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## 1 Introduction

These release notes are for the motor-control middleware group of applications released together with the MCUXpresso SDK v2.9.0. This document provides a list of application examples, their notable features, supported hardware platforms, changes since the last MCUXpresso release, known issues, and links to further documentation.

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## 2 Description

This motor-control middleware release contains application examples for the following three-phase electrical machine topologies:

- **AC Induction Motor (ACIM)**

The Field-Oriented Control (FOC) sensorless (machine model-based estimator algorithms are used to replace the position and speed sensor) application examples **mc\_acim** were developed for the high-voltage development platform and Kinetis MCUs with a floating-point unit (see [Supported platforms](#) for exact platform support details). All examples integrate the Motor Identification (MID) software module and feature the Motor Control Application Tool (MCAT) to enable quick development.

See the user's guide in the *ldocs\MC* folder in your *SDK Documentation* package (see [Examples](#)) or the [www.nxp.com/motorcontrol\\_acim](http://www.nxp.com/motorcontrol_acim) web page for more details.

- **Brush-less DC (BLDC) motor**

The **mc\_bldc** sensorless applications are designed for both low- and high-voltage platforms and feature the six-step commutation integration algorithm, including closed-loop speed control and dynamic motor current limitation. The Motor Control Application Tool (MCAT) is available.

See the user's guide in the *ldocs\MC* folder in your *SDK Documentation* package (see [Examples](#)) or the [www.nxp.com/motorcontrol\\_bldc](http://www.nxp.com/motorcontrol_bldc) web page for more details.

- **Permanent Magnet Synchronous Motor (PMSM)**

These FOC applications support both high- and low-voltage hardware platforms and various MCU types (see [Supported platforms](#) for exact platform support details). The following application types are available in the *mc\_pmsm* folder of your SDK archive (see [Examples](#)):

- **pmsm\_safe** - This FOC example features the fractional arithmetic sensorless algorithms, the MID software module, and, namely, the IEC60730 class B safety routines and overall software design. The example is based on the certified NXP IEC60730B safety library v3.0 or v4.0 and it is meant to serve as a base for fast development of safety compliant customer applications.
- **pmsm\_snsless** - Sensorless FOC examples utilizing both fractional and floating-point arithmetics. The Motor Identification (MID) software module in combination with the Motor Control Application Tool (MCAT) allow for rapid application development.
- **pmsm\_enc** - This PMSM FOC application is identical to the **pmsm\_snsless** example, except for the added option of acquiring the rotor position and speed from the encoder sensor.

See the user's guide in the *ldocs\MC* folder in your SDK Documentation package (see [Examples](#)) or the [www.nxp.com/motorcontrol\\_pmsm](http://www.nxp.com/motorcontrol_pmsm) web page. For more details about the NXP IEC60730 software offering, see [www.nxp.com/iec60730](http://www.nxp.com/iec60730).



All examples support the FreeMASTER interface for quick and simple application debugging, tuning, control, and monitoring. See [www.nxp.com/freemaster](http://www.nxp.com/freemaster) and the application user's guide for more information.

### 3 Examples

The example projects are distributed only in the form of the MCUXpresso SDK Archive and the release documentation is available in the SDK Documentation package. To acquire both packages (specific to your development platform), use the online MCUXpresso SDK Builder tool and perform the following steps:

- Go to [www.mcuxpresso.nxp.com](http://www.mcuxpresso.nxp.com).
- Click the **Select Development Board** button.
- Sign in or create the NXP account (if requested).
- Choose one of the supported platforms (see [Supported platforms](#) for the list of boards supported by this release).
- Click the **Build MCUXpresso SDK** button.
- Make sure that the **Motor Control** middleware is selected and click the **Download SDK** button.
- When the SDK Documentation and SDK Archive package build is done (you receive a notification email), it can be downloaded freely.

### 4 Supported platforms

The motor-control application examples were developed and tested with the following development tools:

- IAR Embedded Workbench IDE version 8.50.9
- Arm<sup>®</sup>-MDK - Keil<sup>®</sup> µVision<sup>®</sup> version 5.33
- MCUXpresso IDE version 11.3.0

FreeMASTER tool version 3.0 was used for application monitoring. See [www.nxp.com/freemaster](http://www.nxp.com/freemaster) for the latest version.

The hardware platforms supported by this release are listed in the following table.

**Table 1. Supported platforms**

Board	mc_acim	mc_bldc	pmsm_snsless	pmsm_enc	pmsm_safe
EVKB-IMXRT1050				✓fp, mid	
EVK-MIMXRT1010			✓fp, mid (new)		
EVK-MIMXRT1020				✓fp, mid	
EVK-MIMXRT1024				✓fp, mid (new)	
EVK-MIMXRT1060				✓fp, mid	
FRDM-KE15Z		✓fix	✓fix, mid		
FRDM-KE16Z		✓fix	✓fix, mid		
FRDM-KV11Z		✓fix	✓fix, mid		
FRDM-KV31F		✓fix	✓fp, mid		
HVP-KV11Z75M		✓fix	✓fix, mid		✓fix (new)
HVP-KV31F120M	✓fp, mid	✓fix	✓fp, mid		✓fix, mid (new)
LPCXpresso55S69			✓fp, mid		

<sup>fix</sup> Fixed-point arithmetics.

<sup>fp</sup> Floating-point arithmetics.

<sup>mid</sup> Motor Identification (MID) software module is available.

## 5 What is new

This section describes all notable changes since the last motor-control middleware MCUXpresso SDK release v2.8.0.

### 1. Support of the EVK-MIMXRT1024 board

The `pmsm_enc` example was added for the EVK-MIMXRT1024 board.

### 2. Updated documentation

The documentation for the `mc_acim`, `pmsm_enc`, and `pmsm_snsless` examples was updated. The documents are available as a part of the SDK Documentation package (see [Examples](#)).

## 6 Known issues

This chapter contains the description of known issues or non-standard behavior of the released example.

**No issues are currently known.**

## 7 Feedback

Your feedback is very important to us. Please feel free to leave a comment [here](#).

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Date of release:

Document identifier: MC280RN

