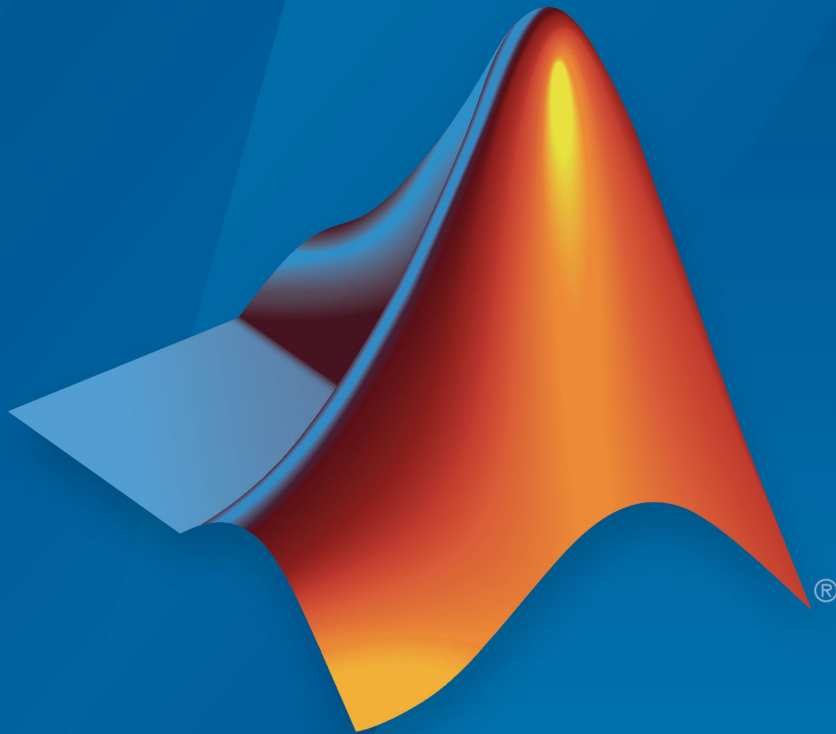


# AUTOSAR Blockset Release Notes



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## *AUTOSAR Blockset Release Notes*

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# R2019a

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**Version: 2.0**

**New Features**

**Bug Fixes**

**Compatibility Considerations**

## Introducing AUTOSAR Blockset

In R2019a, the AUTOSAR Blockset product replaces the Embedded Coder® Support Package for AUTOSAR Standard. You use AUTOSAR Blockset to design and simulate AUTOSAR software.

AUTOSAR Blockset provides an AUTOSAR dictionary and blocks for developing Classic and Adaptive AUTOSAR software using Simulink® models. You can define AUTOSAR software component properties, interfaces, and data types, and map them to existing Simulink models using the AUTOSAR editor. Alternatively, the blockset provides an application interface that lets you automatically generate new Simulink models for AUTOSAR by importing software component and composition descriptions from AUTOSAR XML files.

AUTOSAR Blockset provides blocks and constructs for AUTOSAR library routines and Basic Software (BSW) services, including Memory Access and Diagnostics. By simulating the BSW services together with your application software model, you can verify your AUTOSAR ECU software without leaving Simulink.

AUTOSAR Blockset supports C and C++ production code generation and AUTOSAR XML file export (with Embedded Coder). The software is qualified for use with the ISO 26262 standard (with IEC Certification Kit).

## Product restructuring overview

In R2019a, AUTOSAR Blockset provides AUTOSAR software design and simulation support that previously was provided by Embedded Coder and the Embedded Coder Support Package for AUTOSAR Standard. In the new product, in general, software interfaces and development workflows are unchanged from previous releases. Product restructuring introduced these differences:

- Product requirements and dependencies:
  - AUTOSAR Blockset requires only MATLAB® and Simulink.
  - Embedded Coder is required to generate AUTOSAR C/C++ code and XML files.
  - No support package is required.
- Second development platform:
  - R2019a adds AUTOSAR Adaptive Platform support to existing Classic Platform support.

