ControlLogix Controller Revision 15

Catalog Numbers 1756-L55, 1756-L55M12, 1756-L55M13, 1756-L55M14, 1756-L66M16, 1756-L55M22, 1756-L55M23, 1756-L55M24, 1756-L61, 1756-L62, 1756-L63, 1756-L60M03SE

IMPORTANT	• Do not use this revision of firmware in a redundant controller system (ControlLogix Redundancy system).
	• If you have a 1756-L55 controller, you must install a memory board. For more information, see the ControlLogix Controller and Memory Board Installation Instructions, publication 1756-IN101.

Use These Release Notes

These release notes correspond to the following controllers.

Controller	Catalog Number
ControlLogix 5555	1756-L55, 1756-L55M*xx*
ControlLogix 5561	1756-L61
ControlLogix 5562	1756-L62
ControlLogix 5563	1756-L63
ControlLogix 5560M03SE	1756-L60M03SE

TIP	When reviewing this release note, keep in mind that the minor revision may be different depending on what controller you are updating. Each of the sections are organized in table format that lists the catalog number of the product, firmware revision effected, item, and description.

Compatible Revisions of Software

To use this controller revision, update your system to these software revision levels or later.

Update This Software	To This Revision or Later
RSLinx Classic RSLinx Enterprise	2.43 3.00
RSLogix 5000	15.00
RSNetWorx for ControlNet	5.11
RSNetWorx for DeviceNet	
RSNetWorx for EtherNet/IP	

Before You Update Your System

Before you update your controller to this revision, do the following preliminary actions.

If	Then
Your controller is at revision 11 firmware or earlier	You must first update to revision 12 or 13 before attempting to update to revision 15.4. Once you have your controller updated to revision 12 or 13 then you can update the controller to revision 15.4.
Your controller meets **both** of these conditions: • It has nonvolatile memory. • It is currently at revision 11.*x* or earlier.	Take these precautions. <table><tr><td>**If The Controller**</td><td>**Then**</td></tr><tr><td>Does Not Use a CompactFlash Card</td><td>Save the project to an offline file. When you update the firmware of the controller, you erase the contents of the nonvolatile memory (revision 10.*x* or later).</td></tr><tr><td>Uses a CompactFlash Card</td><td>Remove the CompactFlash card from the controller or check the Load Image option of the CompactFlash card. If it is set to On Power Up or On Corrupt Memory, first store the project with the Load Image option set to User Initiated. Otherwise, you may get a major fault when you update the firmware of the controller. This occurs because the On Power Up or On Corrupt Memory options cause the controller to load the project from nonvolatile memory. The firmware mismatch after the load then causes a major fault.</td></tr></table>

Your controller is close to its limits of memory	This revision may require more memory than previous revisions.
	    • To see what components of your current project require more memory, see page 13.
	    • RSLogix 5000 software revision 13.0 or later lets you estimate the memory requirements of the controller offline.
	
	To update to this revision, you may have to add an expansion memory card to the controller or use a larger memory card.

Your controller is connected to a DH-485 network	Disconnect it from the DH-485 network before you update the firmware of the controller. If you update the firmware of a controller while it is connected to a DH-485 network, communication on the network may stop.

Known Anomaly

The following catalog numbers and corresponding firmware revision have this known anomaly.

Catalog Number	Firmware Revision	Anomaly	Description
1756-L55, 1756-L55M12, 1756-L55M13, 1756-L55M14, 1756-L66M16, 1756-L55M22, 1756-L55M23, 1756-L55M24, 1756-L61, 1756-L62, 1756-L63, 1756-L60M03SE	15.0, 15.3, 15.4, and 15.5	LimitsInv and SelectLimitInv are swapped.	In the High/Low Limit (HLL) instruction: • LimitsInv parameter is set when the SelectLimit is invalid. • SelectLimitInv parameter is set when the HighLimit and LowLimit parameters are invalid. Lgx00055977

Corrected Anomalies

The following catalog numbers and corresponding firmware revision contain this corrected anomaly.

