



# DM05C Display Functionality Introduction

Product Name: Colored IPS Screen Display

Product Model: DM 05C



	Editor	Date
Editor	Lei Liu	2021.09.07
Checked		
Approved		



### Modification History

<b>Version No</b>	<b>Reviser</b>	<b>Date</b>	<b>Revision content</b>
V1.01	Lei Liu	2021.09.07	Initial version

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## **Declaration**

**DM06 functional definition is a function definition description of the standard-version DM06 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 DM06 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 DM06 functional definition, please consult our sales or technical support team.**

**Our company (VeloFox ®) reserves all the rights to interpret and explain DM06 functional definitions.**

**Hangzhou Velofox Intelligent Technology Co., Ltd**



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## A. Product Introduction

### 1. Product name and model

IPS display of electric power assist bikes

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 DM05C products are available to add Bluetooth function in its hardware.

### 2. Product introduction

- ✧ Tempered glass screen with 2.5D chamfered edge
- ✧ 3.5 inch HD high brightness full viewing angles IPS LCD display
- ✧ Special screen fitting technology, great sunlight and outdoor readability
- ✧ Independent operating buttons 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 2.5D chamfering technology. This product is suitable to be installed on the horizontal tube with a



handlebar size of  $\phi$  22.2mm,  $\phi$  25.4mm,  $\phi$  31.8mm



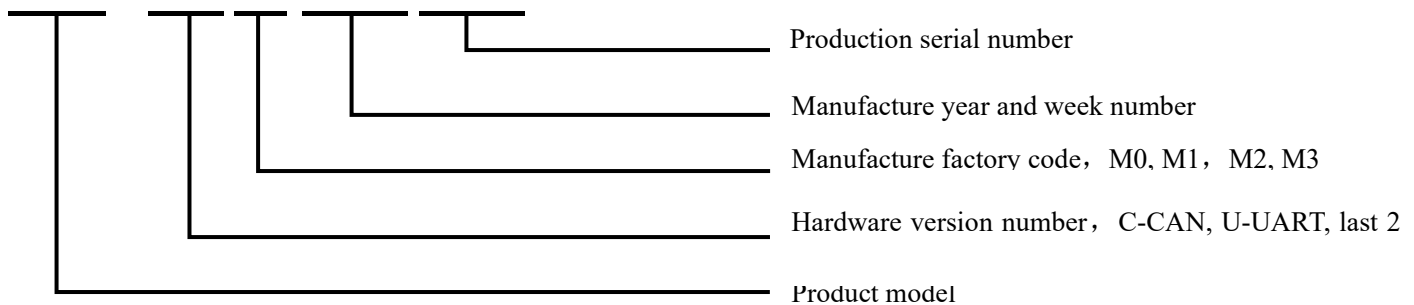
### 5. Display coding rules



DM03-C01M120140001  
V01. XXX. XX-24V2526XX

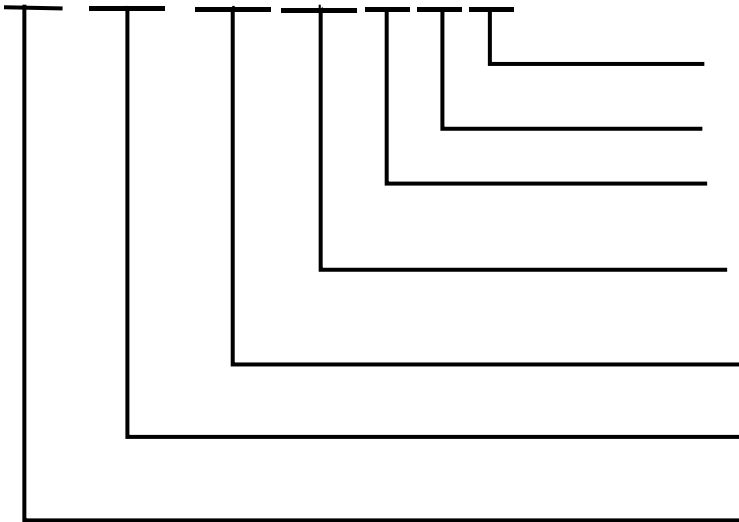
As shown in above picture:

DM03-C01M120140001





# V01. XXX. XX-24V2526XX



Parameter character value ( reserved )

Parameter character value (wheel size value,

Parameter character value ( speed limit information,

Parameter character value

Customer version number (may omit)

Customer code

Firmweare main version code (may omit)