- 
- Classic and adaptive development workflows are logically distinct, and are handled separately in AUTOSAR Blockset software interfaces and documentation.
  - Existing Classic Platform workflows are unchanged, except where enhanced by R2019a features.
  - AUTOSAR block libraries relocated:
    - AUTOSAR Blockset libraries replace block libraries from Embedded Coder and Embedded Coder Support Package for AUTOSAR Standard.
    - Existing block names are unchanged; new blocks are added.
  - AUTOSAR example models renamed and relocated:
    - For example, models `autosar_swk*.slx` in folder `examples/autosarblockset` replace models `rtwdemo_autosar_swk*.slx`, formerly in folder `toolbox/rtw/rtwdemos`.
    - Models remain accessible from the MATLAB command line.
  - AUTOSAR HTML help and PDF books restructured and relocated:
    - AUTOSAR Blockset HTML help replaces AUTOSAR help in Embedded Coder and Embedded Coder Support Package for AUTOSAR Standard.
    - AUTOSAR Blockset Reference, User's Guide, and Release Notes PDF books replace the Embedded Coder AUTOSAR PDF book.

## Resources for Upgrading from AUTOSAR Standard Support Package

If you are upgrading to AUTOSAR Blockset from Embedded Coder Support Package for AUTOSAR Standard, review information about compatibility and upgrade issues at the following locations:

- AUTOSAR Blockset Release Notes (latest release). In HTML notes, to view only compatibility considerations, select **Incompatibilities Only**.
- On the MathWorks® web site, view the R2018b Embedded Coder Support Package for AUTOSAR Standard Release Notes. To view only compatibility considerations, select **Incompatibilities Only**. This document provides compatibility information for releases up through R2018b.

You can also refer to the rest of the archived documentation, including release notes, for Embedded Coder Support Package for AUTOSAR Standard and Embedded Coder.

## Compatibility Considerations

If you are upgrading to R2019a AUTOSAR Blockset from Embedded Coder Support Package for AUTOSAR Standard, these minor compatibility considerations might apply.

- R2019a changes AUTOSAR example model locations. If you reference model names in scripts, update the model names. The new example models use the prefix `autosar_` and are located in the folder `matlabroot/examples/autosarblockset`.
- R2019a restructures and relocates AUTOSAR HTML help and PDF books. Consider updating any bookmarks or references.

For function interface compatibility considerations related to R2019a new features, see “Incrementally auto-configure and map new Simulink elements in AUTOSAR model” on page 1-7.

For function interface changes that support R2019a workflow improvements, consider migrating to the improved workflows. For more information, see “Reuse existing AUTOSAR elements for software components created in Simulink” on page 1-6 and the lookup tables subsection of “Code Perspective enhancements for mapping data stores, model workspace parameters, and internal signals and states” on page 1-8.

## AUTOSAR Classic Platform support extended to Release 4.3.1

R2019a extends support of AUTOSAR Classic Platform schema version 4.3 to include schema revision 4.3.1. AUTOSAR Blockset supports the new schema revision for import and export of `arxml` files and generation of AUTOSAR-compatible C code.

If you import schema 4.3.1 `arxml` code into Simulink, the `arxml` importer detects and uses the schema version and revision, and sets the schema version parameter in the model. For more information on schema import and export, see “Select an AUTOSAR Schema”.

## Support for AUTOSAR Adaptive Platform Release 18.10

In R2019a, you can flexibly model the structure and behavior of software components for the AUTOSAR Adaptive Platform. The Adaptive Platform defines a service-oriented architecture for automotive components that must flexibly adapt to external events and conditions. AUTOSAR Blockset supports Adaptive Platform Release 18.10.

You can:



- 
- Model AUTOSAR adaptive software components using event-based communication.
  - With Embedded Coder, generate C++ code compliant with the AUTOSAR Adaptive Platform.
  - Deploy generated code and build a target executable.

For more information, see “Model AUTOSAR Adaptive Software Components” and “Configure AUTOSAR Adaptive Software Components”.

