Faulting
Val_CtrlrModeB			
Val_KeyswitchA			Controller A and controller B keyswitch position: 0 = Unknown 1 = Run 2 = Program 3 = Remote
Val_KeyswitchB			
Val_MinorFaultsA	DINT		Controller A and controller B minor fault bits: Bit .4 = Program Bit .6 = Task Bit .9 = Port Bit .10 = Battery
Val_MinorFaultsB			
Val_QualProgress	INT		Backup qualification progress percent complete (0…100) (-1 = not active).
Val_Compat			Controller A versus controller B module compatibility: 0 = Unknown 1 = Not compatible 2 = Fully compatible 3 = Standby compatible
Val_XferSizeLast	DINT		Number of 32-bit data words from primary to secondary: most recent transfer.
Val_XferSizeMax			Number of 32-bit data words from primary to secondary: high water mark.

Table 16 - L_Redun Output Parameters

Name	Data Type	Alias For	Description
Val_Sts	SINT		Confirmed Status: 0 = Unknown 1 = Synchronized (secondary ready) 2 = Synchronizing 3 = Secondary disqualified 4 = Secondary not present
Val_Fault			Fault Status: 0 = None 16 = Secondary not ready 17 = No communication with redundancy module
Val_Notify			Current alarm level and acknowledgement (enumeration): 0 = No alarm 1 = Alarm cleared: a reset or acknowledge is required 2 = Low (acknowledged) 3 = Low (unacknowledged) 4 = Medium (acknowledged) 5 = Medium (unacknowledged) 6 = High (acknowledged) 7 = High (unacknowledged) 8 = Urgent (acknowledged) 9 = Urgent (unacknowledged)
Sts_PriChassis	BOOL		0 = Chassis A is currently primary 1 = Chassis B is currently primary
Sts_SyncBusy			1 = Sync requested, sending command to 1756-RM2 Redundancy Module/1757-SRM Redundancy Module.
Sts_SyncDone			1 = Sync MSG to 1756-RM2 Redundancy Module/1757-SRM Redundancy Module executed without error.
Sts_SyncErr			1 = Sync MSG to 1756-RM2 Redundancy Module/1757-SRM Redundancy Module error: MSG path.
Sts_SwitchoverBusy			1 = Switchover requested, sending command to 1756-RM2 Redundancy Module/1757-SRM Redundancy Module.
Sts_SwitchoverDone			1 = Switchover MSG to 1756-RM2 Redundancy Module/1757-SRM Redundancy Module executed without error.
Sts_SwitchoverErr			1 = Switchover MSG to 1756-RM2 Redundancy Module/1757-SRM Redundancy Module error: MSG path.
Sts_AlmInh			1 = One or more alarms shelved, disabled or suppressed.
Sts_Err			1 = Error in configuration: See detail bits for reason.
Err_Alarm			1 = Error in configuration: Alarm minimum on time, shelf time, or severity.
Sts_SecNotRdy	BOOL	SecNotRdy.Inp	1 = Secondary controller is not ready to become primary.
Alm_SecNotRdy		SecNotRdy.Alm	1 = Alarm: Secondary controller is not ready to become primary.
Ack_SecNotRdy		SecNotRdy.Ack	1 = Secondary Not Ready alarm has been acknowledged, disabled by Maintenance, suppressed by Program, or shelved by Operator.
Sts_SecNotRdyDisabled		SecNotRdy.Disabled	
Sts_SecNotRdySuppressed		SecNotRdy.Suppressed	
Sts_SecNotRdyShelved		SecNotRdy.Shelved	
Rdy_Sync			1 = Ready to receive OCmd_Sync.
Rdy_Switchover			1 = Ready to receive MCmd_Switchover.

Table 16 - L_Redun Output Parameters

Name	Data Type	Alias For	Description
Rdy_Reset			1 = At least one alarm requires reset.
Rdy_ResetAckAll			1 = At least one alarm requires reset or acknowledgement.
L_Redun			Unique parameter name for auto-discovery.

Logix Redundant Controller Monitor Local Configuration Tags

Configuration parameters that are arrayed, string, or structure data types cannot be configured as parameters for Add-On Instructions. Configuration parameters of these types appear as local tags to the Add-On Instruction. Local tags can be configured through the HMI faceplates or in RSLogix 5000 software by opening the Instruction Logic of the Add-On Instruction instance and then opening the Data Monitor on a local tag. These parameters cannot be modified by using controller logic or RSLogix 5000 software export/import functionality.

Table 17 - L_Redun Local Configuration Tags

Tag Name	Data Type	Default	Description
Cfg_ChasALoc	STRING_20	'Upper Chassis'	Description of Chassis A Location.
Cfg_ChasBLoc	STRING_20	'Lower Chassis'	Description of Chassis B Location.
Cfg_Desc	STRING_40	'Logix Controller Redundancy Monitor'	Description for display on HMI. The string shows in the title bar of the faceplate.
Cfg_Label	STRING_20	'Redundant Controller'	Label for graphic symbol displayed on HMI. This string appears on the graphic symbol.
Cfg_Tag	STRING_20	'L_Redun'	Tag name for display on HMI. This string shows in the bottom right of the Home tab of the faceplate.

Operations

This section describes the primary operations for Add-On Instructions.

The L_Redun instruction monitors a redundant pair of Logix controllers and provides the following information and capabilities:

- Determines and displays whether the current primary controller is in Chassis 'A' or Chassis 'B' (as defined by user configuration)
- Displays the Chassis A and Chassis B Redundancy Module (1756-RM2) status
- Displays the Controller A and Controller B redundancy status
- Displays the Controller A and Controller B keyswitch positions
- Displays the overall compatibility between modules in Chassis A and modules in Chassis B
- Displays the synchronization progress in percent complete
- Displays the amount of data transferred from the Primary redundancy module to the Secondary in the most recent transfer, and the most sent in any transfer (high-water mark)

This instruction also supports the following commands, if enabled in the configuration:

- Initiate a switchover from Primary to Secondary
- Initiate a resynchronization of the system (if it does not take place automatically)

Modes

The L_Redun instruction has no commands or outputs intended to control equipment and so does not have any modes.

Alarm

The L_Redun Instruction uses the following alarm, implemented by using an embedded P_Alarm Add-On Instruction.

Alarm	P_Alarm Name	Description
Secondary not ready	SecNotRdy	Secondary Controller Not Ready alarm

Refer to the Rockwell Automation Library of Process Objects: Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002, for more information.

Simulation

The L_Redun Add-On Instruction does not have a Simulation capability.

Execution

The following table explains the handling of instruction execution conditions.

Table 18 - L_Redun Execution Conditions

Condition	Description
EnableIn False (false rung)	No EnableIn False logic is provided. The L_Redun instruction must always be scanned true. In Relay Ladder Logic, the L_Redun instruction must be by itself on an unconditional rung. If the Rung Import provided with the Rockwell Automation is used to install this instruction, the proper rung is created for you.
Powerup (prescan, first scan)	On Pre-scan, any commands received before first scan are discarded.
Postscan (SFC transition)	No SFC Postscan logic is provided.

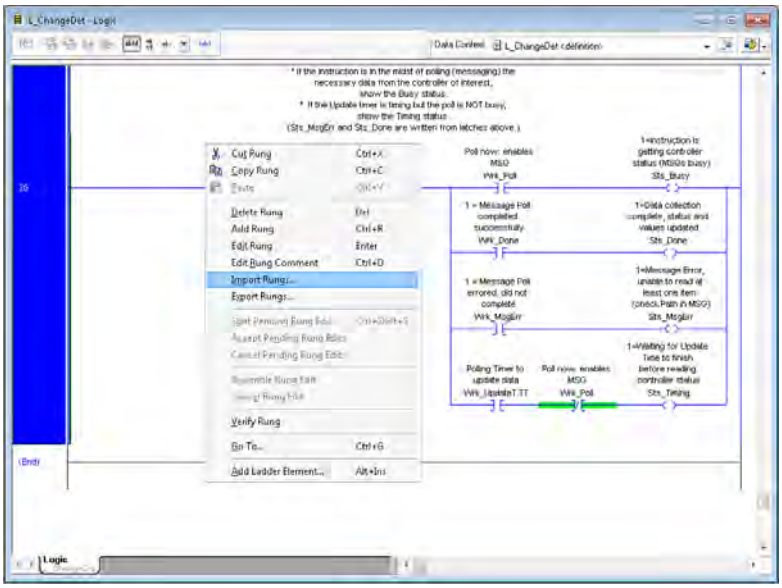
Refer to the Logix5000 Controllers Add-On Instructions Programming Manual, publication 1756-PM010, for more information.

Programming Example

The L_Redun instruction is provided fully configured as a rung import, so very little programming is required for the instruction to be used. This programming example shows how the rung import is used to instantiate the L_Redun instruction.

As L_Redun is a rung import, it needs to be created in a Ladder Diagram routine. The following steps describe how you instantiate L_Redun in your routine.

1. In your ladder routine, right-click where the rungs are to be inserted and choose Import Rungs.



   The Import Rungs dialog box appears.

2. Choose the appropriate L_Redun rung import file named in Required Files on page 44.

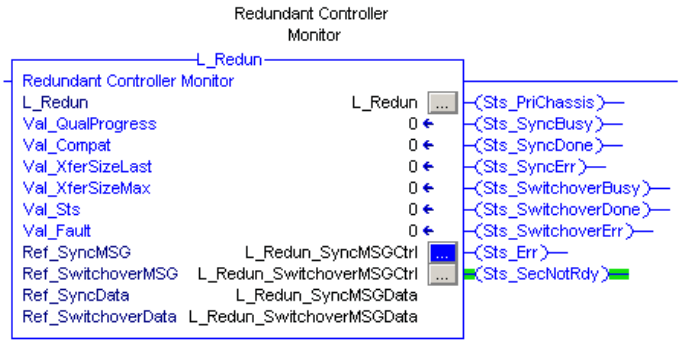
3. Click Import.

