

Firma / Company **FRIWO Gerätebau GmbH**

Gerätetyp / Type: DUMC6000
 Artikelnr. / Part-No.: 1961860
 Zeichnungsnr. / Drawing-No.: 40.0003.500-01
 Datum / Date: 11.10.2021

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 Freigabe App. / Approved App. PRFFR
 Freigabe / Approved KSTVR

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We may ask you to return one signed copy of the specification for our records as having your approval. Unless you do not enter your objection to the latest specification issue without delay, your acceptance and release for production on the basis of this specification is deemed to be given.

Kundenfreigabe / Customer Release:

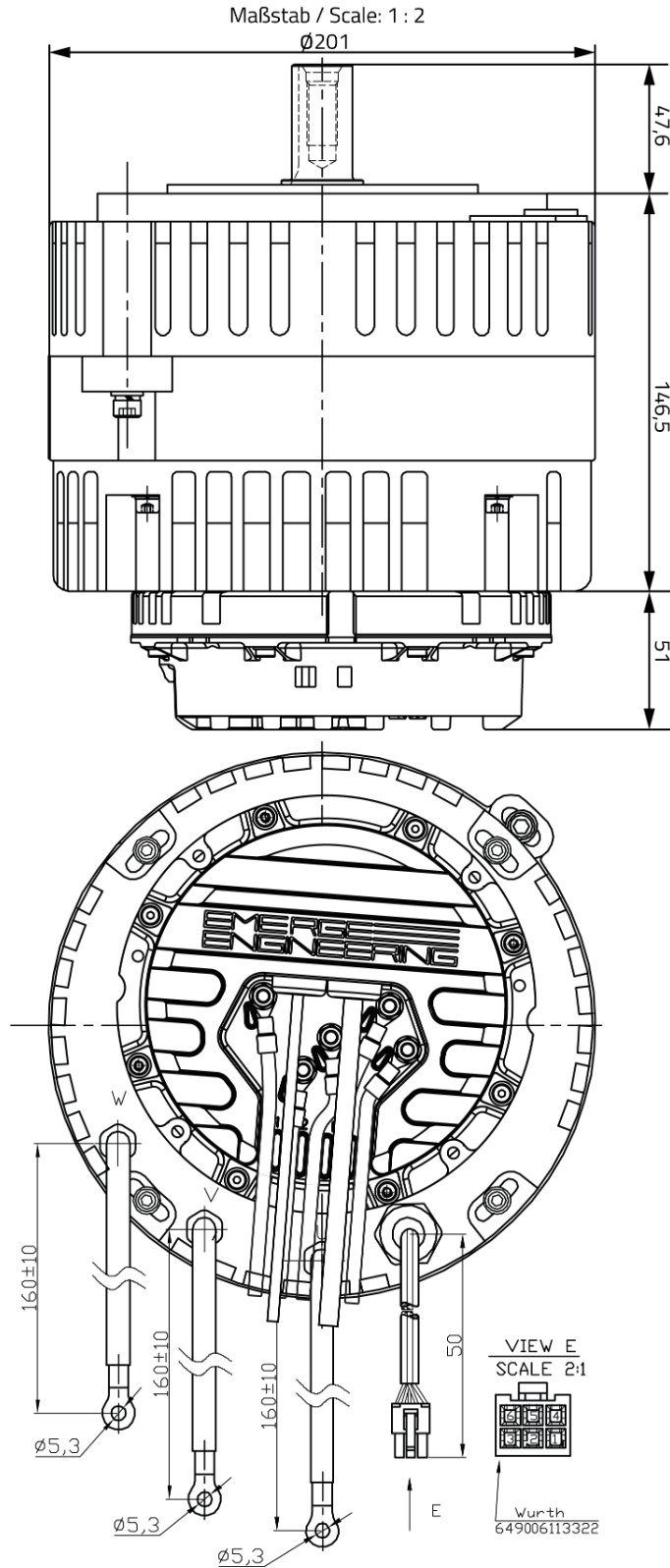
Datum / Date:

Unterschrift / Signature:

