

Estimated Logix 5000 Controller Instruction Execution Times

Catalog Numbers

ControlLogix 5580	1756-L81E, 1756-L81EK, 1756-L82E, 1756-L82EK, 1756-L83E, 1756-L83EK, 1756-L84E, 1756-L84EK, 1756-L85E, 1756-L85EK
GuardLogix 5580	1756-L81ES, 1756-L81ESK, 1756-L82ES, 1756-L82ESK, 1756-L83ES, 1756-L83ESK, 1756-L84ES, 1756-L84ESK
CompactLogix 5380	5069-L306ER, 5069-L306ERM, 5069-L310ER, 5069-L310ER-NSE, 5069-L310ERM, 5069-L320ER, 5069-L320ERM, 5069-L330ER, 5069-L330ERM, 5069-L340ER, 5069-L340ERM, 5069-L350ERM, 5069-L380ERM, 5069-L3100ERM
Compact GuardLogix 5380	5069-L306ERS2, 5069-L306ERMS2, 5069-L310ERS2, 5069-L310ERMS2, 5069-L320ERS2, 5069-L320ERS2K, 5069-L320ERMS2, 5069-L320ERMS2K, 5069-L330ERS2, 5069-L330ERS2K, 5069-L330ERMS2, 5069-L330ERMS2K, 5069-L340ERS2, 5069-L340ERMS2, 5069-L350ERS2, 5069-L350ERS2K, 5069-L350ERMS2, 5069-L350ERMS2K, 5069-L380ERS2, 5069-L380ERMS2, 5069-L3100ERS2, 5069-L3100ERMS2

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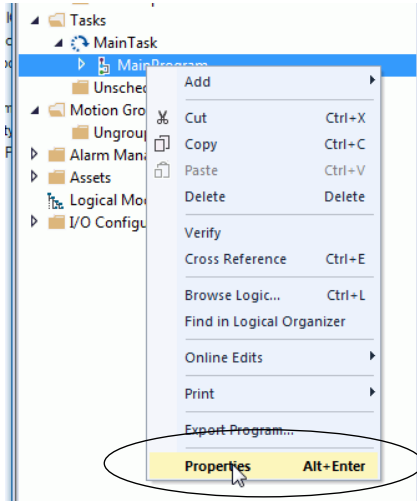
This publication provides **estimated** execution times when Logix 5000™ controllers execute instructions in Studio 5000 Logix Designer® projects.

IMPORTANT The execution times in this publication are approximations. Actual execution times vary based on project configuration and programming techniques. You can monitor actual execution times in your Logix Designer application project on a Program level. For more information on how to monitor your project to see actual execution times, see [Monitor Execution Times in a Project on page 2](#).
This publication is not a design document.

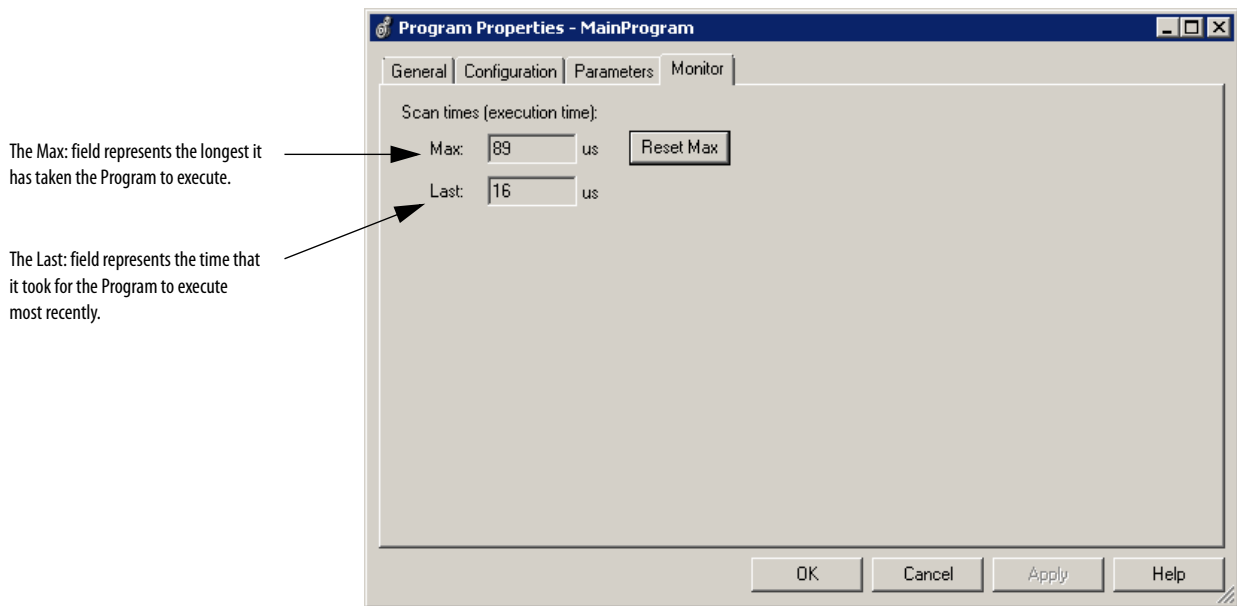
Monitor Execution Times in a Project

The Program Properties dialog box displays the raw execution times of a program. The times represent the total time that it took for all instructions that are included in the program logic to execute. The maximum and last scan times are provided. To monitor execution times, complete these steps.

