

## Quick Start Guide: ASSP EASY Motor Control Kit

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### 1. Introduction

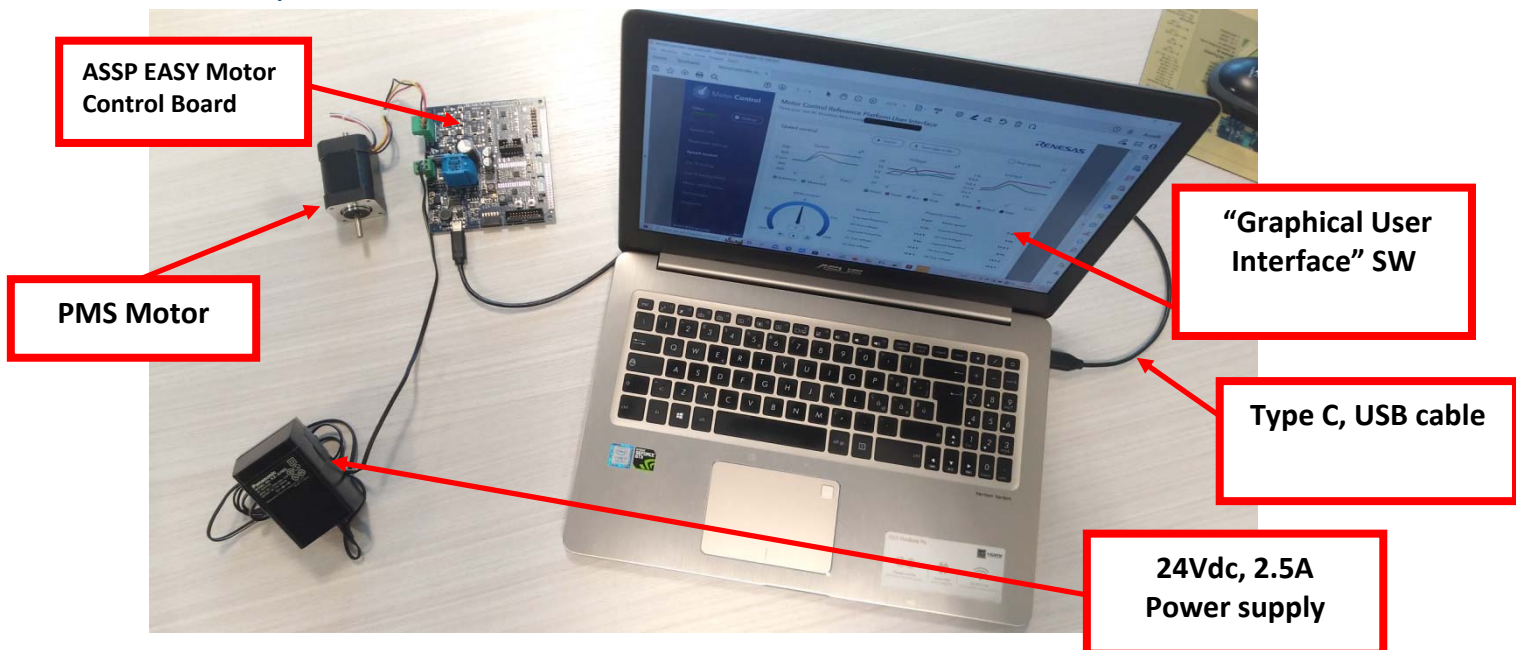
Welcome to the Renesas ASSP EASY Motor Control reference kit!

This quick start guide assists the user to connect and use the Renesas ASSP EASY Motor Control Kit for the first time. The on-board ASSP internal flash memory is pre-programmed with a motor control project. Please check the contents of the kit using the supplied package contents list and notify your supplier if any are missing.

Please note: no CD-ROM is provided in the kit.

**PLEASE DO NOT CONNECT THE BOARD TO THE HOST PC BEFORE INSTRUCTED**

### 2. Kit layout



For further board details, please refer to the ASSP EASY Motor Control Solution User Manual.

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### 3. Initial Board Configuration

Before connecting the USB cable to the host PC and to the motor control board please follow the setup procedure as described below.

- The demonstration 3-phase Permanent Magnet Motor (e.g., PMSM) is shipped pre-wired with its connector as shown below. The box contains a 3-phase Brushless Motor type MB057GA240. (Please refer to Ing-Pini website for more details: <https://ing-pini.it>)



SENSOR LEADS, #22 AWG 300MM MIN. LENGTH

MOTOR LEADS, #20 AWG 300MM MIN. LENGTH

PLASTIC TUBE, 300MM MIN.