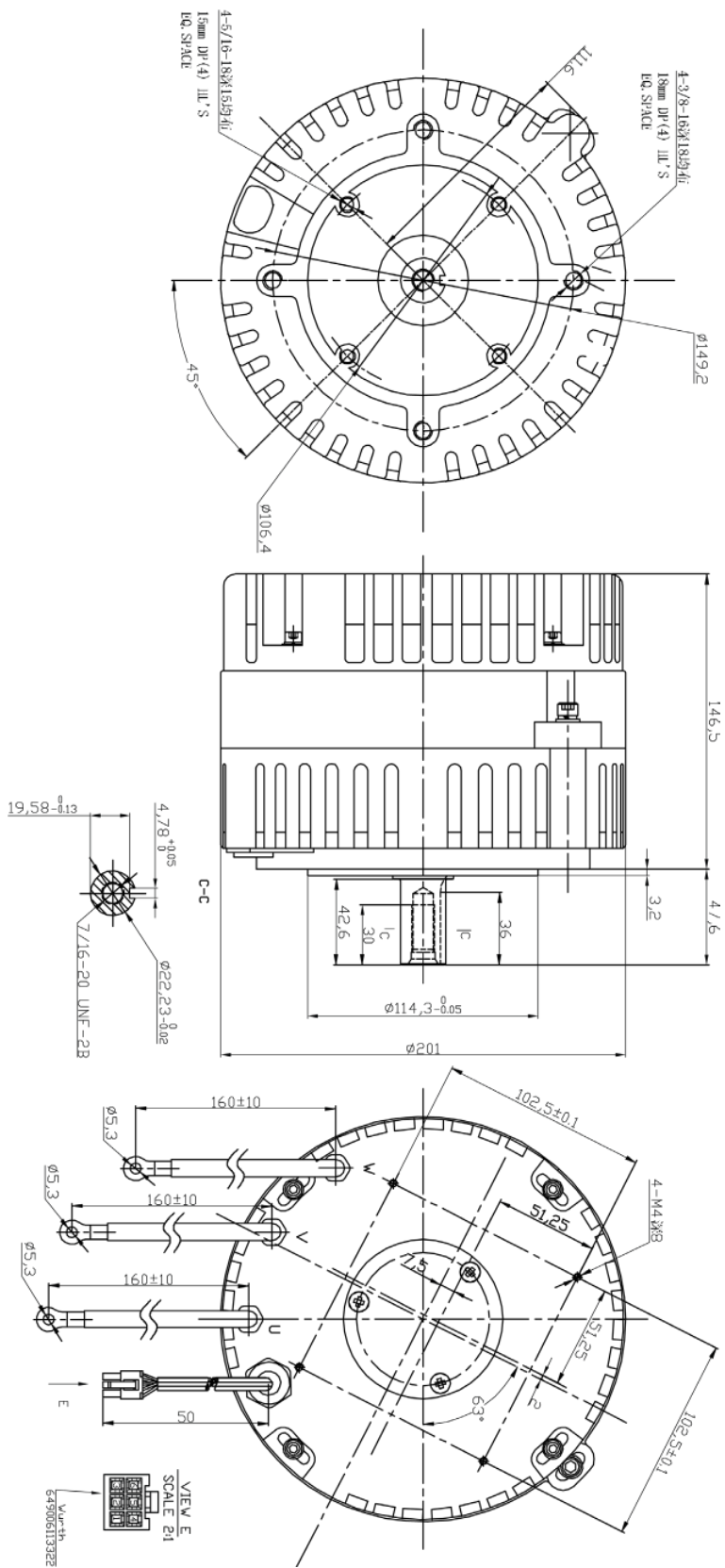
Index / Rev.	Datum / Date	Name	Einzelheit / Detail
Ⓐ	2021/11/3	Frenkie	Add the views for Motor, see point 1.2. Without PCR
Ⓑ	2022/3/4	Frenkie	PCR P003852990; MR2022-4-12366: Update Interfaces, Features, Electrical data, Inform Connector, High current terminals, Supported operating system. See points 1.5, 1.6, 2.1, 2.3, 4, 5 and 6.

1 Generelle Informationen / General Informations

1.1 Gehäuse / Housing



1.2 Motor



1.3 Gehäusebedruckung / Housing printing

Label content:

Barcode 128

Barcode content: AAAAAAAAAAAAA = Last 1-12 digits from the last 2 blocks of serial number

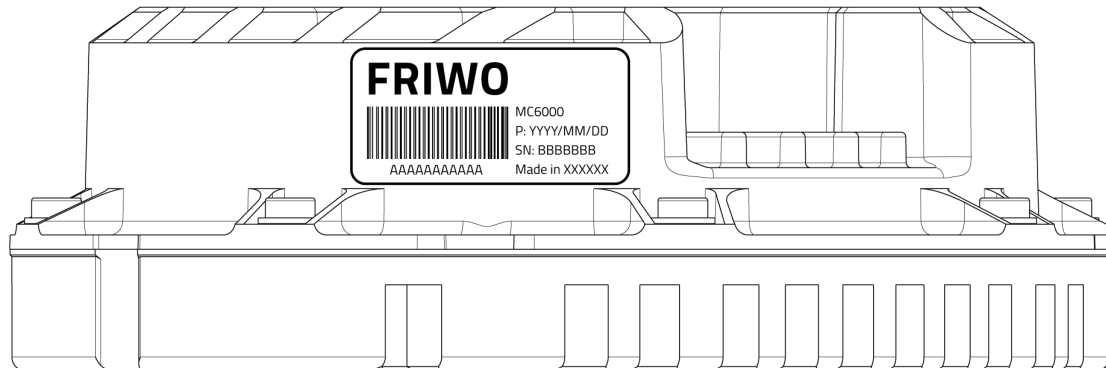
P Datecode: YYYY = Year / MM = Month / DD= Day (P = Production date)

