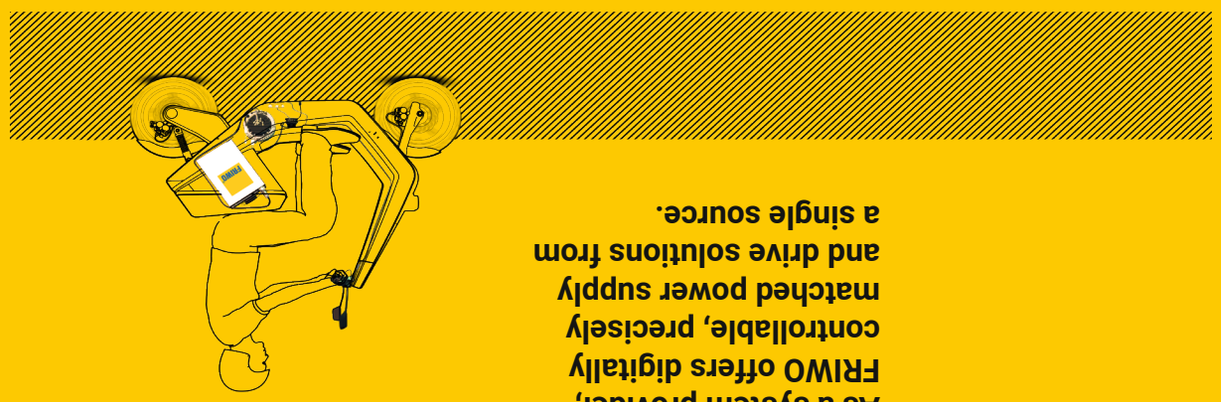
V. 01/20

We accelerate e-mobility



As a system provider,
FRIWO offers digitally
controllable, precisely
matched power supply
and drive solutions from
a single source.

Alcom electronics

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Technology

We supply all the components required for a modern electric powertrain.

1. Display
2. Vehicle Control Unit
3. Drive Unit
4. Motor Controller
5. Battery
6. Charger
7. Service Software

Display

The weatherproof display is easy to read, even in direct sunlight, and keeps the driver up to date at all times. Due to the open CAN bus interface, other displays can also be integrated into our powertrain. If a vehicle does not require a fixed display, a smartphone equipped with our Emerge EV App can be used instead.

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Display for light electric vehicles

The display has all the essential display elements and signal or warning lights that can be expected from an electric vehicle. The display values are updated absolutely without delay and in very high quality.

In addition, we have incorporated features that make the vehicle and the interaction with the driver even more exciting. The bar graph above the speed indicator can be operated variably and enables the display of a wide variety of information, such as the remaining overboost.

The IP67-protected display is splash-proof and can be installed outdoors.

Overview

Supply voltage	12V
Backlight	Yes
Center display	Speed, Ride mode, Boost, Temperature, State of charge, Milage, Trip milage
Icons (lower edge)	Indicators, Low beam, High beam, Charge mode, Low battery warning, On/Off
Bottom line	Voltage, Temperature, Time, etc.
Buttons	Switch bottom line, Trip reset

Views

Vehicle Control Unit

With our VCU, we network the entire vehicle with peripheral components. An Example: In eScooter sharing models, the VCU establishes the online connection to rent the vehicle via an app. Further interfaces are USB, WiFi, Bluetooth, GPS, GPRS, 3G or 4G, which can be used differently depending on the application.

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The networker

The VCU is used in complex vehicle wiring systems to control vehicle functions or as a gateway between separate CAN buses.

It takes on tasks such as the evaluation and control of the lighting system or provides the necessary anti-theft protection. In addition, the VCU is also suitable for „big data applications“ as it is equipped with WiFi and GPS connections to upload all collected data to a cloud.

As a complete in-house development, the functions of the VCU can be completely adapted to customer wishes and requirements.

Overview

Supply	12V
Interfaces	USB, 2x CAN, Bluetooth
Analog inputs	2
Digital inputs	5
Digital outputs	2

Views

Drive Unit

In addition to our intelligent motor control, which is also available separately and can be used with other motors, we offer complete drive units. In this case our motor control is installed directly on the motor. Together they form a perfectly matched unit for the best possible driving experience.

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Project accelerator

The Emerge drive unit is a powerful unit consisting of a Motenergy motor and an Emerge 6000 motor controller with a mechanical peak power of over 6.2kW. The two components are perfectly matching each other and, with a continuous output of 5kW, provide a drive unit for exciting applications.

The drive unit can be controlled either via accelerator pedal and brake or via CAN bus. Four different driving profiles and performance classes can be selected via Bluetooth for a maximum driving experience. With the optional developer license, the drive unit can be specifically adapted to the application and customer requirements.

Overview

Applications	Electric scooter, go cart, golf cart, pumps, fans
Input power (el)	9kW (12PS) @ 48V
Output power (mech)	6.3kW (8.5PS)
Torque	26Nm
Efficiency	83% @ 3500/min, 4.75kW Out, 13Nm
Speed	5000/min
Recuperation	Yes
Reverse gear	Yes
CAN-Bus	Yes
Bluetooth	Yes
Diagnostic interface	USB, CAN
Weight	10.9kg
Diameter	201mm
Length	146.5mm (Motor) 52.0mm (Controller)
Shaft diameter	24mm

Views

Motor Controller

Our intelligent motor controller has enjoyed great success in electric scooter sharing and motor sports since 2014.
In Europe more than 4000 rental vehicles are on the road that gathered millions of kilometers and a huge amount of experience. Thanks to two full race saisons in the WEC LMP1 class including the 24h of Le Mans race, the controller has proven its durability and special robustness.

