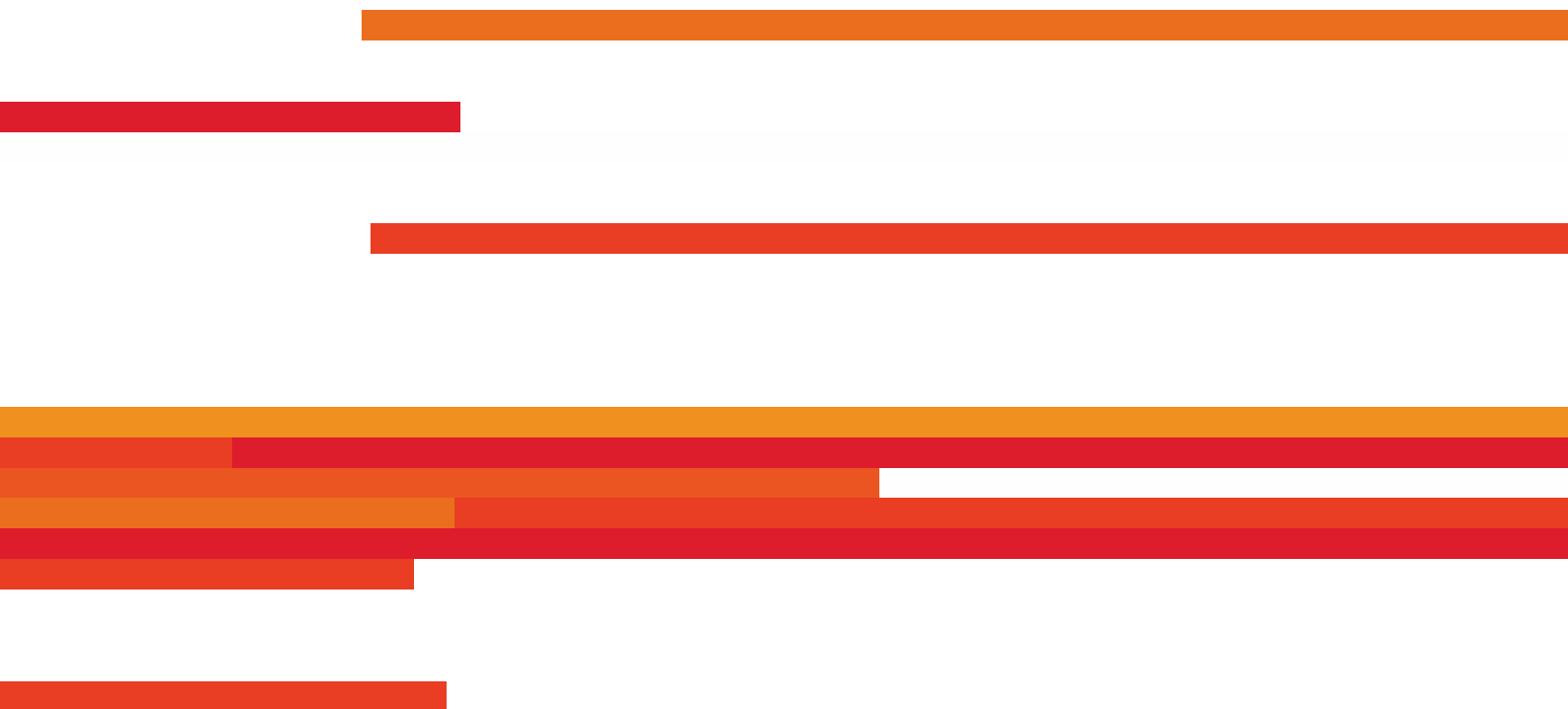




MISRA AC SLSF:2023 Amendment 3

Revisions for MATLAB Release R2024b

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MISRA Mission Statement

MISRA provides world-leading best practice guidelines for the safe and secure application of both embedded control systems and standalone software.

MISRA is a collaboration between manufacturers, component suppliers, engineering consultancies and academics which seeks to research and promote best practice in developing safety- and security-related electronic systems and other software-intensive applications.

To this end, MISRA conducts research projects and publishes documents that provide accessible information for engineers and management.

MISRA also facilitates the dissemination and exchange of information between practitioners through supporting and holding technical events.

Disclaimer

Compliance with these guidelines does not in itself ensure error-free robust software.

Compliance with the requirements of this document, or any other standard, does not of itself confer immunity from legal obligations.

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1 Introduction

The MISRA Autocode (AC) family of documents deals with the application of language subsets for automatic code generation purposes. MISRA AC SLSF, *Modelling design and style guidelines for the application of Simulink and Stateflow*, specifies modelling best practices intended to assist users of MathWorks' tools Simulink and Stateflow to produce high quality models using them.

Simulink and Stateflow receive updates as part of regular MathWorks MATLAB releases. The second edition of the guidelines, MISRA AC SLSF:2023 [1], takes account of MATLAB releases up to and including R2023a.