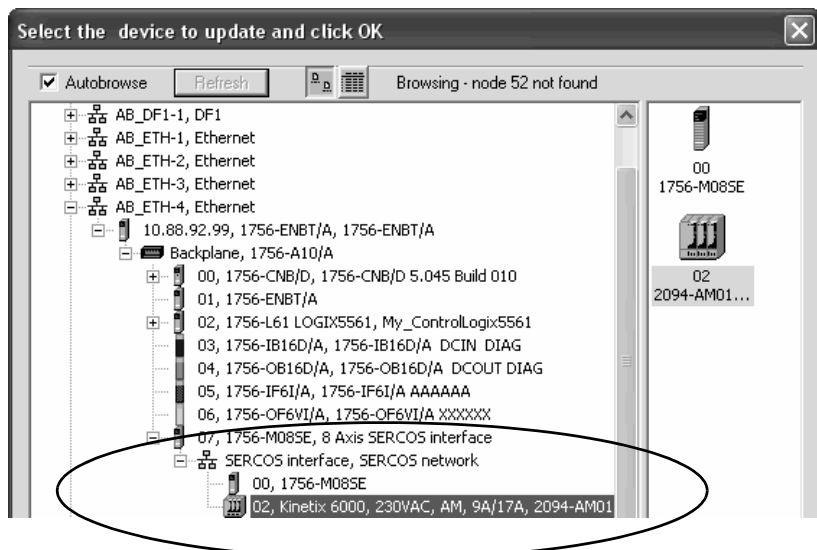| Catalog Number	Firmware Revision	Corrected Anomaly	Description
1756-L60M03SE	15.5	SERCON816 ASIC chip	A SERCOS interface module ring drop and service channel issue was identified as a result of an anomaly occurring in the SERCON816 ASIC chip.
1756-L55	15.5	Non-recoverable major fault	The 1756-L55 controllers experience a non-recoverable major fault in approximately 3…4 months of continuous operation. Continuous operation is defined as the controller being powered up; the mode of the controller (program, run, remote) does not matter. This was caused by a background diagnostic test completion.
1756-L55, 1756-L55M12, 1756-L55M13, 1756-L55M14, 1756-L66M16, 1756-L55M22, 1756-L55M23, 1756-L55M24, 1756-L61, 1756-L62, 1756-L63, 1756-L60M03SE	15.4	The Batch recipe became inoperative.	If two PXRQ instructions that had been triggered on the same phase were received by the batch server before the first PXRQ completes the batch recipe became inoperative. Lgx00056918
	15.4	CompactFlash LED indicator	When accessing the CompactFlash card the CF LED indicator did not operate as expected. Lgx00045715

