DM05C Display
Functionality Introduction

Product Name：Colored IPS Screen Display

Product Model：DM 05C

	Editor	Editor
Editor	刘磊	2021.09.07
Checked		
Approved		

已批准

Modification History

Version No	Reviser	Date	Revision content
V1.01	刘磊	2021.09.07	Initial version

Declaration

DM05C functional definition is a function definition description of the standard-version DM05 display produced by Velofox , and is part of the technical documentation.

All of Velofox's display products are customized according to the electric system's requirements. While this document is a reference for complete function definitions, operation instructions, and error codes, any configuration difference between your display and the standard DM05C is possible, due to various technical requirements in different ebike applications. Please consult your drive system supplier for additional function requirements and data display.

If you have any questions about DM05C functional definition, please consult our sales or technical support team.

Our company (VeloFox ®) reserves all the rights to interpret and explain DM05 functional definitions.

Hangzhou Velofox Intelligent Technology Co., Ltd

catalogue

A. Product Introduction

1 Product name and model

Colored IPS Screen Display of electric power assist bike

Product model：DM05C

- DM05C includes two versions of UART communication and CAN BUS communication

  DM05C_U corresponds to UART communication version；

  DM05C_C corresponds to CAN BUS communication version.

- All DM05 products are available to add Bluetooth function in its hardware.

2 Product introduction

- ✧ Imported tempered glass, 2.5D extra hard, high transmittance
- ✧ 3.5 inch HD high brightness full viewing angles IPS LCD display
- ✧ Special screen fitting technology, great sunlight and outdoor readabilitySeperated remote control with ergonomic design
- ✧ IP65 and up waterproof, excellent for outdoor use
- ✧ Built-in Bluetooth function, compatible with CAN-BUS and UART communication
- ✧ Service Tool function for fast firmware upgrade, parameter setting, and easy maintenance

3 Range of application

Suitable for all E-bikes that comply with EN15194 standard

4 Appearance and size

The shell material of DM05C is PC+ABS，the screen is made of imported tempered glass with beveled edge. This product is suitable to be installed on a horizontal handlebar tube size of Φ22.2mm，Φ25.4mm，and Φ31.8mm
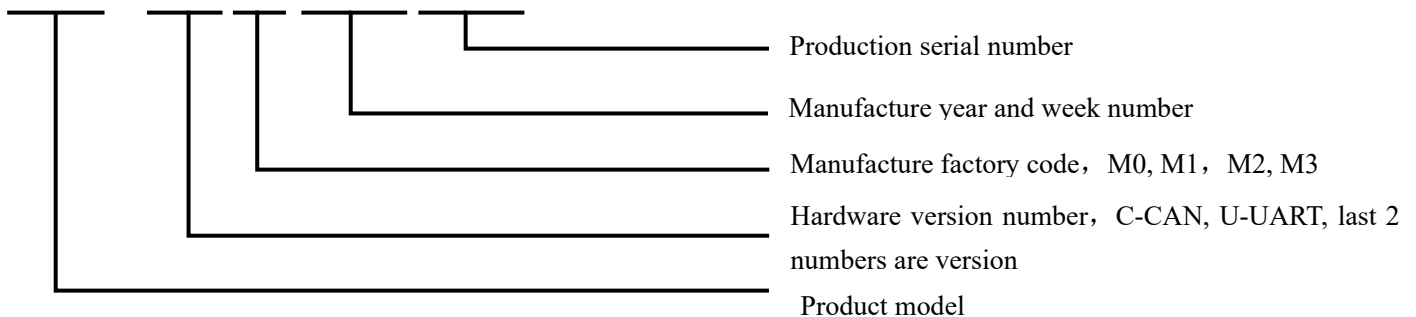
61 mm   *14.5 mm*

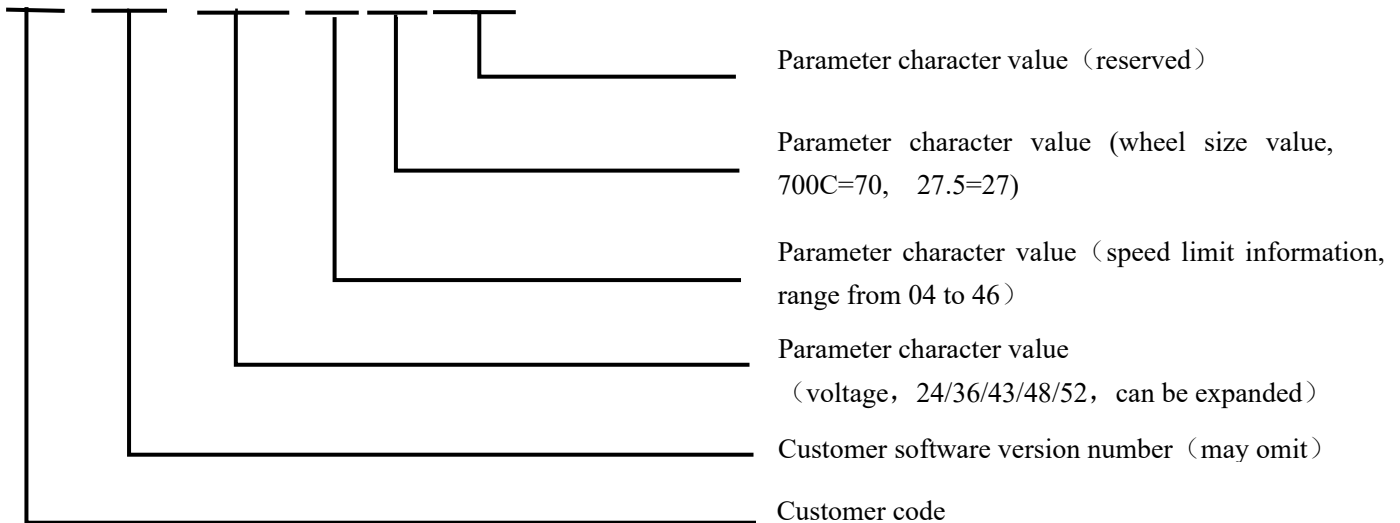*91 mm*

Holder size： φ 22.2mm， φ 25.4mm，φ31.8mm

5 Display coding rules

DM03-C01M120140001
V01.XXX.XX-24V2526XX

As shown in above picture:

DM05A-C01M020340001

Production serial number

Manufacture year and week number

Manufacture factory code，M0, M1，M2, M3

Hardware version number，C-CAN, U-UART, last 2 numbers are version

Product model

A08.01-36V2570XX

Parameter character value（reserved）

Parameter character value (wheel size value, 700C=70, 27.5=27)

Parameter character value（speed limit information, range from 04 to 46）

Parameter character value
（voltage，24/36/43/48/52，can be expanded）

Customer software version number（may omit）

Customer code

示例：

DM05C-C01M020340001

A08.01-36V2570

二 Product manual

1 Specifications

① Power supply：DC 24V/36V/48V

② Rated current：42 mA

③ Shutdown leakage current：<1uA

④ Screen specification：3.5 inch Colored IPS Screen Display,resolution 320*480

⑤ Communication method：UART/ CAN-BUS

⑥ Operating temperature：-10°C～60°C

⑦ Storage temperature：-20°C～70°C

⑧ Waterproof level：IP65

2. Function overview

① Left side independent buttons with ergonomic design

② Customization of boot interface and UI

③ Unit: Km/Miles, Language: English/German

④ Display key riding data, speed, mileage, battery info, etc.

⑤ Statistical function for power assist mode

⑥ Walk assist function

⑦ Error code indication

⑧ Parameters setting and advanced setting

⑨ Range and battery indication（*available if BMS provides necessary info）

⑩ Percentage Analysis of total power output shared between engine and rider (*available if torque sensor provides necessary info)

⑪ Health info statistics（*available if connected to external bluetooth device）

⑫ *Optional: Bluetooth function, for wireless connection for data transmission

⑬ *Optional: Service reminder function

⑭ *Optional：Auto headlight on/off function

⑮ *Optional：Real-Time Clock, for a current time indication

3. Installation

① Display locking clip includes two handle bar sizes, size A Φ31.8mm，B Φ25.4mm. Please include the requested locking clip size in the purchase order.

Installing DM05 display: Adjust display to a position easy to operate, using M3*10 hex set to screws and tighten. Tightening torque: 0.8N.m

*Note: **Damage caused by excessive torque is not covered by the warranty.**

② Place remote button on the left side of horizontal tube, for more remote button models, please refer to Velofox product catalog.

③ Connect the 5 pin plug to the docking plug of the controller

4 Interface

4.1 Boot interface
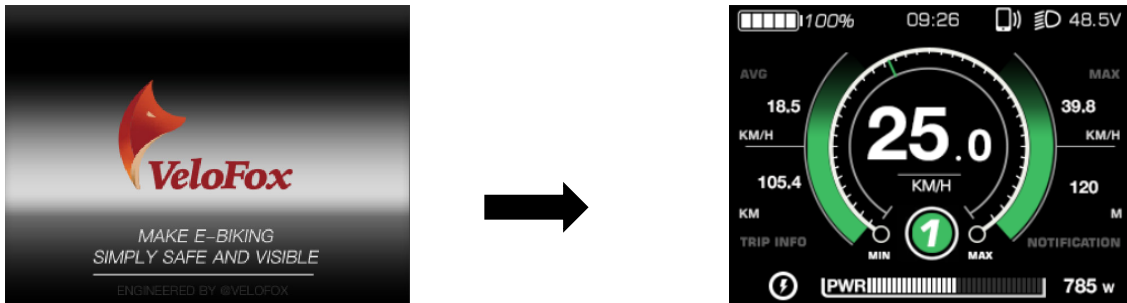
Boot logo interface is displayed for 2 seconds after the display is turned on. When the communication connection is established, display enters the main interface which shows information obtained from the controller. (All data displayed is following communication protocol provided by the customer) 。

4.2 Basic interface and operation

Adjust up & down

Power-on button

M button

RM01

Basic display interface

DM05C

① All RM series buttons are compatible with DM02 series displays, the power-on button is located on the top side of the display.

② Standard Outlet is a board end connector, which is convenient for after-sales maintenance and replacement.

③ 3.5 inch HD high brightness IPS LCD screen meets the need for customization of the boot interface and UI interface