1. Right-click the program and choose Properties.



2. On the Program Properties dialog box, click the Monitor tab to see execution times.



Before You Begin

Consider the following before you begin to use this book.

- The estimated times that are listed in this publication are in **microseconds (μ s)**.
- This publication excludes estimated times for instruction execution in sequential function chart (SFC) programming.
- Not all controllers support all versions of the Logix Designer application.

For example, some ControlLogix® 5580 controllers support the Logix Designer application, version 28.00.00 or later, and some ControlLogix 5580 controllers support version 29.00.00 or later.

For more information on controller and software compatibility, see the Rockwell Automation® Product Compatibility and Download Center (PCDC) that is available at <https://compatibility.rockwellautomation.com/Pages/home.aspx>.

- Not all controllers support all instructions.

For example, 5069-L306ERM controller supports Motion instructions, but the 5069-L306ER controller does not.

- The estimated execution times are the same regardless of the Logix Designer application project version within which they are used.

For example, the 1756-L85E controller executes the ADD instruction in ladder logic at the same speed in a Logix Designer application project, version 30.00.00 as in version 31.00.00.

- The estimated instruction execution times are the same regardless of the controller families within which the controllers are included.

For example, the 5069-L320ERM controller (CompactLogix™ 5380 family) executes an MAJ instruction at the same speed as the 5069-L350ERMS2 controller (Compact GuardLogix® 5380 family).

Design Considerations

We recommend that you consider the following when you design your application.

Array Subscripts	<ul style="list-style-type: none"> • When an array uses a tag for one of its subscripts, additional execution time is required, depending on the number of dimensions in the array. Remember that execution time for an instruction increases for each parameter that references an array. • If you use multiple dimensional arrays in an instruction, account for the additional time for each array reference. • The controller operates on 32-bit data structures. If you use a tag other than a DINT to reference a position in an array, remember to account for the additional time for the data conversion and for using a tag as an index. • If you use an expression in the index, additional time is used for the operators. The additional time depends on the type of operator.
Data Conversions	<ul style="list-style-type: none"> • If you use a data type that is not an optimal data type or if you mix data types, you must account for the additional execution time for data conversion. • If you mix integers and REALs in an instruction, the controller converts the values to REALs and then back to the destination data type.
Expressions	If an instruction contains an expression (CMP, CPT, FAL, FSC), add time for each operator in the expression. For each operator, use the values for the corresponding instruction from the "Ladder Instructions" tab. Keep in mind that data type conversions occur if different or non 32-bit data types are used.
Function Block	When you use Function Block instructions, remember to include the time for IREF, OREF, and/or the WIRE when you estimate execution time.
Structured Text	When you use Structured Text, remember that the number and complexity of the assignments, instructions, and comments that are included in the construct increases the required execution time.

Ladder Instructions

Logix 5000 controllers execute these ladder instructions. Remember, not all controllers support all instructions.

Ladder Instructions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Instruction	Data Type	Notes	Time (µs)
ABS	DINT		0.011
ABS	REAL		0.016
ACS	REAL		1.365
ADD	DINT		0.013
ADD	REAL		0.084
AFI	—		0.001
ALMA	analog_alarm	.In is true, Alarm state doesn't change (input value doesn't change alarm level)	1.299
ALMA	analog_alarm	One condition triggers	1.869
ALMA	analog_alarm	Two conditions trigger	2.194
ALMA	analog_alarm	.In = FALSE	0.386
ALMD	digital_alarm	Alarm state doesn't change (T>T or F>F)	0.574
ALMD	digital_alarm	Alarm state changes (T>F or F>T)	1.346
AND	DINT		0.014
ASN	REAL		1.298
ATN	REAL		1.221
AVC			1.000
AVE	DINT	x = Length	0.635 + (x * 1.23)
AVE	INT	x = Length	0.627 + (x * 1.28)
AVE	REAL	x = Length	0.616 + (x * 1.79)
AVE	SINT	x = Length	0.548 + (x * 1.24)
BRK	—		—
BSL	DINT	x = Length Round up x / 32 to a whole number.	0.100 + (x * 0.09)
BSR	DINT	x = Length Round up x / 32 to a whole number.	0.107 + (x * 0.09)
BTD	DINT		0.146

