
LABCAR-MODEL-ICE V4.3.0

Release Notes

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1 Introduction

1.1 Definitions and Abbreviations

Term/Abbreviation	Definition
CNG	Compressed Natural Gas
ECU	Electronic Control Unit
EHI	ETAS Help Desk International
EMS	Engine Management System
HW	Hardware
ICE	Internal Combustion Engine
KIR	Known Issue Report – For severe Problem Reports which occur after a release, ETAS has introduced the Known Issue Report to inform affected customer immediately. The current Known Issues of former versions can be found on the ETAS website: http://www.etas.com/kir
LVM	ETAS LABCAR VARIANT MANAGEMENT
PDF	Portable Document Format
PR	Problem Report
RT	Realtime
SW	Software
LCO	ETAS LABCAR-OPERATOR

1.2 Conventions

The following typographical conventions are used in this document:

Choose **File** → **Open**.

Menu commands are shown in boldface.

Click **OK**.

Buttons are shown in boldface.

Press <ENTER>.

Keyboard commands are shown in angled brackets.

The "Open File" dialog box is displayed.

Names of program windows, dialog boxes, fields, etc. are shown in quotation marks.

Select the file `setup.exe`

Text in drop-down lists on the screen, program code, as well as path- and file names are shown in the Courier font.

A *distribution* is always a one-dimensional table of sample points.

General emphasis and new terms are set in italics.

1.3 User Documentation

The LABCAR-MODEL-ICE user's guide in PDF format is available on the DVD. Every ICE configuration variant contains its own documentation.

2 Product Definition

2.1 Functions at a glance

LABCAR-MODEL-ICE is a numerical computer simulation model of an internal combustion engine with available powertrain types of gasoline, diesel and CNG. It is used for closed loop testing of EMS functions, i.e., test of diagnosis and control functions. It is optimized for running on the ETAS LABCAR real-time system and is designed as a model extension for LABCAR-MODEL-VVTB.

This model has a structure similar to a real engine and contains a fuel supply system, an intake system of air and fuel, a combustion system to generate output torque and an after treatment system for the exhaust gas. Each system consists of several components. They are either physically modelled or map-based to reduce the parameterization effort.

Being a grey-box MATLAB/Simulink model, LABCAR-MODEL-ICE consists of an open overall model block diagram and several compiled S-Functions. In other words, the signal flow is visible directly, but all binaries are pre-compiled. The model documentation provides a detailed description of each component. The underlying equations are described in the user documentation.

Five different configurations of a simulated internal combustion engine are available. These configurations are referred to as standards configurations. Each of them includes a basic parametrization for the corresponding engine layout and fuel type.

An integration of user-specific components is possible.

2.2 General Description

2.2.1 System Prerequisites

The following minimum system prerequisites have to be met:

Required Hardware	1,0 GHz PC (x86_64) 1 GB RAM DVD-ROM drive Network adapter Graphics with a resolution of at least 1024 x 768, 32 MB RAM ETAS RTPC (needed for realtime execution)
Required Free Disk Space	1 GB (not including the size for application data)

The following system prerequisites are recommended:

Recommended Hardware	2,0 GHz Dual-Core PC or equivalent (x86_64) 2 GB RAM DVD-ROM drive Network adapter Graphics with a resolution of 1920 x 1280, 1 GB RAM ETAS RTPC (needed for realtime execution)
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Recommended Free Disk Space >2,0 GB

2.2.2 Software Prerequisites

The following minimum software prerequisites have to be met:

Operating System	Microsoft Windows 10 Version 1703 or higher
MATLAB/Simulink	R2016b 64bit or higher
Microsoft Visual C++ Redistributables	Microsoft Visual C++ 2015 Redistributables (x64)
ETAS LABCAR-OPERATOR	V5.4.11
ETAS COSYM	V2.3
ETAS RTPC	V6.4.1

2.2.3 Release Test Configuration

The simulation model has been developed and tested using ETAS LABCAR-OPERATOR V5.4.10 and following MATLAB 64bit versions:

- R2016b
- R2017a and R2017b
- R2018a and R2018b
- R2019a and R2019b
- R2020a

The model may also work with other versions of this software. Please contact the technical support for detailed information.

2.2.4 Restrictions

LABCAR-MODEL-ICE requires a 64bit (x86_64 architecture) simulation environment. All 32bit versions of MATLAB, Windows or RTPC are unsupported.

2.2.5 Miscellaneous

Not applicable

2.3 Delivery

The software is delivered on a DVD including LABCAR-MODEL-ICE software, documentation, tools, utilities, and further information. All software documentation is available in the Portable Document Format (PDF), which requires Adobe Reader.