This Amendment to MISRA AC SLSF:2023 contains modifications that bring the guidelines up to date for MATLAB release R2024b. Specifically, this document contains updated versions of:

- Appendix C: Simulink diagnostic configuration
- Appendix D: Simulink window appearance settings
- Appendix E: Allowable Simulink and Stateflow blocks

In addition to modifications related to MATLAB changes,

- Appendix C includes revisions to the required settings of some diagnostics and
- Appendix E includes revisions to the statuses (allowed or not allowed) of some library blocks and specific configurations.

When applying MISRA AC SLSF:2023 in developments using MATLAB release R2024b, the versions of the Appendices in this document should be used instead of those in MISRA AC SLSF:2023 and references in MISRA AC SLSF:2023 to Appendices C, D or E should be taken to refer to the versions in this document.

2 References

- [1] MISRA AC SLSF:2023 *Modelling design and style guidelines for the application of Simulink and Stateflow*, ISBN 978-1-911700-07-4 (paperback), ISBN 978-1-911700-06-7 (PDF), The MISRA Consortium Limited, 2023
- [2] MISRA AC SLSF:2023 Amendment 2 *Revisions for MATLAB Release R2024a*, ISBN 978-1-911700-17-3 (PDF), The MISRA Consortium Limited, 2024

Appendix C: Simulink diagnostic configuration

The main menu options in the following table shall be set, per sub-rule MISRA AC SLSF 004 A, for “diagnostic configuration” in the Simulink window on completion of the model.¹

The use of settings other than as specified here must be supported with documented deviations per Appendix F: Compliance. Specific exceptions to this requirement are instances where a setting that will prevent or halt a tool action is used instead of one that will not (e.g. an Error setting used in place of a Warning setting).

The required treatment of diagnostics is as follows:

- Errors and other conditions that prevent or halt tool actions:
 - Ordinarily, the causes of these will necessarily need to be corrected.
 - A diagnostic in this category can be suppressed only when supported by a deviation.
- Warnings and other conditions that generate a diagnostic message but do not prevent or halt tool actions:
 - The causes of these should be investigated and avoided as far as is reasonably practical.
 - A diagnostic in this category can be suppressed or left uncorrected without the need for a deviation.

Setting key		Diagnostic setting has changed to a more significant level
		Diagnostic setting has not changed
		Diagnostic setting has changed to a less significant level
		New diagnostic setting introduced

Note: Changes are highlighted with respect to MISRA AC SLSF:2023 Amendment 2 [2].

Menu options	Related rule	Setting	Releases
Diagnostics / Solver			
Algebraic loop	None	error	All
Minimize artificial algebraic loop occurrences	None	warning	All
Block priority violation	None	error	All
Min step size violation	None	error	All
Consecutive zero crossings violation	None	error	All
Automatic solver parameter selection	MISRA AC SLSF 003 A	error	All
State name clash	MISRA AC GMG 006 C	warning	All
Operating point restore interface checksum mismatch	None	warning	2019A –
Extraneous discrete derivative signals	None	error	– 2023B
Sample hit time adjusting	None	error	– 2015B
Unspecified inheritability of sample time	MISRA AC SLSF 009 C	error	– 2015B
Solver data inconsistency	None	warning	– 2015B
SimState interface checksum mismatch	None	warning	– 2018B
SimState object from other release	None	warning	– 2018B
Diagnostics / Advanced			
Allow symbolic dimension specification	None	Unselected	All
Check undefined subsystem initial output	MISRA AC SLSF 007 A	Selected	2014A –
Allow automatic unit conversions	None	Unselected	All
Allowed unit systems	None	SI Only	All
Units inconsistency messages	None	warning	All
Solver data inconsistency	None	warning	2017B –
Ignored zero crossings	None	warning	2020A –
Masked zero crossings	None	warning	2020A –

¹ The grouping of the menu options varies between the different releases of Simulink. The options listed in the table may not be seen within the root of the menu but may be located at the second or third level of menu.