   The Import Configuration dialog box appears.

4. Click OK to create the instance of L_Redun.

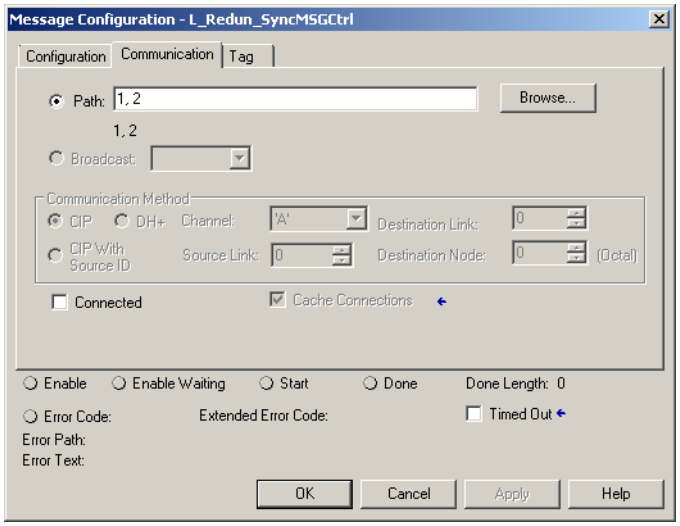
5. Complete the following steps for each of the two MSG controls to set the path to point to the 1756-RM2 module in the local chassis.

   a. Click the ellipsis next to the MSG control tag.



   The Message Configuration dialog box appears.

b. Click the Communication tab to set the second number in the path to the slot number of the 1756-RM2 module.

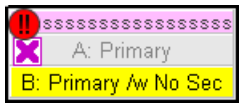


c. Click OK.

Display Elements

A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, in conjunction with tag structures in the ControlLogix system, aid consistency and save engineering time.

Table 19 - L_Redun Display Elements Description

Display Element Name	Display Element	Description
GO_L_Redun		This global object is used for redundancy modules.
GO_L_Redun2Slot		This global object is used for 2-slot redundancy modules.
GO_L_RedunDisplay		This display element is used to represent the Redundant Controller Monitor.

The L_Redun instruction has display elements (global objects) for use on process graphic displays. These elements provide you with the following:

- Information on the object's current state
- Touch field to open the object's faceplate
- Tooltip to display the object's configured tag and description

Status/Quality Indicators

Each of these symbols appears when the described condition is true.

Graphic Symbol	Description
	Invalid configuration.
	Communication Fault.
No symbol displayed	Communication OK and configuration valid.

TIP When the Invalid Configuration indicator appears, you can find what configuration setting is invalid by following the indicators. Click the graphic symbol to open the faceplate. The Invalid Configuration indicator appears next to the appropriate tab at the top of the faceplate to guide you in finding the configuration error. Once you navigate to the tab, the misconfigured item is flagged with this indicator or appears in a magenta box.

For the L_Redun instruction, the Invalid Configuration indicator appears under the following conditions:

- The Alarm Minimum On time or Shelf time is set to a value less than zero or greater than 2,147,483 seconds.
- Alarm Severity is set to a value less than 1 or greater than 1000.

Alarm Indicators

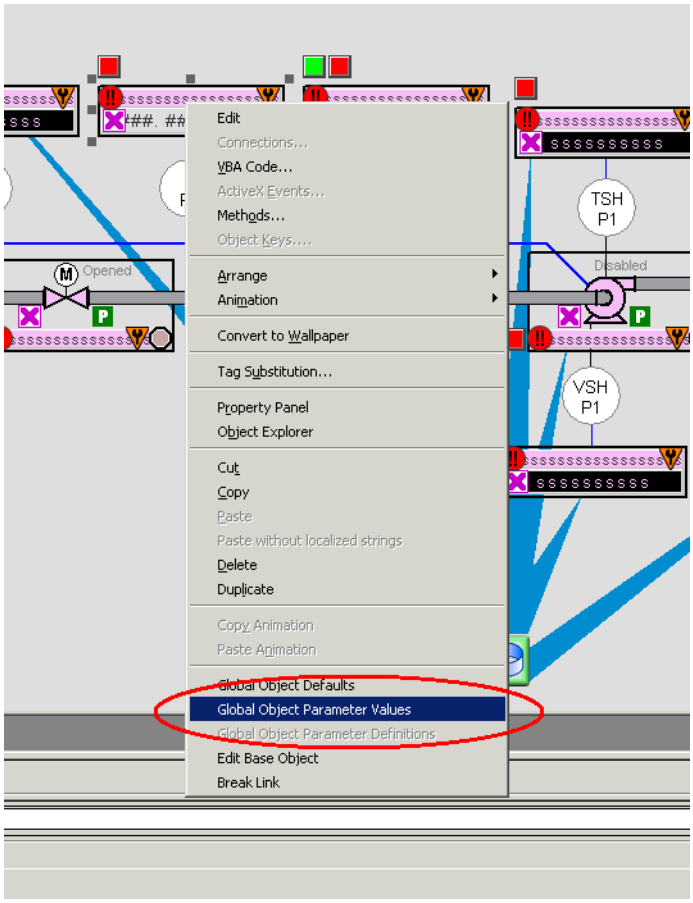
One of these symbols appears on the global object to indicate the described alarm condition. The alarm border and label background blink if acknowledgement of an alarm condition is required.

Symbol	Border and Label Background	Description
	No change in color	Alarm Inhibit: an alarm is suppressed by the Program, disabled by Maintenance, or shelved by the Operator.
	White	Return to normal (no alarm condition), but a previous alarm has not been acknowledged.
	Blue	Low severity alarm.
	Yellow	Medium severity alarm.
	Red	High severity alarm.
	Magenta	Urgent severity alarm.
No symbol	No change in color	No alarm or alarm inhibit condition, and all alarms are acknowledged.

Using Display Elements

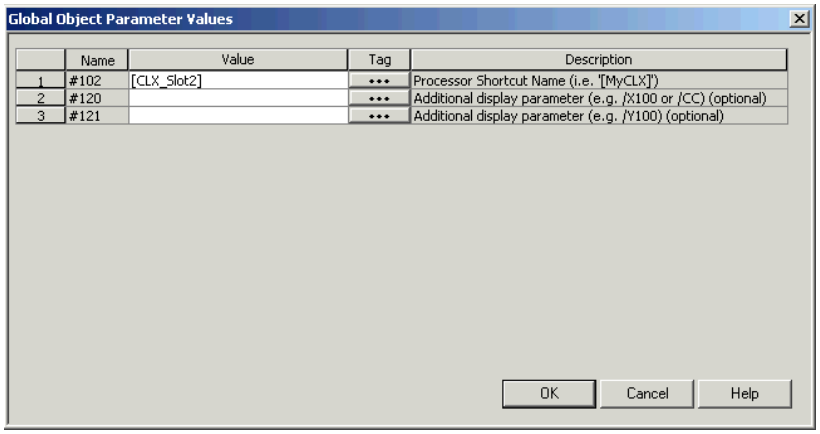
The global objects for L_Redun can be found in the global object file (RA-BAS) L_Redun Graphics Library.ggfx. Do the following to use a global object.

1. Copy it from the global object file and paste it in the display file.



2. In the display, right-click the global object and choose Global Object Parameter Values.

   The Global Object Parameter Values dialog box appears.



The global object parameters are as follows.

Parameter	Required	Description
#102	Y	RSLinx Enterprise shortcut pointing to the controller.
#120	N	Additional parameter to pass to the display command to open the faceplate. Typically used to define position for the faceplate.
#121	N	Additional parameter to pass to the display command to open the faceplate. if defining X and Y coordinate, separate parameters so that X is defined by #120 and Y is defined by #121. This lets these same parameters to be used in subsequent display commands originating from the faceplate.

3. Type the tag or value in the Value column as specified in the Description column.

   TIP You can click the ellipsis (. . .) to browse and select a tag.
   Values for items marked '(optional)' can be left blank.

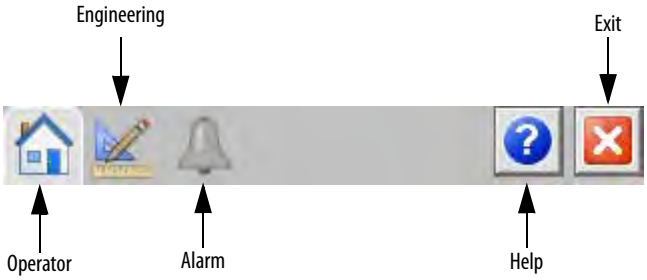
4. Click OK.

Faceplate

The L_Redun faceplate consists of three tabs and each tab consists of one or more pages.

The title bar of each faceplate contains the value of the 'Cfg_Desc' local configuration tag.