Ladder Instructions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Instruction	Data Type	Notes	Time (μ s)
CBCM			1.500
CBIM			1.100
CBSSM			1.300
CLR	DINT		0.006
CLR	REAL		0.007
CMP	DINT REAL	e = time for the operators in the expression	0.073
CONCAT	STRING	x = number of characters in Source A + number of characters in Source B	$0.143 + (x * 0.10)$
COP	DINT		$0.186 + (x * 0.02)$
COP	INT		$0.181 + (x * 0.01)$
COP	REAL		$0.179 + (x * 0.02)$
COP	SINT		$0.177 + (x * 0.01)$
COS	REAL		1.423
CPM			1.400
CPS	DINT	x = Length	$0.271 + (x * 0.02)$
CPS	INT	x = Length	$0.273 + (x * 0.01)$
CPS	REAL	x = Length	$0.271 + (x * 0.02)$
CPS	SINT	x = Length	$0.280 + (x * 0.01)$
CPT	—	e = time for the operators in the expression	0.083
CROUT		Negative and positive feedback	0.900
CSM			1.500
CTD	Counter		0.011
CTU	Counter		0.011
DCA			1.600
DCAF			1.600
DCM			0.800
DCS			1.300
DCST			1.300
DCSTL			1.800
DCSTM			1.500
DCSRT			1.000
DDT	DINT	0 mismatches x = number of bits to compare Based on ALL mode	$0.177 + (x * 0.16)$
DDT	DINT	1 mismatch x = number of bits to compare Based on ALL mode	$0.325 + (x * 0.16)$
DDT	DINT	2 mismatches x = number of bits to compare Based on ALL mode	$0.455 + (x * 0.16)$

Ladder Instructions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Instruction	Data Type	Notes	Time (µs)
DEG	DINT		—
DEG	REAL		0.084
DELETE	—	x = number of Destination characters	$0.132 + (x * 0.11)$
DIN		Auto and manual reset	0.800
DIV	DINT		0.208
DIV	REAL		0.098
DTOS	—	x = number of Destination characters	$0.328 + (x * 0.06)$
DTR	DINT		0.043
ENPEN		Auto and manual reset	0.600
EOT	—		0.180
EPMS			1.400
EQU	DINT		0.009
EQU	REAL		0.007
ESTOP			0.700
EVENT	—		0.768
FAL	—	x = array length	$0.200 + (x * 0.96)$
FBC	DINT	0 mismatches x = number of bits to compare Based on ALL mode	$0.193 + (x * 0.16)$
FBC	DINT	1 mismatch x = number of bits to compare Based on ALL mode	$0.315 + (x * 0.16)$
FBC	DINT	2 mismatches x = number of bits to compare Based on ALL mode	$0.428 + (x * 0.16)$
FFL	DINT		0.135
FFL	INT		0.142
FFL	REAL		0.135
FFL	SINT		0.130
FFU	DINT	x = Length	$0.144 + (x * 0.07)$
FFU	INT	x = Length	$0.153 + (x * 0.11)$
FFU	REAL	x = Length	$0.157 + (x * 0.07)$
FFU	SINT	x = Length	$0.142 + (x * 0.07)$
FIND	STRING		0.125
FLL	DINT	x = Length	$0.087 + (x * 0.04)$
FLL	INT	x = Length	$0.030 + (x * 0.07)$
FLL	REAL	x = Length	$0.087 + (x * 0.04)$
FLL	SINT	x = Length	$0.037 + (x * 0.09)$
FOR	DINT	x = Terminal value/Step size	$0.268 + (x * 1.05)$

Ladder Instructions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Instruction	Data Type	Notes	Time (μ s)
FPMS			0.900
FRD	—		0.126
FSBM			1.800
FSC	—	$x = \text{length of file, } e = \text{execution time for compare expression} + D124$	$0.198 + (x * 0.98)$
GEQ	DINT		0.009
GEQ	REAL		0.012
GRT	DINT		0.009
GRT	REAL		0.012
GSV	See GSV SSV Instructions on page 14 .		
INSERT	STRING	$x = \text{number of Destination characters}$	$0.156 + (x * 0.10)$
IOT	—		0.395
JMP	—		0.019
JSR	—	no parameters	0.245
JSR/RET	DINT	$x = \text{number of parameters}$ The time is for the JSR/RET pair.	$0.442 + (x * 0.72)$
JSR/RET	INT	$x = \text{number of parameters}$ The time is for the JSR/RET pair.	$0.442 + (x * 0.81)$
JSR/RET	REAL	$x = \text{number of parameters}$ The time is for the JSR/RET pair.	$0.442 + (x * 0.73)$
JSR/RET	SINT	$x = \text{number of parameters}$ The time is for the JSR/RET pair.	$0.425 + (x * 0.76)$
JSR/SBR	DINT	$x = \text{number of parameters}$ The time is for the JSR/SBR pair.	$0.462 + (x * 0.72)$
JSR/SBR	INT	$x = \text{number of parameters}$ The time is for the JSR/SBR pair.	$0.444 + (x * 0.81)$
JSR/SBR	REAL	$x = \text{number of parameters}$ The time is for the JSR/SBR pair.	$0.443 + (x * 0.73)$
JSR/SBR	SINT	$x = \text{number of parameters}$ The time is for the JSR/SBR pair.	$0.462 + (x * 0.75)$
LBL	—		0.004
LC			0.900
LEQ	DINT		0.009
LEQ	REAL		0.012
LES	DINT		0.009
LES	REAL		0.012
LFL	DINT		0.134
LFL	INT		0.141
LFL	REAL		0.135
LFL	SINT		0.130
LFU	DINT		0.175
LFU	INT		0.167
LFU	REAL		0.175