Example:

DM05C-C01M020340001

V01.A08.01-36V2570



## B. 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 IPS LCD 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 motor output shared between engine and rider (\*available if torque sensor provides necessary info)
- ⑪ Health info statistics (\*available if connected to external bluetooth device)



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- ⑫ \*Optional: Add Bluetooth in hardware, for wireless connection to a smartphone to achieve GPS function
- ⑬ \*Optional: Maintenance service reminder
- ⑭ \*Optional: Auto head on/off function
- ⑮ \*Optional: RTC, Real-Time Clock for a current time indication

### 3. Installation

① Display locking clip includes three handlebar sizes, size A  $\Phi$ 31.8mm,  $\Phi$ 25.4mm, and  $\Phi$ 22,2. Please include the requested locking clip size in the purchase order.

Installing DM06 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.**

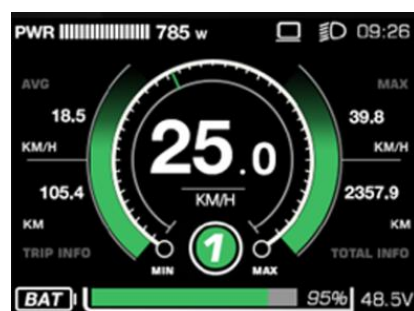
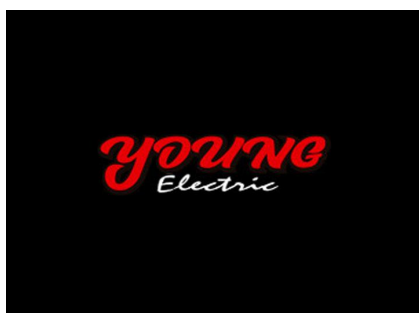
② Place remote button on the left side of horizontal tube, using M3\*10 hex set to screws and tighten.

For more remote button models, please refer to Velofox product catalogue

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 3 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)

**\* Animated boot interface available for customization**

## 4.2 Basic interface and operation

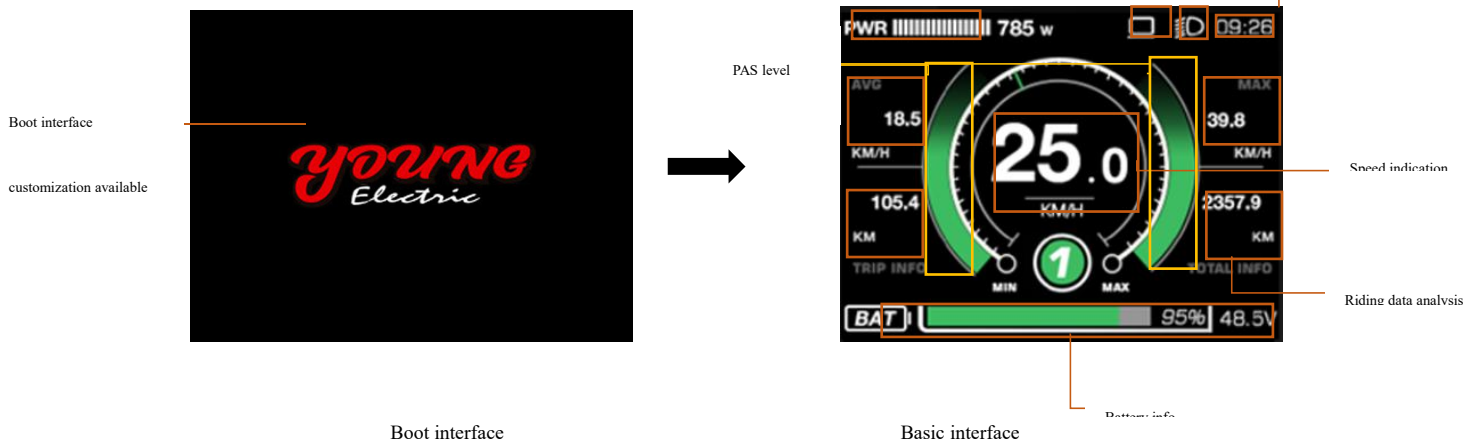


- ① All RM series buttons are compatible with DM05C series displays
- ② Standard Outlet is a board end connector, which is convenient for after-sales maintenance and replacement
- ③ 3.5 inch HD high brightness IPS LCD screen meets the need for customization of the boot interface and UI interface



### 4.3 Function interface introduction

#### Boot interface and basic function interface



Boot 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)

Basic interface includes real-time speed info, battery info, PAS indication, real-time clock, light-on indication, Bluetooth connection and riding data analysis.