## **Generate AUTOSAR IFL and IFX library routines for interpolation using AUTOSAR lookup table blocks**

R2019a provides AUTOSAR lookup table blocks that you can configure to generate specific IFL and IFX interpolation routines in your AUTOSAR-compliant C code.

- Curve - Approximate one-dimensional function
- Curve Using Prelookup - Use precalculated index and fraction values to accelerate approximation of one-dimensional function
- Map - Approximate two-dimensional function
- Map Using Prelookup - Use precalculated index and fraction values to accelerate approximation of two-dimensional function
- Prelookup - Compute index and fraction for Curve Using Prelookup or Map Using Prelookup block

To configure AUTOSAR library routine generation for a lookup table block, open the block parameters dialog box. Modify the block parameters to configure a specific AUTOSAR routine. If you select the AUTOSAR 4.0 code replacement library (CRL) for your model, code generated from the block is replaced with the AUTOSAR library routine that you configured. For more information, see “Configure Lookup Tables for AUTOSAR Measurement and Calibration” and “Code Generation with AUTOSAR Code Replacement Library”.

## **Enhanced AUTOSAR model creation in Simulink using Component Quick Start or Simulink Start Page**

R2019a provides new resources for creating an AUTOSAR software component model in Simulink:

- AUTOSAR Component Quick Start – Provides easy, ordered steps for mapping an open Simulink model to an AUTOSAR software component. In an open model, set **System target file** to an AUTOSAR target and open Code perspective. AUTOSAR Component Quick Start opens, and you can quickly step through AUTOSAR software component configuration.
- Simulink Start Page – Provides AUTOSAR Blockset model templates. Select a Classic Platform or Adaptive Platform template, which you can use as a starting point for developing an AUTOSAR software component model.

For more information, see “Create AUTOSAR Software Component in Simulink”.

## Reuse existing AUTOSAR elements for software components created in Simulink

R2019a enhances design and development of AUTOSAR software components created in Simulink by supporting generalized reuse of existing AUTOSAR element definitions. Changes include:

- Improved import of AUTOSAR element definitions with function `updateAUTOSARProperties`
- Option to treat imported elements as read-only (the default), preventing definition changes, or read-write

```
% Import XML definitions of AUTOSAR software address methods as read-write elements
ar = arxml.importer('SwAddressMethods.arxml');
updateAUTOSARProperties(ar, 'mySWC', 'ReadOnly', false);
```
- AUTOSAR Dictionary displays **Exported XML File** name for packageable elements
- AUTOSAR XML export preserves `arxml` file structure for imported noncomponent elements
- AUTOSAR property functions `createEnumeration` and `createNumericType` generate Simulink definitions for working with imported AUTOSAR elements
- AUTOSAR Component Quick Start supports import of AUTOSAR element definitions as part of initial configuration

Function `updateAUTOSARProperties` generalizes and replaces function `updateReferences`. If you previously used `updateReferences` to import existing AUTOSAR elements into a Simulink-originated component, consider replacing `updateReferences` function calls with `updateAUTOSARProperties` function calls.

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For more information, see the `updateAUTOSARProperties` reference page, “Reuse AUTOSAR Element Descriptions”, and example “Reuse AUTOSAR Elements in Component Model”.

## Incrementally auto-configure and map new Simulink elements in AUTOSAR model

R2019a enhances AUTOSAR function `autosar.api.create` so that you can incrementally configure and map Simulink elements as you modify your AUTOSAR model. When used with a mapped AUTOSAR model, function call `autosar.api.create(modelName)`:

- Preserves current model configuration and mapping.
- Finds and maps unmapped model elements.
- Updates the AUTOSAR Dictionary for deleted model elements.

For more information, see “Incrementally Update AUTOSAR Mapping after Model Changes”.

## Compatibility Considerations

R2019a changes the default behavior of `autosar.api.create`. If you call the function without a *mode* argument (`init`, `default`, or `incremental`), the function behavior depends on the mapping state of the model.