Menu options	Related rule	Setting	Releases
Initial state is array	None	warning	All
Insufficient maximum identifier length	None	warning	2020B -
Block diagram contains disabled library links	None	error	2017B -
Block diagram contains parameterized library links	None	error	2017B -
Combine output and update methods for code generation and simulation	None	Selected	All
Behavior when pregenerated library subsystem code is missing	None	error	2022B -
Behavior when a matching unit test for subsystem reference is missing	None	error	2023A -
Enable debug execution mode for FMU Import blocks	None	Unselected	2019A -
Arithmetic operations in variant conditions	None	error	2019A -
Variant activation time inherited from Simulink.VariantControl	None	error	2022B -
Variant condition mismatch at signal source and destination	None	error	2020B -
Variant configuration not used by top model	None	error	2022B -
Check runtime output of execution context	None	Selected	- 2020B
Check undefined subsystem initial output	None	Selected	- 2022A
Diagnostics / Sample Time			
Source block specifies -1 sample time	MISRA AC SLSF 009 D	error	All
Discrete used as continuous	MISRA AC SLSF 003 A	error	- 2013B
Multitask rate transition	None	error	- 2020A
Multitask data transfer	None	error	2020B -
Single rate transition	None	error	- 2020A
Single task data transfer	None	error	2020B -
Multitask conditionally executed subsystem	None	error	All
Tasks with equal priority	None	error	All
Exported tasks rate transition	None	error	2019B - 2023B
Enforce sample times specified by Signal Specification blocks	MISRA AC SLSF 009 D	error	All
Sample hit time adjusting	None	warning	2017B -
Unspecified inheritability of sample time	MISRA AC SLSF 009 C	error	2017B -
Diagnostics / Data Validity / Signals			
Signal resolution	None	Explicit only	All
Division by singular matrix	None	error	All
Underspecified data types	MISRA AC GMG 010 A, B, C	error	All
Inf or NaN block output	MISRA AC GMG 013 B	error	All
"rt" prefix for identifiers	MISRA AC GMG 006 D	error	All
Wrap on overflow	MISRA AC GMG 010 B	error	2014A -
Saturate on overflow	MISRA AC GMG 013 A	error	2014A -
Underspecified dimensions	None	error	2018B -
Simulation range checking	None	error	All
String truncation checking	None	error	2018A -
Detect overflow	MISRA AC GMG 010 D	error	- 2013B
Diagnostics / Data Validity / Parameters			
Detect overflow	None	error	All
Bits of error threshold	None	Zero bit	2024A -
Detect precision loss	None	warning	All
Suppress double to single detection	None	Unselected	2024A -
Absolute difference threshold	None	0.0	2024A -
Relative difference threshold	None	0.0	2024A -
Detect underflow	MISRA AC GMG 010 D	error	All
Detect loss of tunability	None	warning	All
Detect downcast	MISRA AC GMG 010 D	error	All
Diagnostics / Data Validity / Data Store Memory Blocks			
Detect read before write	MISRA AC SLSF 045 C	Enable all as errors	All
Detect write after read	MISRA AC SLSF 045 C	Enable all as errors	All
Detect write after write	MISRA AC SLSF 055 D	Enable all as errors	All
Multitask data store	MISRA AC SLSF 005 C Data store blocks not permitted	error	All
Duplicate data store names	None	warning	All

Menu options	Related rule	Setting	Releases
Diagnostics / Data Validity / Advanced Parameters			
Multiple driving blocks executing at the same time step	MISRA AC SLSF 005 C Merge block not permitted	error	All
Underspecified initialization detection	MISRA AC SLSF 007 A	Classic	All
Array bounds exceeded	MISRA AC GMG 010 D	error	All
Model Verification block enabling	None	Use local settings	All
Detect non-reused custom storage classes	None	error	- 2022A
Detect ambiguous custom storage class final values	None	error	- 2022A
Parameter Writer block validation	None	Use local settings	2023A -
Diagnostics / Type Conversion			
Unnecessary type conversions	None	warning	All
Vector/matrix block input conversion	MISRA AC SLSF 015 C	error	All
32-bit integer to single precision float conversion	MISRA AC GMG 010 A	warning	All
Detect underflow	MISRA AC GMG 010 D	error	2013B -
Detect precision loss	MISRA AC GMG 010 D	error	2013B -
Detect overflow	MISRA AC GMG 010 D	error	All
Diagnostics / Connectivity / Signals			
Signal label mismatch	MISRA AC SLSF 027 B, C, D, E	error	All
Unconnected block input ports	MISRA AC SLSF 017 A	error	All
Unconnected block output ports	MISRA AC SLSF 017 A	error	All
Unconnected line	MISRA AC SLSF 017 B	error	All
Diagnostics / Connectivity / Buses			
Unspecified bus object at root Outport block	None	error	All
Element name mismatch	MISRA AC SLSF 027 B	error	All
Bus signal treated as vector	MISRA AC SLSF 016 D	error	All
Non-bus signals treated as bus signals	MISRA AC SLSF 016 D, E	error	2013B -
Repair bus selections	None	Warn and repair	2009B -
Mux blocks used to create bus signals	MISRA AC SLSF 016 A	error	- 2015B
Diagnostics / Connectivity / Function calls			
Context-dependent inputs	None	error	All
Invalid function-call connection	None	error	- 2019B
Diagnostics / Compatibility			
S-function upgrades needed	None	error	All
Block behaviour depends on frame status of signal	None	error	2009B -
Operating point object from earlier release	None	error	2021B -
SimState object from earlier release	None	warning	- 2021A
Diagnostics / Model Referencing			
Model block version mismatch	MISRA AC GMG 001 A	warning	All
Port and parameter mismatch	None	error	All
Unsupported data logging	MISRA AC SLSF 005 A To File & To Workspace blocks not permitted	error	All
No explicit final value for model arguments	None	warning	2020B -
Invalid root Inport/Outport block connection	None	warning	- 2023B
Model Configuration mismatch	Section 3.2 Model configuration	warning	- 2013B
Diagnostics / Saving			
Block diagram contains disabled library links	None	error	- 2015B
Block diagram contains parameterized library links	None	error	- 2015B
Diagnostics / Stateflow			
Unused data, events, messages and functions	MISRA AC SLSF 037 G	error	2013B -
Unexpected backtracking	MISRA AC SLSF 043 I	error	2013B -
Invalid input data access in chart initialization	MISRA AC SLSF 042 F	error	2009B -
No unconditional default transitions	MISRA AC SLSF 042 D	error	2013B -
Transition outside natural parent	MISRA AC SLSF 034 C	error	2013B -
Undirected event broadcasts	MISRA AC SLSF 047 A	error	2013B -
Transition action specified before condition action	MISRA AC SLSF 045 C	error	2013B -
Read-before-write to output in Moore chart	None	error	2014A -
Absolute time temporal value shorter than sampling period	None	error	2017B -
Self transition on leaf state	None	warning	2017B -
Execute-at-Initialization disabled in presence of input events	None	warning	2017B -