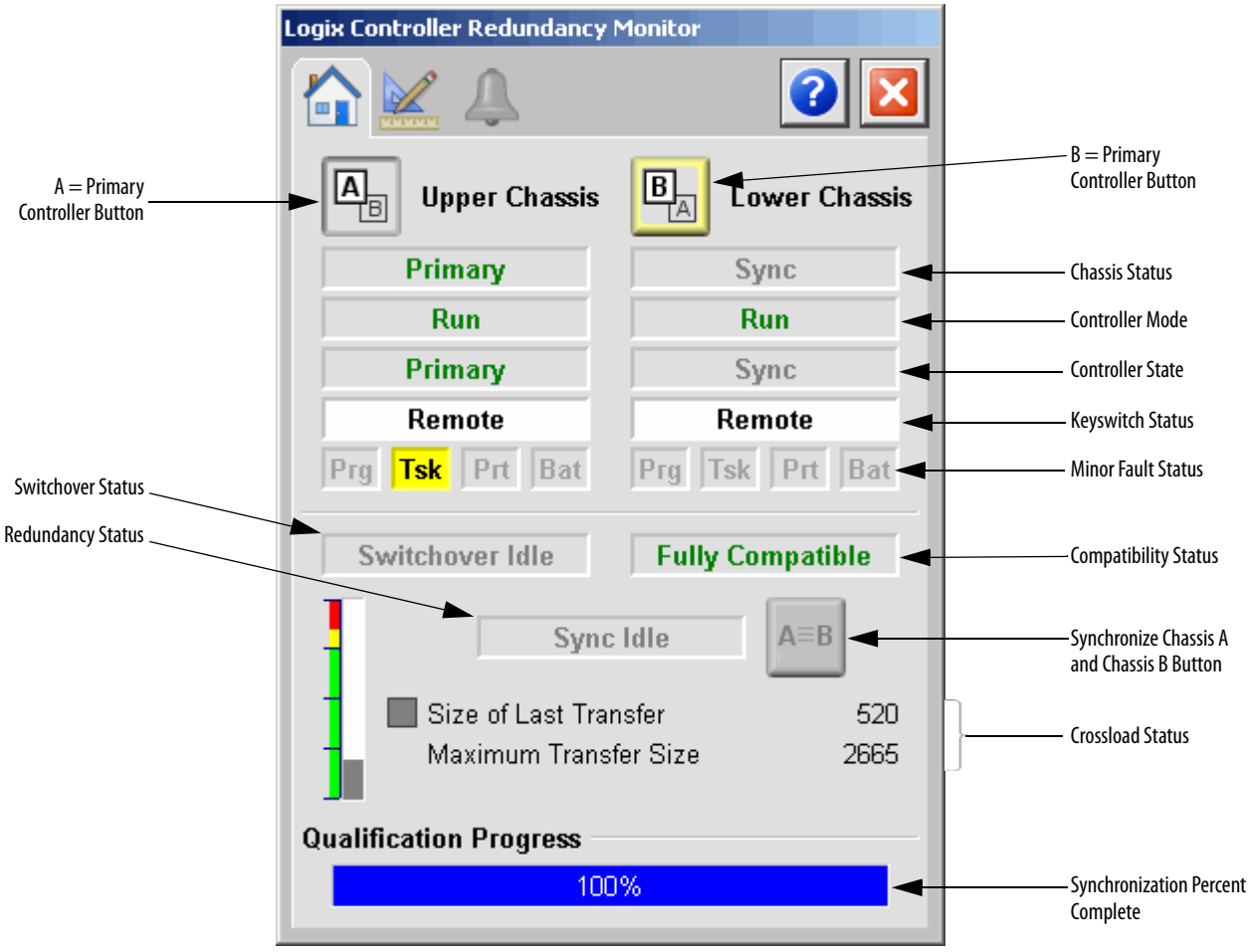
The Operator tab is displayed when the faceplate is initially opened. Click the appropriate icon at the top of the faceplate to access a specific tab.



The faceplate provides the means for operators, maintenance personnel, engineers, and others to interact with the L_Redun instruction instance, including viewing its status and values and manipulating it through its commands and settings. When a given input is restricted via FactoryTalk View security, the required user security code letter is shown in the tables that follow.

Operator Tab

The Operator tab provides status information on the primary and secondary controllers.



The following table shows the function of the Alarm tab.

Table 20 - Operator Tab Description

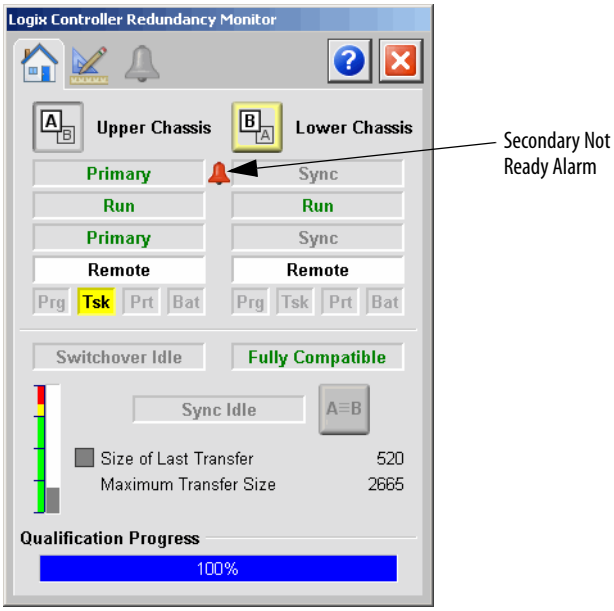
Function	Action	Security
	Click to make the controller in Chassis A the Primary controller.	Equipment Maintenance (Code C)
	Click to make the controller in Chassis B the Primary controller.	
	Click to start the synchronization process between the controllers in Chassis A and Chassis B.	Normal Operation of Devices (Code A)

The following table shows the alarm status symbols used on the Operator tab.

Table 21 - Operator Tab Alarm Status

Graphic Symbol	Alarm Status
	In Alarm (Active Alarm)
	In Alarm and Acknowledged
	Out of Alarm but not Acknowledged
	Alarm Suppressed (by Program)
	Alarm Disabled (by Maintenance)
	Alarm Shelved (by Operator)

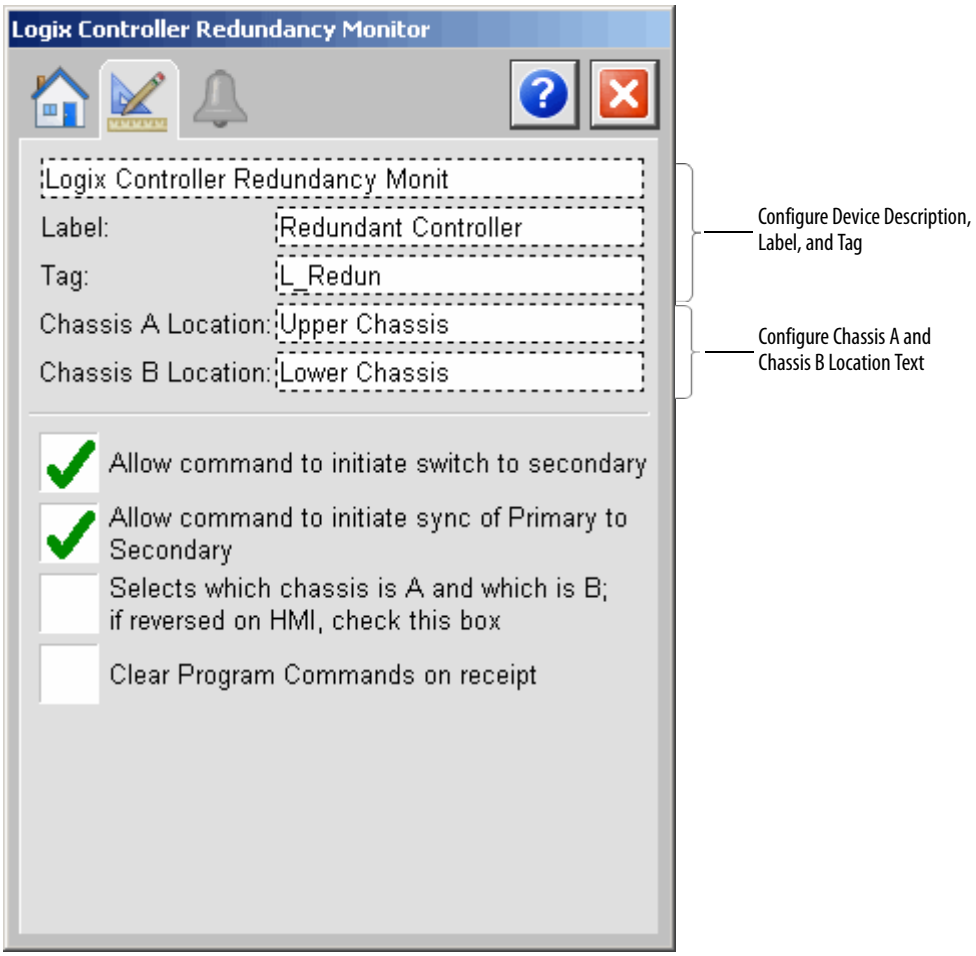
Alarm indicators appear on the Operator tab when the corresponding alarm occurs.



Engineering Tab

The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, and faceplate-to-faceplate navigation settings, for initial system commissioning or later system changes.

On the Engineering tab, you can identify and configure each chassis and configure display, switchover, and synchronization options.