Example: 30.07.2020 = P: 2020/07/30

SN:BBBBBBB = Last 7 digits from the last block of serial number

Made in XXXXXX = Made in Germany or Made in Vietnam or Made in India

Information to serial number: 0 won't be added in the content



Label content:

Datamatrix Code size 8mm x 8mm

Barcode content: AAAAAAAAAAAAA-AAAAAAAAAAAA-AAAAAAAAAAAA-AAAAAAA = Complete serial number

P Datecode: YYYY = Year / MM = Month / DD= Day (P = Production date)

Example: 30.07.2020 = P: 2020/07/30

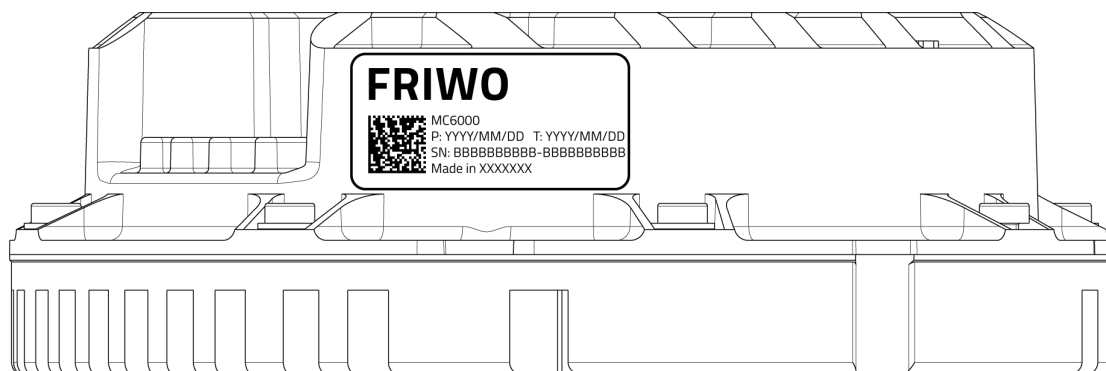
T Datecode: YYYY = Year / MM = Month / DD= Day (T = EOL test date)

Example: 31.08.2020 = T: 2020/08/31

SN:BBBBBBBBBBB-BBBBBBBB = Last 1-17 digits from the last 2 blocks of serial number

Made in XXXXXX = Made in Germany or Made in Vietnam or Made in India

Information to serial number: 0 won't be added in the content



1.4 Anwendungen / Applications

- E-Mobility / E-Mobility: Electric Scooters, Elektroroller, Kickboards, Go-Kart, Golfkart/ Light electric vehicles, Electric scooters, Go kart, Golf cart.

1.5 Schnittstellen / Interfaces

- Automotive CAN-bus
- Analog Throttle & brake
- Reverse gear
- Boost / Push to pass button
- USB: Programming Interface

1.6 Merkmale/ Features

- Smartphone connectivity
- Four different setups from 3kW to 6kW (mechanical output power) including Boost-Control (selectable via smartphone app)
- Regenerative braking (recuperation / regeneration)
- Automatic flux-weakening for higher speeds
- USB-based configuration and programming tool
- Self-protection and graceful degradation in overload conditions

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2 Elektrische Daten / Electrical Data

2.1 Leistungsdaten der Varianten Emerge 6000 / Performance data of the Emerge 6000 variants

Dauerleistung S1 @48V / Continuous power S1 @48V:	6240 W
Peakleistung S22 @48V / Peak power S22 @48V:	10800 W
DC Spannung min / DC voltage min:	12 V
DC Spannung max / DC voltage max:	60 V
DC Überspannungsschutz max / DC overvoltage protection max:	72V
Max. Motorstrom (AC) / Max. Motor current (AC):	350 Apeak / 247 Arms
Max. Batteriestrom (DC) / Max. Battery current (DC):	210 A

2.2 Steuereingänge / Control inputs

CAN-Bus:	125..1000 kBit/s
USB:	256 kBit/s
2 x Analogeingang (1 x 5V / 1 x 12V) / 2 x Analog input (1 x 5V / 1 x 12V):	5 / 12 V

2.3 Motortypen (PMSM / BLDC) / Motor types (PMSM / BLDC)

Max. elektrische Drehzahl / Max. electrical speed:	96000 1/min (el) 1600 1/Sek. (el)
Rotor Positionssensor / Rotor position sensor:	3x Hall-Sensor (Digital)