The DVD contains the following items:

Directory

Documentation

Documentation \ OSS

Installation

Meaning / Explanation

General and model-specific user documentation

Source codes of used open source components

Installation files for this product

2.3.1 Used 3rd Party Software

Starting with LABCAR-MODEL V4.3, FMU Export Tooling is introduced to generate FMUs out of LABCAR-MODEL products. The FMU Export Tooling relies internally on below 3rd party products which help in compilation and generation of FMUs.

- [FMI-Kit for Simulink V2.9](#)
- [Microsoft Visual Studio 2015 Build Tools](#)

The above tools are not part of LABCAR-MODEL product installers and needs to be installed separately. Please follow the links above to download and install them.

2.4 Installation

2.4.1 Installation Hints

Installation is required to use ETAS LABCAR-MODEL products. Please execute the file `setup.exe` in the `Installation` folder of this DVD. Please take a look at the Chapter "Installation" in the User's Guide to learn about the files and folders that will be installed by this procedure.

2.5 Licensing

Two different licenses are available for LABCAR-MODEL-ICE: an operator license and a runtime license. The operator license is required for generating C-code from MATLAB/Simulink including one or more of the S-Functions from LABCAR-MODEL-ICE. The runtime license is required for executing the model either in MATLAB/Simulink directly or on the ETAS RTPC.

The ETAS License Manager is used for licensing. Please refer to the corresponding documentation.

3 Changes

This chapter describes changes with respect to the previous version of LABCAR-MODEL-ICE.

3.1 What's New

Changes from V4.2.0 to V4.3.0:

- FMU generation support for Co-simulation on Windows 64 Bit platforms.
- Support for COSYM HiL.

Changes from V4.1.0 to V4.2.0:

- Extended compatibility towards more versions of MATLAB/Simulink

Changes from V4.0.1 to V4.1.0:

- Enhancement of documentation
- Updated licensing mechanism
- Standard installation of the product

Changes from V4.0.0 to V4.0.1:

- Enhancements of documentation: each function pictured in the documentation as it is used in the plant model
- Support for LABCAR VARIANT MANAGEMENT
- Modified licensing mechanism
- Switched to Microsoft Visual C++ 2015 runtime

Changes from V1.1 to V4.0.0:

- Modularization of complete ICE: The plant model is structured as a base system with further component subsystems, e.g., intake system (air filter, compressor, etc.), fuel system (fuel pump, Injection valve, etc.), combustion system (cylinder fill, composition, etc.), exhaust system (EGR, turbine, etc.), aftertreatment system (TWC, SCR, etc.)
- New components and features, e.g., secondary air system pump, injection measurement (piezo partial stroke measurement), turbocharger eBooster
- Enhancements on existing components: CNG simulation
- Extension of functional documentation of many components

3.2 Compatibility to Earlier Releases

This release of LABCAR-MODEL-ICE is fully compatible with all older releases.

3.3 Fixed Problems

This section describes the set of problems, which ETAS fixed since the last release of LABCAR-MODEL-ICE.

Problem Number	Title
-	-

3.4 Known Issue Reports

If a product issue develops, ETAS will prepare a Known Issue Report (KIR) and post it on the internet. The report includes information regarding the technical impact and status of the solution. Therefore, you must check the KIR applicable to this ETAS product version and follow the relevant instructions prior to operation of the product.

The Known Issue Report (KIR) is available online: <http://www.etas.com/kir>

3.5 Known Issues

This section describes the set of known problems of the released version of LABCAR-MODEL-ICE.

3.5.1 Software related Items

Problem Number	Title
LM-3202	<p>FMU Exporter produces ambiguous interface names:</p> <p>The interfaces (Inports and Outports) of generated FMUs are appended with suffixes (Ex: Label_d1, Label_d2) when the port names are not unique in the Simulink model.</p> <p>This results in ambiguity of Inport and Outport names when the User is accessing the interfaces of the generated FMUs in co-simulation platforms.</p> <p>The warnings printed by FMU Exporter tooling during the FMU generation help in differentiating these interfaces. They can be used as reference when creating connections to the FMU in a co-simulation environment. The User can make use of FMU Exporter tooling function 'ExportAsFmuWithConfig' to save the console messages including warnings to a log file.</p> <p>Please refer to LABCAR-MODEL Users Guide Section 2.4.1 for additional details on the function usage.</p>

3.5.2 Hardware related Items

Problem Number	Title
-	-

4 Hints

Not applicable.

5 **Hotfix Information**

Not applicable.

6 Contact, Support and Problem Reporting

For details of your local sales office as well as your local technical support team and product hotlines, take a look at the ETAS website:

ETAS subsidiaries	WWW:	www.etas.com/en/contact.php
ETAS technical support	WWW:	www.etas.com/en/hotlines.php