Catalog Number	Firmware Revision	Corrected Anomaly	Description
1756-L55, 1756-L55M12, 1756-L55M13, 1756-L55M14, 1756-L66M16, 1756-L55M22, 1756-L55M23, 1756-L55M24, 1756-L61, 1756-L62, 1756-L63, 1756-L60M03SE	15.4	RSLogix 5000 software reported that POINT I/O connections were not scheduled even though they were scheduled and working on the network.	After associating the RSNetWorx for ControlNet file in RSLogix 5000 software and scheduling the network, RSLogix 5000 software displayed an error while trying to save the configuration. The error stated that the POINT I/O connections were not scheduled even though they clearly were and working properly on the network. If you made changes to the program that didn't involve ControlNet changes, and then downloaded, you had to reschedule the ControlNet network. The work around was to remove the association before you saved. Revision 15.4 removes the need for this work around. Lgx00058517
	15.4	PXRQ Instruction sometimes stayed in process and did not complete.	When executing phase request messages to a batch server, the PXRQ instruction would sometimes stay in process (IP bit set) and never complete. The same scenario could have occurred if the user took ownership of a phase from Logix5000 software while a PXRQ instruction was in process. The only recovery method was to transition from program to run or to cycle power to the controller. Lgx00058484, 58631, 59317, 58390, 57760
	15.4	Executing PXRQ instruction through manual phase control could have caused loss of controller communication.	If the batch server was running and a PXRQ instruction was executed by manual control within Logix5000 software, the controller could have lost communication. The recovery method was to cycle power to the controller. Lgx00058151
	15.4	An Attempt to Abort a Phase Request (PXRQ) caused all PXRQ's not to function.	If the abort bit was set in a PXRQ instruction with the IP or WA bit set, all remaining PXRQ instructions in the phase would stop operating correctly. Recovery from this situation required that you download the program again or to cycle power to the controller. Lgx00058678
1756-L55, 1756-L55M12, 1756-L55M13, 1756-L55M14, 1756-L66M16, 1756-L55M22, 1756-L55M23, 1756-L55M24, 1756-L61, 1756-L62, 1756-L63, 1756-L60M03SE	15.3	Large Write MSG Instructions.	This revision of ControlLogix firmware adds more stringent range checks when reading to or writing from tags. Message packets are now limited to 240 bytes. This could cause some MSG instructions that worked in previous firmware revisions to not work in revision 15 firmware. For example, use a CIP Generic MSG instruction to perform a Get Attribute Single service. The attribute is 4 bytes. Assume the destination tag is an INT data type (2 bytes). In revision 13 firmware, the MSG instruction places the first 2 bytes of the attribute in the destination tag. In revision 15 firmware, the MSG instruction errors because the destination tag is not large enough. To correct this error, change the destination tag to a DINT data type. Lgx00052504

Catalog Number	Firmware Revision	Corrected Anomaly	Description
1756-L55, 1756-L55M12, 1756-L55M13, 1756-L55M14, 1756-L66M16, 1756-L55M22, 1756-L55M23, 1756-L55M24, 1756-L61, 1756-L62, 1756-L63, 1756-L60M03SE	15.3	The File Search Compare (FSC) instruction caused a non-recoverable fault.	The FSC instruction caused an non-recoverable fault if both these conditions occurred. • A major fault was declared from within the expression of an FSC instruction. • The user fault routine cleared the fault. When the user fault routine attempted to recover, information previously saved was not properly restored, which resulted in corrupted system registers and a non-recoverable fault. Lgx00055522
	15.3	Programmatic change of MSG status bits could cause the MSG to appear to remain active (EN Set).	If you programmatically reset the DN or ER bits of a MSG instruction due to the asynchronous nature of the MSG, the MSG could appear to remain active (EN set). In fact, the MSG instruction was not active. The MSG instruction required manual intervention to trigger it to execute again. Revision 15 removes the need for manual intervention to trigger the MSG to execute again. Lgx00053112

Catalog Number	Firmware Revision	Corrected Anomaly	Description
1756-L55, 1756-L55M12, 1756-L55M13, 1756-L55M14, 1756-L66M16, 1756-L55M22, 1756-L55M23, 1756-L55M24, 1756-L61, 1756-L62, 1756-L63, 1756-L60M03SE	15.3	An SFC instruction could execute the wrong step.	If you had an SFC instruction with nested simultaneous branches, the controller could begin execution at an unexpected step. Following the convergence of a nested simultaneous branch, if the SFC instruction looped back to the initial step of the parent branch, instead of executing that step, the SFC instruction could jump to a step of another path in the nested simultaneous branch. Execution starts at Step_000. When Tran_000 becomes true, Step_001, Step_002 and Step_003 should become active. However, because the nested simultaneous branch in the left path converged and looped back to its parent step (Step_001), the active steps were actually **Step_005**, Step_002 and Step_003. Lgx00054247

Enhancements

The following catalog numbers and corresponding firmware revision added this enhancement.

