MOTIX™ motor bench

User guide

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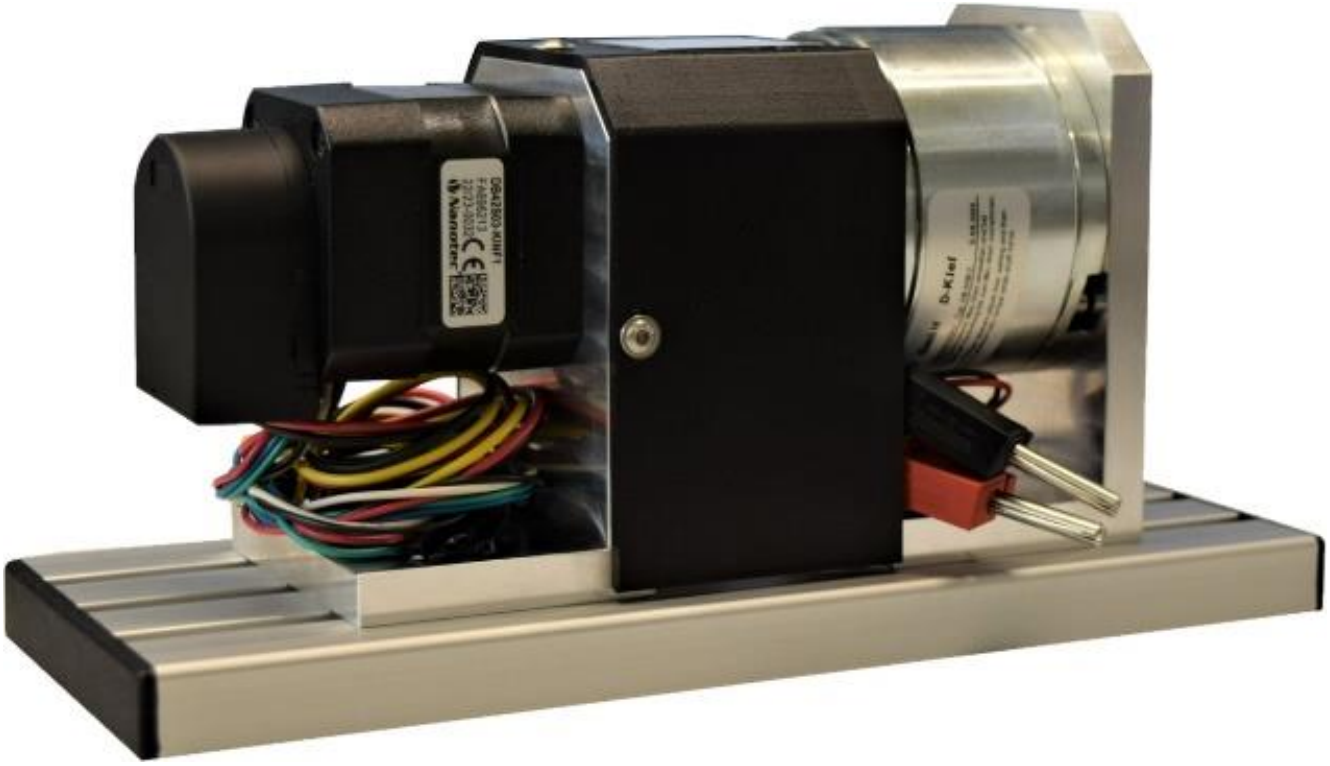
About this document



Scope and purpose

This User guide is intended to enable users to use the MOTIX™ motor bench.

This document describes the MOTIX™ motor bench and its components.

The MOTIX™ motor bench can be combined with Infineon evaluation boards and reference designs for BLDC motor control evaluation. It is meant to support the motor control software development process.

The MOTIX™ motor bench is intended to be used with 3 phase evaluation boards of Infineon products.
For example:

- MOTIX™
- AURIX™
- TRAVEO™

Intended audience

This document is intended for anyone using the MOTIX™ motor bench. It is intended for trained personel.

Safety information

The MOTIX™ motor bench contains spinning components while operating. Always keep the coupling cover closed. Check all screws and axle alignment frequently.

Secure loose items before starting the test bench. Ensure that long hair, loose clothing, and any other loose items are securely fastened or removed to prevent entanglement with rotating parts.

Keep hair properly tied up or covered to avoid any chances of entanglement with rotating parts. Do not lean over the test bench while it is in operation.