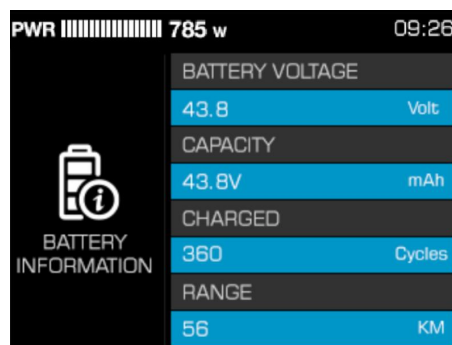
Riding data analysis displays speed info and trip info which includes TRIP, ODO, Range, Average speed, Max speed and trip time. Speed display value has 3 digits, maximum value is 99.9KM/H, including one digit after the decimal point. ODO value has 4 digits, with one digit after decimal point. After 9999.9 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.

TRIP data on function interface I can be cleared by a button operation while ODO data cannot be cleared.

## Other function interfaces

### Function interface I —— Battery information page

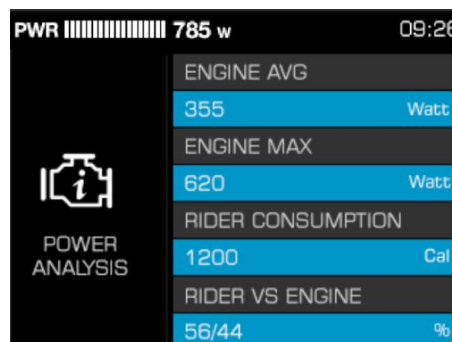
Function interface I mainly display battery info, including battery voltage, capacity, changing cycles, and range info. Accumulated changing cycles are provided by battery BMS, if BMS does not provide relevant information, it shows ----. Range is calculated by controller using battery BMS capacity info, if controller can not provide range info, range info shows----.



### Function interface II —— Motor power analysis page

Function interface II power analysis requires controller's support.

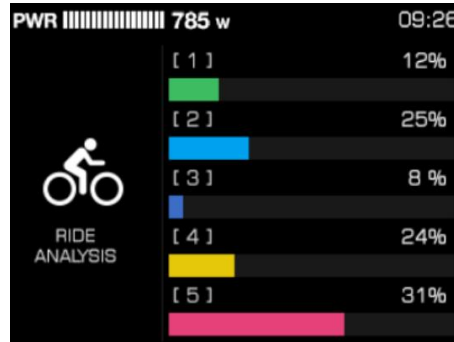
Function interface II displays power output analysis, including average power output by motor, the maximum output by motor, and power output shared between rider and motor. Power output by motor will follow data provided by controller, if requested info is not available from controller, display will calculate using collected voltage and electric currents data.



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### Function interface III —— Riding analysis


Function interface III displays time usage analysis under each PAS level, data are calculated by the display according to the actual riding state, shown as a percentage. To clear the time usage data under PAS level, use button operation.



PAS levels in digits

Under the basic function interface, short press M button to switch between each function interface.

### Walk assist interface

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



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### 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

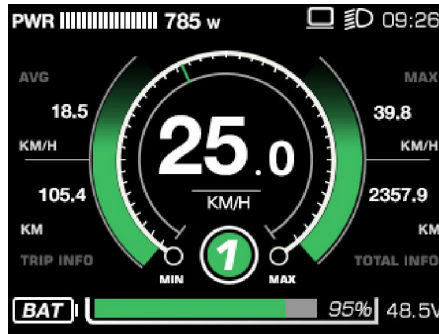
When the display receives the error info returned by controller, it will show a detailed error code on interface, indicating relevant electrical system fault information. The error code will be displayed numerically in the speed display area.