Catalog Number	Firmware Revision	Enhancement	Description
1756-L55, 1756-L55M12, 1756-L55M13, 1756-L55M14, 1756-L66M16, 1756-L55M22, 1756-L55M23, 1756-L55M24, 1756-L61, 1756-L62, 1756-L63, 1756-L60M03SE	15.4	Update the firmware of SERCOS drives over your SERCOS network.	This revision lets you use ControlFlash software to update the firmware of your SERCOS drives over the SERCOS network. You don't need to connect a separate cable to the drives. Your SERCOS drives must be at this revision or later to update them over the SERCOS network: • 1394 drive, rev 1.85 • Ultra3000 drive, rev 1.50 • Kinetix 6000 drive, rev 1.85 • 8720MC drive, rev 3.85 Your SERCOS motion module must be at this revision firmware or later to use ControlFLASH to update the SERCOS drives over the SERCOS network: • 1756-M03SE module, rev 15.32 • 1756-M08SE module, rev 15.32 • 1756-M16SE module, rev 15.32
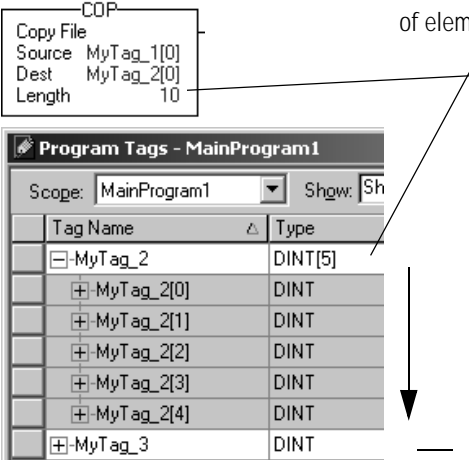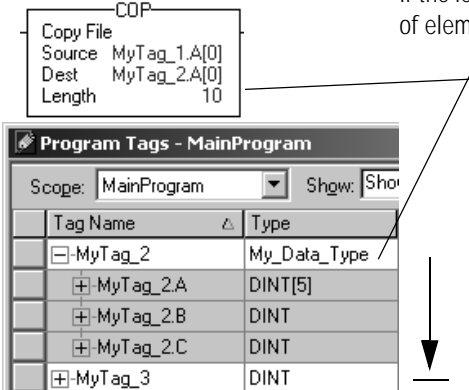
Catalog Number	Firmware Revision	Enhancement	Description
1756-L55, 1756-L55M12, 1756-L55M13, 1756-L55M14, 1756-L66M16, 1756-L55M22, 1756-L55M23, 1756-L55M24, 1756-L61, 1756-L62, 1756-L63, 1756-L60M03SE	15.3	PhaseManager provides a state model.	The PhaseManager option provides a state model for your equipment. It includes: • equipment phase to run the state model. • PHASE data type. • equipment phase instructions (relay ladder and structured text only).

If You Want To	Use This Instruction
Signal a phase that the state routine is complete so go to the next state	Equipment Phase State Complete (PSC)
Change the state or substate of a phase	Equipment Phase Command (PCMD)
Signal a failure for a phase	Equipment Phase Failure (PFL)
Clear the failure code of a phase	Equipment Phase Clear Failure (PCLF)
Initiate communication with RSBizWare Batch software	Equipment Phase External Request (PXRQ)
Clear the NewInputParameters bit of a phase	Equipment Phase New Parameters (PRNP)
Set up breakpoints within the logic of a phase	Equipment Phase Pause (PPD)
Take ownership of a phase to: • prevent another program or RSBizWare Batch software from commanding a phase • make sure another program or RSBizWare Batch software does **not** already own a phase	Attach to Equipment Phase (PATT)
Relinquish ownership of a phase	Detach from Equipment Phase (PDET)
Override a command	Equipment Phase Override Command (POVR)

• Support for 100 programs and equipment phases (combined) per task.