Ladder Instructions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Instruction	Data Type	Notes	Time (µs)
LFU	SINT		0.154
LIM	DINT		0.017
LIM	REAL		0.048
LN	DINT		—
LN	REAL		1.124
LOG	DINT		—
LOG	REAL		1.118
LOWER	STRING	x = number of Source characters	0.102 + (x * 0.11)
MAAT	—	Available with SERCOS motion only.	1.800 - Standard controllers 3.200 - Safety controllers
MAFR	—		CIP Motion 1.600 SERCOS Motion 3.600 - Standard controllers 3.900 - Safety controllers
MAG	—		CIP Motion 10.600 - Standard controllers 11.500 - Safety controllers SERCOS Motion 10.600 - Standard controllers 11.600 - Safety controllers
MAH	—	switch/marker	CIP Motion 4.000 - Standard controllers 4.100 - Safety controllers SERCOS Motion 3.400 - Standard controllers 3.500 - Safety controllers
MAHD	—		2.000
MAJ	—		CIP Motion 5.100 - Standard controllers 5.500 - Safety controllers SERCOS Motion 5.300
MAJ	—	w/ merge	CIP Motion 5.900 SERCOS Motion 6.200
MAM	—		CIP Motion 5.900 - Standard controllers 6.700 - Safety controllers SERCOS Motion 6.000 - Standard controllers 6.100 - Safety controllers
MAM	—	w/ merge	CIP Motion 7.000 - Standard controllers 6.900 - Safety controllers SERCOS Motion 6.900 - Standard controllers 7.900 - Safety controllers

Ladder Instructions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Instruction	Data Type	Notes	Time (µs)
MAOC	—		CIP Motion 10.300 - Standard controllers 9.900 - Safety controllers SERCOS Motion 9.300 - Standard controllers 9.700 - Safety controllers
MAPC	—		CIP Motion 10.200 - Standard controllers 10.800 - Safety controllers SERCOS Motion 10.600 - Standard controllers 10.700 - Safety controllers
MAR	—		CIP Motion 3.400 - Standard controllers 3.200 - Safety controllers SERCOS Motion 4.900 - Standard controllers 5.000 - Safety controllers
MAS	—	all with move and jog running	CIP Motion 5.200 - Standard controllers 5.500 - Safety controllers SERCOS Motion 5.600 - Standard controllers 5.900 - Safety controllers
MAS	—	individual motion types	3.700
MASD	—		CIP Motion 2.000 SERCOS Motion 4.000
MASR	—		1.500
MATC	—		4.500
MAW	—		CIP Motion 2.000 SERCOS Motion 4.000
MCCD	—		3.100
MCCM	—		CIP Motion 13.200 - Standard controllers 17.000 - Safety controllers SERCOS Motion 13.000 - Standard controllers 14.500 - Safety controllers
MCCP	—	cubic	—
MCCP	—	linear	—
MCD	—		CIP Motion 3.500 - Standard controllers 3.400 - Safety controllers SERCOS Motion 3.200 - Standard controllers 3.400 - Safety controllers

Ladder Instructions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Instruction	Data Type	Notes	Time (µs)
MCLM	—		CIP Motion 13.200 - Standard controllers 17.000 - Safety controllers SERCOS Motion 13.000 - Standard controllers 14.500 - Safety controllers
MCR	—		0.001
MCS	—		3.600
MCS D	—		CIP Motion 5.100 SERCOS Motion 7.900
MCSR	—		4.400
MCT	—		CIP Motion 15.200 - Standard controllers 15.300 - Safety controllers SERCOS Motion 14.900 - Standard controllers 15.200 - Safety controllers
MCTP	—		CIP Motion 6.500 SERCOS Motion 7.700 - Standard controllers 6.700 - Safety controllers
MDAC	—		1.400
MDCC	—		1.600
MDF	—		3.400
MDO	—		5.200
MDOC	—		1.100
MDR	—		CIP Motion 2.400 SERCOS Motion 3.900
MDW	—		CIP Motion 1.000 SERCOS Motion 3.700
MEQ	DINT		0.013
MGS	—	hard shutdown with move and jog running	3.200
MGS	—	fast shutdown with move and jog running	3.200
MGS	—	fast stop with move and jog running	3.100
MGS	—	move and jog running	3.300
MGSD	—		7.100
MGSP	—		1.700
MGSR	—		3.000
MID	—	x = number of Destination characters	0.130 + (x * 0.11)
MMVC			1.400

