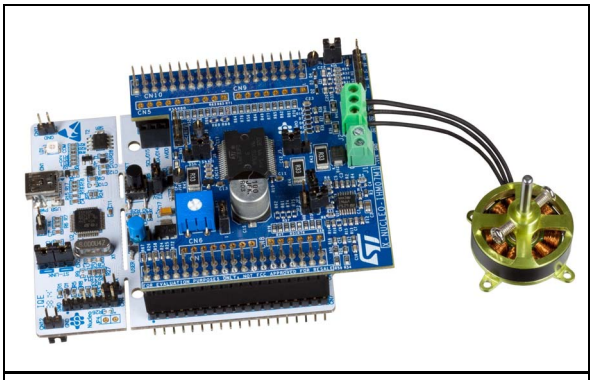
P-NUCLEO-IHM001
P-NUCLEO-IHM002

STM32 Nucleo packs FOC and 6-step motor control platform for three-phase, low-voltage and low-current motor

Data brief

Features

- X-NUCLEO-IHM07M1:
  - Three-phase driver board for BLDC/PMSM motors based on L6230
  - Nominal operating voltage range from 8 V to 48 V DC
  - 2.8 A output peak current (1.4 A RMS)
  - Non-dissipative overcurrent detection and protection
  - Full compatible with ST 6-step or ST-FOC-control algorithm
  - Full support for sensorless and sensor mode
  - 3-Shunt and 1-Shunt configurable jumpers for motor current sensing
  - Hall encoder motor sensor connector and circuit
  - Potentiometer available for speed regulation
  - Compatible with STM32 Nucleo boards
  - Equipped with ST morpho connectors
- NUCLEO-F302R8:
  - STM32F302R8 32-bit Microcontroller based on ARM® Cortex®-M4 core (72 MHz max) with 64-Kbyte Flash memory and 16-Kbyte SRAM
  - Two types of extension resources: Arduino™ UNO Revision 3 connectivity and ST morpho extension pin headers for full access to all STM32 I/Os
  - Mbed-enabled (http://mbed.org)
  - On-board ST-LINK/V2-1 debugger/programmer with SWD connector: selection-mode switch to use the kit as a standalone ST-LINK/V2-1
  - Two push-buttons: USER and RESET
- Three-phase motor:
  - Bull-Running model BR2804-1700 kV
  - Nominal voltage 11.1 V DC (battery up to 3 S)



1. Pictures not contractual.

  - Maximum DC current: 5 A
  - Seven pole pairs
- DC power supply:
  - Nominal output voltage: 12 V DC
  - Maximum output current: 2 A
  - Nominal input voltage: 100-240 V AC
  - Nominal frequency: 50/60 Hz

1 Description

The STM32 Nucleo pack P-NUCLEO-IHM001 is a kit composed of:
the X-NUCLEO-IHM07M1 board, the NUCLEO-F302R8 board and the motor (refer to the first figure on the cover page).

The STM32 Nucleo pack P-NUCLEO-IHM002 is a kit composed of:
the X-NUCLEO-IHM07M1 board, the NUCLEO-F302R8 board, the motor and the DC power supply (refer to both figures on the cover page).

This platform provides a motor control solution for three-phase, low-voltage and low-current DC brushless motor. It is based on the L6230 driver (belonging to STSPIN family) and on the STM32F302R8 MCU.

The L6230 driver is a DMOS fully integrated device for three-phase brushless PMSM motor, with integrated overcurrent and thermal protection.
The STM32F302R8 is a 32-bit microcontroller based on a high-performance ARM® Cortex®-M4 32-bit RISC core, with floating point unit (FPU), operating at a frequency of up to 72 MHz and embedding an advanced analog peripheral set.

The X-NUCLEO-IHM07M1 board is fully configurable and ready to support different closed loop control, FOC or 6-step, based on sensorless or sensor mode. It is compatible with three shunts or single shunt for current sense measuring.

The NUCLEO-F302R8 board provides an affordable and flexible way for users to try out new concepts and to build prototypes with STM32 MCU. It does not require any separate probe as it integrates the ST-LINK/V2-1 debugger and programmer.

Only for the P-NUCLEO-IHM002 pack the included power supply unit provides the appropriate power.

2 System architecture of the STM32 Nucleo packs

The P-NUCLEO-IHM001 pack is composed of three main blocks (see *Figure 1*):

- Control block: NUCLEO-F302R8 MCU board
- Power block: X-NUCLEO-IHM07M1
- PMSM motor: Bull-Running BR2804-1700 kV

The P-NUCLEO-IHM002 pack is composed of four main blocks (see *Figure 2*):

- Control block: NUCLEO-F302R8 MCU board
- Power block: X-NUCLEO-IHM07M1
- PMSM motor: Bull-Running BR2804-1700 kV
- Power supply unit (12 V, 2 A)