4.3 Function interface introduction

Boot interface and basic function interface

Boot Interface   Basic Interface
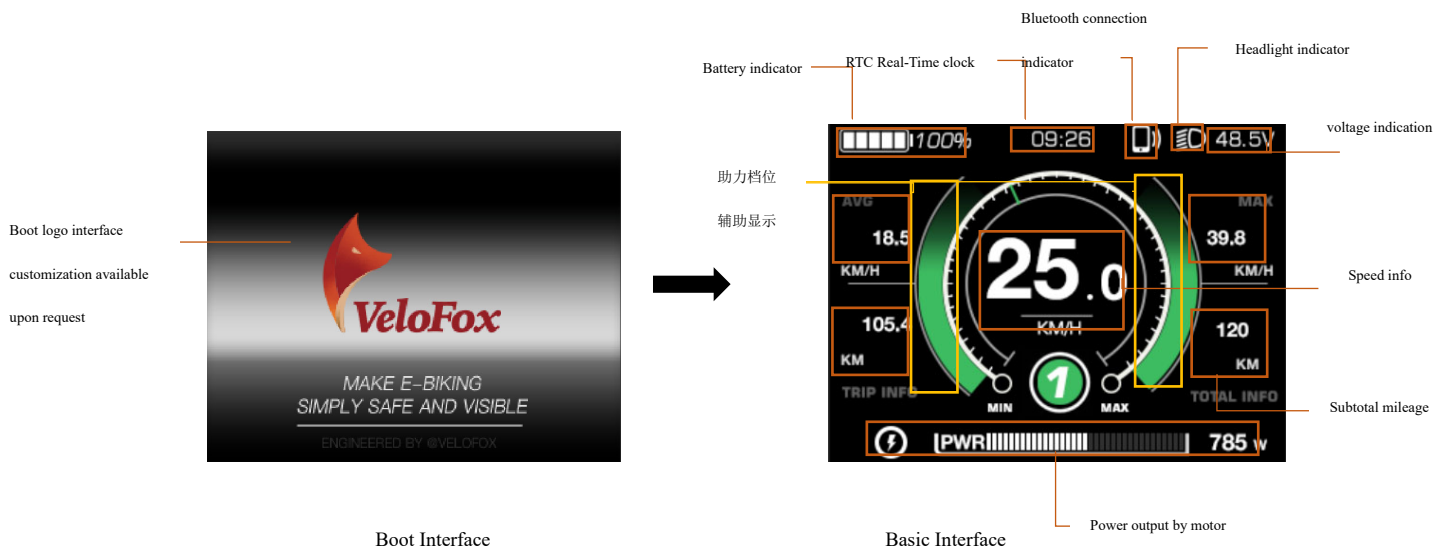
Boot logo interface is displayed for 3 seconds after display is turned on. When the communication connection is established, display enters the main interface, showing real-time information stored in the controller and battery BMS according to the communication protocol. (Battery indicator will not show battery percentage if BMS info is not available)

The basic function interface contains real-time speed, power information, power gear, clock information, light indicator, connection status and cycling statistics display.

Mileage statistics show speed and mileage information，including average speed, maximum speed, and TRIP info which is subtotal mileages as shown on basic interface. Speed display value has 3 digits, maximum value is 99.9KM/H, including one digit after the decimal point. Subtotal mileage

TRIP value has 4 digits, including one digit after the decimal point. After 9999.9 KM is exceeded, the decimal point is not indicated, and a 5-digit mileage value is displayed directly, with a maximum value of 99999km. After the maximum value is exceeded, the value is shown as the actual mileage value deducted by 100,000.

Cycling statistics in the basic function interface can be displayed in the main interface, and the data can be cleared by pressing the button.   During data clearing, only TRIP related information is cleared, but ODO accumulated mileage information is not cleared.

Other function interfaces

Function interface I-battery information,

The function interface II mainly displays battery information, including voltage, capacity percentage, accumulated charging cycles, and Range which is endurance mileage.Accumulated charging cycles are provided by battery BMS, if it is not available from BMS, display shows ---- for charging cycles. The Range is calculated by controller using battery BMS capacity info, if controller can not provide range info, range info shows----.
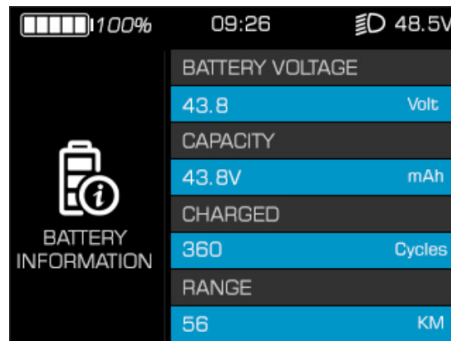
Function interface Ⅱ——Motor information

Function interface Ⅱ shows the motor information of the system. The function needs the support of the controller.

Power analysis area shows power output analysis, including average power output by motor, the maximun output by motor, and power output shared between rider and motor. Power output by motor will follow data provided by controller, if requested info is not available from controller, display will calculate using collected voltage and electric currents data.
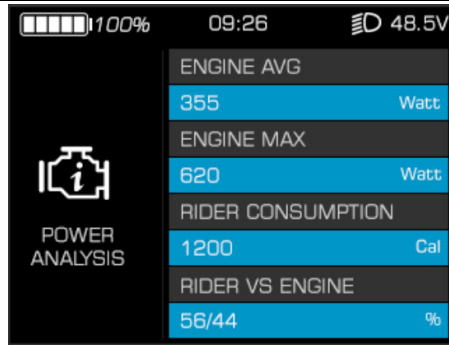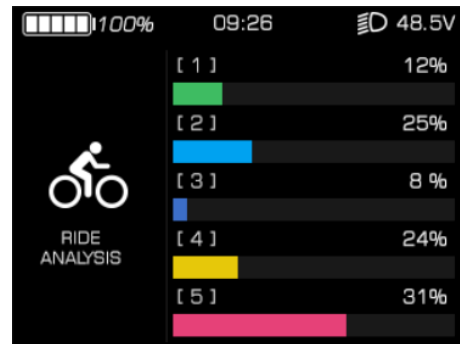
Function interfaceⅢ——Assist Mode Usage Statistics

The function interface Ⅲ mainly displays the usage time statistics of different power assist modes during the riding process. The statistical data is calculated by the meter according to the actual riding state and displayed as percentage data. The statistics of the usage time of the power-assist mode can be reset to zero by pressing the button.
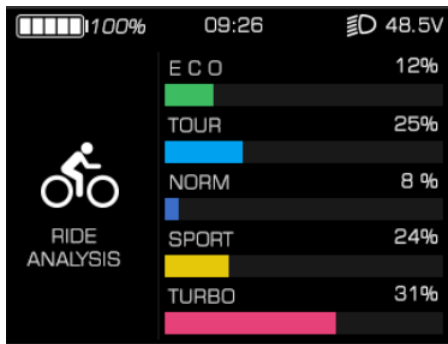
PAS 英文档位

PAS 数字档位

In the state of the basic function interface, short press the M key to switch the display of each function interface.