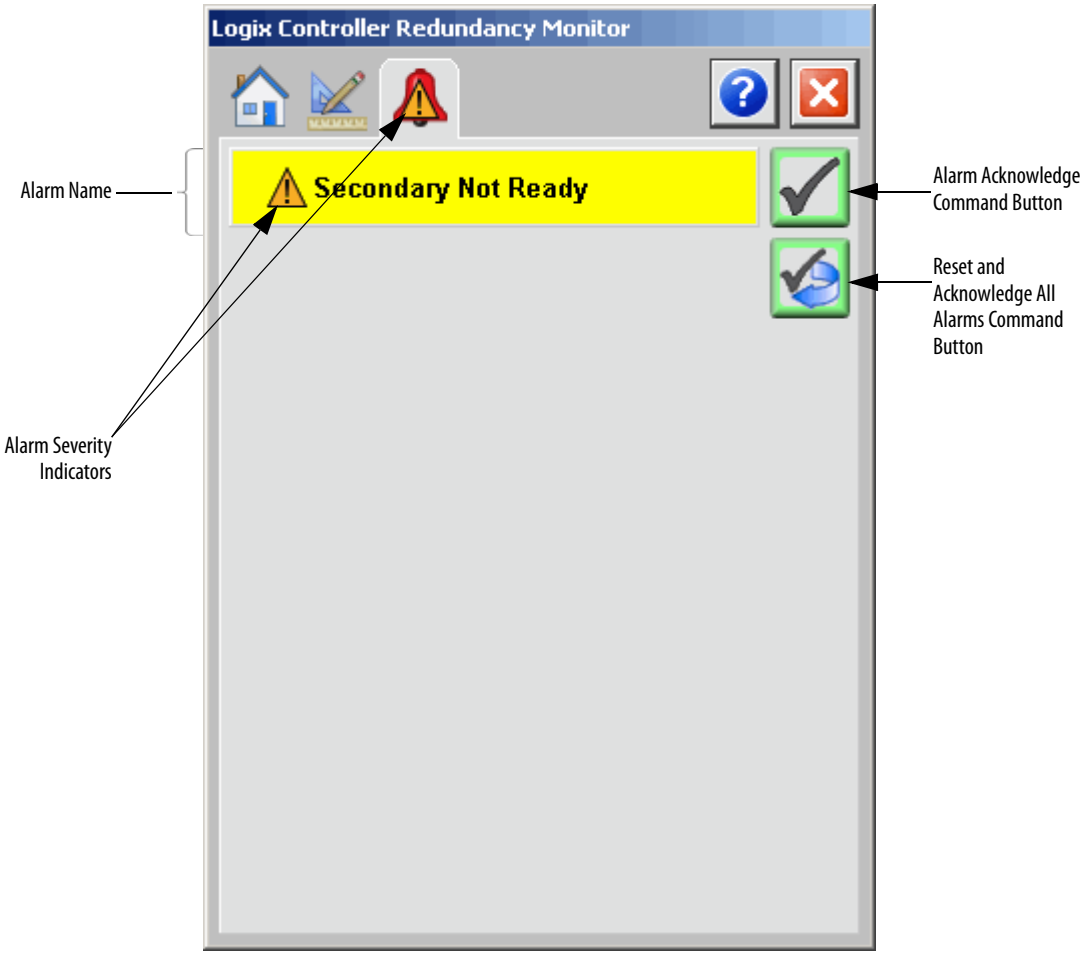
The following table lists the functions on the Engineering tab.

Table 22 - Engineering Tab Description

Function	Action	Security	Configuration Parameters
Cfg_Desc	Type the device description to show on the faceplate title bar.	Engineering Configuration (Code E)	Cfg_Desc
Cfg_Label	Type the label to show on the graphic symbol.		Cfg_Label
Cfg_Tag	Type the tag name to show on the faceplate title bar and in the tooltip. **TIP:** Pausing the mouse over this field displays a tool tip with the configured Logix tag/path.		Cfg_Tag
Chassis A Location Chassis B Location	Type the text for Chassis A Location and Chassis B Location that appears on the faceplate.		• Cfg_ChasALoc • Cfg_ChasBLoc
Allow command to initiate switch to secondary	Check to enable the Maintenance command to switch to the secondary controller.		Cfg_AllowMCmdSwitchover
Allow command to initiate sync of Primary to Secondary	Check to enable the Operator command to initiate synchronization of the primary controller to the secondary controller.		Cfg_AllowOCmdSync
Selects which chassis is A and which is B; if reversed on HMI, check this box	Check to designate chassis A and chassis B on the HMI.		Cfg_Select_A_B
Clear Program Commands on receipt	Check to clear Programs commands on receipt.		Cfg_PCmdClear

Alarms Tab

The Alarms tab displays each configured alarm for the L_Redun instruction. The icon on the tab for the alarms page changes color based on the current active alarms. A blinking alarm icon indicates that one or more alarms must be acknowledged or the device must be reset.



Click an alarm name to open the P_Alarm faceplate for that alarm. From the P_Alarm faceplate, you can configure and perform additional operations on the alarm.

If an alarm is active, the panel behind the alarm changes color to match the severity of the alarm. The color of the bell icon at the top of the faceplate shows the highest active alarm's severity, and the icon blinks if any alarm is unacknowledged or requires reset.

Table 23 - Alarm Color Definitions

Color	Definition
Magenta	Urgent
Red	High
Yellow	Medium
Blue	Low
White (bell icon)	Alarm has cleared but is unacknowledged
Background (light gray)	No alarm

The following table shows the function of the Alarm tab.

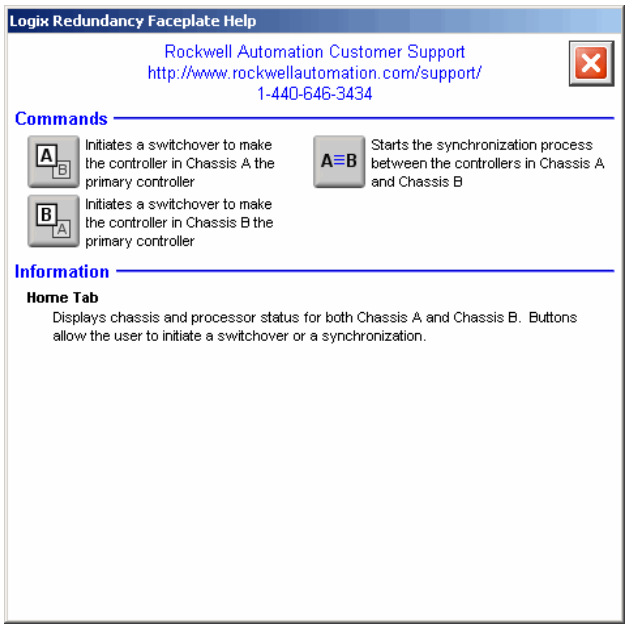
Table 24 - Alarms Tab Description

Function	Action	Security
Alarm Name	Click the alarm name to open the associated P_Alarm faceplate.	None
	Click to acknowledge the alarm.	Acknowledge Alarms (Code F)
	Click to reset and acknowledge all alarms.	

The Reset and Acknowledge All Alarms button is enabled, the panel behind the alarm blinks, and the Alarm Acknowledge button is enabled if the alarm requires acknowledgment. Click the button with the checkmark to acknowledge the alarm.

Refer to the Rockwell Automation Library of Process Objects: Common Alarm Mode (P_Alarm) Reference Manual, publication SYSLIB-RM002, for more information.

L_Redun Faceplate Help



Notes:

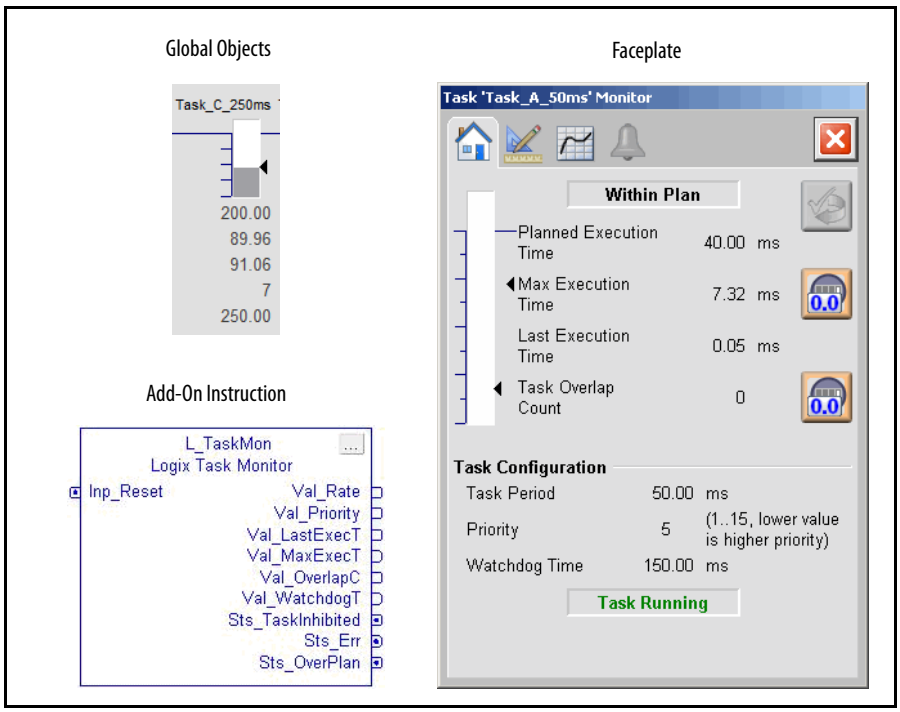
Logix Task Monitor (L_TaskMon)

The L_TaskMon (Logix Task Monitor) Add-On Instruction monitors one task running in a Logix controller to provide task statistics, such as task scan time and overlap count.

The instruction also provides the following:

- Task configuration settings, such as priority, rate, and watchdog timer setting
- Task 'plan' execution time
- Alarm if the planned execution time is exceeded

  Maintenance commands are provided for clearing the maximum execution time and the overlap count.



Guidelines

Use this instruction in these situations:

- Monitor the execution of one or more tasks in a Logix controller
- Set an alarm when task execution time exceeds a 'plan' threshold

Do **not** use this instruction if you are using suitable software or another method to monitor controller task execution.

Functional Description

The L_TaskMon instruction includes an Add-On Instruction for use with RS Logix 5000 software, version 18 or later, Logix controllers, firmware revision 18 or later, and a graphic symbol and faceplate display for use with either FactoryTalk View Site Edition or Machine Edition software, version 7.0 or later.

Required Files

Add-On Instructions are reusable code objects that contain encapsulated logic that can streamline implementing your system. This lets you create your own instruction set for programming logic as a supplement to the instruction set provided natively in the ControlLogix firmware. An Add-On Instruction is defined once in each controller project, and can be instantiated multiple times in your application code as needed.

Controller File

The L_TaskMon_3_1-**00**_RUNG.L5X Add-On Instruction must be imported into the controller project for use in the controller configuration. The service release number (boldfaced) can change as service revisions are created.

The import file is available from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

Visualization Files

The following files for this Add-On Instruction can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

IMPORTANT	Files must be imported in the following order: image files, then global object files, and then graphic files. This order is required to properly configure the visualization files.