2.4 Mechanische Parameter / Mechanical parameters

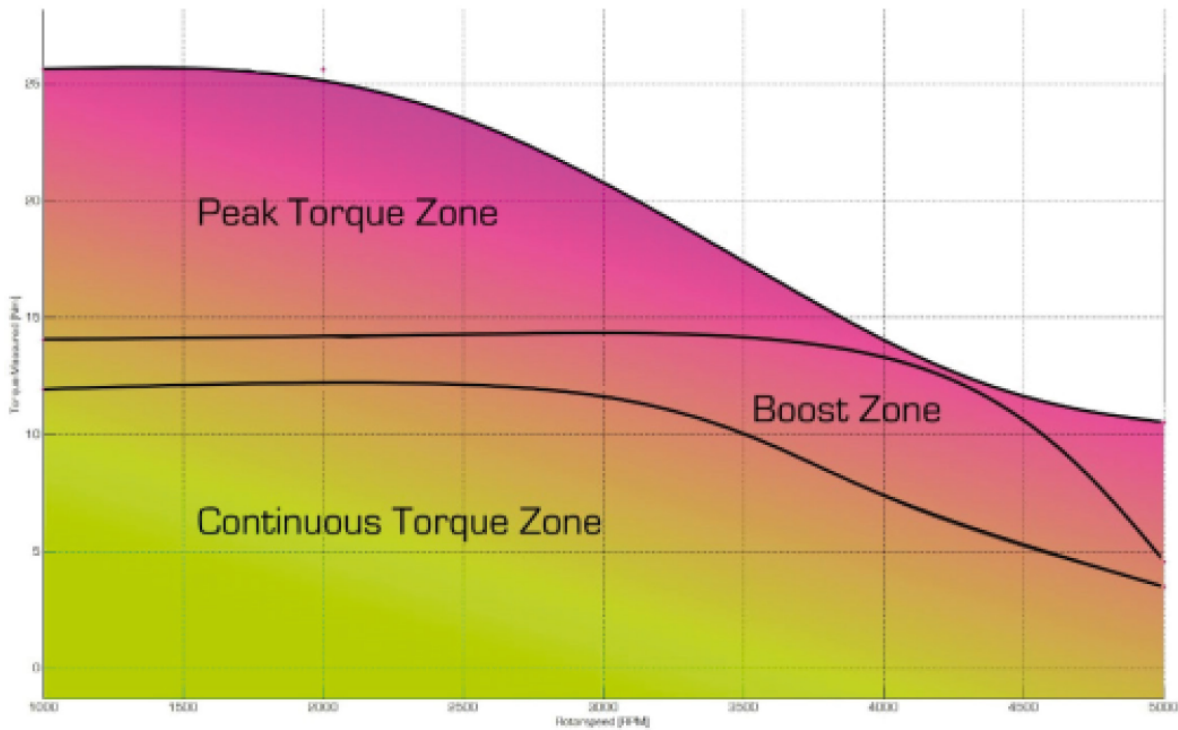
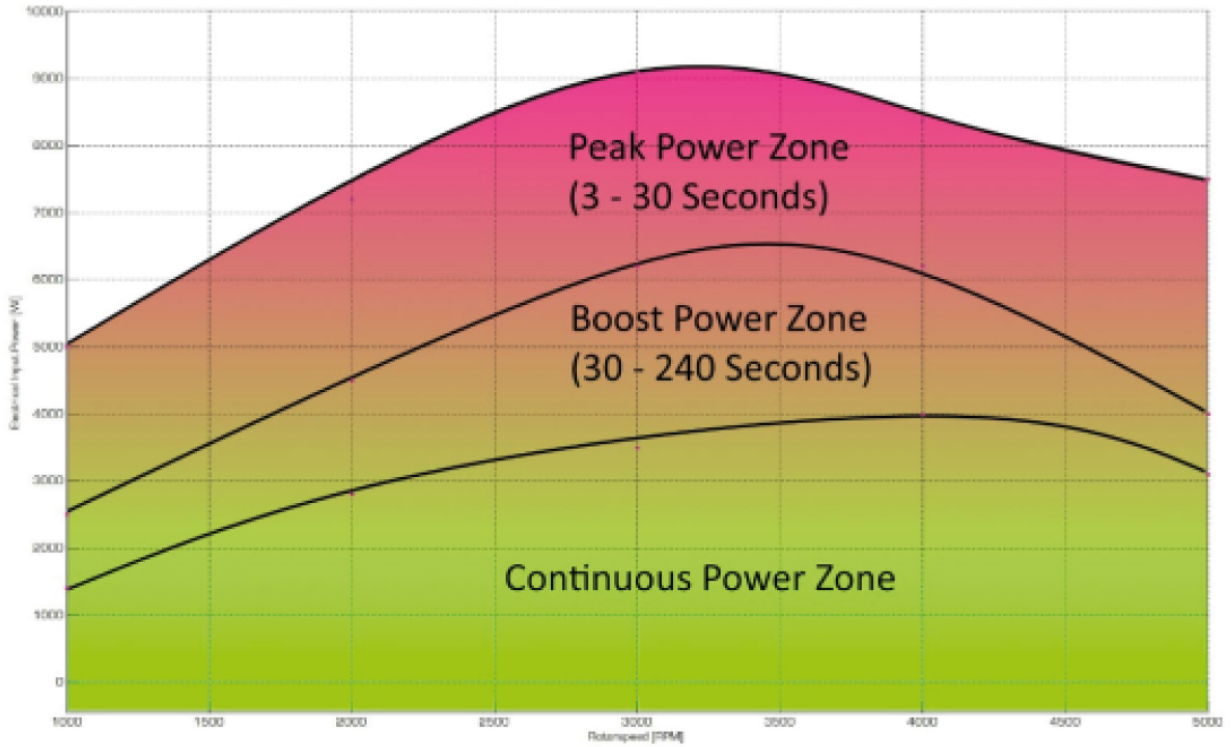
Durchmesser / Diameter:	201 mm
Höhe / Height:	146.5 (Motor) + 52.0 (Controller)
Gewicht / Weight:	10900 gram
Kühlkörper / Heat sink:	Passive Kühlung durch Konvektion / Passive cooling by convection