Walk assist interface

Long press ∨ to enter walk assist mode, interface shown as below：

Maintenance reminder interface

The display can be set with regular maintenance reminders, and when reaches the set mileage value, display will notify the user through the maintenance reminders. After the maintenance reminder mileage is reached, display will show a notification interface every time being turned on to prompt the user to carry out daily vehicle maintenance. Notification interface can be cancelled by short press M button manually. After connecting to service tool box, the maintenance reminder can be reset through after-sales diagnostic tool, and meanwhile, the maintenance record will be registered.

Error code interface

When the display receives the error info returned by controller, it will show a detailed error code on interface, indicating relevant electrical system fault information. The error code will bedisplayed numerically in the speed display area.

Bluetooth connection and message alert interface

The instrument supports Bluetooth function. After bluetooth connection is successful, the icon will be displayed in the upper left corner of the instrument.

Setting interface

Within 10s after turning on display, long press M button to enter the setting interface, short press ∧、∨ to switch between setting interfaces. Short press ∧、∨ to enter parameter picking state.
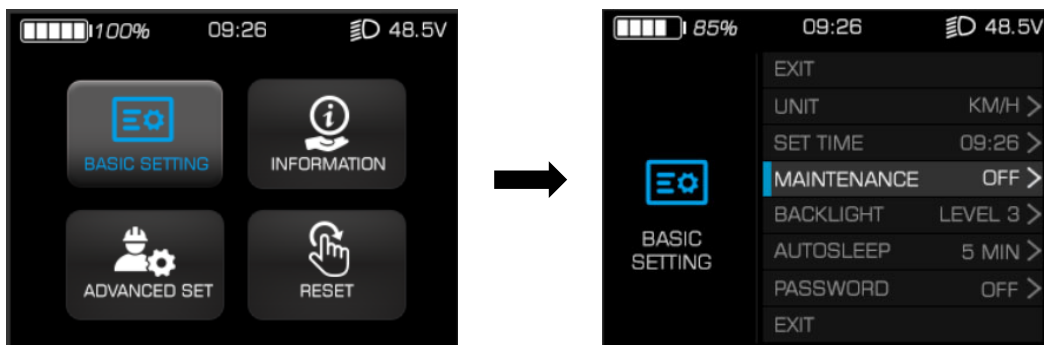
设置界面 1 级菜单页面

For more setting operation illustration, please refer to part 7

5Button definition

5.1 Button name

Adjust
button

Power
button

M button

Power button: Turn on/off the display

Adjust button: Adjust the assisting power level during riding and switch functions

   Long press the adjust buttons to perform specific function operation

Mode button: Switch interface functions and enter into parameter setting interface

5.2 Definition of button operation

Operation Type	Description
Short press	Press the button and soon released, while the button is released,the function activated accordingly
Long press	Press the button and hold, when the hold time exceeds the setting time(generally 2 seconds), the function activated accordingly.

6 Basic function operation

6.1 Turn on/off the display

To turn on, long press button until boot logo interface appears and shortly enters the basic interface. To turn off, long press button until display is turned off. If the rider does not perform any operation on the display within set shutdown time, while speed is 0, and current is less than 1A, then the display will be turned off automatically. Set shutdown time is self-defined by user.

6.2 Assist level switch

During normal working state，short press ∧、∨ buttons to switch assist level, and change assist mode

* Power display has two default modes, English gear and digital gear;   You can specify the requirements in the order, or modify and select by yourself through the advanced Settings and auxiliary tools of the instrument 。

Power assist display modes as shown below：

Digital gear: 0-5 levels
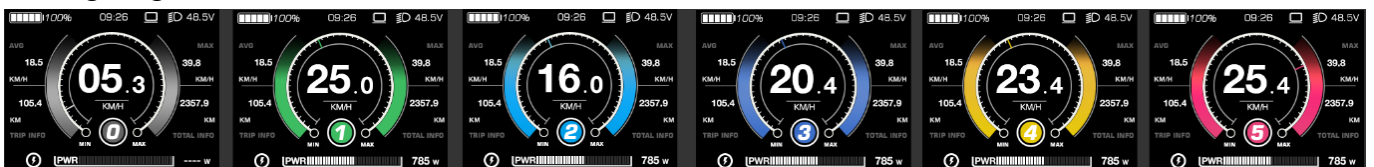
English gear：
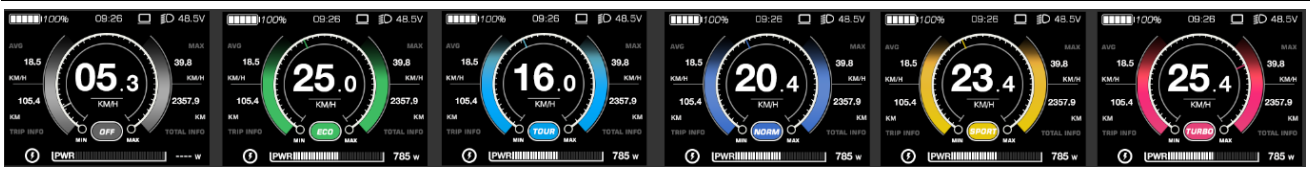
Short press ⌃、⌄ button to switch assist level. Switching level is not cycled, that is, after reaching

5th level, short press ⌄ button to return to off level. It's the same when adjusting up.

6.3 Information switch

In a power-on state, short press M button to switch alternately from basic interface, function interfaces.