Table 25 - L_TaskMon Visualization File Types

Application Type	File Type	FactoryTalk View SE Software	FactoryTalk View ME Software	Description
Graphics - Global Objects	GGFX	(RA-BAS) Logix Faceplate Objects	(RA-BAS-ME) Logix Faceplate Objects	Global objects used on Logix Object faceplates.
		(RA-BAS) Logix Graphics Library	(RA-BAS-ME) Logix Graphics Library	Graphic objects used to build displays for all Logix Objects, including L_TaskMon.
		(RA-BAS) Common Faceplate Objects	(RA-BAS-ME) Common Faceplate Objects	Common global graphics used on Logix Objects faceplates.
		(RA-BAS) Process Alarm Objects	(RA-BAS-ME) Process Alarm Objects	Common global objects used for alarming on all Process Object faceplates.
Graphics Files	GFX	(RA-BAS) L_TaskMon-Faceplate	(RA-BAS-ME) L_TaskMon Faceplate	The faceplate display used for the object.
		(RA-BAS) Common Analog Edit	N/A	Faceplate used for analog input data entry. the FactoryTalk View ME faceplates use the native analog input data entry so no file is required.
		(RA-BAS) P_Alarm-Faceplate	(RA-BAS-ME) P_Alarm-Faceplate	The alarm faceplate display used for the object.
		(RA-BAS) P_Alarm-Help	(RA-BAS-ME) P_Alarm-Help	P_Alarm Help information that is accessed from the L_TaskMon Help faceplate.
Optional Graphic Display		(RA-BAS) L_TaskMon-Summary	(RA-BAS-ME) L_TaskMon-Summary	Contains eight (8) L_TaskMon objects to show all of the tasks in a controller.
Graphics - Images	PNG	All .png files in the images folder	All .png files in the images folder	These are the common icons used in the global objects and faceplates for all Process Objects. When PNG graphic formats are imported they are renamed like a BMP file but retain a PNG format.
HMI Tags	CSV	N/A	FTVME_PlantPAxLib_Tags_3_1_**00**.csv (1)	These tags must be imported into the FactoryTalk View ME project to support switching tabs on any Process Object faceplate.

(1) The service release number (boldfaced) can change as service revisions are created.

Controller Code

This section describes the parameter references for this Add-On Instruction.

Logix Task Monitor Input Structure

Input parameters include the following:

- Input data elements (Inp_) are typically used to connect field inputs from I/O modules or signals from other objects.
- Configuration data elements (Cfg_) are used to set configurable capabilities and features of the instruction.
- Command data elements (PCmd_, OCmd_, MCmd_) are used by program logic, operators, and maintenance personnel to request instruction actions.

Table 26 - L_TaskMon Input Parameters

Name	Data Type	Alias For	Default	Description
EnableIn	BOOL		1	**Ladder Diagram:** If the rung-in condition is true, the instruction's Logic routine executes. If the rung-in condition is false, the instruction's EnableInFalse routine executes. **Function Block Diagram:** If true, or not connected, the instruction's Logic routine executes. If the parameter is exposed as a pin and wired, and the pin is false, the instruction's EnableInFalse routine executes. **Structured Text:** No effect. The instruction's Logic routine executes.
Inp_Reset	BOOL		0	1 = Reset max task time and any alarm requiring reset.
Cfg_PCmdClear	BOOL		1	When this parameter is 1, program commands are cleared once they are acted upon. When set to 0, program commands remain set until cleared by the application program logic. This parameter is aliased to internal tag Mode.Cfg_PCmdClear from P_Mode. **IMPORTANT:** Clearing this parameter online can cause unintended program command execution.
Cfg_HasOverPlanAlm	BOOL	OverPlan.Cfg_Exists	0	1 = Task plan exceeded alarm exists and is checked.
Cfg_OverPlanResetReqd	BOOL	OverPlan.Cfg_ResetReqd	0	1 = Task plan exceeded alarm is latched in, requires reset command to clear.
Cfg_OverPlanAckReqd	BOOL	OverPlan.Cfg_AckReqd	1	1 = Task plan exceeded alarm must be acknowledged.
Cfg_OverPlanSeverity	INT	OverPlan.Cfg_Severity	500	This parameter determines the severity of each alarm. This drives the color and symbol that are used to indicate alarm status on the faceplate and global object. The following are valid values: 1…250 = Low 251…500 = Medium 501…750 = High 751…1000 = Urgent **IMPORTANT:** For FactoryTalk View software version 7.0, this severity parameter drive only the indication on the global object and faceplate. The FactoryTalk Alarms and Events definition of severity drives the color and symbol that is used on the alarm banner and alarm summary as well as the value returned by FactoryTalk Alarms and Events display commands.
Cfg_PlanExecT	REAL		3000.00	Expected execution time of task (including interrupts) (milliseconds).
PCmd_Reset	BOOL		0	• Set PCmd_Reset to 1 to reset all alarms requiring reset • This parameter is always reset automatically

Table 26 - L_TaskMon Input Parameters

Name	Data Type	Alias For	Default	Description
PCmd_OverPlanAck	BOOL	OverPlan.PCmd_Reset	0	• Set PCmd_<Alarm>Ack to 1 to Acknowledge alarm • The parameter is reset automatically
PCmd_OverPlanSuppress		OverPlan.PCmd_Suppress		When Cfg_PCmdClear is 1: • Set PCmd_<Alarm>Suppress to 1 to suppress alarm • Set PCmd_<Alarm>Unsuppress to 1 to unsuppress alarm • These parameters reset automatically When Cfg_PCmdClear is 0: • Set PCmd_<Alarm>Suppress to 1 to suppress alarm • Set PCmd_<Alarm>Suppress to 0 to unsuppress alarm • PCmd_<Alarm>Unsuppress is not used • These Parameters do not reset automatically
PCmd_OverPlanUnsuppress		OverPlan.PCmd_Unsuppress		
PCmd_OverPlanUnshelve		OverPlan.PCmd_Unshelve		• Set PCmd_<Alarm>Unshelve to 1 to Unshelve alarm • The parameter is reset automatically
MCmd_ClearMaxExecT	BOOL		0	Maintenance command to clear maximum execution time.
MCmd_ClearOverlapC	BOOL		0	Maintenance command to clear task overlap count.
OCmd_Reset	BOOL		0	Operator command to reset latched alarm .
OCmd_ResetAckAll	BOOL		0	Operator command to reset and acknowledge all alarms.

Logix Task Monitor Output Structure

Output parameters include the following:

- Value data elements (Val_) are numeric outputs of the instruction for use by the HMI. Values also can be used by other application logic or software packages.
- Status data elements (Sts_) are bit outputs of the instruction for use by the HMI. Status bits also can be used by other application logic.
- Error data elements (Err_) are outputs of the instruction that indicate a particular configuration error. If any Err_ bit is set then the Sts_Err configuration error summary status is set and the Invalid Configuration indicator is displayed on the HMI.
- Alarm data elements (Alm_) are outputs of the instruction that indicate a particular alarm has occurred.
- Acknowledge data elements (Ack_) are outputs of the instruction that indicate the corresponding alarm has been acknowledged.
- Ready data elements (Rdy_) are bit outputs of the instruction used by the HMI to enable or disable command buttons and setting entry fields.

Table 27 - L_TaskMon Output Parameters

Name	Data Type	Alias For	Description
EnableOut	BOOL		Enable output: The EnableOut signal is not manipulated by this instruction. Its output state always reflects EnableIn Input state.
Val_Rate	REAL		Configured task period (milliseconds).
Val_Priority	DINT		Configured task priority (1…15, the lower the number, the higher the priority).
Val_LastExecT	REAL		Actual last execution time of task (milliseconds).
Val_MaxExecT			Highest execution time of task (milliseconds).
Val_OverlapC	DINT		Task overlap count.
Val_WatchdogT	REAL		Configured task watchdog timer value (milliseconds).
Val_Notify	SINT		Current alarm level and acknowledgement (enumeration): 0 = No alarm 1 = Alarm cleared: a reset or acknowledge is required 2 = Low (acknowledged) 3 = Low (unacknowledged) 4 = Medium (acknowledged) 5 = Medium (unacknowledged) 6 = High (acknowledged) 7 = High (unacknowledged) 8 = Urgent (acknowledged) 9 = Urgent (unacknowledged)
Sts_TaskInhibited	BOOL		1 = Task is inhibited 0 = Task is active
Sts_AlmInh	BOOL		1 = An alarm is shelved, disabled, or suppressed: display icon.
Sts_Err	BOOL		1 = Error in configuration: See detail bits for reason.
Err_Plan	BOOL		1 = Error in configuration: Task planned execution time (use 0…2,000,000 milliseconds).
Err_Alarm	BOOL		1 = Error in configuration: Alarm Min On Time, Shelf Time, or Severity

Table 27 - L_TaskMon Output Parameters

Name	Data Type	Alias For	Description
Sts_OverPlan	BOOL	OverPlan.Inp	1 = Task actual time exceeds plan time.
Alm_OverPlan		OverPlan.Alm	1 = Alarm: Planned task time exceeded.
Ack_OverPlan		OverPlan.Ack	1 = T ask plan exceeded alarm has been acknowledged, disabled by Maintenance, suppressed by Program, or shelved by Operator.
Sts_OverPlanDisabled		OverPlan.Disabled	
Sts_OverPlanSuppressed		OverPlan.Suppressed	
Sts_OverPlanShelved		OverPlan.Shelved	
Rdy_Reset	BOOL		1 = Ready for OCmd_Reset (enables button).
Rdy_ResetAckAll	BOOL		1 = At least one alarm requires reset or acknowledgement.
L_TaskMon	BOOL		Unique parameter name for auto-discovery.