Ladder Instructions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Instruction	Data Type	Notes	Time (µs)
MOD	DINT		0.323
MOD	REAL		0.486
MOV	DINT-DINT		0.008
MOV	REAL-REAL		0.015
MRAT	—		3.100
MRHD	—		1.800
MRP	—		1.900
MSF	—		CIP Motion 1.900 SERCOS Motion 4.100
MSG	—		0.980
MSO	—		CIP Motion 1.600 SERCOS Motion 1.100
MUL	DINT		0.186
MUL	REAL		0.084
MVC			0.900
MVM	—		0.134
NEG	DINT		0.012
NEG	REAL		0.020
NEQ	DINT		0.009
NEQ	REAL		0.008
NOP	—		0.001
NOT	DINT		0.012
ONS	BOOL		0.043
OR	DINT		0.013
OSF	BOOL		0.044
OSR	BOOL		0.047
OTE	BOOL		0.005
OTL	BOOL		0.005
OTU	BOOL		0.005
PATT	—		1.180
PCLF	—		1.000
PCMD	—		1.850
PDET	—		0.680
PFL	—		0.101
PID	DINT	independent - slave mode	3.590
PID	DINT	independent	3.337

Ladder Instructions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Instruction	Data Type	Notes	Time (µs)
PID	DINT	ISA - dependent	3.615
PID	DINT	manual mode	3.187
PID	DINT	set output mode	2.994
PID	REAL	independent - slave mode	3.285
PID	REAL	independent	3.198
PID	REAL	ISA - dependent	3.539
PID	REAL	manual mode	2.929
PID	REAL	set output mode	3.102
POVR	—		1.080
PPD	—		0.373
PRNP	—		0.335
PSC	—		0.109
PXRQ	—		0.132
RAD	REAL		0.084
RES	Timer, Control, or Counter		0.007
RET	—	in FOR loop	0.081
RET	—	no parameters	0.072
RIN			0.700
ROUT		Negative feedback	0.600
ROUT		Positive feedback	0.900
RTO	TIMER		0.092
RTOS	—	example 1 Source = 1.234	2.347
RTOS	—	example 2 Source = 1234.5677	2.268
SBR	—	no parameters	0.093
SFP	—	pause	0.530
SFP	—	execute	0.280
SFR	—		0.580
SIN	REAL		1.418
SIZE	DINT		0.107
SMAT			1.000
SQI	DINT		0.052
SQL	DINT		0.083
SQO	DINT		0.087
SQR	DINT		0.109
SQR	REAL		0.087
SRT	DINT	Varies with the length and randomness of the numbers.	0.443
SRT	REAL	Varies with the length and randomness of the numbers.	0.449

Ladder Instructions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Instruction	Data Type	Notes	Time (μ s)
SSV		See GSV SSV Instructions on page 14 .	
STD	DINT	x = Length	$1.065 + (x * 4.79)$
STD	INT	x = Length	$1.220 + (x * 4.94)$
STD	REAL	x = Length	$1.043 + (x * 4.96)$
STD	SINT	x = Length	$1.194 + (x * 4.80)$
STOD	—	example 1 Source = 1234	0.438
STOD	—	example 2 Source = ABCDEFGH1234ABCDEFGH	0.738
STOR	—	example 1 Source = 1.234	1.345
STOR	—	example 2 Source = ABCDEFGH1.234ABCDEFGH	1.656
SUB	DINT		0.012
SUB	REAL		0.085
SWPB	DINT	High/Low	0.096
SWPB	DINT	Reverse	0.095
SWPB	DINT	Word	0.089
TAN	REAL		1.626
THRS		Active pin enabled	1.000
THRS		Active pin disabled	1.000
THRSe			1.900
TND	—		0.000
TOD	—		0.171
TOF	TIMER		0.071
TON	TIMER		0.090
TRN	DINT		0.160
TRN	REAL		0.267
TSAM			1.900
TSSM			1.600
UID	—		0.708
UIE	—		0.196
UPPER	—	x = number of Source characters	$0.101 + (x * 0.11)$
XIC	BOOL		0.002
XIO	BOOL		0.002
XOR	DINT		0.012
XPY	REAL	Actual time depends on the values of the operands.	2.503

GSV SSV Instructions

Logix 5000 controllers execute GSV and SSV instructions as follows.