Menu options	Related rule	Setting	Releases
Unreachable execution path	MISRA AC SLSF 043 C, E, F	error	2017B –
Transition shadowing	MISRA AC SLSF 043 I	error	2013B – 2015B
Diagnostics / Stateflow / Advanced Parameters			
Use of machine-parented data instead of Data Store Memory	None	error	2017B – 2022B

Appendix D: Simulink window appearance settings

The following appearance options must be set in the Simulink window on completion of the model²:

Setting key		Appearance setting has changed to a more significant level
		Appearance setting has not changed
		Appearance setting has changed to a less significant level
		New appearance setting introduced

Note: Changes are highlighted with respect to MISRA AC SLSF:2023 Amendment 2 [2].

D.1 Window Settings

Menu options	Related rule	Setting	Priority
Modeling > Environment			
Model Browser	None	Selected	Advisory
Explorer bar	None	Selected	Advisory
Zoom	MISRA AC SLSF 019	100%	Advisory
Smart guides	None	Selected	Advisory
Preserve alignment	None	Selected	Advisory
Toolstrip * ¹	None	Selected	Advisory
Status bar	None	Selected	Advisory
Modeling > Environment > Simulink Preferences			
Use classic diagram theme	MISRA AC SLSF 024	Selected	Advisory
Content preview displays for new hierarchical elements	None	Deselected	Advisory

D.2 Model Settings

Menu options	Related rule	Setting	Priority
Format			
Show Markup	None	Selected	Required
Background * ²	MISRA AC SLSF 019	White	Required
Debug > Diagnostics > Information Overlays			
> Signal Display			
Signal dimensions	None	Deselected	Required
Signal Data Ranges	None	Deselected	Required
Propagated signal labels	None	Deselected	Required
Nonscalar signals * ³	None	Selected	Required
Signal resolves to object	None	Deselected	Required
> Sample Time			
Colours	None	Deselected	Required
Text	None	Deselected	Required
Timing Legend	None	Deselected	Required
Automatic Rate Transitions	MISRA AC SLSF 058	Deselected	Required
> Library links			
Show All Links	None	Selected	Required
> Blocks			
Execution order * ⁴	None	Deselected	Required
Reduced Blocks	None	Deselected	Required
Variant conditions	None	Deselected	Required
Variant Legend	None	Deselected	Required
Variant Fading	None	Deselected	Required

² The location of the options listed in the table varies between the different releases of Simulink. In the latest versions they are spread across different toolbars and the right-click menu on a selected block.

Menu options	Related rule	Setting	Priority
Reference Model I/O mismatch	None	Deselected	Required
Reference Model version	None	Deselected	Required
Connectors	None	Deselected	Required
Name in Tooltip	None	Deselected	Required
Description in Tooltip	None	Deselected	Required
Parameters in Tooltip	None	Deselected	Required
Show block name	MISRA AC SLSF 026	As per related rule	Required
Hide Automatic Block Names	MISRA AC SLSF 026	Deselected	Required
Execution Context * ⁵	None	Deselected	Required
> Ports			
Units	None	Deselected	Required
Base Data Types	None	Deselected	Required
Alias Data Types	None	Deselected	Required
Port Number	None	Deselected	Required
> Signal Badges			
Logging & Viewers * ⁶	None	Selected	Required
Test Point * ⁷	None	Selected	Required
Linearization indicators	None	Selected	Required
C Code > Code Interface			
Storage class	None	Deselected	Required

D.3 Block Settings

Menu options	Related rule	Setting	Priority
Format			
Auto name	MISRA AC SLSF 026	As per related rule	Required
Foreground Colour * ⁸	MISRA AC SLSF 023	Black	Required
Background Colour * ⁸	MISRA AC SLSF 023	White	Required
Shadow	MISRA AC SLSF 024	Deselected	Required
Content Preview	None	Deselected	Required
Port Labels	None	From Block Name / From Port Block Name	Required
Show Block Name	MISRA AC SLSF 026	Deselected	Required

Notes:

Key	Description
* ¹	This menu option was renamed from Toolbars.
* ²	This menu option was renamed from Canvas Colour.
* ³	This menu option was renamed from Wide non-scalar lines.
* ⁴	This menu option was renamed from Sorted execution order.
* ⁵	This menu option was renamed from Execution Context Indicator in 2020a and then removed in 2021a.
* ⁶	This menu option was renamed from Viewer indicator.
* ⁷	This menu option was renamed from Testpoint and logging indicators.
* ⁸	These menu options were renamed from Block Colours.

