FRIWO

MOTOR CONTROLLER

Motor control solution for brushless drives
(BLDC und PMSM)

Emerge 6000 Brushless Motor Controller

Motor control solution for PMSM and BLDC drives

*Available in different colours

- ☐ Applications
    - ☐ E-mobility: electric scooters, eScooters, Kickboards
    - ☐ Logistic vehicles, LEV, micromobility, forc lifts
    - ☐ Industrial: Servo drives, pumps, fans
    - ☐ Powertools
- ☐ Interfaces[1]
    - ☐ CAN-bus
    - ☐ USB: Setup of the controller
    - ☐ Smartphone Connectivity
    - ☐ 2x analogue input
    - ☐ 2x digital input
- ☐ Features
    - ☐ Automatic motor teach-in
    - ☐ Seamless regenerative braking (recuperation / regeneration)
    - ☐ Automatic Flux weakening to extend usable speed range
    - ☐ Smartphone Connectivity to smartphone
    - ☐ USB-based configuration and maintenance toolset for development, production and after-sales-support

[1] Features depending on specific order

Emerge 6000 Brushless Motor Controller

Main Parameters Power-Electronic Emerge 6000		
Nominal power S1 @48V	W	6240
Repetitive peak power S2[2] @48V	W	10800
DC voltage min	V	14
DC voltage max	V	65
Max. current (AC)	A	300
Max. current (DC)	A	210
Remote Control Interfaces		
CAN (low speed & high speed)	kBit/s	125..1000
USB (Virtual Com Port)	kBit/s	256
2 x Analogue	V	5
Motor Types (PMSM / BLDC)		
Rotor speed max.	1/min (el)	96000
	1/sec. (el)	1600
Position feedback	Sensor-type	3x hall sensor
Mech. Parameters		
Diameter	mm	155
Height	mm	52
Weight	Gramm	930
Thermal interface		Convection-cooling or direct cooling on bottom side

[2] Depending on MOSFET temperature
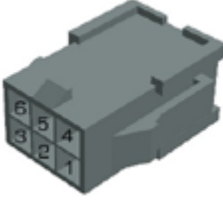
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Smartphone App Interface (Smartphone Connectivity Low Energy)

Intended Use-case	End-user interface to visualize drive data
	Cost-effective data-logging device
Supported OS	Android (any)
	iOS (any)
	Windows Phone (none)
Parameters to be displayed	Vehicle Speed
	Average Speed
	Trip Distance (ODO with Reset)
	Total Distance (ODO)
	Battery voltage
	Battery current (charge/discharge)
	Actual electrical power
	Diagnostic trouble codes (DTC, error codes)
Additional displayed information if connected to Emerge BMS (Battery Management System)	State of Charge
	Remaining Distance
Parameters to be setup (depending on configuration	Ride-Mode (four different modes of torque and speed stetting)

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Installation Signal Connector Cable (grey) [3] with standard hall-sensor setup			
Connector (Controller Side)	**Pin / Color**	**Function**	**Additional Info**
Throttle Connector MPC4	1	NC	Not used
Würth 64900421822	2 / Pink	5V	Throttle supply
4 pole male	3 / Purple	AIN1	Analog input 1, 0 to 5V, (e.g. Throttle)
	4 / Brown	GND	Throttle ground
Motor Connector MPC4	1 / Green	Hall L3	Hall sensor Phase L3
Würth 64900621822	2 / Gray-Pink	Temp IN	Temperature sensor motor
6 pole male	3 / Red	5V	Hall sensor supply
	4 / Blue	Hall L2	Hall sensor Phase L2
	5 / Yellow	Hall L1	Hall sensor Phase L1
	6 / Black	GND	Hall sensor GND
Aux Connector MPC4	1 / Yellow-Brown	DIN2	Digital input 2, active low
Würth 64900821822	2 / White-Green	DIN1	Digital input 1, active low
8 pole male	3 / Red-Blue	5V	Additional sensor supply
	4 / Grey	CAN Low	125,250,500,1000kb/s
	5	NC	
	6 / White-Yellow	AIN2	Analog input 2, 0 to 12V, (e.g. Brake)
	7 / Brown-Green	GND	Additional sensor ground
	8 / White	CAN-High	125,250,500,1000kb/s

Order numbers of matching connectors for your vehicle wiring harness:

- crimp connectors (female): Würth 64900713722DEC

- housing 4 pole (female): Würth 649004113322

- housing 6 pole (female): Würth 649006113322

- housing 8 pole (female): Würth 649008113322

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[3] (Warning: If not declared separately, all I/O will not survive short against any voltage greater than +5V or reverse voltage).