**2.5 Wiederholte kontinuierliche, Boost- und Spitzenleistungsdaten /
Repetitive Continuous, Boost and Peak Performance Data**

Boost-Leistung alle 60 Sekunden in der Dauerleistungszone verfügbar/ Boost power available each 60 seconds in continuous power zone

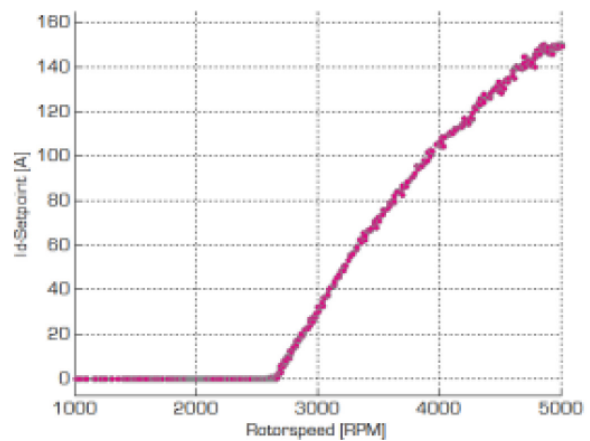
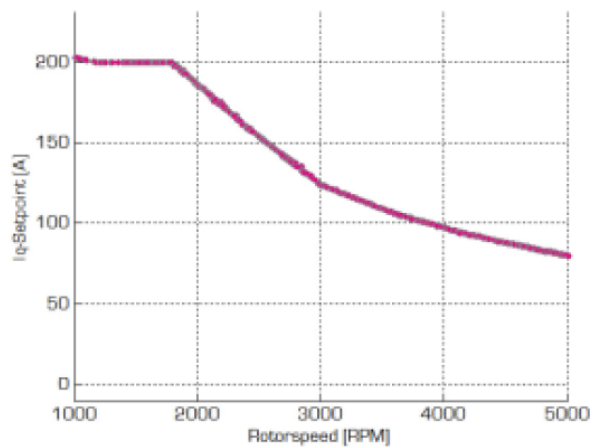
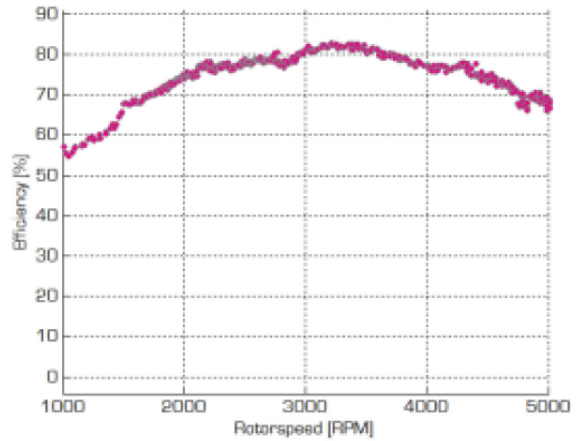
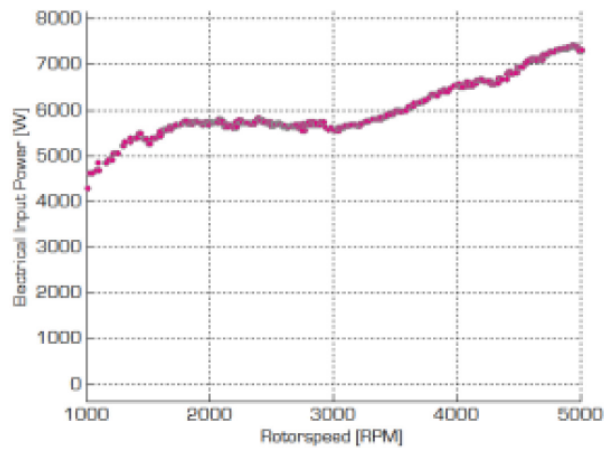
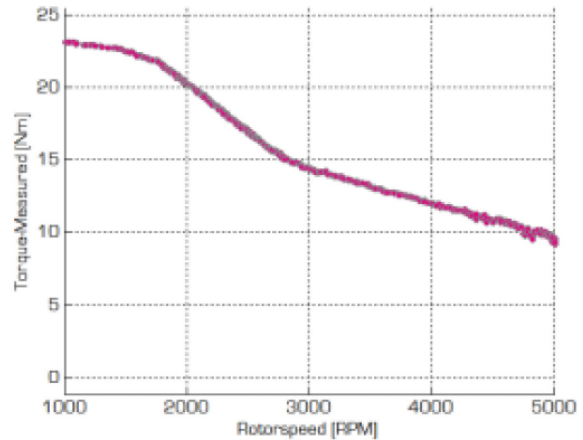
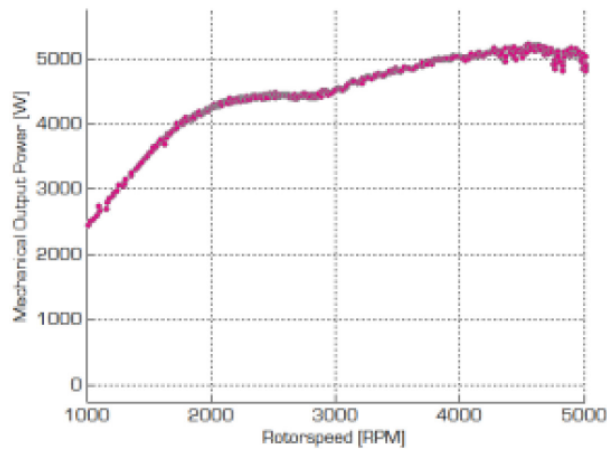
Spitzenleistung erfordert eine relativ kühle Antriebseinheit (unter der Dauerleistungsgrenze)/ Peak power requires a relatively cool drive unit (below continuous power limit)