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1 Mechanical setup

1.1 Main assembly

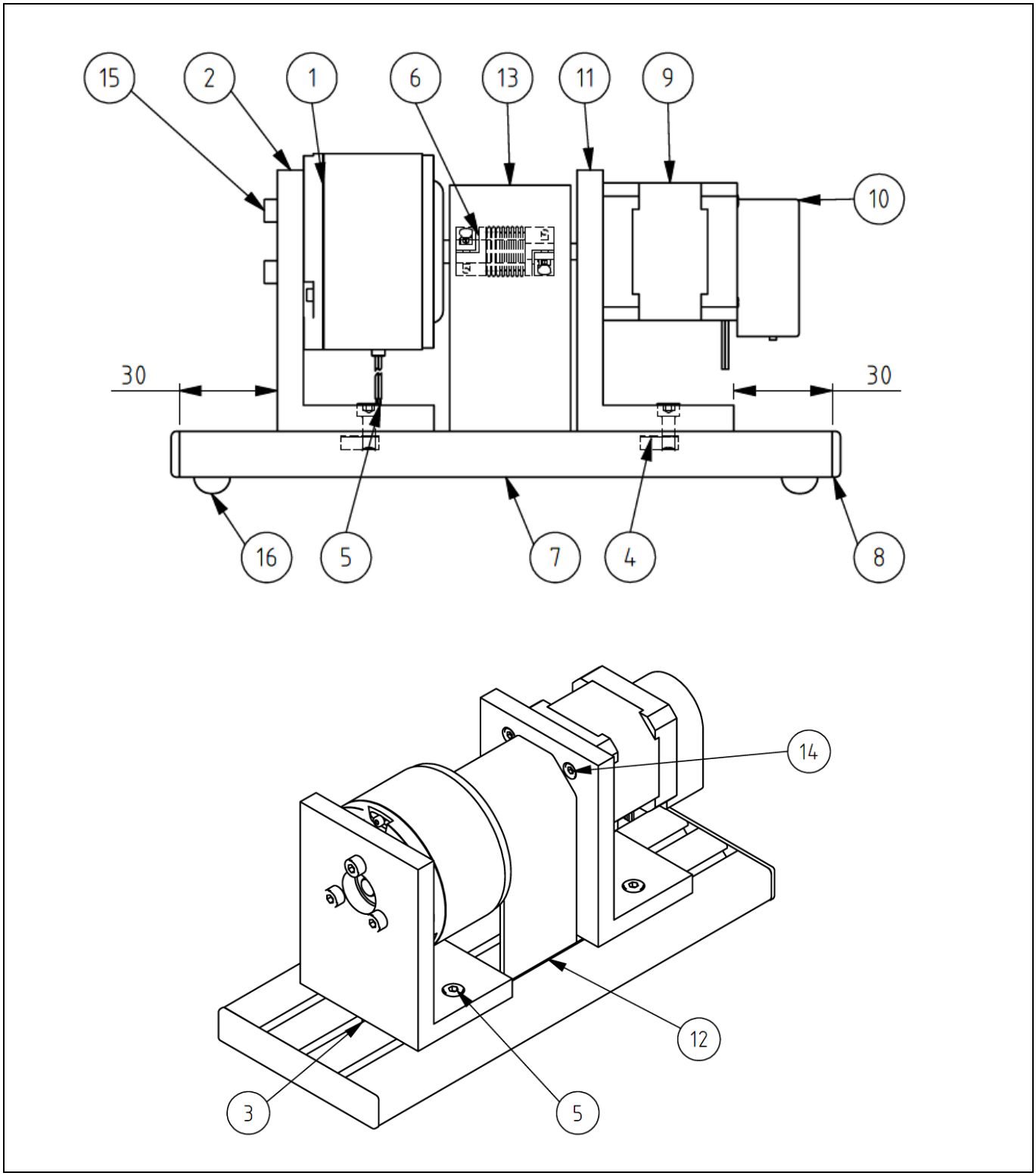


Figure 1 Overview

1.2 Bill of material

Table 1 Bill of material

No.	Qty.	Title	Comp./Manuf.	Draw./Manuf. No.	Rev./Note
1	1	Hysteresis brake	Mobac	HB 50M-2	–
2	1	Brake bracket	Mechanische Zerspanung	800695	Rev. 1.0
3	4	Parallel pin ISO2338 5 M8x10	–	–	Toolbox part
4	4	Slot nut M4	Item	0037006	–
5	4	Screw SO 4762 M4x10 – 10N	–	–	Toolbox part
6	1	Miniature bellows coupling MK2	Misumi	CPJ20-RD-5-7	–
7	1	Profile 5 80x14 L=200	Item	0037085	3m length item 0044813
8	2	Cover cap 5 80x14	Item	0037091	–
9	1	Brushless DC motor DB42S03	nanotec	DB42S03	–
10	1	Encoder WEDL5541-B14	nanotec	WEDL5541-B14	–
11	1	Motor bracket	Mechanische Zerspanung	800694	Rev.1.0
12	2	Cover profile 5L=40 mm	item	0039174	Only orderable in 2m length
13	1	Shaft cover	Infineon Technologies AG	801081 (3D Print) 30x30x2	Rev.1.0 (Figure 1) Rev.2.0 (Product Picture)
14	4	Screw ISO 4762 M3 x 10 - 10N	–	–	Toolbox Part
15	3	Screw ISO 7380-1 M4x16 - 16N	–	–	Toolbox Part
16	4	Buffer D11x5	item	0.0.667.78	Set of 4

1.3 Electric connections

Table 2

Components	Wire	Function	Wire termination
Hysteresis brake	red	DC+	Wago 215-212
Hysteresis brake	black	DC-	Wago 215-311
Motor phase	AWG20 yellow	U	crimped ferrule
Motor phase	AWG20 red	V	crimped ferrule
Motor phase	AWG20 black	W	crimped ferrule
Motor Hall sensor	AWG26 red	+5V	Dupont female 1-pin
Motor Hall sensor	AWG26 black	GND	Dupont female 1-pin
Motor Hall sensor	AWG26 blue	H1	Dupont female 1-pin