Logix Task Monitor Local Configuration Tags

Configuration parameters that are arrayed, string, or structure data types cannot be configured as parameters for Add-On Instructions. Configuration parameters of these types appear as local tags to the Add-On Instruction. Local tags can be configured through the HMI faceplates or in RSLogix 5000 software by opening the Instruction Logic of the Add-On Instruction instance and then opening the Data Monitor on a local tag. These parameters cannot be modified by using controller logic or RSLogix 5000 software export/import functionality.

Table 28 - L_TaskMon Local Configuration Tags

Tag Name	Data Type	Default	Description
Cfg_Desc	STRING_40	'Logix Task Monitor'	Description for display on HMI. This string is shown in the title bar of the faceplate.
Cfg_Label	STRING_20	'Task Monitor'	Label for graphic symbol displayed on HMI. This string appears on the graphic symbol.
Cfg_Tag	STRING_20	'L_TaskMon'	Tag name for display on HMI. This string shows in the bottom right of the Home tab of the faceplate.

Operations

The L_TaskMon instruction monitors one task in a Logix controller, and provides the following:

- Task configuration information:
  - Task Name
  - Task Priority
  - Task Rate (for a Periodic Task)
  - Watchdog Timer setting
- Task statistics:
  - Last scan time
  - Maximum scan time
  - Task Overlap count
  - Maintenance commands to reset the maximum time and overlap count
- Task status:
  - Task active or Inhibited status
- Task 'plan' execution time handling:
  - Configuration of a 'plan' execution time
  - Optional alarm if the actual execution time exceeds the 'plan' threshold
  - Reset command to clear and acknowledge the Over Plan alarm

Modes

The L_TaskMon instruction has no commands or outputs intended to control equipment and so does not have any modes.

Alarm

The L_TaskMon instruction uses the following alarm, implemented by using an embedded P_Alarm Add-On Instruction.

Alarm	P_Alarm Name	Description
Over Plan	OverPlan	Alarm if actual task execution time exceeds Planned.

Refer to the Rockwell Automation Library of Process Objects: Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002, for more information.

Simulation

The L_TaskMon Add-On Instruction does not have a Simulation capability.

Execution

The following table explains the handling of instruction execution conditions.

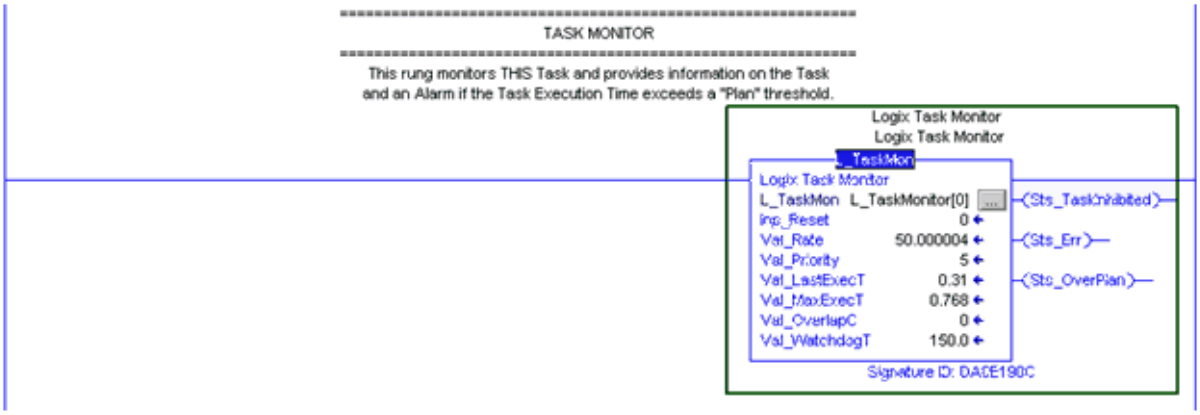
Table 29 - L_TaskMon Execution Conditions

Condition	Description
EnableIn False (false rung)	No EnableIn False logic is provided. The L_TaskMon instruction must always be scanned true. In Relay Ladder Logic, the L_TaskMon instruction must be by itself on an unconditional rung. If you develop your application by using a template or sample application provided with the Rockwell Automation Library, the proper rung has been created for you.
Powerup (pre-scan, first scan)	No Pre-scan or first scan logic is provided.
Postscan	No SFC Postscan logic is provided.

Refer to the Logix5000 Controllers Add-On Instructions Programming Manual, publication 1756-PM010, for more information.

Programming Example

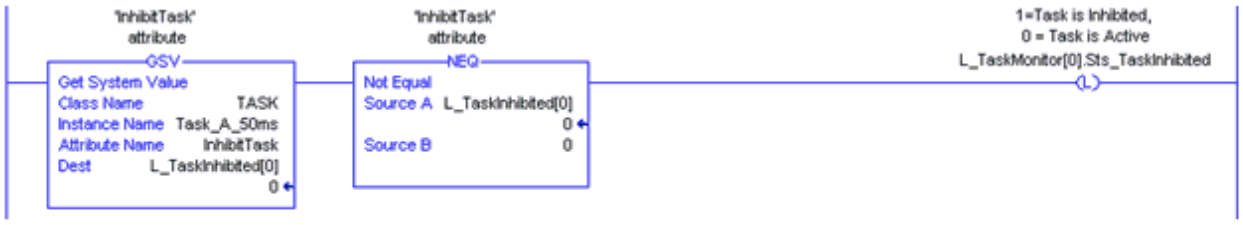
Include one instance of the L_TaskMon instruction in each controller task. A good place to put each instance is at the top of the Main Routine of the Main Program of the task.



If you code the L_TaskMon instances in Ladder Diagram routines, their backing tags can be in an array, as shown above.

You can configure the Cfg_PlanExecT to set a planned task execution time. If the task's execution time, which includes all higher-priority tasks, exceeds the Plan value, an Over Plan alarm can be generated.

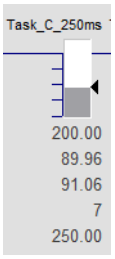
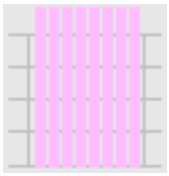
TIP If you plan to inhibit tasks and need to show when a task is inhibited, add a rung **in a separate task** to check for this condition. An inhibited task does not scan its logic and so cannot detect when it has been inhibited.



Display Elements

A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, in conjunction with tag structures in the ControlLogix system, aid consistency and save engineering time.

Table 30 - L_TaskMon Display Elements Description

Display Element Name	Display Element	Description
GO_TaskMon		This global object provides task statistics for one task in a Logix controller.
GO_TaskMon Summary		This object provides a graphic representation of eight L_TaskMon objects in a controller. Clicking this object displays a summary screen of all eight L_TaskMon objects.

The L_TaskMon instruction has display elements (global objects) for use on process graphic displays. These elements provide you with the following:

- Information on the object's current state
- Touch field to open the object's faceplate
- Tool tip to display the object's configured tag and description

Status/Quality Indicators

Each of these symbols appears when the described condition is true.

Graphic Symbol	Description
	Invalid configuration.
No symbol displayed	I/O communication OK and configuration valid.

TIP When the Invalid Configuration indicator appears, you can find what configuration setting is invalid by following the indicators. Click the graphic symbol to open the faceplate. The Invalid Configuration indicator appears next to the appropriate tab at the top of the faceplate to guide you in finding the configuration error. Once you navigate to the tab, the misconfigured item is flagged with this indicator or appears in a magenta box.

For the L_TaskMon instruction, the Invalid Configuration indicator appears under the following conditions:

- The Task Planned Execution time is set to a value less than 1 or greater than 2,000,000 milliseconds.
- The Alarm Minimum On time is set to a value less than zero or greater than 2,147,483 seconds.
- Alarm Severity is set to a value less than 1 or greater than 1000.

Alarm Indicators

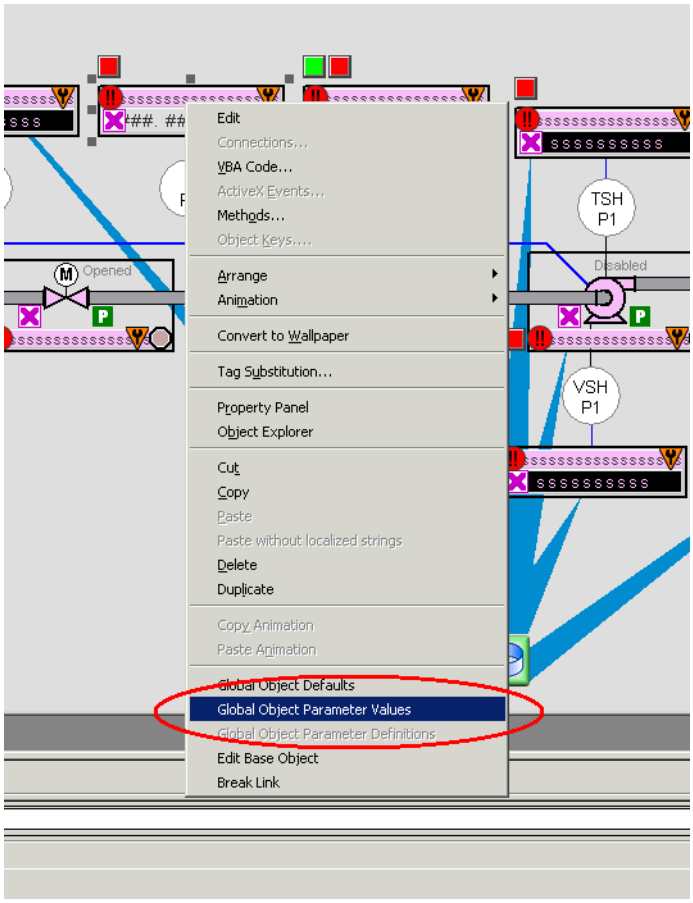
One of these symbols appears on the global object to indicate the described alarm condition. The alarm border and label background blink if acknowledgement of an alarm condition is required.