GSV SSV Instructions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Instruction	Object	Attribute Name	Time (µs)
GSV	CONTROLLER	DataTablePadPercentage	0.245
GSV	CONTROLLER	InhibitAutomaticFirmwareUpdate	0.235
GSV	CONTROLLER	KeepTestEditsOnSwitchOver	0.235
GSV	CONTROLLER	Name	0.832
GSV	CONTROLLER	RedundancyEnabled	0.213
GSV	CONTROLLER	ShareUnusedTimeSlice	0.295
GSV	CONTROLLER	TimeSlice	0.300
GSV	CONTROLLERDEVICE	DeviceName	0.440
GSV	CONTROLLERDEVICE	ProductCode	0.296
GSV	CONTROLLERDEVICE	ProductRev	0.311
GSV	CONTROLLERDEVICE	SerialNumber	0.312
GSV	CONTROLLERDEVICE	Status	0.296
GSV	CONTROLLERDEVICE	Type	0.296
GSV	CONTROLLERDEVICE	Vendor	0.311
GSV	CST	CurrentStatus	0.325
GSV	CST	CurrentValue	0.550
GSV	FAULTLOG	MajorEvents	0.298
GSV	FAULTLOG	MajorFaultBits	0.303
GSV	FAULTLOG	MinorEvents	0.303
GSV	FAULTLOG	MinorFaultBits	0.293
GSV	MESSAGE	ConnectionPath	0.689
GSV	MESSAGE	ConnectionRate	0.351
GSV	MESSAGE	MessageType	0.233
GSV	MESSAGE	Port	0.251
GSV	MESSAGE	TimeoutMultiplier	0.252
GSV	MESSAGE	UnconnectedTimeout	0.354
GSV	MODULE	EntryStatus	0.265
GSV	MODULE	FaultCode	0.259
GSV	MODULE	FaultInfo	0.284
GSV	MODULE	FirmwareSupervisorStatus	0.290
GSV	MODULE	ForceStatus	0.276
GSV	MODULE	Instance	0.291
GSV	MODULE	LEDStatus	0.259

GSV SSV Instructions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Instruction	Object	Attribute Name	Time (µs)
GSV	MODULE	Mode	0.356
GSV	PROGRAM	DisableFlag	0.309
GSV	PROGRAM	Instance	0.318
GSV	PROGRAM	LastScanTime	0.406
GSV	PROGRAM	MajorFaultRecord	0.561
GSV	PROGRAM	MinorFaultRecord	0.561
GSV	PROGRAM	MaxScanTime	0.319
GSV	PROGRAM	Name	0.920
GSV	ROUTINE	Instance	0.335
GSV	ROUTINE	Name	0.858
GSV	TASK	DisableUpdateOutputs	0.291
GSV	TASK	EnableTimeout	0.292
GSV	TASK	Instance	0.290
GSV	TASK	InhibitTask	0.292
GSV	TASK	LastScanTime	0.291
GSV	TASK	MaxInterval	0.326
GSV	TASK	MaxScanTime	0.256
GSV	TASK	MinInterval	0.327
GSV	TASK	Name	0.868
GSV	TASK	OverlapCount	0.300
GSV	TASK	Priority	0.284
GSV	TASK	Rate	0.292
GSV	TASK	StartTime	0.361
GSV	TASK	Status	0.291
GSV	TASK	Watchdog	0.291
GSV	WALLCLOCKTIME	ApplyDST	0.165
GSV	WALLCLOCKTIME	CSTOffset	0.265
GSV	WALLCLOCKTIME	CurrentValue	0.562
GSV	WALLCLOCKTIME	DSTAdjustment	0.265
GSV	WALLCLOCKTIME	DateTime	3.140
GSV	WALLCLOCKTIME	LocalDateTime	3.072
GSV	WALLCLOCKTIME	TimeZoneString	0.462
SSV	CONTROLLER	InhibitAutomaticFirmwareUpdate	0.218
SSV	CONTROLLER	ShareUnusedTimeSlice	0.228
SSV	CONTROLLER	TimeSlice	0.466
SSV	FAULTLOG	MajorEvents	0.225
SSV	FAULTLOG	MajorFaultBits	0.234

GSV SSV Instructions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Instruction	Object	Attribute Name	Time (µs)
SSV	FAULTLOG	MinorEvents	0.235
SSV	FAULTLOG	MinorFaultBits	0.217
SSV	MESSAGE	ConnectionPath	0.844
SSV	MESSAGE	ConnectionRate	0.511
SSV	MESSAGE	MessageType	0.575
SSV	MESSAGE	Port	0.494
SSV	MESSAGE	TimeoutMultiplier	0.494
SSV	MESSAGE	UnconnectedTimeout	0.516
SSV	MODULE	Mode	0.233
SSV	PROGRAM	DisableFlag	0.482
SSV	PROGRAM	LastScanTime	0.411
SSV	PROGRAM	MajorFaultRecord	0.815
SSV	PROGRAM	MinorFaultRecord	0.701
SSV	PROGRAM	MaxScanTime	0.413
SSV	TASK	DisableUpdateOutputs	0.567
SSV	TASK	EnableTimeout	0.504
SSV	TASK	InhibitTask	0.549
SSV	TASK	LastScanTime	0.357
SSV	TASK	MaxInterval	0.436
SSV	TASK	MaxScanTime	0.344
SSV	TASK	MinInterval	0.441
SSV	TASK	OverlapCount	0.358
SSV	TASK	Priority	1.106
SSV	TASK	Rate	0.550
SSV	TASK	StartTime	0.449
SSV	TASK	Status	0.357
SSV	TASK	Watchdog	0.555
SSV	WALLCLOCKTIME	ApplyDST	0.265
SSV	WALLCLOCKTIME	CSTOffset	1.262
SSV	WALLCLOCKTIME	CurrentValue ⁽¹⁾	1.992
SSV	WALLCLOCKTIME	DSTAdjustment	0.265
SSV	WALLCLOCKTIME	DateTime	2.565
SSV	WALLCLOCKTIME	LocalDateTime ⁽¹⁾	2.432
SSV	WALLCLOCKTIME	TimeZoneString	0.962

(1) The execution time for these attributes can double or triple, depending on the value being set.