Leistungsdaten ausgewertet bei: 48V Zwischenkreisspannung, 25°C Umgebungstemperatur/ Performance data evaluated at: 48V DC-link voltage, 25°C ambient temperature



2.6 Gemessene Leistungsdaten / Measured Performance Data

5kW-Modus / 5kW Mode:



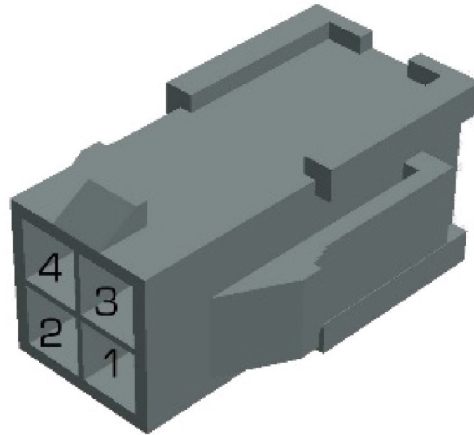
3 Smartphone App Schnittstelle (Smartphone connectivity Energiesparend) / Smartphone app interface (Smartphone connectivity Low Energy)

Einsatzzweck / Purpose:	Qualitativ hochwertiges User-Interface Datenlogging für Entwicklungszwecke. / High quality user interface data logging for development purposes
Unterstützte Betriebssysteme / Supported operating systems:	Android (Android 5 oder neuer) iOS (ab iPhone 4S, iPod, iPad) / Windows Phone (nicht unterstützt) Android (Android 5 or later) iOS (from iPhone 4S, iPod, iPad) Windows Phone (not supported)
Angezeigte Werte / Displayed values:	Fahrzeuggeschwindigkeit Durchschnittsgeschwindigkeit Trip Strecke (Odometer mit Reset) Gesamte Strecke (Odometer) Batteriespannung Batteriestrom (entladen/rekuperieren) Elektrische Leistungs Fehlercodes (Diagnostic trouble codes / DTC) State of Charge (SOC) Restreichweite / Vehicle speed Average speed Trip distance (Odometer with reset) Total distance (Odometer) Battery voltage Battery current (discharge/recuperation) Electrical power Fault codes (Diagnostic trouble codes / DTC) State of Charge (SOC) Remaining range
Einstellbare Werte / Adjustable values:	Fahrmodus (vier verschiedene Fahrmodi) / Drive mode (four different drive modes)



4 Anschlussplan der Signalleitung (grau) 3 mit standard hall-sensor Kabelsatz / Wiring diagram of signal wire (grey) 3 with standard hall sensor cable set