• Runtime/online addition of 1756 I/O modules to a ControlLogix controller.

In a ControlLogix system, at runtime, you can add 1756 I/O modules to the local chassis, remotely via the unscheduled portion of a ControlNet network, and remotely via an EtherNet/IP network.

Catalog Number	Firmware Revision	Enhancement	Description
1756-L55, 1756-L55M12, 1756-L55M13, 1756-L55M14, 1756-L66M16, 1756-L55M22, 1756-L55M23, 1756-L55M24, 1756-L61, 1756-L62, 1756-L63, 1756-L60M03SE	15.3	New Motion Termination Types	The Motion Coordinated Linear Move (MCLM) and Motion Coordinated Circular Move (MCCM) instructions have 2 new termination types.

Termination Type	Description

4 - Follow Contour Velocity Constrained	This termination type works best with tangential transitions. For example, use it to go from a line to a circle, a circle to a line, or a circle to a circle.
	  • The axes follow the path.
	  • If the moves are long enough, the axes won't decelerate between moves. If the moves are too short, the axes decelerate between moves.

5 - Follow Contour Velocity Unconstrained	This termination type is similar to the contour velocity constrained. It has these differences:
	  • Use this termination type to get a triangular velocity profile across several moves. This reduces jerk.
	  • You must calculate the acceleration for the triangular velocity profile.
	  • You must also calculate the starting speed for each move in the deceleration half of the profile.

• Motion error code 65 indicates that the axis moved too far and the controller can't store the position. The range for position depends on the conrevision constant of the axis.

  Suppose you have a conrevision constant of 2,097,152 counts/in. In that case:

  – maximum positive position = 2,147,483,647 / 2,097,152 counts/in. = 1023 in.

  – maximum negative position = -2,147,483,648 / 2,097,152 counts/in. = -1023 in.

  To prevent this error, set up soft travel limits that keep the axis within the position range.

  – You can inhibit an axis.

Example	Description
1	Suppose you make equipment that has between 8 and 12 axes, in that case, set up one project for all 12 axes. Inhibit those axes that you did not purchase.
2	Suppose you have 2 production lines that use the same SERCOS ring. And suppose one of the lines gets a fault. In that case, inhibit the axes on that line. This lets you run the other line while you take care of the fault.

  – In function block diagram instructions, DeltaT for periodic timing in a periodic task now includes fractional values.

Restrictions

Any ControlLogix controllers using firmware revision 15.3 have these restrictions.

Restriction	Description
In a tag of a user-defined data type, an instruction may write past the end of an array.	If you write too much data to an array that is within a user-defined data type, some instructions write beyond the array and into other members of the tag.

Example 1: Instruction Stops at the End of the Array

If the length is greater than the number of elements in the destination array…

```
-COP-
Copy File
Source   MyTag_1[0]
Dest     MyTag_2[0]
Length          10
```

Program Tags - MainProgram1

Scope: MainProgram1   Show: Sh

Tag Name △	Type
⊟-MyTag_2	DINT[5]
⊞-MyTag_2[0]	DINT
⊞-MyTag_2[1]	DINT
⊞-MyTag_2[2]	DINT
⊞-MyTag_2[3]	DINT
⊞-MyTag_2[4]	DINT
⊞-MyTag_3	DINT

…the instruction stops at the end of the array.

Example 2: Instruction Writes Beyond the Array

If the length is greater than the number of elements in the destination array…

```
-COP-
Copy File
Source   MyTag_1.A[0]
Dest     MyTag_2.A[0]
Length          10
```

Program Tags - MainProgram

Scope: MainProgram   Show: Sho

Tag Name △	Type
⊟-MyTag_2	My_Data_Type
⊞-MyTag_2.A	DINT[5]
⊞-MyTag_2.B	DINT
⊞-MyTag_2.C	DINT
⊞-MyTag_3	DINT

…the instruction writes data beyond the end of the array into other members of the tag. Regardless of the length specified for the instruction, it stops writing if it reaches the end of the tag.