Motor Hall sensor	AWG26 white	H2	Dupont female 1-pin
Motor Hall sensor	AWG26 green	H3	Dupont female 1-pin

Note: It is recommended to use pull-up resistors on the H1, H2, and H3 connections to +5V.

1.4 Motor

The MOTIX™ motor bench is equipped with a Nanotec DB42S03 BLDC motor. The latest specification can be found on the manufacturer's website.

Table 3 Motor parameters copied from DB42S03 datasheet

No. of Pol./Phases	8/3		
Voltage Rated (VDC)	24		
Current (AMP)	No load [A]	Rated [A]	Peak [A]
	0.2	1.79	5.4
Resistance / phase to phase [Ohms] @ 25°C	1.5 ± 15%		
Inductance / phase to phase [mH] @ 1kHz	2.1 ± 20%		
Tourque Rated / Peak	Constant [Nm/A]	Rated [Nm]	Peak [Nm]
	0.035	0.0625	0.19
Power Rated [W]	26		
Speed	Rated [RPM]	No Load [RPM]	
	4000	6200	
Rotor Inertia [Kg-m^2]	2.4x10^{-6}		
Weight [Kg]	0.3		

1.5 Hysteresis brake

The MOTIX™ motor bench is equipped with a Mobac HB-50M-2 hysteresis brake. The latest specification can be found on the manufacturer's website.

Table 4 Brake parameters copied from Mobac HB-50M-2 datasheet.

Torque at working current [Nm]	0.38	
Working current [mA]	270	
Resistance at 25°C ± 10% [Ohm]	95	
DC Voltage [V]	24	
Rpm max. 25°C ± 10% [min^{-1}]	15000	
Power dissipation [Watt]	Peak	continous
	90	23
Residual torque without current [Nm]	1.55×10^{-3}	
Rotor inertia [$kgcm^2$]	0.1670	
Weight [kg]	0.755	

1.6 Couplings

The coupling creates the mechanical link between the motor and the hysteresis brake. It also compensates mechanical inaccuracies in the setup. It is mandatory to realign the setup frequently.