Appendix E: Allowable Simulink and Stateflow blocks

The table below details which Simulink and Stateflow blocks from The MathWorks libraries are allowed in controller and plant modelling. The criteria for allowable blocks are detailed in rule MISRA AC SLSF 005.

A detailed description of each block can be found in documentation from The MathWorks and can be used in conjunction with the criteria for allowable blocks to understand its assigned status.

Additional information for some blocks is provided in the notes section at the end of the table.

Status Key		Block status has changed to Not allowed (N)
		Block status has changed to Allowed (A)
		Block status has not changed
		New block introduced
		Block deprecated

Note: Changes are highlighted with respect to MISRA AC SLSF:2023 Amendment 2 [2].

Category	Block	Show block name	Can be re-sized	Controller modelling status	Plant modelling status	Releases
Additional Math and Discrete	Decrement Real World			N	N	2009A –
	Decrement Stored Integer			N	N	2009A –
	Decrement Time To Zero			N	N	2009A –
	Decrement To Zero			N	N	2009A –
	Fixed-Point State-Space			N	N	2009A –
	Increment Real World			N	N	2009A –
	Increment Stored Integer			N	N	2009A –
	Transfer FcnDirect Form II			N	N	2009A –
	Transfer FcnDirect Form II Time Varying			N	N	2009A –
	Unit Delay Enabled			N	N	2009A – 2016A
	Unit Delay Enabled External IC			N	N	2009A – 2016A
	Unit Delay Enabled Resettable			N	N	2009A – 2016A
	Unit Delay Enabled Resettable External IC			N	N	2009A – 2016A
	Unit Delay External IC			N	N	2009A – 2016A
	Unit Delay Resettable			N	N	2009A – 2016A
	Unit Delay Resettable External IC			N	N	2009A – 2016A
	Unit Delay With Preview Enabled			N	N	2009A – 2016A
	Unit Delay With Preview Enabled Resettable			N	N	2009A – 2016A
	Unit Delay With Preview Enabled Resettable External RV			N	N	2009A – 2016A
	Unit Delay With Preview Resettable			N	N	2009A – 2016A
Unit Delay With Preview Resettable External RV			N	N	2009A – 2016A	
Continuous	Derivative *1	N	N	N	A	2009A –
	Descriptor State-Space			N	N	2018B –
	Entity Transport Delay			N	N	2019B –
	First Order Hold			N	N	2019B –
	Integrator Limited			N	N	2009A –
	Integrator *2	N	N	N	A	2009A –
	Integrator, Second-Order			N	N	2010A –
	Integrator, Second-Order Limited			N	N	2010A –
	PID Controller			N	N	2009B –
	PID Controller (2DOF)			N	N	2009B –
	State-Space	Y	N	N	A	2009A –
	Transfer Fcn	Y	N	N	A	2009A –
	Transport Delay	Y	N	N	A	2009A –
	Variable Time Delay	Y	N	N	A	2009A –
	Variable Transport Delay			N	N	2009A –
Zero-Pole	Y	N	N	A	2009A –	
Discontinuities	Backlash	Y	N	N	A	2009A –
	Coulomb and Viscous Friction	Y	N	N	A	2009A –