The following instructions write beyond the array into other members of the tag:

BSL	FBC	LFL
BSR	FFL	LFU
COP	FFU	SQL
CPS	FLL	SRT
DDT	GSV	SSV

This restriction also applies to all previous revisions.

To prevent writing beyond the limits of the destination array, make sure the length operand of the instruction is less than or equal to the number of elements in the array.

Lgx00033747

Restriction	Description

In circular center programming mode, a Motion Coordinated Circular Move (MCCM) instruction may fail to reach the specified end point of a 180 degree Arc if the circle center is programmed incorrectly.	If you configure a Motion Coordinated Circular Move (MCCM) instruction as shown below, the instruction may not produce a move to the specified end points.
	
	MCCM
	Motion Coordinated Circular Move
	Coordinate System — CSXY — 2-dimensional circle (2 axes)
	Motion Control — mc_p2
	Move Type — 0
	Position — XY_P2[0,0] — end points are specified to produce an arc of 180 degrees
	  X — 0.0
	  Y — 0.0
	Circle Type — 1 — Circle Type = 1 (center) or 3 (center incremental).
	Via/Center/Radius — Center_left[0,0]
	Direction — 0 — user-defined center is not correct but within the current% radius deviation allowance
	Speed — C_speed
	  0.0 ←
	
	To work around this restriction, enter the correct circle center.
	
	Lgx00044813

Blended path contour may deviate beyond the confines of the programmed path.	In some very unique circumstances, when either changing velocity profile types or having drastically different acceleration and/or deceleration values on the two moves comprising a blended contour, the resultant blended path contour may deviate beyond the confines of the programmed path. Lgx00045400

An additional restriction exists for the 1756-L55M16 controller using firmware revision 15.3.

Restriction	Description
1756-L55M16 controllers, guidelines for memory use.	You cannot download a project that has very large routines and/or that has more than 3.5 Mbytes of tags to a 1756-L55M16 controller. During the download, RSLogix 5000 software indicates that the controller is out of memory. (While online, you may be able to create a large routine, but once offline you will be unable to download the project.) To avoid using too much memory: • limit the number of rungs in a routine to less than 2500. (Use a series of smaller routines.) • if you are entering a large number of rungs in a routine, do this offline. • periodically download the project as you enter rungs. If the project successfully downloads, then your routines are within limits. • use the Memory tab of the Controller Properties window to check memory use.
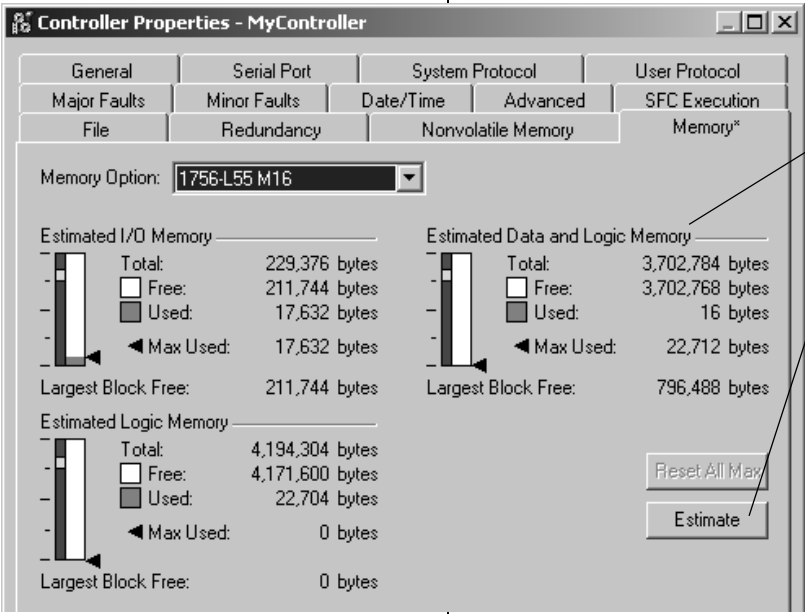
In general, the data and logic memory represents the 3.5M byte limit for tags.