The switching process of each interface, as shown below:

基础界面
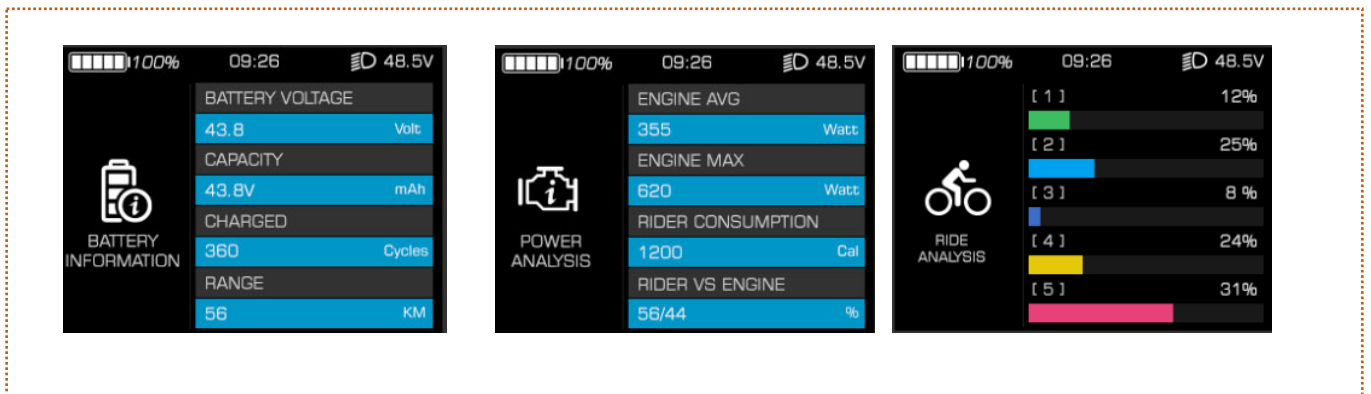
功能显示界面

6.4 Light control function

Display supports automatic lights-on/off function, when loaded with battery and is turned on, the default is to automatically turn on/off lights, that is the display automatically detects the ambient light

intensity and controls the turning on/off of the lights. The icon ⊟ on the top right corner of the basic interface indicates automatic lights-on state.

When automatic lights-on/off function fails, long press ⌃ button to manually turn on the front light, a light icon ⊟ on top left corner of screen will appear indicating light-on status. Long press ⌃ button to manually turn the lights off.

Automatic lights-on/off function is disabled , after manually turn off the headlight. Re-start display to enable automatic lights-on/off function.

When headlights are on, screen brightness will be lowered to preset brightness level.

6.5 Maintenance reminder

Display supports maintenance reminder function, when this function is enabled, the display will remind the user to give ebike a maintenance check once the total mileage reached a preset value. maintenance reminder function can be turned on/off in the setting interface and is turned on by default. The factory default reminding mileage is 5000km which is not modifiable by users, that is, display will remind the user to give a maintenance check once the total mileage reached 5000km.

6.6 Walk assist function

When speed is 0, long press ∨ button to enter walk assist mode, motor outputs power according to the set speed and control the actual walk speed, display shows the walk assist icon 🚲 and the real-time speed. Release ∨ button or any other button to exit walk assist mode, the motor is turned off, and the display gets back to the basic interface. Walk assist interface, shown as below：
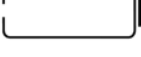
6.7 Battery power indicator and assist power output

Battery power information is divided into battery bar indication and remaining percentage indication. When battery power is normal, battery capacity is divided into 5 bars. Before communication is established, the battery percentage is not displayed, and the power bar is full and blinks at 2Hz. After battery info is acquired, power bar will stop blinking, and displays the power percentage. If communication is not successful within 3s, it will stop blinking and no power percentage will be displayed.

After battery capacity is lower than 5% or the voltage is lower than low voltage value, display will enter the low-voltage mode. In this mode battery level showed level 0 and border blink at 1Hz, with no power output from the motor, and disabled assist level switch. Power assist level is displayed as OFF or 0.

To get out of low-voltage mode, reset, and increase the voltage above low-voltage value and battery capacity above 5%.

Percentage of battery power and power level table（Battery % info is required from BMS or controller）：

余量百分比信息	电池条指示	说明
80% ≤ SOC		Full battery level 5
60% ≤ SOC < 80%		Level 4
40% ≤ SOC < 60%		Level 3
20% ≤ SOC < 40%		Level 2
10% ≤SOC < 20%		Level 1
5% ≤ SOC < 10%		Level 0
0% ≤ SOC < 5%		Level 0 and icon blink at 1Hz

● Remarks about battery indicator：

When there is a battery communication error：

1. Display will estimate the power according to the voltage and show the battery level accordingly；

2. No battery percentage information will be shown；

3. Range information will not be displayed；

4. If the voltage is lower than the low-voltage value, the effect of the current on voltage needs to be considered when converting to a voltage at 0 current

7. Setting function

Display provides specific parameter setting functions. The optional items of setting function will be deleted according to different market and product standards. The following is the complete parameter setting, information reading function description under the default state of display. Please contact our sales and technical support team for confirmation in case of any discrepancies.

Within 10s after turning on display, long press M button to enter setting interface, short press ∧、

⌄ button to switch between setting interfaces. In any setting interfaces, short press M button to enter parameter editing state, the blue mark indicates chosen parameter, and selected option or value will be indicated by a white font with a grey background. Short press ∧、⌄ button to edit parameters. Long press M button to confirm parameter selection. Long press M button again to exit and return to previous page