- If the model is not mapped to an AUTOSAR software component, the function creates a Simulink to AUTOSAR mapping in `default` mode. In this mapping, Simulink inports and outports are mapped to AUTOSAR ports with default AUTOSAR properties.
- If the model is already mapped to an AUTOSAR software component, the function updates the existing mapping in `incremental` mode. The function finds and maps unmapped model elements, and updates the AUTOSAR Dictionary for deleted model elements.

Previously, if you called the function without a *mode* argument, the function created a Simulink to AUTOSAR mapping in `init` mode. In this mapping, Simulink inports and outports were not mapped to AUTOSAR ports. Also, if the model was already mapped to an AUTOSAR software component, the new mapping replaced the existing mapping.

If a MATLAB script previously called the function `autosar.api.create` without a *mode* argument, update the script to account for the R2019a behavior change. Consider taking

advantage of the new behavior or, if you rely on the previous `init` mode behavior, specify `init` as the *mode* argument.

## Code Perspective enhancements for mapping data stores, model workspace parameters, and internal signals and states

R2019a improves the Simulink to AUTOSAR mapping workflow by enhancing Code Mappings editor tabs and improving graphical display of model data.

### Map data stores to AUTOSAR component per-instance and static memory for calibration

In R2019a, AUTOSAR Code Mappings editor adds a **Data Stores** tab. In AUTOSAR code perspective, use the tab to map internal data store elements to AUTOSAR component per-instance and static memory for calibration. Alternatively, you can use equivalent AUTOSAR map functions `getDataStore` and `mapDataStore`. For more information, see “Map Data Stores to AUTOSAR Variables”, “Configure AUTOSAR Per-Instance Memory”, and “Configure AUTOSAR Static Memory”.

### Map model workspace parameters to AUTOSAR component instance-specific parameters for calibration

R2019a extends model workspace parameter mapping to support AUTOSAR per-instance parameters. Using Code Mappings editor, **Parameters** tab, you can map model workspace parameters that are marked as model arguments to AUTOSAR instance-specific parameters for calibration. Alternatively, you can use equivalent AUTOSAR map functions `getParameter` and `mapParameter`. For more information, see “Map Model Workspace Parameters to AUTOSAR Component Internal Parameters”, “Shared and Per-Instance Parameters”, and “Configure AUTOSAR Shared or Per-Instance Parameters”.

### Signals and States tabs combined

R2019a combines AUTOSAR Code Mappings editor tabs **Signals** and **States** into a **Signals/States** tab. Use the **Signals/States** tab to map Simulink block signals or states to AUTOSAR variables for calibration.

AUTOSAR map functions `getSignal`, `getState`, `mapSignal`, and `mapState` are not affected by the **Signals/States** tab change.

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## Lookup Tables tab removed

R2019a removes the **Lookup Tables** tab from AUTOSAR Code Mappings editor. The **Lookup Tables** tab was used to map Simulink lookup table or breakpoint objects created in the base workspace to AUTOSAR calibration parameters for integrated and distributed lookups. Instead, you can use the **Parameters** tab to map lookup table or breakpoint objects created in the model workspace. See “Map Model Workspace Parameters to AUTOSAR Component Internal Parameters”.

AUTOSAR map functions `getLookupTable` and `mapLookupTable` are not affected by the **Lookup Tables** tab removal. However, consider switching from using base workspace objects with functions `getLookupTable` and `mapLookupTable` to using model workspace objects with functions `getParameter` and `mapParameter`.