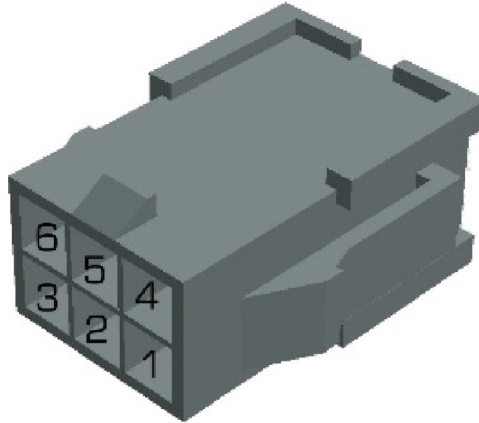
4.1 Gasgriff Connector MPC4 Würth 64900421822 4-pole männlich / Throttle grip connector MPC4 Würth 64900421822 4-pole male



1	NC	Nicht belegt / Not used
2 / Pink	5V	Sensor Versorgung 5V / Sensor supply 5V
3 / Violett / Purple	AIN1	Analog Input 1, 0V bis 5V (z.B. Gasgriff) Analog input 1, 0V to 5V (e.g. throttle stick)
4 / Braun / Brown	GND	Sensor GND (nicht isoliert) / Sensor GND (not isolated)

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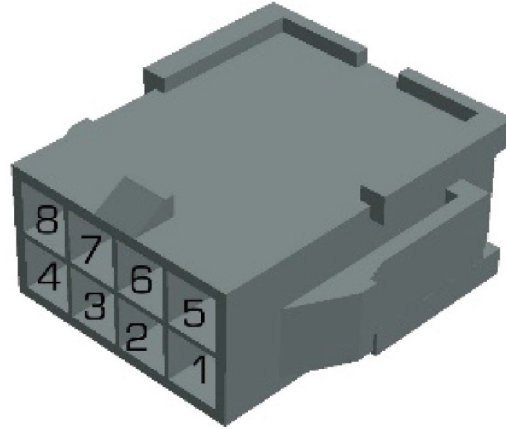
4.2 Hall-Sensor Connector MPC4 Würth 64900621822 6 pole männlich /
 Hall sensor connector MPC4 Würth 64900621822 6 pole male



1 / Grün / Green	Hall L3	Hall-Sensor Phase L3
2 / Grau-Pink	Temp IN	Temperatursensor Motor / Temperature sensor motor
3 / Rot / Red	5V	Sensor Versorgung 5V / Sensor supply 5V
4 / Blau / Blue	Hall L2	Hall-Sensor Phase L2
5 / Gelb / Yellow	Hall L1	Hall-Sensor Phase L1
6 / Schwarz / Black	GND	Sensor GND (nicht isoliert) / Sensor GND (not isolated)

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4.3 Aux Connector MPC4 Würth 64900821822 8 pole männlich /
 Aux Connector MPC4 Würth 64900821822 8 pole male