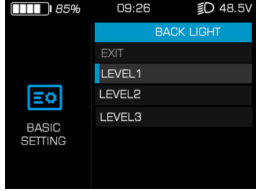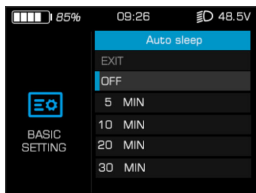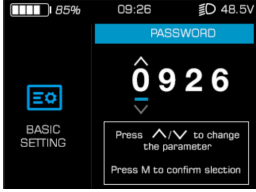Selected option or value will be indicated by a white font with grey background，as shown below:
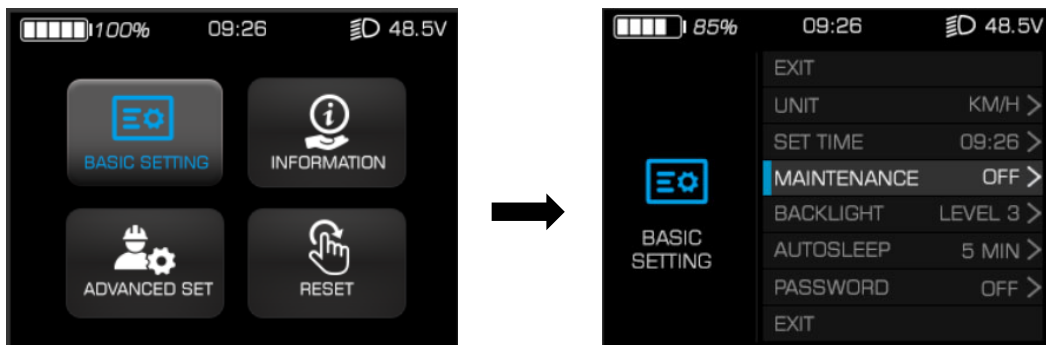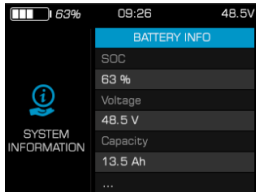

In any setting interfaces, short press M button to enter the next level menu, and long press M button to return to the previous level menu.
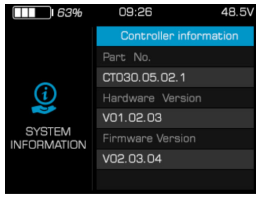
First level parameter setting interface, and the description of each parameter interface is as follow:

Setting items	Interface	Description	Setting data	Remark
Unit setting		UNIT	Value=KM/H MPH	Default Value=KM/H KM/H—Metric MPH—Imperial
Clock setting		SET TIME	Customization	Default= 12：00

Maintenance reminder		MAINTENANCE	Fixed value	Default= 5000km
Backlight level setting		BACK LIGHT	Value= LEVEL1,backlight level 60% Value= LEVEL 2 backlight level 80% Value= LEVEL 3 backlight level 100%	Default Value= LEVEL 3
Auto shutdown time		Auto sleep	Value=OFF,5-30 min	Default Value=5min OFF means no auto shutdown
Power on Passward setting		Password	Value= OFF and ON; When is ON, user is allowed to set 4-digit password	Default value：OFF
Display info		Display information	read only	According to communication protocol
Battery info		Battery information	read only	According to communication protocol

|			
Controller info		Controller information	read only	According to communication protocol

8. Advanced setting functions

*Warning

The advanced setting function is based on specific protocol content, allowing to modify and set the controller and system parameter through display side. This feature is only available to specific groups of people, such as bike manufacturers, dealers and other entities with professional technical capabilities. Debugging and maintenance are allowed through advanced setting functions. In case of improper parameter setting or other setting problems, the whole system will work improperly or even have failure problems. **Please be cautious about whom to open this feature to.**

Advanced settings require a specific password, if you need to use this feature, please communicate with our company sales and technical support team to confirm compatibility with your current hardware version. In the meantime, please confirm with our sales and technical support team for adequate maintenance capacity, before obtaining the password.
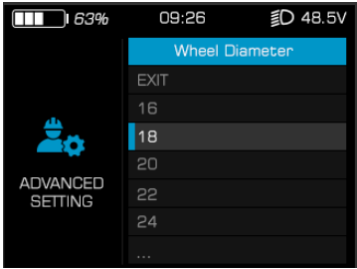
Advanced setting operation instructions

After selecting the advanced setting in the first-level menu, short press M button to enter the login password. Short press M button to select the corresponding password digit in the 4-digit password field. The selected password digits will be highlighted with a white background. Short press ︿、﹀ to edit password value, and short press M button again to confirm the input. The password input interface is as follows:
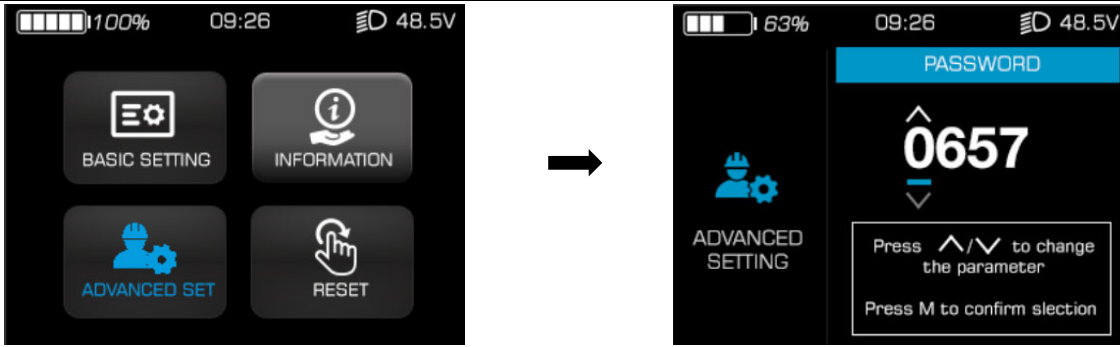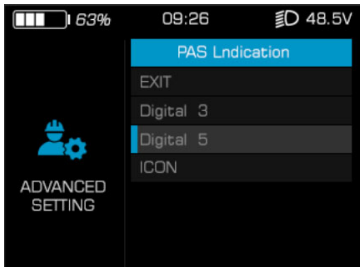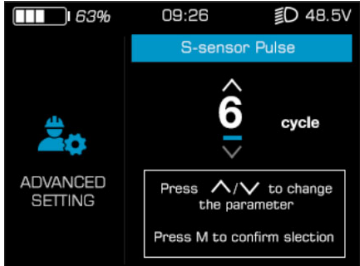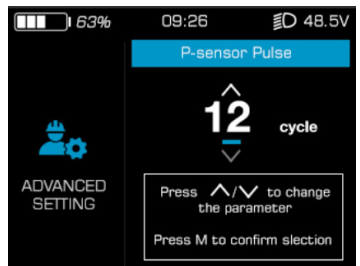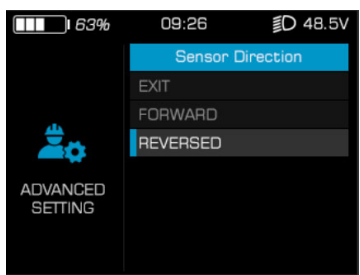
After the password is typed correctly, advanced setting is entered, divided into two-page