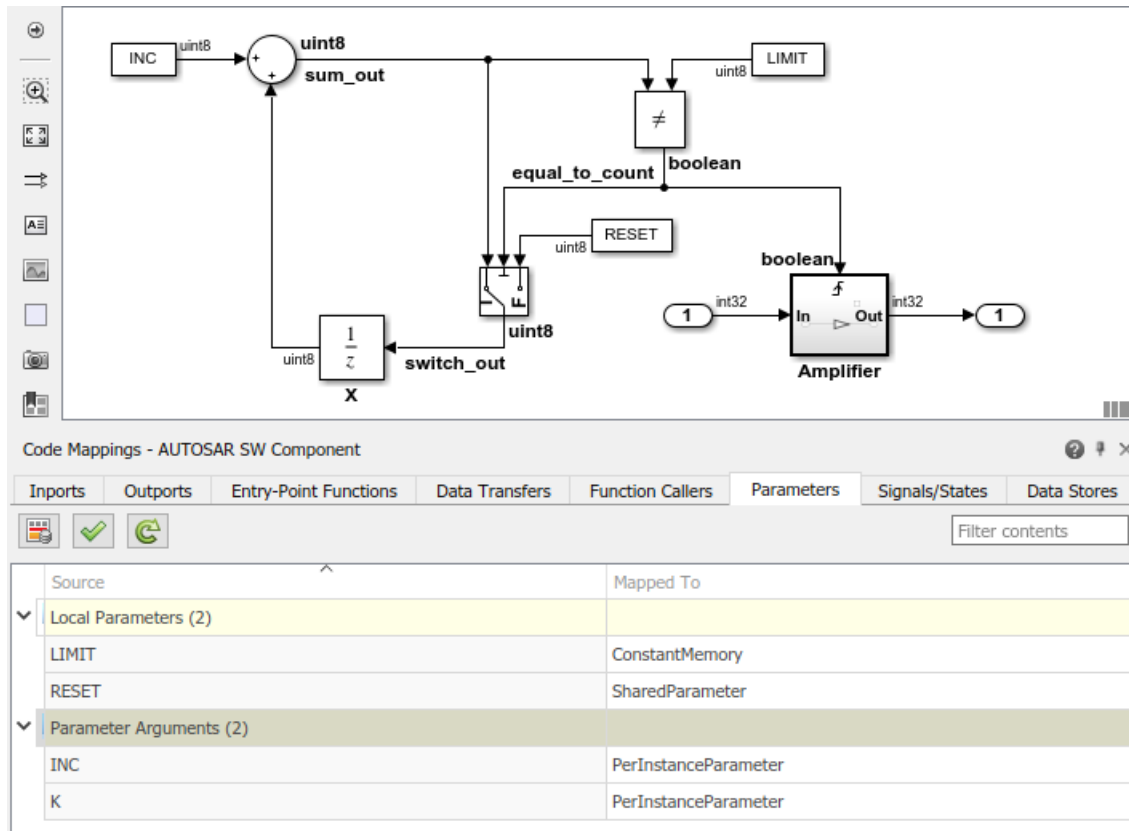
For an example of the model workspace-based workflow, see “Configure Lookup Tables for AUTOSAR Measurement and Calibration”.

## Model data grouped in categories for easy reference

To improve navigation and usability of model data mapping tables, Code Mappings editor now groups model data into categories. The editor displays a node for each category. For example:

- The **Signals/States** tab displays nodes for **Signals** and **States**.
- The **Parameters** tab displays nodes for **Local Parameters** and **Parameter Arguments**.

To focus on entries of interest and reduce scrolling, you can expand and collapse model data categories.



## Model Advisor checks for AUTOSAR Blockset configuration and lookup table block code replacements

The following table identifies the new Model Advisor checks for AUTOSAR Blockset:

Model Advisor Check	Check ID
Check model configuration parameters for AUTOSAR compliance	mathworks.autosar.autosar_configset
Check compatibility of AUTOSAR Interpolation Routines	mathworks.autosar.lut_replacement_check

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## **AUTOSAR contextual tab in the Simulink Toolstrip Tech Preview**

In R2019a, you have the option to turn on the Simulink Toolstrip. For more information, see [Simulink Toolstrip tech preview replaces menus and toolbars in the Simulink Desktop \(Simulink\)](#).

The Simulink Toolstrip includes contextual tabs, which appear only when you need them. The AUTOSAR contextual tab includes options for completing actions that apply only to AUTOSAR Blockset.

To access the AUTOSAR tab, with the Simulink Toolstrip activated, click **Apps** and then click the **AUTOSAR** button. The **AUTOSAR** tab appears.

Documentation does not reflect the addition of the AUTOSAR contextual tab.