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High quality motor controller

The motor control for brushless electric drives was developed for use in light electric vehicles. Due to the small form factor, the high power up to 12kW and the best possible efficiency, we offer a high degree of freedom in vehicle development. Thanks to Bluetooth functionality and our Emerge EV App, we deliver a high-quality display solution that fits right in, basically for free.

We have developed 100% of the hardware and software ourselves and are therefore able to react quickly to customer requirements..

Overview

Supply voltage	14V - 65V
Phase current	300A
Motor types	PMSM
Control algorithm	Field oriented control with flux weakening
Functions	Automatic teach-in, four ride modes, reverse gear, boost, display control, smartphone app
Position feedback	Hall sensor
Analog inputs	2
Digital inputs	2
Communication	CAN, Bluetooth
Diagnostic interface	USB, CAN
Diameter	155mm
Height	45mm
Weight	914g

Views



Battery

Since 2013, our battery technology can be found in the large electric scooter rental fleets in Berlin, Munich, Stuttgart, Paris and Bordeaux, as well as in a wide range of industrial products. We developed the electronics and the software of the battery management system (BMS) ourselves and can react quickly to any functional requirement. With a UL certification, the BMS can be legally distributed in more than 50 countries worldwide, including the USA.

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Battery pack

Our battery packs provide the power for Europe's largest rental scooter fleets and have proven safe continuous operation and a long service life in more than 5,000,000 km and more than 150,000 hours of charging.

24/7 continuous operation requires a robust battery management system (BMS) to ensure high safety and availability. Since we have developed 100% of the BMS electronics and software ourselves, we can react flexibly to special customer requirements and special functions.

Overview

Energy	2216 Wh
Cell type	Samsung INR 18650 35E
Cell config	14S 12P
Nominal voltage	50.4V
Voltage range	30V - 59V
Cont. current	50A
Peak current	65A
12V output	1.6A
Standby	<0.1mA
Digital inputs	Keylock (Enable), Charger
Communication	CAN-Bus
Diagnostic interface	USB, CAN
Dimensions	268mm x 76mm x 378mm
Weight	10kg

Views

Charger

Innovative charging concepts for maximum mobility: Equipped with the experience of almost half a century, FRIWO is your ideal partner in charging technology.
Regardless of whether you require highest performance, convection cooling, temperature monitoring, active battery balancing or communication via BUS systems, our comprehensive expertise in the field of charging technology will help you find the perfect solution for your specific needs.

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Full power, lower consumption

Coming from a market-leading position in the field of e-bike charging technology, we are more than familiar with the requirements of an optimal power supply for light electric vehicles. In addition to the shortest possible charging times for limitless electromobility, maximum user-friendly handling, exceptional operational lives and safety issues are of central importance for the design of our devices. Tailor-made for „green" electric mobility, it goes without saying that our highly efficient charging systems offer minimal standby losses with the aim of achieving „zero standby".

Dealing with the future of electromobility, FRIWO as an innovative company is also constantly exploring new power supply concepts. In the field of contactless energy transmission, which could represent the charging infrastructure concept for electric vehicles of the future, we have already realized efficient inductive charging systems featuring parallel data transfer.

Overview

Input Voltage	90 - 264 VAC
Input Frequency	47Hz - 63Hz
Efficiency	> 93%
Power factor pF	> 0,98
Output Voltage	29 - 60V
Output current	0 - 7000mA
Communication	CAN
Authentication	OPTIGA TRUST
Protection	OVP, OCP, OTP
Safety	IEC / EN 60335-1 & IEC / EN 60335-2-29
Water protection	IPX4
Operation Temperature	-20 °C - 55 ° C

Views

Service Software

For long-term driving pleasure, appropriate control and maintenance of a drive system is essential. Our self-developed service software accompanies your vehicle throughout its entire lifetime: from the development phase through series production to fault analysis in the workshop.

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Service power

A lot happens during the life of an electric vehicle.

Everything starts with the development process. In order to provide the best possible support for your R&D, we supply the 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.

During series production, the Enable-Tool supports the calibration of control units, the commissioning of electrical systems and stores protocols in databases.

Even an electric vehicle has to be serviced. We have already developed the infrastructure to set up your dealer network. Our control units are equipped with a USB diagnostic interface to give service staff access to the fault memory or to carry out firmware updates.

We currently offer the Enable-Tool NG exclusively as an annual fleet licence, which can be variably distributed among the developer and service user roles.

Overview

Interface	USB
System requirements	Microsoft Windows, Dualcore CPU @ 1.8 Ghz, 2GB RAM, 100MB HDD
Features depending on user role	see below:
Read fault codes	Service and developer
Change parameters	Developer
Create datalog	Service and developer
Create data snapshot	Developer
Transfer data snapshot on a certain OEM ECU	Service
Transfer data snapshot all OEM ECUs	Developer

Views

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