Category	Block	Show block name	Can be re-sized	Controller modelling status	Plant modelling status	Releases
	Dead Zone	Y	N	N	A	2009A –
	Dead Zone Dynamic			N	N	2009A –
	Hit Crossing			N	N	2009A –
	PWM			N	N	2020B –
	Quantizer	Y	N	A	A	2009A –
	Rate Limiter			N	N	2009A –
	Rate Limiter Dynamic			N	N	2009A –
	Relay	Y	N	A	A	2009A –
	Saturation	Y	N	A	A	2009A –
	Saturation Dynamic			N	N	2009A –
	Variable Pulse Generator			N	N	2020B –
	Wrap To Zero			N	N	2009A –
Discrete	Delay			N	N	2009A –
	Difference			N	N	2009A –
	Discrete Derivative			N	N	2009A –
	Discrete Filter			N	N	2009A –
	Discrete FIR Filter			N	N	2009A –
	Discrete PID Controller			N	N	2009B –
	Discrete PID Controller (2DOF)			N	N	2009B –
	Discrete State-Space	Y	N	A	A	2009A –
	Discrete Transfer Fcn	Y	N	A	A	2009A –
	Discrete Zero-Pole			N	N	2009A –
	Discrete-Time Integrator			N	N	2009A –
	Enabled Delay			N	N	2015A – 2017A
	First-Order Hold			N	N	2009A – 2024A
	Memory	Y	N	N	A	2009A –
	Propagation Delay			N	N	2022B –
	Resetable Delay			N	N	2012B –
	Tapped Delay			N	N	2009A –
	Transfer Fcn First Order			N	N	2009A –
	Transfer Fcn Lead or Lag			N	N	2009A –
	Transfer Fcn Real Zero			N	N	2009A –
Unit Delay	Y	N	A	A	2009A –	
Variable Integer Delay			N	N	2012B –	
Zero-Order Hold	Y	N	A	A	2009A –	
Logic and Bit Operations	Bit Clear			N	N	2009A –
	Bit Set			N	N	2009A –
	Bit to Integer Converter			N	N	2022A –
	Bitwise Operator	Y	N	A	A	2009A –
	Combinatorial Logic			N	N	2009A –
	Compare To Constant			N	N	2009A –
	Compare To Zero			N	N	2009A –
	Detect Change			N	N	2009A –
	Detect Decrease			N	N	2009A –
	Detect Fall Negative			N	N	2009A –
	Detect Fall Nonpositive			N	N	2009A –
	Detect Increase			N	N	2009A –
	Detect Rise Nonnegative			N	N	2009A –
	Detect Rise Positive			N	N	2009A –
	Extract Bits			N	N	2009A –
	Float Extract Bits			N	N	2023A –
	Integer to Bit Converter			N	N	2022A –
	Interval Test			N	N	2009A –
	Interval Test Dynamic			N	N	2009A –
	Logical Operator	N	Y	A	A	2009A –
Relational Operator	N	N	A	A	2009A –	
Shift Arithmetic	Y	N	A	A	2009A –	
Lookup Tables	1-D Lookup Table	Y	N	A	A	2009A –
	2-D Lookup Table	Y	N	A	A	2009A –
	Cosine	Y	N	A	A	2009A –

Category	Block	Show block name	Can be re-sized	Controller modelling status	Plant modelling status	Releases
	Direct Lookup Table (n-D)	Y	N	A	A	2009A –
	Interpolation Using Prelookup	Y	N	A	A	2009A –
	Lookup Table Dynamic	N	N	A	A	2009A –
	n-D Lookup Table	Y	Y	A	A	2009A –
	Prelookup	Y	N	A	A	2009A –
	Sine			N	N	2009A –
Math Operations	Abs	N	N	A	A	2009A –
	Add	N	Y	A	A	2009A –
	Algebraic Constraint			N	N	2009A –
	Assignment			N	N	2009A –
	Bias			N	N	2009A –
	Complex to Magnitude-Angle	N	N	A	A	2009A –
	Complex to Real-Imag	N	N	A	A	2009A –
	Divide			N	N	2009A –
	Dot Product	N	N	A	A	2009A –
	Find Nonzero Elements			N	N	2009A –
	Gain	Y	N	A	A	2009A –
	Magnitude-Angle to Complex	N	N	A	A	2009A –
	Math Function					2009A –
	exp	N	N	A	A	
	log	N	N	A	A	
	2^u	N	N	A	A	
	10^u	N	N	A	A	
	log10	N	N	A	A	
	magnitude^2	N	N	N	A	
	square	N	N	N	A	
	pow	N	N	A	A	
	conj	N	N	N	A	
	reciprocal with Exact method	N	N	N	A	
	reciprocal with Newton-Raphson method	N	N	N	A	
	hypot	N	N	N	A	
	rem	N	N	A	A	
	mod	N	N	A	A	
	transpose	N	N	A	A	
	hermitian	N	N	N	A	
	Matrix Concatenate			N	N	2009A –
	Min Max	N	Y	A	A	2009A –
	Min Max Running Resettable			N	N	2009A –
	Permute Dimensions	Y	N	A	A	2009A –
	Polynomial	Y	N	A	A	2009A –
	Product	N	Y	A	A	2009A –
	Product of Elements			N	N	2009A –
	Real-Imag to Complex	N	N	A	A	2009A –
	Reciprocal Sqrt			N	N	2009A – 2019A
	Reshape	N	N	A	A	2009A –
	Rounding Function			N	N	2009A –
	Sign			N	N	2009A –
	Signed Sqrt			N	N	2010A – 2018A
	Sine Wave Function			N	N	2009A –
	Slider Gain	Y	N	N	A	2009A –
	Sqrt	N	N	A	A	2010A –
	Squeeze			N	N	2009A –
	Subtract			N	N	2009A – 2018A
Sum	Y	Y	A	A	2009A – 2018A	
Sum of Elements	Y	Y	A	A	2009A – 2018A	
Trigonometric Function	N	N	N	A	2009A –	
Unary Minus			N	N	2009A –	
Vector Concatenate			N	N	2009A –	
Weighted Sample Time Math			N	N	2009A –	
Array Processing Subsystem			N	N	2024A –	