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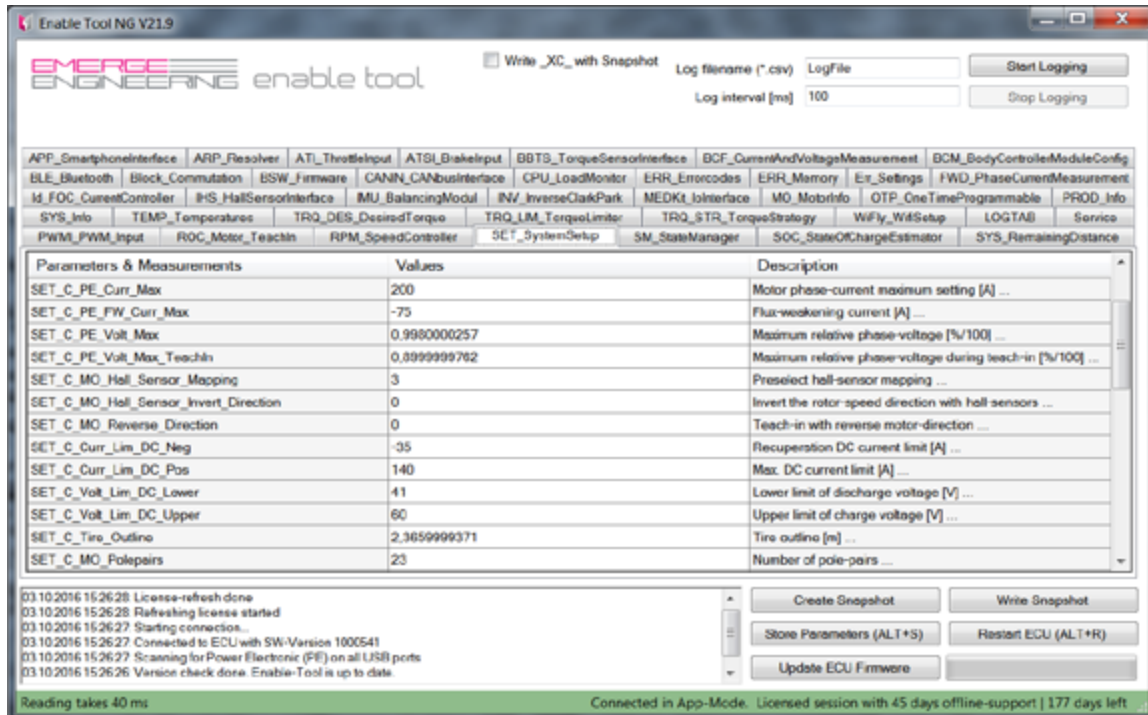
High-Current Screw Terminals [4]		
L1	Motor L1	
L2	Motor L2	
(-)	Battery -	Battery GND
L3	Motor L3	
(+)	Battery +	65V Nominal, (72V abs. max)