Symbol	Border and Label Background	Description
	No change in color	Alarm Inhibit: an alarm is suppressed by the Program, disabled by Maintenance, or shelved by the Operator.
	White	Return to normal (no alarm condition), but a previous alarm has not been acknowledged.
	Blue	Low severity alarm.
	Yellow	Medium severity alarm.
	Red	High severity alarm.
	Magenta	Urgent severity alarm.
No symbol	No change in color	No alarm or alarm inhibit condition, and all alarms are acknowledged.

Using Display Elements

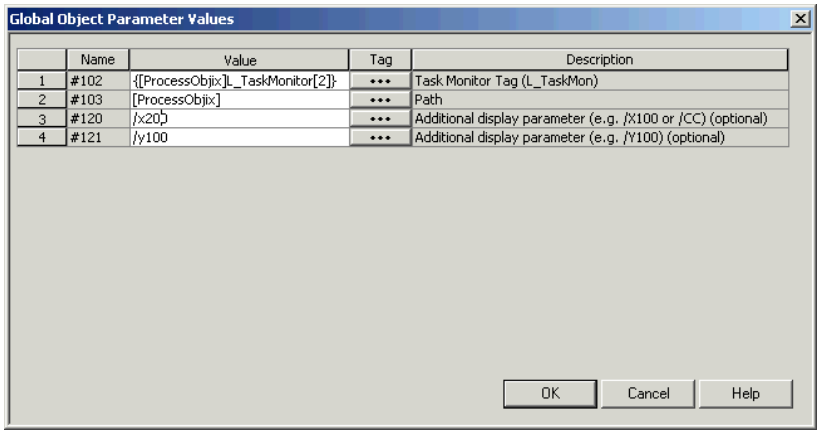
The global objects for L_TaskMon can be found in the global object file (RA-BAS) L_TaskMon Graphics Library.ggfx. Do the following to use a global object.

1. Copy it from the global object file and paste it in the display file.



2. In the display, right-click the global object and choose Global Object Parameter Values.

   The Global Object Parameter Values dialog box appears.



The global object parameters are as follows.

Parameter	Required	Description
#102	Y	Object tag to point to the name of the associated object Add-On Instruction in the controller.
#120	N	Additional parameter to pass to the display command to open the faceplate. Typically used to define position for the faceplate.
#121	N	Additional parameter to pass to the display command to open the faceplate. if defining X and Y coordinate, separate parameters so that X is defined by #120 and Y is defined by #121. This lets these same parameters to be used in subsequent display commands originating from the faceplate.

3. Type the tag or value in the Value column as specified in the Description column.

   TIP You can click the ellipsis (. . .) to browse and select a tag.
   Values for items marked '(optional)' can be left blank.

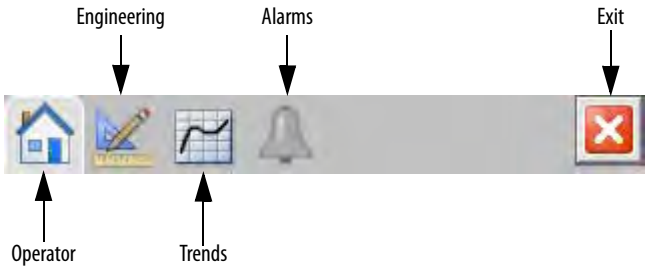
4. Click OK.

Faceplate

The L_TaskMon faceplate consists of four tabs and each tab consists of one or more pages.

The title bar of each faceplate contains the value of the 'Cfg_Desc' local configuration tag.

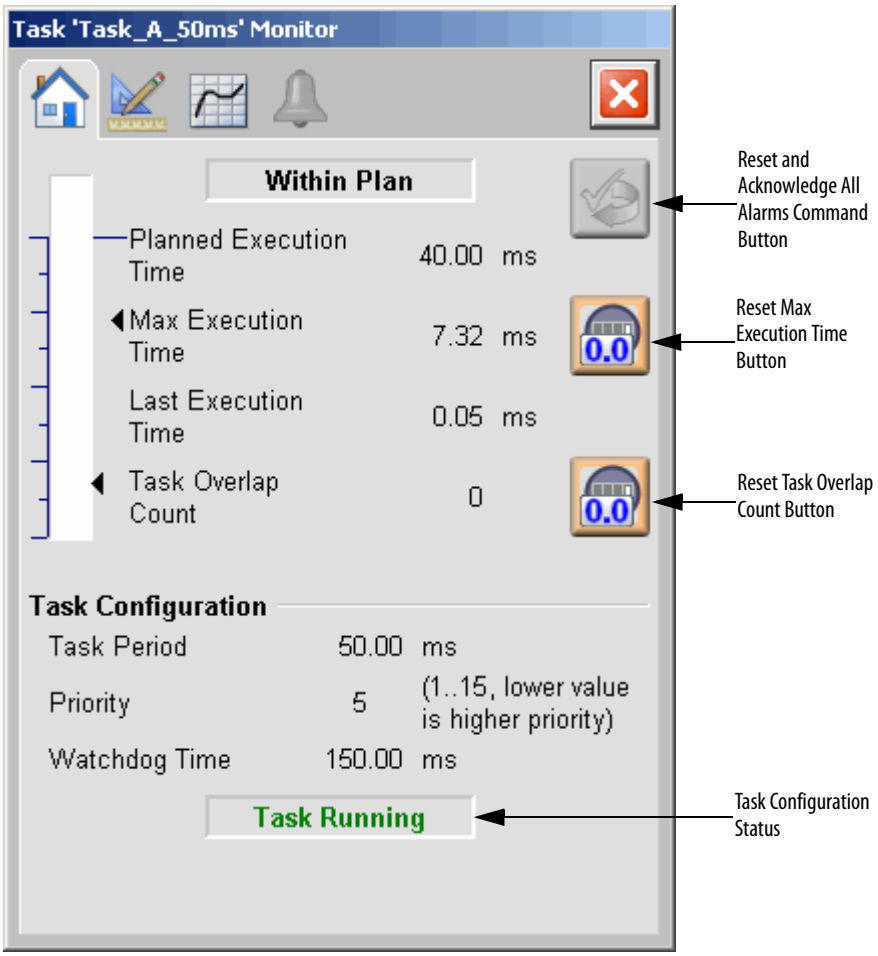
The Operator tab is displayed when the faceplate is initially opened. Click the appropriate icon at the top of the faceplate to access a specific tab.



The faceplate provides the means for maintenance personnel, engineers, and others to interact with the L_TaskMon instruction instance.

Operator Tab

The Faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the task status.

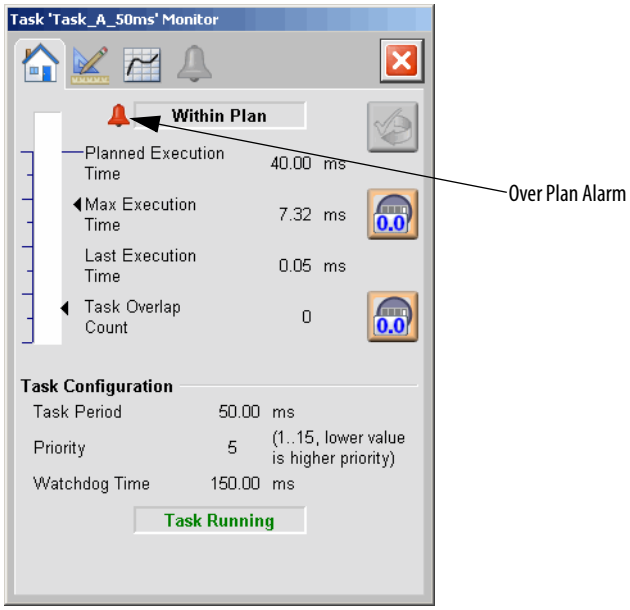


The following table shows the function of the Operator tab.

Table 31 - Operator Tab Description

Function	Action	Security
	Click to reset and acknowledge all alarms.	Normal Operation of Devices (Code A)
	Click to reset the Max Execution Time.	Configuration and Tuning Maintenance (Code D)
	Click to reset Task Overlap Count.	

The alarm indicator appears on the Operator tab when the corresponding alarm occurs.



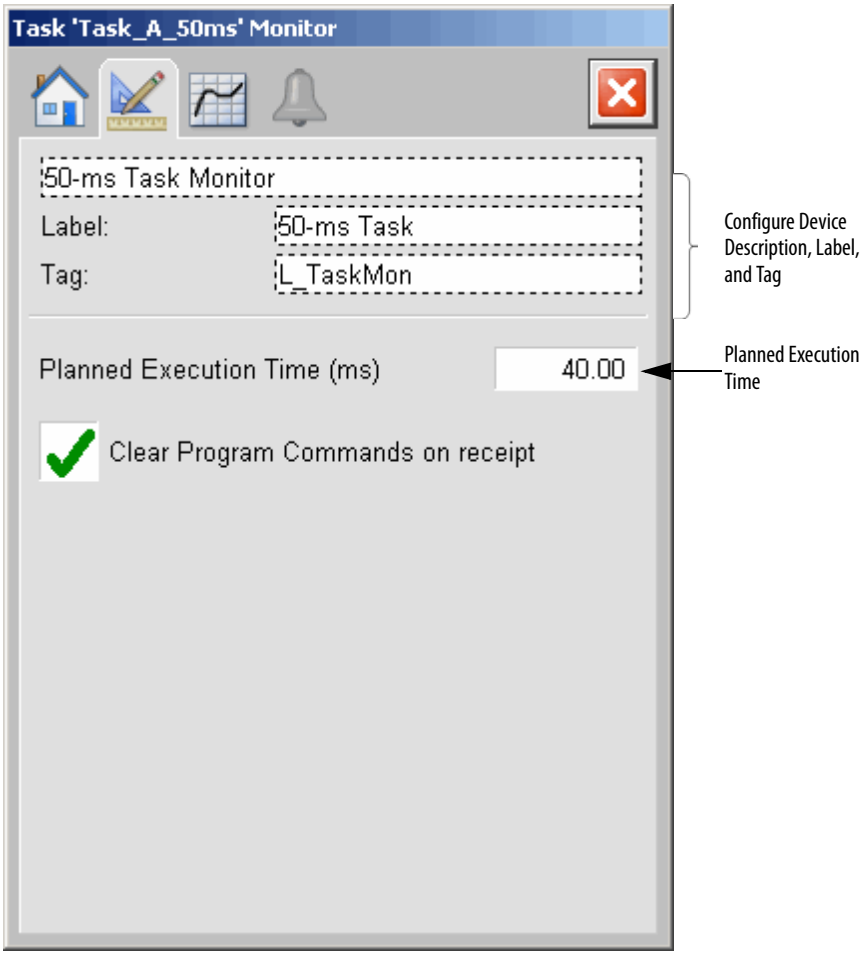
The following table shows the alarm status symbols used on the Operator tab.