Figure 1. P-NUCLEO-IHM001 pack main blocks

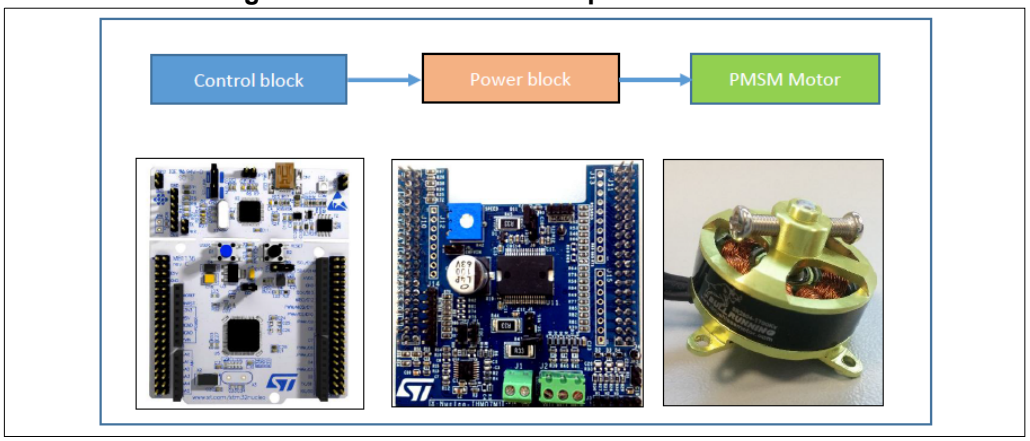
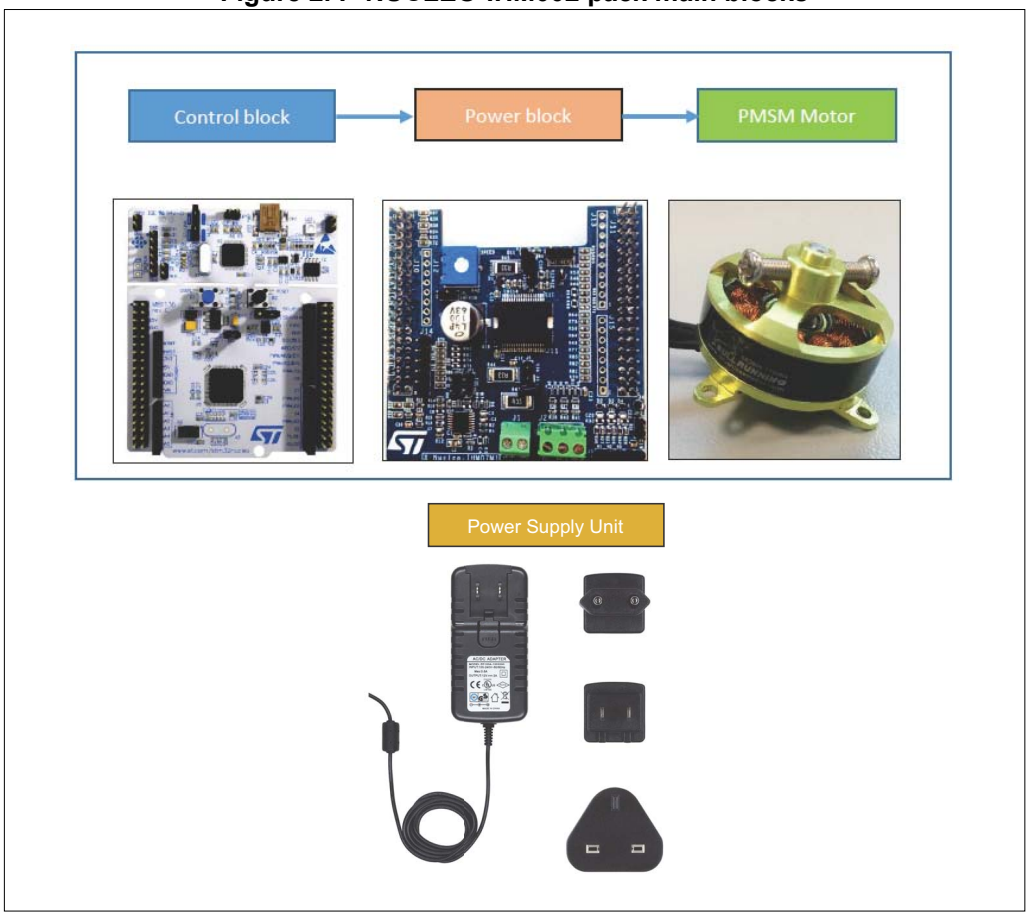


Figure 2. P-NUCLEO-IHM002 pack main blocks



3 Ordering information

Table 1. Ordering information

Order code	Board	DC Power Supply
P-NUCLEO-IHM001	X-NUCLEO-IHM07M1, NUCLEO-F302R8	Not provided
P-NUCLEO-IHM002	X-NUCLEO-IHM07M1, NUCLEO-F302R8	Provided (12 V, 2 A)

4 Revision history

Table 2. Document revision history

Date	Revision	Changes
09-Sep-2015	1	Initial release.
22-Jul-2016	2	Updated *Features* and *Section 2: System architecture of the STM32 Nucleo packs* to introduce the Nucleo pack with the power supply unit.