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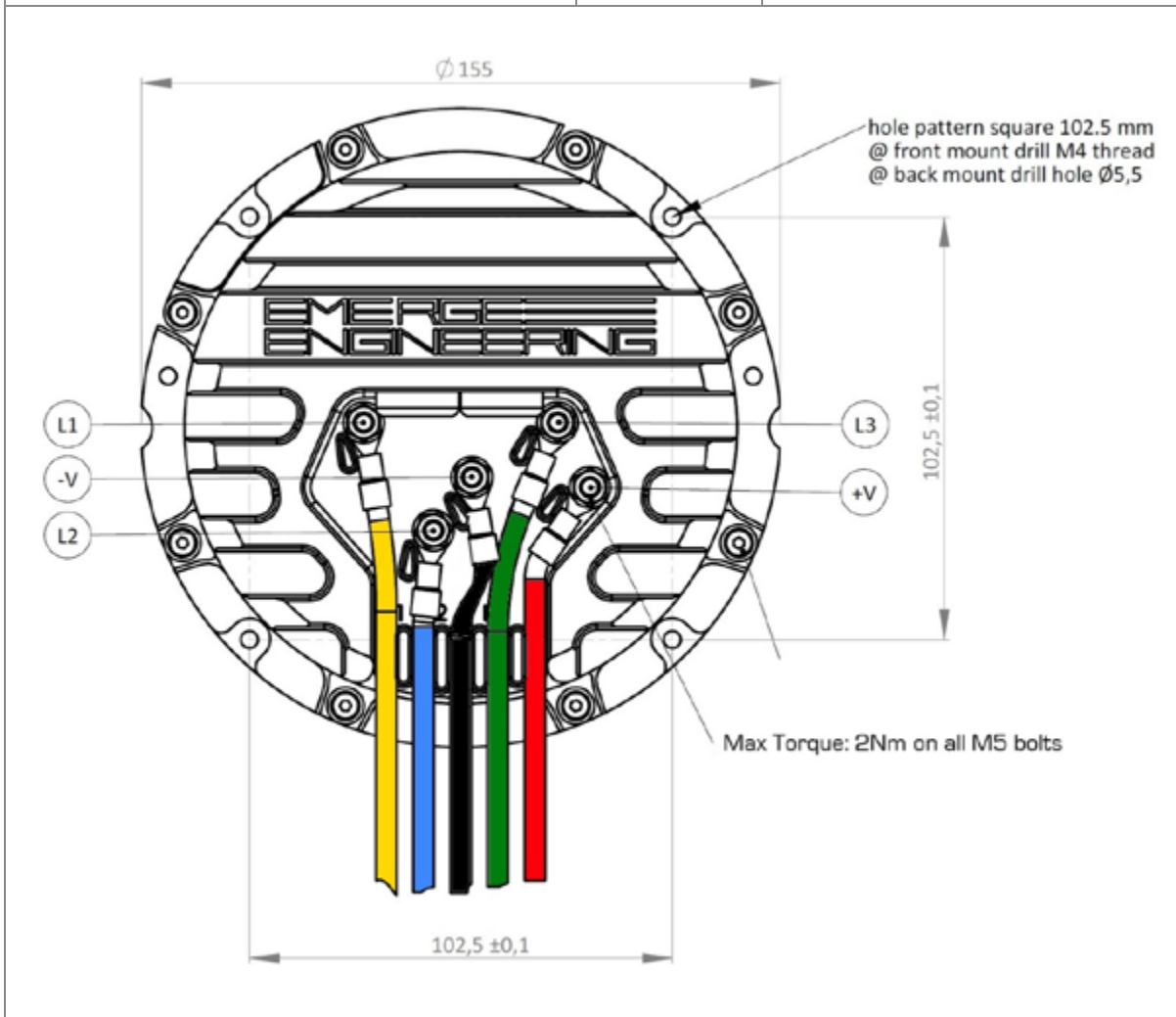
[4] Terminal names are embosed on housing

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USB-Interface[5] Overview

Intended Use-case	The enable-tool USB-interface is made to support the different stages of a product development
	a) Development: Allowing the motor-controller to be analyzed, measured and calibrated in real-time.
	b) Production: with reduced complexity, just allowing to write the production dataset and calibrate the system
	c) Aftersales: The look and feel of Enable-Tool can be customized and reduced to a "minimum level of complexity" to allow a quick and easy support.
	d) Dealer and Retailers: Setup your dealers and retailers to service your vehicles.
	Enable-Tool provides functions that you would expect from professional automotive measurement and calibration tools, like encryption of datasets to share with the production and dealships, or encrypted and signed flash-datasets and encrypted-hex-files.
Supported OS	Windows 7 / Windows 8

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[5] Parameter lists are customer specific and depend on your purchased package (you might see more or less parameters and/or are not allow to access some of them)

FRIWO

Manual of the Enable Tool NG

Software for our motor controllers

A lot happens during the life of an electric vehicle. Our internally developed service software accompanies your vehicle throughout each stage of its life – from development and mass production to fault analysis in the workshop.

It all starts with the development process. In order to provide the best possible support for your development team, we supply Enable Tool NG with the right software to make settings on our control units, manage different versions of this data, and safely carry out assembly from the prototype to the larger vehicle fleet.

The Enable Tool NG supports the calibration of the control units and the commissioning of electric systems during mass production. The software also maintains databases for the long-term secure storage of data and protocols.

Even an electric vehicle needs to be serviced. With the Enable Tool NG, we have prepared the infrastructure for you to set up and expand your dealer network! Our control units are equipped with a USB diagnostic interface to give registered service staff access to the fault memory or to carry out firmware updates.

For this purpose, different roles can be assigned to the users of the software depending on their authorizations.

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