Table 5 Overview of couplings variations

Motor axle diameter (rated) [mm]	5
Brake axle diameter (rated) [mm]	7

2 Hardware and software support

2.1 MOTIX™ MCUs

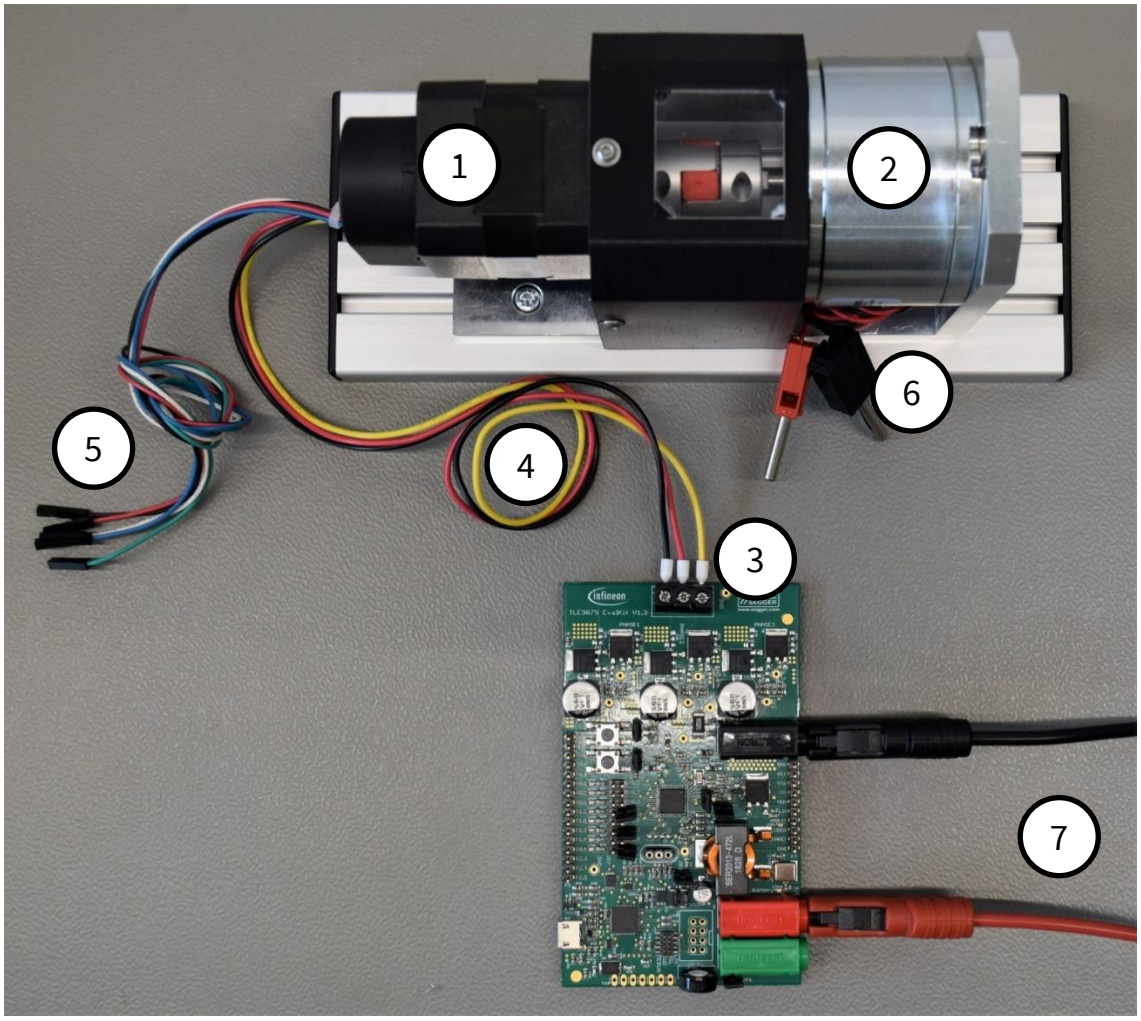
Table 6

Name	Order no.	Example software
TLE9879 Evalkit	SP001389172	- Sensor-less FOC - Block commutation, Hall sensor based - Block commutation with BEMF
TLE987X EVALB_VQFN	SP005421934	
TLE987X EVALB_TQFP	SP005421936	

3 Example setup

The MOTIX™ motor bench can be used with several evaluation boards from Infineon Technologies. This chapter describes an example setup.

Table 7 Example setup



1	DB42S03 BLDC motor
2	Mobac HB-50M-2 hysteresis brake
3	TLE9879 evalkit
4	BLDC motor phase wires
5	Hall sensor wires
6	Hysteresis brake connectors
7	12V Power supply

Revision history

Document revision	Date	Description of changes
Rev. 1.00	2022-10-11	Initial release
Rev. 1.10	2023-07-14	Update of document template Product picture updated Figure 2 (Couplings variatons) removed Table 1, Table 7 updated

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