As you develop your project, periodically go to this tab and click Estimate.

Keep your used memory within the green area. Once the used memory is in the yellow, the controller may not have enough memory for runtime communication.

For a detailed description of how the controller organizes its memory, see Logix5000 Controllers Common Procedures, publication 1756-PM001.

Additional Memory Requirements

Revision 15.0 or later may require more memory than previous revisions (For example: 10.*x*, 11.*x*). To estimate the additional memory that your project may require, use the following table.

Estimating Additional Memory Requirements

If You Have This Firmware Revision (add all that apply)	Then Add the Following Memory Requirements To Your Project		Which Comes from This Type of Memory	
	Component	**Increase Per Instance**	**I/O (base)**	**Data and Logic (expansion)**
15.*x* or earlier	Tag that uses the COORDINATE SYSTEM data type	60 bytes		4
	Tag that uses any AXIS data type	4 bytes		4
13.*x* or earlier	Program	12 bytes		4
	Task	4 bytes		4
	User-defined data type	4 bytes		4
	I/O module	16 bytes	4 (8 bytes)	4 (8 bytes)
	Produced or consumed tag	8 bytes	4	
12.*x* or earlier	I/O module with a comm format = Rack Optimization	90 bytes		4
	I/O module with a comm format = something other than Rack Optimization (such as a direct connection)	144 bytes		4
	CompactLogix 1769 I/O module	170 bytes		4
	Bridge module with a comm format = None	160 bytes		4
	Bridge module with a comm format = Rack Optimization	220 bytes		4
11.*x* or earlier	User-defined data type: • Number of user-defined data types in the controller organizer > Data Types folder > User-Defined folder • **Not** the use of that data type in tags	128 bytes		4
	Indirect address (using a tag as the subscript for an array in an instruction, such as an Array_A[Tag_B]). This memory change applies only if the array: • uses a structure as its data type. • does **not** use one of these data types: CONTROL, COUNTER, PID, or TIMER. • has only one dimension (such as UDT_1[5]).	(-60 bytes)		4
10.*x* or earlier	Program	12 bytes		4
	Routine	16 bytes		4
9.*x* or earlier	Tag that uses the MESSAGE data type	376 bytes		4

If You Have This Firmware Revision (add all that apply)	Then Add the Following Memory Requirements To Your Project			Which Comes from This Type of Memory	
	Component		Increase Per Instance	I/O (base)	Data and Logic (expansion)
7.*x* or earlier	Project		1050 bytes	4	
	Tag		0.55 bytes		4
	Message that transfers more than 500 bytes of data and targets a controller in the same chassis. This memory is allocated only when the MSG instruction is enabled. To estimate, count the number of these messages that are enabled and/or cached at one time.		2000 bytes	4	
6.*x* or earlier	Base Tag		24 bytes		4
	Alias Tag		16 bytes		4
	Produced or Consumed tag	Data type	Bytes per tag		
		DINT	4	12 bytes	4	
		REAL	4	12 bytes	4	
				3 x bytes per tag	4	
				3 x bytes per tag		
6.*x*	Routine		68 bytes		4
5.*x* or earlier	Routine		116 bytes		4

Additional Resources

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

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Notes:

Rockwell Automation Support

Rockwell Automation provides technical information on the web to assist you in using its products. At http://support.rockwellautomation.com, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect Support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://support.rockwellautomation.com.

Installation Assistance

If you experience a problem with a hardware module within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your module up and running.

United States	1.440.646.3223 Monday – Friday, 8am – 5pm EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning, it may need to be returned.

United States	Contact your distributor. You must provide a Customer Support case number (see phone number above to obtain one) to your distributor in order to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for return procedure.

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