Table 32 - Operator Tab Alarm Status

Graphic Symbol	Alarm Status
	In Alarm (Active Alarm)
	In Alarm and Acknowledged
	Out of Alarm but not Acknowledged
	Alarm Suppressed (by Program)
	Alarm Disabled (by Maintenance)
	Alarm Shelved (by Operator)

Engineering Tab

The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, and faceplate-to-faceplate navigation settings, for initial system commissioning or later system changes.



The following table lists the functions on the Engineering tab.

Table 33 - Engineering Tab Description

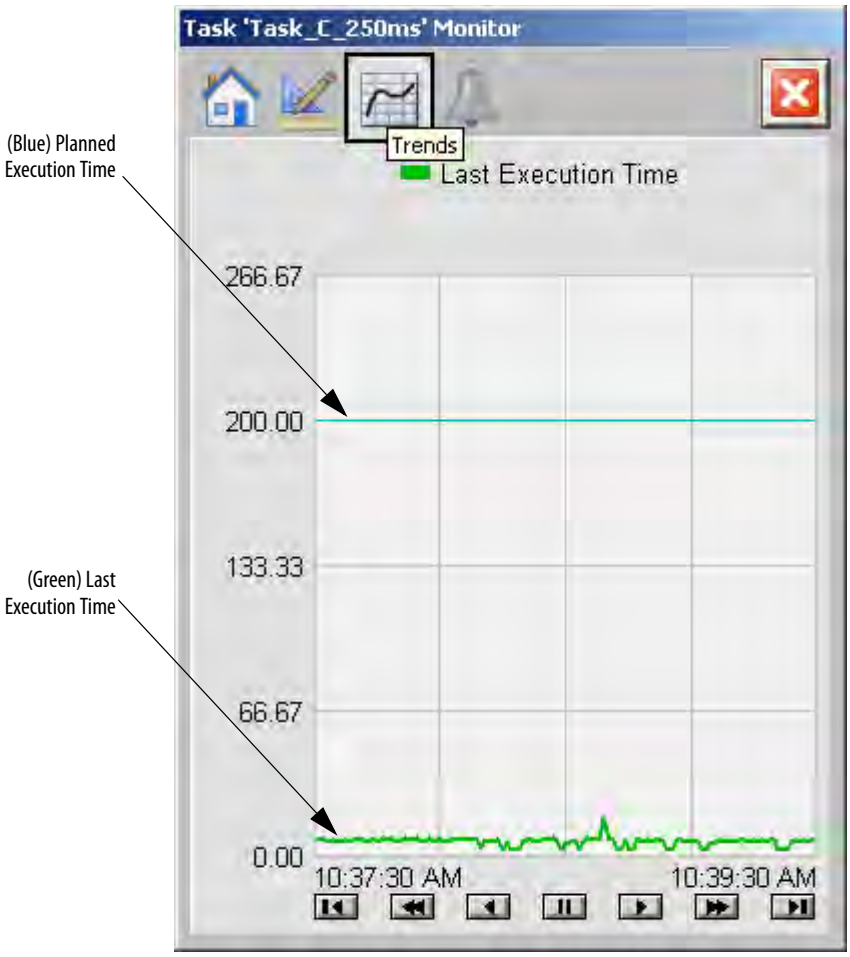
Function	Action	Security	Configuration Parameters
Description	Type the device description to show on the faceplate title bar.	Engineering Configuration (Code E)	Cfg_Desc
Label	Type the label to show on the graphic symbol.		Cfg_Label

Table 33 - Engineering Tab Description

Function	Action	Security	Configuration Parameters
Tag	Type the tag name to show on the faceplate and tooltip. **TIP:** Pausing the mouse over this field displays a tool tip with the configured Logix tag/path.	Engineering Configuration (Code E)	Cfg_Tag
Planned Execution Time	Type the planned execution time in milliseconds.		Cfg_PlanExecT
Clear Program Commands on Receipt	Check to clear program commands upon receipt.		Cfg_PCmdClear

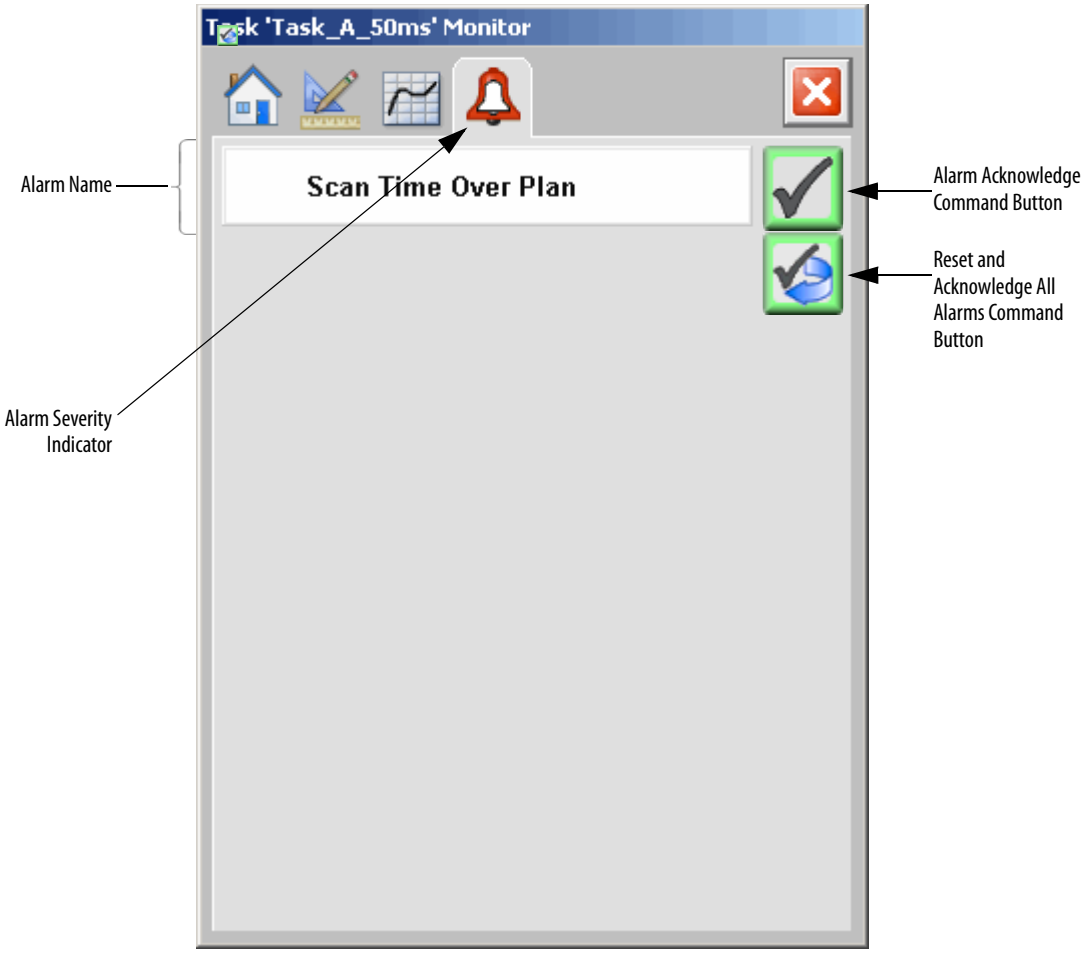
Trends Tab

The Trends tab shows trend charts of key device data over time. These faceplate trends provide a quick view of current device performance to supplement, but not replace, dedicated historical or live trend displays.



Alarms Tab

The Alarms tab displays each configured alarm for the L_TaskMon instruction. The icon on the tab for the alarms page changes color based on the current active alarms. A blinking alarm icon indicates that one or more alarms must be acknowledged or the device must be reset.



Click an alarm name to open the P_Alarm faceplate for that alarm. From the P_Alarm faceplate, you can configure and perform additional operations on the alarm.

If an alarm is active, the panel behind the alarm changes color to match the severity of the alarm. The color of the bell icon at the top of the faceplate shows the highest active alarm's severity, and the icon blinks if any alarm is unacknowledged or requires reset.

Table 34 - Alarm Color Definitions

Color	Definition
Magenta	Urgent
Red	High
Yellow	Medium
Blue	Low
White (bell icon)	Alarm has cleared but is unacknowledged
Background (light gray)	No alarm

The following table shows the function of the Alarm tab.

Table 35 - Alarms Tab Description

Function	Action	Security
Alarm Name	Click an alarm name to open the associated P_Alarm faceplate.	None
	Click to acknowledge the alarm.	Acknowledge Alarms (Code F)
	Click to reset and acknowledge all alarms.	

The Reset and Acknowledge All Alarms button is enabled, the panel behind the alarm blinks, and the Alarm Acknowledge button is enabled if the alarm requires acknowledgment. Click the button with the checkmark to acknowledge the alarm.

Refer to the Rockwell Automation Library of Process Objects: Common Alarm Mode (P_Alarm) Reference Manual, publication SYSLIB-RM002, for more information.

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If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
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