Function Block Diagrams

Logix 5000 controllers execute these function block elements.

Function Block Diagrams - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Function Block Element	Notes	Time (μ s)
ABS		0.035
ACS		1.392
ADD		0.097
ALM		0.689
AND		0.026
ASN		1.314
ATN		1.247
BAND		0.136
BNOT		0.141
BOR		0.135
BTDT		0.176
BXOR		0.125
COS		1.441
CTUD		0.463
D2SD		0.451
D3SD		0.534
DEDT		2.167
DEG		0.098
DERV		1.749
DFF		0.171
DIV		0.111
EQU		0.034
ESEL-Average Sel.		0.513
ESEL-High Select		0.468
ESEL-Low Select		0.475
ESEL-Manual		0.315
ESEL-Median Sel.		0.668
FGEN		0.861
FRD		0.139
GEQ		0.038
GRT		0.042
HLL		0.278

Function Block Diagrams - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Function Block Element	Notes	Time (µs)
HPF		2.406
ImmDINT		0.000
ImmREAL		0.000
INTG		1.591
IRefBOOL		0.010
IRefDINT		0.011
IRefREAL		0.018
JKFF		0.171
LDL2		3.019
LDLG		2.104
LEQ		0.041
LES		0.038
LIM		0.074
LN		1.141
LOG		1.141
LPF		2.328
MAVE (uniform)	x = number of samples	$0.499 + (x * 0.10)$
MAVE (weighted)	x = number of samples	$0.489 + (x * 0.12)$
MAXC		0.301
MEQ		0.038
MINC		0.319
MOD		0.502
MSTD	x = number of samples	$0.572 + (x * 0.27)$
MUL		0.098
MUX		0.236
MVMT		0.170
NEG		0.033
NEQ		0.034
NOT		0.024
NTCH		2.588
OR		0.003
ORefBOOL		0.003
ORefDINT		0.003
ORefREAL		0.026
OSFI		0.158

Function Block Diagrams - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Function Block Element	Notes	Time (μs)
OSRI		0.158
PI		2.609
PIDE		6.887
PMUL		0.417
POSP		2.030
RAD		0.098
RESD		0.148
RLIM		1.673
RMPS		2.369
RTOR		0.863
SCL		0.325
SCRV		2.676
SEL		0.172
SETD		0.141
SIN		1.430
SNEG		0.155
SOC		2.711
SQR		0.100
SRTP		1.837
SSUM	x = number of samples	$0.120 + (x * 0.00)$
SUB		0.098
TAN		1.637
TOD		0.186
TOFR		0.852
TONR		0.879
TOT		2.293
TRN		0.176
UPDN		0.289
WireBOOL-to-BOOL		0.007
WireDINT-to-DINT		0.009
WireDINT-to-REAL		0.124
WireREAL-to-DINT		0.172
WireREAL-to-REAL		0.016
XOR		0.027
XPY		2.363

Structured Text

Logix 5000 controllers execute these structured text elements.

Structured Text Elements - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Structured Text Element	Example	Type	Data Type	Time (µs)
assignment, simple	A := B;		DINT_A := DINT_B	0.012
			DINT_A := INT_B	0.034
			DINT_A := REAL_B	0.175
			DINT_A := SINT_B	0.031
			INT_A := DINT_B	0.113
			INT_A := INT_B	0.135
			INT_A := REAL_B	0.202
			REAL_A := DINT_B	0.126
			REAL_A := INT_B	0.055
			REAL_A := REAL_B	0.019
			REAL_A := SINT_B	0.052
			SINT_A := DINT_B	0.112
			SINT_A := REAL_B	0.199
SINT_A := SINT_B	0.131			
assignment, complex	A := -B; A := B + C; A := sin(B);			Use the execution time for the ladder logic Compute (CPT) instruction plus time for each operator and function in the expression. For each operator and function, use the value for the corresponding instruction. For example, for Tag_A := Tag_B + Tag_C, use the time for the CPT instruction plus the time for the ADD instruction.
comparison, simple	A > B A = B	=	DINT	0.002
		=	REAL	0.002
		<>	DINT	0.002
		<>	REAL	0.002
		>	DINT	0.002
		>	REAL	0.006
		>=	DINT	0.002
		>=	REAL	0.006
		<	DINT	0.002
		<	REAL	0.006
		<=	DINT	0.002
		<=	REAL	0.006
comparison, complex	A > -B A > (B + C) A > sin(B)			Use the execution time for the ladder logic Compare (CMP) instruction plus time for each operator and function in the expression For each operator and function, use the value for the corresponding instruction. For example, for Tag_A > (Tag_B + Tag_C), use the time for the CMP instruction plus the time for the GRT instruction and the ADD instruction.