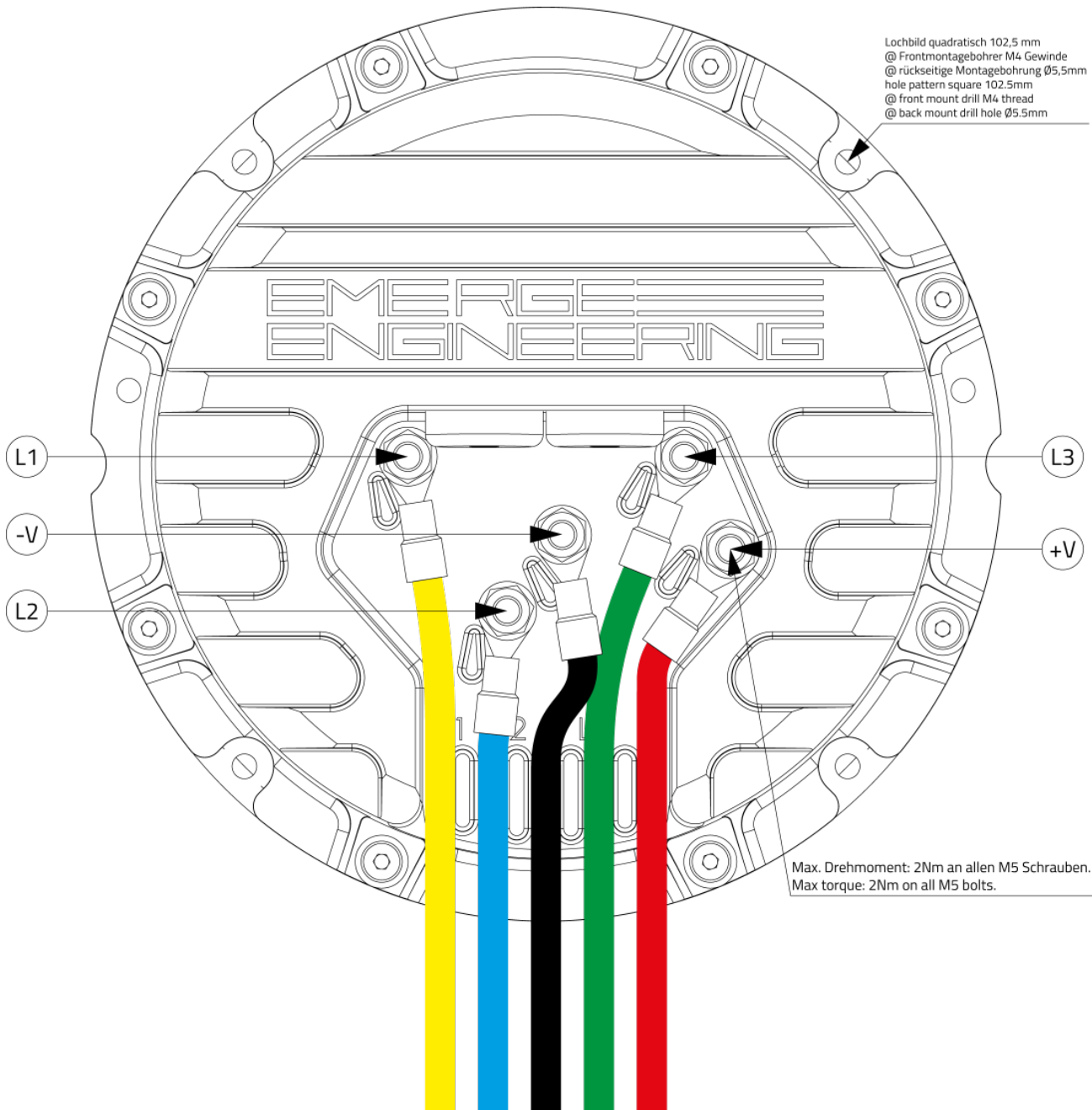
1 / Gelb-Braun / Yellow-brown	DIN2	Digital Input 2 / active low
2 / Weiss-Grün / White-Green	SP1	Digital Input 1 / active low
3 / Rot-Blau / Red-Blue	5V	Sensor Versorgung 5V / Sensor supply 5V
4 / Grau / Grey	CAN-Low	125,250,500,1000kb/s
5	NC	Nicht belegt / Not used
6 / Weiss-Gelb / White-Yellow	AIN2	Analog Input 2, 0V bis 12V (z.B. Bremse) / Analog Input 2, 0V to 12V (e.g. brake)
7 / Braun-Grün / Brown-Green	GND	Sensor GND (nicht isoliert) / Sensor GND (not isolated)
8 / Weiss / White	CAN-High	125,250,500,1000kb/s

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5 Hochstrom Terminals / High current terminals

- L1: Motor L1
- L2: Motor L2
- (-): Batterie - (Batterie GND) /
Battery - (Battery GND) /
- L3: Motor L3
- (+): Batterie + (60V Nominell, 72V abs. max) /
Battery + (60V Nominal, 72V abs. max)



6 Übersicht USB-Schnittstelle / Overview USB Interface

6.1 Einsatzzweck / Purpose

Das Enable-Tool wurde speziell zur Unterstützung aller Phasen im Produktlebenszyklus entwickelt

- a) Entwicklung: Parameter und Messwerte können in Echtzeit verarbeitet werden. Datenlogs können erstellt werden. Datensätze können erstellt und auf weitere Steuerung (z.B. Entwicklungsflotte) verteilt werden.
- b) Produktion: Reduzierte Komplexität. Einfache und schnelle Parametrierung, Kalibrierung von bestimmten Parametern und End-of-Line Test
- c) Aftersales / Service: Firmware-Updates, Fehlersuche mit Fehlerspeicher, Online-Support
- d) Händler: Kundenspezifische-Ansicht des Programms mit Ihrem Firmenlogo

Das Enable-Tool bietet Funktionen, die Sie typischerweise im professionellen Umfeld der Automobilentwicklung finden. Datensätze und Firmwareupdates sind durch Verschlüsselung vor Manipulationen geschützt (Tuningschutz).

The Enable tool is specifically designed to support all phases of the product life cycle.

- a) Development: Parameters and measured values can be processed in real time. Data logs can be created. Data sets can be created and distributed to other control systems (e.g. development fleet).
- b) Production: Reduced complexity. Simple and fast parameterization, calibration of specific parameters and end-of-line testing.
- c) Aftersales / Service: firmware updates, troubleshooting with error memory, online support.
- d) Dealers: Customized view of the program with your company logo.

The Enable tool offers functions that you will typically find in the professional environment of automotive development. Data records and firmware updates are protected against manipulation by encryption (tuning protection).

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6.2 Unterstütztes Betriebssystem / Supported operating system

Windows 7 / Windows 8 / Windows 10