contents. Short press ∧、∨ to pick and select.
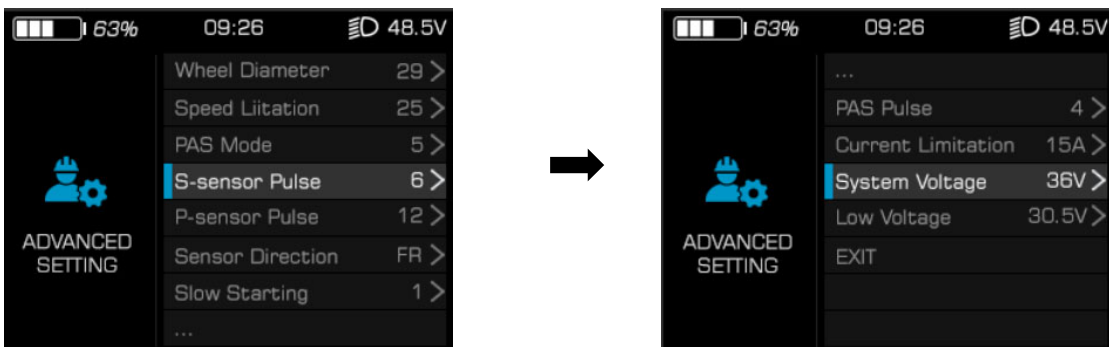
Advanced setting functions descriptions：：

| Setting item	Interface	Description	Setting data	Remark
Wheel size setting		WheelDI=Wheel diameter	Value=12， 14，16，20， 24，26，27， 27.5， 700C， 28，*29， *CCF （*Value is optional）	Default value： 26

Speed limitation setting		SpdLtd=Speed limitation	Value= 5 to 46	Default Value= 25 Step=1
Pedal assistant Mode setting		PAS= Pedal assistant Mode	Value= Dig-3; Dig-5; ICON	Dig-3: Digital 3 gear levels Dig-5: Digital 5 gear levels ICON: Eng version gears
Speed sensor setting`		Ssensor=Speed sensor	Value= 1--12	Default：1 Step=1; Motor speed measuring magnet number
PAS sensor setting		P-Sensor= PAS sensor	Value= 1-64	Default：12 Step=1; PAS sensor
PAS sensor direction setting		Direc= PAS sensor direction	Value= F or R	F=Forward R=Reversed Signal direction of sensor, can be adjusted corresponding to right or left instalation

slow acceleration setting		Slow-ACC= slow acceleration	Value= 0-3	Default：0
assistance started pulse setting		P-Pulse=assistance started pulse	Value= 2-63	Default：2 Step=1
current limitation setting		CurLtd= current limitation	Value= 0-31.5A	Default：12 Step=0.5A
select system voltage setting		SysVol= select system voltage	Value= 24V/36V/48V	Default：36V
low voltage level setting		LowVol= low voltage level	Value= 10.0-52.0V	Default：31.5V Step=0.5V

＊Note: The wheel diameter value option CCF is the wheel diameter perimeter setting, which requires the support of the controller communication protocol. Parameter 29 means The wheel diameter 29 inches, which needs the support of the corresponding controller communication protocol.

9. Data clearance

Data clearance is aimed at the removal of data information such as subtotal mileage TRIP, average speed, and maximum speed. 10s after display is turned on when display is at function interface, long press M button to show data clearance window, and short press ∧、∨ button to select accordingly. To remove the pop-up clearance window, long press M button or remain no operation for 30s.
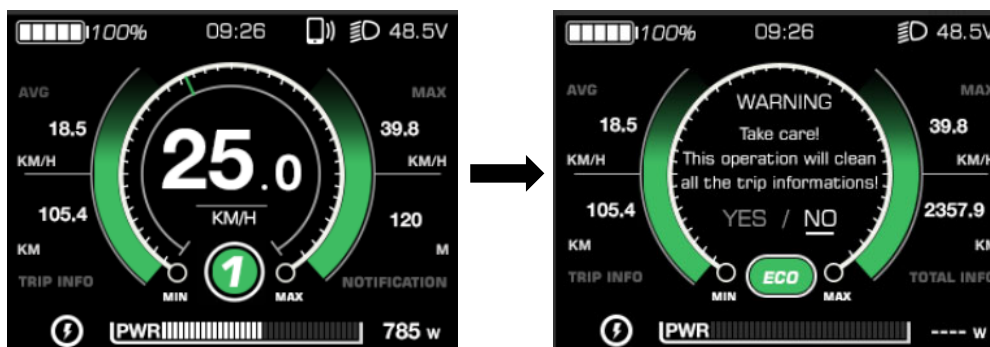
After clearance, the subtotal mileage TRIP is 0, average speed, and max speed is 0. ODO information can't be cleaned manually on the display, professional service tools are required.

10.Error information

Display can warn bike faults. When faults are detected, error code will be shown on the interface and blink at 1Hz. When error code is shown, button functions will not be affected, meaning interfaces can be shown normally by pressing buttons. If no button operation after 5s, the display will return to the error code interface.