Category	Block	Show block name	Can be re-sized	Controller modelling status	Plant modelling status	Releases
Matrix Operations	Create Diagonal Matrix	N	N	A	A	2009A –
	Cross Product	N	N	A	A	2021B –
	Expand Scalar	Y	Y	A	A	2024A –
	Extract Diagonal	N	N	A	A	2021B –
	Hermitian Transpose			N	N	2021B –
	IdentityMatrix	N	N	A	A	2021B –
	IsHermitian			N	N	2022A –
	IsSymmetric	N	N	A	A	2021B –
	IsTriangular	N	N	A	A	2021B –
	Matrix Multiply	N	N	A	A	2009A –
	Matrix Concatenate	N	N	A	A	2009B –
	Matrix Square			N	N	2009A –
	Neighborhood Processing Subsystem			N	N	2022B –
	Permute Matrix	N	N	A	A	2009A –
	Pixel Processing Subsystem			N	N	2024A –
	Submatrix	N	N	A	A	2009A –
Transpose	N	N	A	A	2021B –	
Messages & Events	Hit Crossing Probe			N	N	2009A –
	Hit Scheduler			N	N	2022B –
	Message Merge			N	N	2021A –
	Message Polling Subsystem			N	N	2022A –
	Message Triggered Subsystem			N	N	2022A –
	Queue			N	N	2016A –
	Receive			N	N	2016A –
	Send			N	N	2016A –
Sequence Viewer			N	N	2015B –	
Model Verification	Assertion			N	N	2009A –
	Check Discrete Gradient			N	N	2009A –
	Check Dynamic Gap			N	N	2009A –
	Check Dynamic Lower Bound			N	N	2009A –
	Check Dynamic Range			N	N	2009A –
	Check Dynamic Upper Bound			N	N	2009A –
	Check Input Resolution			N	N	2009A –
	Check Static Gap			N	N	2009A –
	Check Static Lower Bound			N	N	2009A –
	Check Static Range			N	N	2009A –
Check Static Upper Bound			N	N	2009A –	
Model-Wide Utilities	Block Support Table			N	N	2009A –
	DocBlock	N	N	A	A	2009A –
	Model Info	N	Y	A	A	2009A –
	Timed-Based Linearization			N	N	2009A –
	Trigger-Based Linearization			N	N	2009A –
Ports and Subsystems	Atomic Subsystem	Y	Y	A	A	2009A –
	Code Reuse Subsystem	Y	Y	A	A	2009A –
	Configurable Subsystem			N	N	2009A – 2024A
	Enable	N	N	A	A	2009A –
	Enabled and Triggered Subsystem * ⁴			N	N	2009A –
	Enabled Subsystem * ⁴			N	N	2009A –
	For Each Subsystem	Y	Y	A	A	2009A –
	For Iterator Subsystem	Y	Y	A	A	2009A –
	Function Element			N	N	2022A –
	Function Element Call			N	N	2022A –
	Function-Call Feedback Latch			N	N	2009A –
	Function-Call Generator	N	N	A	A	2009A –
	Function-Call Split			N	N	2010A –
	Function-Call Subsystem * ⁴			N	N	2009A –
	If			N	N	2009A –
	If Action Subsystem			N	N	2009A –
In Bus Element	Y	N	A	A	2017A –	
Inport	Y	N	A	A	2009A –	

Category	Block	Show block name	Can be re-sized	Controller modelling status	Plant modelling status	Releases
	Model	Y	Y	A	A	2009A –
	Model Variants			N	N	2009B – 2018A
	Out Bus Element	Y	N	A	A	2017A –
	Outport	Y	N	A	A	2009A –
	Resettable Subsystem	Y	Y	A	A	2015A –
	Subsystem	Y	Y	A	A	2009A –
	Subsystem Examples			N	N	2009A – 2017A
	Subsystem Reference	Y	Y	A	A	2019B –
	Switch Case			N	N	2009A –
	Switch Case Action Subsystem			N	N	2009A –
	Trigger	N	N	A	A	2009A –
	Triggered Subsystem			N	N	2009A –
	Unit System Configuration			N	N	2016A –
	Variant Assembly Subsystem			N	N	2010B –
	Variant Model			N	N	2010B –
	Variant Subsystem			N	N	2010B –
	While Iterator Subsystem	Y	Y	A	A	2009A –
Signal Attributes	Bus to Vector			N	N	2009A –
	Data Type Conversion	N	N	A	A	2009A –
	Data Type Conversion Inherited			N	N	2009A –
	Data Type Duplicate			N	N	2009A –
	Data Type Propagation			N	N	2009A –
	Data Type Propagation Examples			N	N	2009A –
	Data Type Scaling Strip			N	N	2009A –
	IC			N	N	2009A –
	Probe			N	N	2009A –
	Rate Transition			N	N	2009A –
	Signal Conversion	N	N	A	A	2009A –
	Signal Specification	Y	N	A	A	2009A –
	Unit Conversion			N	N	2016A –
	Weighted Sample Time			N	N	2009A –
Width	N	N	A	A	2009A –	
Signal Routing	Bus Assignment	N	Y	A	A	2009A –
	Bus Creator	N	Y	A	A	2009A –
	Bus Element In	Y	N	A	A	2017A –
	Bus Element Out	Y	N	A	A	2017A –
	Bus Selector	N	Y	A	A	2009A –
	Connection Port			N	N	2009A –
	Data Store Memory			N	N	2009A –
	Data Store Read			N	N	2009A –
	Data Store Write			N	N	2009A –
	Demux	N	Y	A	A	2009A –
	Environment Controller			N	N	2009A – 2024A
	From	N	Y	A	A	2009A –
	Goto	N	Y	A	A	2009A –
	Goto Tag Visibility			N	N	2009A –
	Index Vector			N	N	2009A –
	Manual Switch			N	N	2009A –
	Manual Variant Sink			N	N	2016B –
	Manual Variant Source			N	N	2016B –
	Merge			N	N	2009A –
	Multiport Switch	N	Y	A	A	2009A –
	Mux	N	Y	A	A	2009A –
	Parameter Writer			N	N	2019A –
	Selector	Y	N	A	A	2009A –
	State Reader			N	N	2016B –
	State Writer			N	N	2016B –
	Switch	N	N	A	A	2009A –
	Two-Way Connection			N	N	2009A –
	Variant End			N	N	2024A –
	Variant Sink			N	N	2016B –