FLAT 0.381 DEEP x 16 LONG

25±0.78

10.21A

88.1±1.5

7±0.78

10.21B

REV	DESCRIPTION	DATE	APP'D
1.1	PRELIMINARY	11/01	L-19-01, JAC

MOTOR WINDING CONFIGURATION

PHASE R (WHT/YEL)

PHASE S (WHT/BLK)

PHASE T (WHT/RED)

4 POLE

NOTE: THIS DRAWING HAS BEEN CREATED BY AUTOCAD. MANUAL REVISIONS ARE NOT ALLOWED.

REV	DESCRIPTION	DATE	APP'D
1	BRUSHLESS D.C. MOTOR		

MOTOR PARAMETERS @25°C			
	TOL	UNITS	VALUE
MAX. OPERATING SPEED (S <sub>W</sub> )		MAX. R.P.M.	5000
CONTINUOUS TORQUE (T <sub>c</sub> )		MAX. OZ-IN	39
PEAK TORQUE (T <sub>p</sub> )		MAX. OZ-IN	114
CONTINUOUS CURRENT (I <sub>c</sub> )		MAX. AMPS	3.5
PEAK CURRENT (I <sub>p</sub> )		MAX. AMPS	10.6
TORQUE SENSITIVITY (K <sub>t</sub> )	±10%	OZ-IN/AMPS	11.9
BACK EMF CONSTANT (K <sub>e</sub> ) (L-L, D.C.)	±10%	V/K R.P.M.	8.8
D.C. RESISTANCE (R <sub>s</sub> ) (L-L)	±10%	OHMS	1.12
INDUCTANCE (L) (L-L)	±15%	mH	3.19
ROTOR INERTIA (J <sub>r</sub> )	NOM.	CG-IN-SEC <sup>2</sup>	0.0017
WEIGHT		NOM. LBS	1.78

COLOR CODE	
PHASE R	WHT/YEL
PHASE S	WHT/BLK
PHASE T	WHT/RED
WINDING	STAR
WINDING	4 POLE
WINDING	23-24 VDC
WINDING	BLACK GROUND

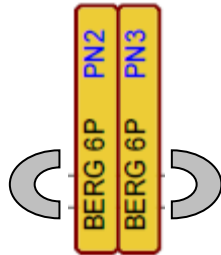
TURNS (REV/SEC)	
HALL A	
HALL B	
HALL C	
PHASE R	
PHASE S	
PHASE T	

- Connect the PMSM motor connector to the socket **J19** on the motor control board.
- There are two options to supply power to the motor control board.
  - Plug-in the USB cable from the PC to supply power directly to the board. In this case the current delivered to the motor is limited by the USB and U5 IC (step-up Renesas ISL97656) capabilities.
  - The second method is to power the board using an external voltage DC source.

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For full details of power supply options please refer to Chapter 5 of the ASSP EASY Motor Control Solution User Manual.

4. For initial setup of the Renesas ASSP EASY Motor Control Kit the first method must be used (USB powered option 'a'). Ensure that Jumpers **PN2** and **PN3** are correctly configured as described below.

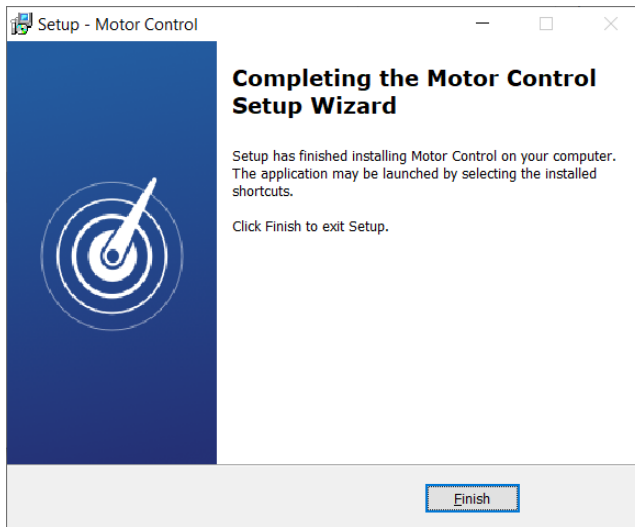


Jumper between pin 4,6: power supply comes from USB step-up. The VBUS is 14Vdc. NO ISOLATION BETWEEN POWER AND SERIAL COMMUNICATION

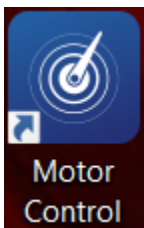
### 4. PC Graphical User Interface (GUI) Software Installation

The PC GUI supports 32-bit and 64-bit Windows™ operating systems (Windows 10, 8.1, 8, 7, Vista).