Structured Text Elements - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Structured Text Element	Example	Type	Data Type	Time (μ s)
instruction		ABS	DINT	0.097
		ABS	REAL	0.109
		ACS	REAL	1.469
		ADD	DINT	0.013
		ADD	REAL	0.084
		AND	DINT	0.097
		ASN	REAL	1.401
		ATN	REAL	1.320
		CLR	DINT	0.011
		CLR	REAL	0.117
		COS	REAL	1.519
		DEG	REAL	0.173
		DIV	DINT	0.209
		DIV	REAL	0.098
		EQU DINT		0.002
		EQU REAL		0.002
		GEQ DINT		0.002
		GEQ REAL		0.006
		GRT DINT		0.002
		GRT REAL		0.006
		LEQ	DINT	0.002
		LEQ	REAL	0.006
		LN	REAL	1.213
		LOG	REAL	1.211
		MOD	DINT	0.411
		MOD	REAL	0.575
		MUL	DINT	0.187
		MUL	REAL	0.084
		NEG	DINT	0.097
		NEG	REAL	0.110
		NEQ	DINT	0.002
		NEQ	REAL	0.002
		NOT	DINT	0.096
		OR	DINT	0.097
		RAD	REAL	0.173
		SIN	REAL	1.508
		SQR	DINT	0.193
		SQR	REAL	0.177
		SRT	DINT	0.601
		SRT	REAL	0.618
	SUB	DINT	0.013	
	SUB	REAL	0.085	

Structured Text Elements - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Structured Text Element	Example	Type	Data Type	Time (μs)
instruction		TAN	REAL	1.718
		TRN	DINT	0.245
		TRN	REAL	0.340
		XOR	DINT	0.097
		XPY	REAL	3.699

Motion Planner

Logix 5000 controllers execute these motion states and actions.

Motion Planner - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Motion State or Action (Δ = per axis)	Notes	Time (μs)
Motion Task Overhead		5.417
Servo Axis Δ	SERCOS motion only	1.967
CIP Axis Δ		3.933
Virtual Axis Δ		1.133
Consumed Axis Δ	These values are worst case (producer/consumer update ratio = 2/3). To reduce the time by 25%, use a consumer coarse update period that is an integer multiple of the producer coarse update period (for example, 2/4).	2.133
Per Coordinate System		0.489
Group Auto Tag Update Δ ** (Servo/Virtual/Consumer)	servo	0.633
	virtual	0.533
Coordinate System Auto Tag Update		0.500
Servo On Δ		SERCOS Motion 0.075
		CIP Motion 0.350
Trap Move Δ		SERCOS Motion 0.725
		CIP Motion 0.850
S-Curve Move Δ		SERCOS Motion 0.750
		CIP Motion 0.850
Trap Jog Δ		SERCOS Motion 0.700
		CIP Motion 0.850
S-Curve Jog Δ		SERCOS Motion 0.725
		CIP Motion 0.850
Gearing (Actual) Δ		SERCOS Motion 0.475
		CIP Motion 0.575

Motion Planner - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Motion State or Action (Δ = per axis)	Notes	Time (μ s)
Clutch Δ		0.025
Clutch Δ		0.025
Position Camming (Actual, linear) Δ		SERCOS Motion 0.875 CIP Motion 1.050
Position Camming (Actual, cubic) Δ		SERCOS Motion 0.900 CIP Motion 1.125
Position Camming (Command, linear) Δ		SERCOS Motion 0.875 CIP Motion 1.100
Position Camming (Command, cubic) Δ		SERCOS Motion 0.875 CIP Motion 1.100
Time Camming (linear) Δ		SERCOS Motion 0.975 CIP Motion 1.175
Time Camming (cubic) Δ		SERCOS Motion 1.175 CIP Motion 1.425
MCCP Linear		0.948
MCCP Cubic		1.171

Conversions

Logix 5000 controllers convert ladder instruction data types as follows.

Ladder Instruction Conversions - ControlLogix 5580, GuardLogix 5580, CompactLogix 5380, and Compact GuardLogix 5380 Controllers

Ladder Instruction	Data Type	Time (ms)
Conv	SINT-DINT	0.111
Conv	INT-DINT	0.112
Conv	DINT-SINT	0.031
Conv	DINT-INT	0.034
Conv	SINT-REAL	0.199
Conv	INT-REAL	0.201
Conv	DINT-REAL	0.174
Conv	REAL-SINT	0.052
Conv	REAL-INT	0.055
Conv	REAL-DINT	0.156

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

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Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

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