Category	Block	Show block name	Can be re-sized	Controller modelling status	Plant modelling status	Releases
Sinks	Variant Source			N	N	2016B –
	Variant Start			N	N	2024A –
	Vector Concatenate	N	Y	A	A	2009B –
	Display			N	N	2009A –
	Floating Scope			N	N	2009A –
	Out Bus Element	Y	N	A	A	2017A –
	Outport	Y	N	A	A	2009A –
	Record			N	N	2021A –
	Scope			N	N	2009A –
	Stop Simulation			N	N	2009A –
	Terminator	N	N	A	A	2009A –
	To File			N	N	2009A –
	To Workspace			N	N	2009A –
XY Graph			N	N	2009A –	
Sources	Inport	Y	N	A	A	2009A –
	Band-Limited White Noise	Y	N	N	A	2009A –
	Chirp Signal	Y	N	N	A	2009A –
	Clock	N	N	N	A	2009A –
	Constant	Y	N	A	A	2009A –
	Counter Free-Running			N	N	2009A –
	Counter Limited	Y	N	N	A	2009A –
	Digital Clock	Y	N	N	A	2009A –
	Enumerated Constant			N	N	2009B –
	From File	Y	N	N	A	2009A –
	From Spreadsheet	Y	N	N	A	2017B –
	From Workspace	Y	N	N	A	2009A –
	Ground ^{*3}	N	N	N	A	2009A –
	In Bus Element	Y	N	A	A	2017A –
	Playback	N	N	N	A	2022B –
	Pulse Generator	Y	N	N	A	2009A –
	Ramp	Y	N	N	A	2009A –
	Random Number	Y	N	N	A	2009A –
	Repeating Sequence	Y	N	N	A	2009A –
	Repeating Sequence Interpolated	Y	N	N	A	2009A –
	Repeating Sequence Stair	Y	N	N	A	2009A –
	Signal Builder	Y	N	N	A	2009A – 2022B
	Signal Editor	Y	N	N	A	2017B –
	Signal Generator	Y	N	N	A	2009A –
	Sine Wave	Y	N	N	A	2009A –
	Step	Y	N	N	A	2009A –
	Uniform Random Number	Y	N	N	A	2009A –
Waveform Generator			N	N	2014A –	
User-Defined Functions	C Caller			N	N	2018B –
	C Function			N	N	2020A –
	Fcn			N	N	2009A – 2020A
	Function Caller			N	N	2014B –
	Initialize Function			N	N	2016B –
	Interpreted MATLAB Function			N	N	2009A –
	Level-2 MATLAB S-Function	Y	Y	N	A	2009A –
	MATLAB Function	Y	Y	N	A	2009A –
	MATLAB System			N	N	2013B –
	Reinitialize Function			N	N	2022A –
	Reset Function			N	N	2017B –
	S-Function	Y	Y	A	A	2009A –
	S-Function Builder	Y	Y	N	A	2009A –
	S-Function Examples			N	N	2009A –
	Simulink Function			N	N	2014B –
	Terminate Function			N	N	2016B –
Stateflow	Chart	Y	Y	A	A	2009A –
	Chart (MATLAB)			N	N	2012B – 2013B

Category	Block	Show block name	Can be re-sized	Controller modelling status	Plant modelling status	Releases
	Message Viewer			N	N	2015B – 2017A
	Sequence Viewer			N	N	2017B –
	State Transition Table			N	N	2012B –
	Truth Table			N	N	2009A –

Notes:

Key	Description
*1	Use of this block may impact simulation times, depending on the solver and its settings.
*2	The accuracy of this block's output may depend on the chosen solver.
*3	Use of this block may mask errors, and in some circumstances it will not output the expected value.
*4	Use Subsystem, Enable and Trigger blocks to create equivalents of these blocks following related rules on positioning of the Enable and Trigger blocks.