Error code interface as shown below:

Bafang protocol's error code information table：

Error code	Error description	Suggest operation
"04" shown at speed	throttle doesn't turn back to zero position (stay on the high position)	Check if the throttle turned back
"05" shown at speed	throttle failure	Check throttle
"07" shown at speed	overvoltage protection	Check battery voltage
"08" shown at speed	failure of motor's hall signal wire	Check motor
"09" shown at speed	failure of motor's phase wire	Check motor
"11" shown at speed	failure of the motor's temperature sensor	Check controller
"12" shown at speed	failure of the current sensor	Check controller
"13" shown at speed	failure of the temperature of the battery	Check battery
"14" shown at speed	Controller temperature is too high, and reaches the protection point	Check motor
"21" shown at speed	failure of the speed sensor	Check the install position of the speed sensor
"22" shown at speed	Failure of BMS communication	Change battery
"30" shown at speed	communication failure	Check connector to controller

（＊ The corresponding fault codes of different system protocols are different. If the fault code of the instrument appears, please contact our sales and technical support team in time to verify and confirm!）

11. Wire definition

11.1 Standard wires definition:

The standard outlet of the display is defined by Velofox according to the conventional application,

and the standard outlet needs to match the corresponding conversion harness. Our company has corresponding standard settings for the conversion line length and interface standards. If the standard settings cannot meet your requirement, a customized conversion harness is required.

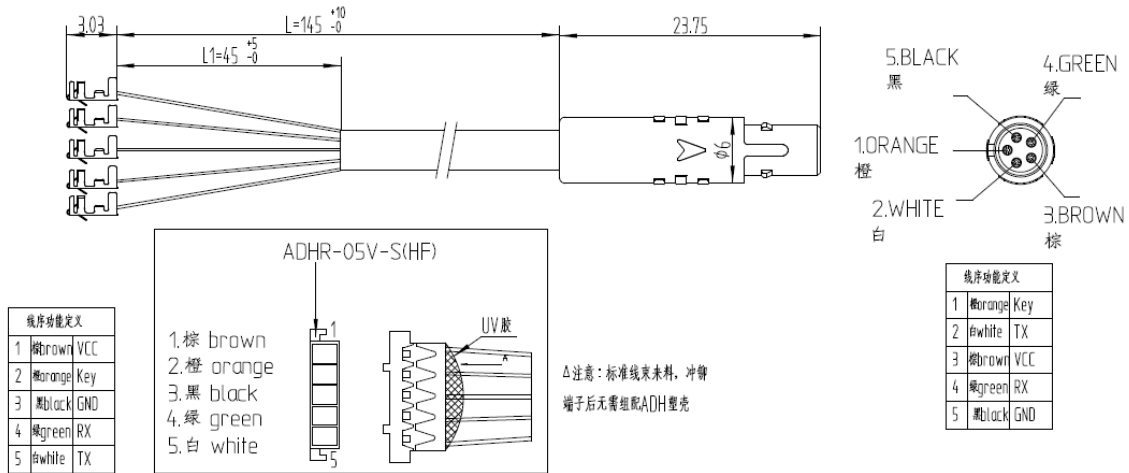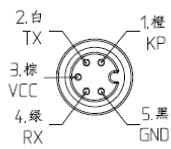Standard outlet in a sample is shown in the figure below:

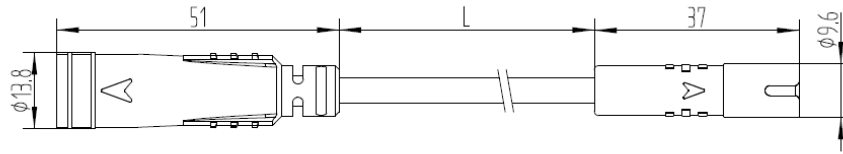Table 1 Standard wire definition

No.	Color	Function
1	Orange(KP)	Power lock control wire
2	White(TX)	Data transmission wire of display
3	Brown(VCC)	Power wire of display
4	Green(RX)	Data receiving wire of display
5	Black(GND)	GND of display
6	reserve	reserve

11.2 Standard conversion wire specifications：

Adaptor-C2H:

Adaptor-C2J:

Δ10mm白色热缩套管标记
Adaptor C2J
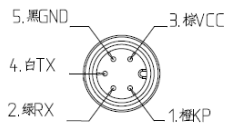
C Package specifications

Standard delivery, in double corrugated box packaging. The inner layer is a double corrugated septum plus EPE foam product bag.

Outer box size：580*390*168mm   (L*W*H)

D Note

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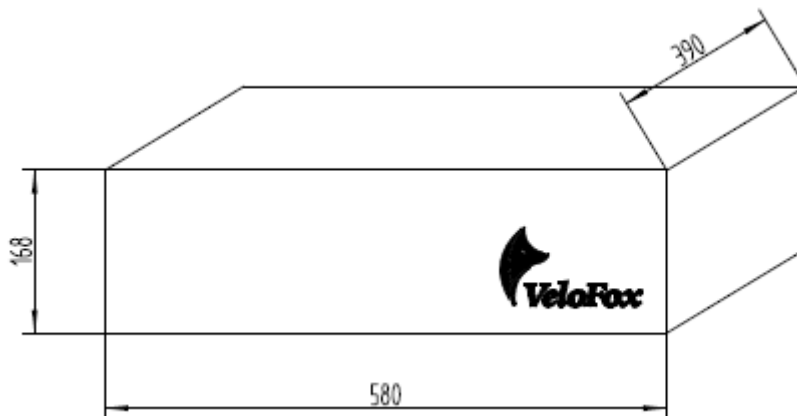
♦ In the use of the display, pay attention to the security, do not plug the display in and out when the power is on；

♦ Try to avoid exposure in harsh environments like heavy rain, heavy snow, and strong sunlight

♦ When the display can't be used normally, it should be sent to repair as soon as possible