**Note: Windows™ Vista, 7, 8 and 10 users must install the software with administration rights.** User may experience a “User Account Control” dialog box pop-up. In such case, enter the administrator password and click <OK>. Else, to install right-click on the “**MotorControlSetup\_x.x.x.exe**” and select “**Run as administrator**” or double-click on <**MotorControlSetup\_x.x.x.exe**> and then follow the on-screen instructions until reaching the following installer screen and then click <**Finish**> to complete installation.



A Motor Control GUI icon (see below) will be available on the desktop:



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The GUI software will be installed by default within the folder “C:\Program Files\BFG Engineering\Motor Control”.

As a final step, **it is mandatory to copy the ASSP\_V01.ini file within the Motor Control GUI installation folder.** The .ini file is delivered with the installation software and contains some configuration settings for the initial setup.

### 5. Installing USB Drivers

The ASSP EASY Motor Control Kit features an on-board USB to serial (UART) converter interface, to communicate with the PC. It is mandatory to download and install the respective USB drivers for enabling the communication. Please download and install the latest drivers from <https://ftdichip.com/drivers/>.

(Information about the converter IC is available from the FDTI website).

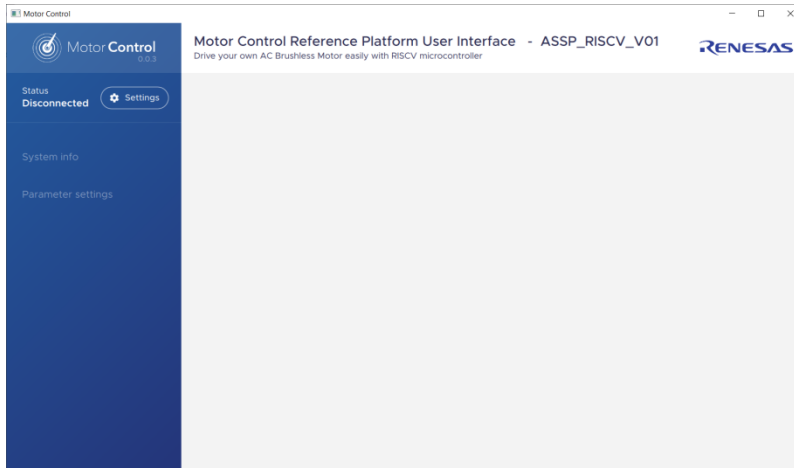
### 6. Using the Graphical User Interface (GUI)

Note: Windows Vista and Windows 7, 8 users must run the GUI with administrative rights. To automatically set the administrator privilege level, press the right mouse button over the icon of the GUI, select “**Properties**”, press the left mouse button on the “**Compatibility**” tab and select the checkbox “**Run this program as an administrator**” under the privilege Level; then click <OK>.

It is recommended to connect the USB cable to the PC and the board before opening the GUI as this makes the connection process easier. The GUI can be opened without the board being connected.

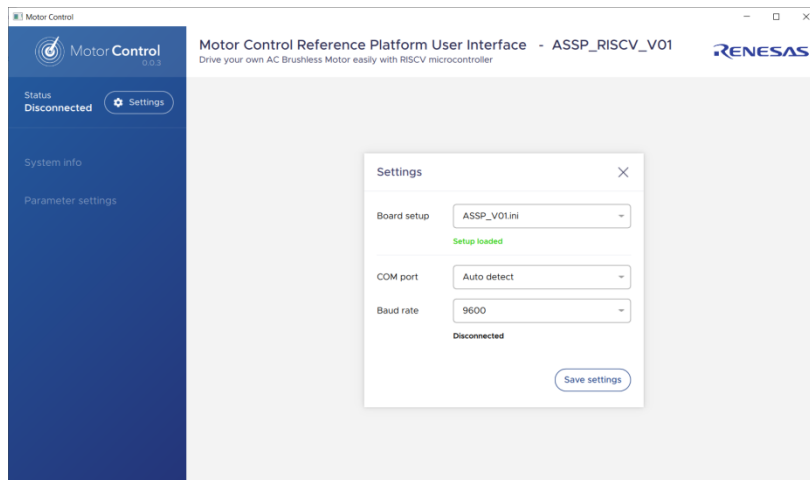
Double-click on the Motor Control GUI icon to start the program; once opened, use the following procedure to connect the GUI to the kit:

- Click on the “**Settings**” button. Usually, the following window will appear.

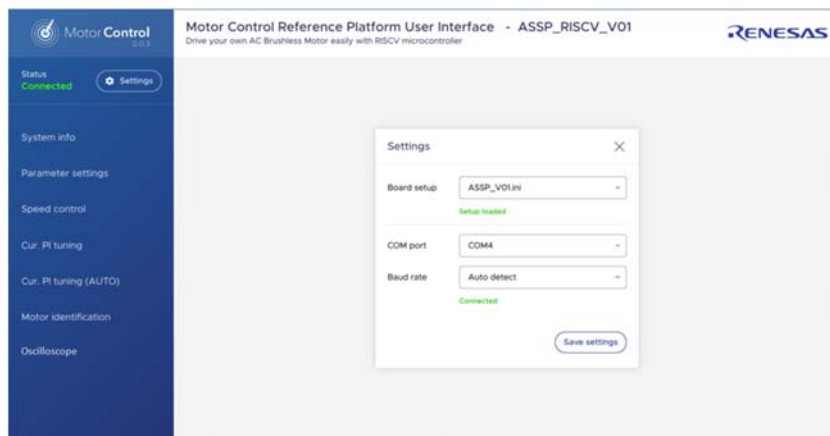


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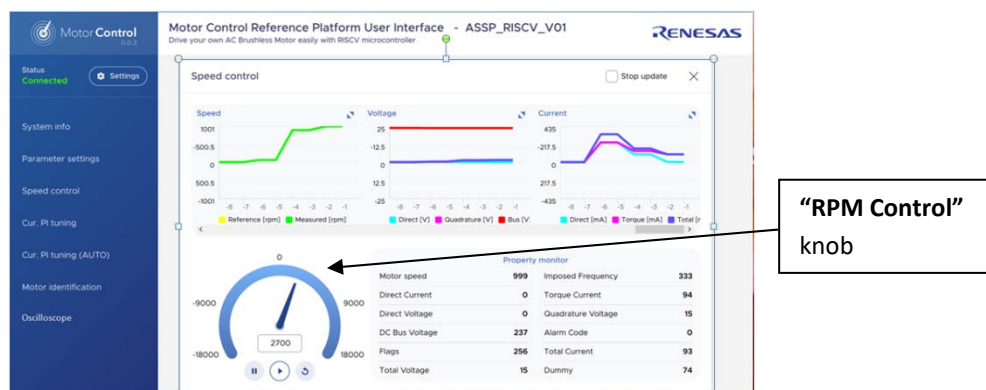
- Please select the .ini file, then select “COM port” or “Auto detect” options and finally configure the baud rate setting which must be set to **19200** or **Auto- detect** as shown in the screenshot



- Save the settings for future sessions.
- If the settings are set correctly, after saving the status will change from ‘Disconnected’ (black font) to ‘Connected’ (green font) indicating the connection with the kit is established successfully.



Once connected the GUI can be used to control the motor manually using the “RPM Control” knob. With this function the user can start, stop, and set the direction and speed of the motor, whilst observing its performance parameters within the “system display” windows provided by the GUI.



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To close the GUI please use the standard windows graphical interface button.

All the features of the GUI, including the unique Auto-calibration feature are described in the ASSP EASY Motor Control Solution User Manual.

**NOTE:** to setup the initial connection, the USB powered option was chosen. However, this operational mode has implicit performance restrictions due to the USB interface supply power limitations. Additionally, the PI control loop and the motor identification procedure cannot be supported properly within their full dynamic and operating performance range. Once the motor is setup to work properly with the USB power supply, it is advisable to switch to the external 24V, 2,5A power supply provided with the kit.

For full details of power supply options please refer to Chapter 5 of the ASSP EASY Motor Control Solution User Manual.

### 7. Additional material

After you have completed this quick start procedure, please review the technical documentation and collateral available within the solution page. The following contents are currently available:

Items	Description of Resources
<b>Auto-tuning Video-Tutorial</b>	Short video explaining how to easily tune any brushless AC motor in 45 seconds using just the intuitive PC Graphical User Interface
<b>Manuals</b>	Relevant documentation for the kit, the 3-phase motor, the PC tuning/monitoring GUI, the RISC-V based ASSP, the Renesas MOSFETs and the motors tuned.
<ul style="list-style-type: none"> <li>• Kit Motor Specifications</li> <li>• Renesas Datasheets</li> <li>• Tuned Motors Specifications</li> <li>• PC GUI user guide</li> </ul>	
<b>Schematics-Gerber-BoM</b>	Schematics, Gerber files (Design files, CAD), Bill of Materials for both the main kit and the external power stages (not included as part of the kit)
<ul style="list-style-type: none"> <li>• Main low voltage inverter Board</li> </ul>	

### 8. Support

Online technical support and further information is available at the following locations

<https://www.renesas.com/eu/en/application/home-building/motor-control-solutions>

<https://www.renesas.com/risc-v>

**For more information on the solution please contact your Renesas sales representative or BFG Engineering.**