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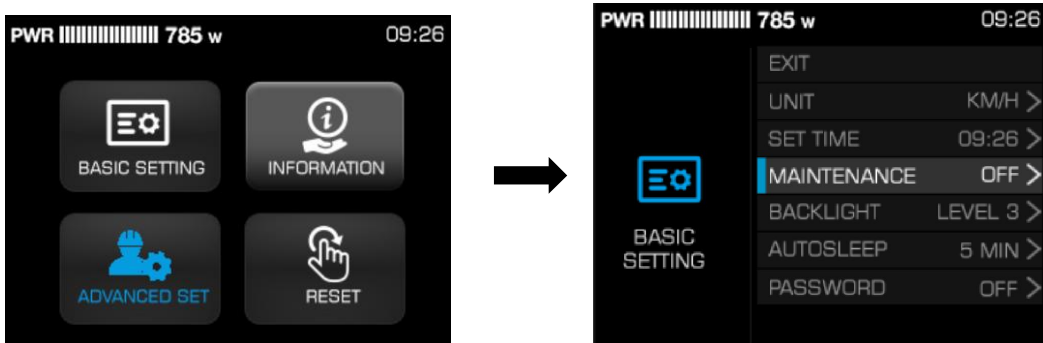
### Bluetooth connection and information reminding interface

Display supports Bluetooth function, on the premise of matching mobile App. When a Bluetooth connection is established, display will show  symbol.



### 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.



Setting interface level 1 menu page

For more setting operation illustration, please refer to part 7

## 5. Button definition

### 5.1 Button name



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

M button: Long press M button within 10s to enter parameter setting interface

Light-on button: Turn on or off light

### 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

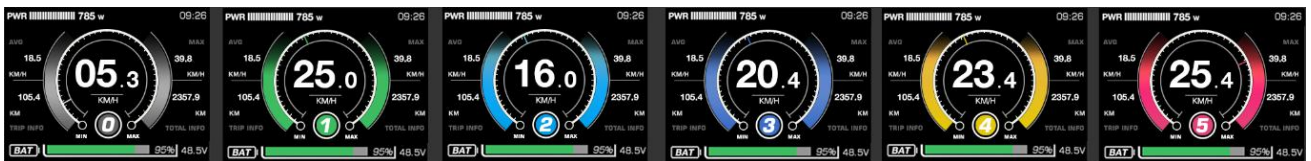
When display is connected to controller, to turn on display, long press  button until boot logo interface appears and shortly enters the basic interface. To turn off, long press  button until display is turned off. If the rider does not perform any operation on the display within set shutdown time, while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




### 6.2 Assist level switch

During normal working state, short press  ,  buttons to switch assist level, and change assist mode.

Power assist display modes as shown below:

Digital PAS level: 0-5 levels



Short press  ,  button to switch assist level. Switching level is not cycled, that is, after reaching 5<sup>th</sup> level, Short press  button to return to off level. It's the same when adjusting up.



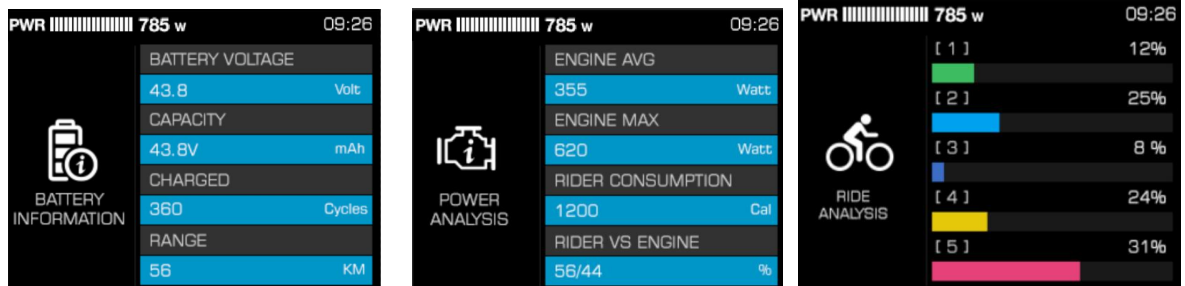
### 6.3 Information switch

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

The switching process of each interface, as shown below:






Basic interface



Function

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## 6.4 Light control function

When loaded with battery and is turned on, short press  button to manually turn on or off bike light. The icon  on the top right corner of the basic interface indicates lights-on state. When light is on, short press  button to turn off light.

When lights 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 is default to appear at ODO 5000km, end user is not allowed to change this default setting.



## 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 press any button to exit walk assist mode, the

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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) :



SOC	Battery level	Description
$80\% \leq \text{SOC}$		Full battery level 5
$60\% \leq \text{SOC} < 80\%$		Level 4
$40\% \leq \text{SOC} < 60\%$		Level 3
$20\% \leq \text{SOC} < 40\%$		Level 2
$10\% \leq \text{SOC} < 20\%$		Level 1
$5\% \leq \text{SOC} < 10\%$		Level 0
$0\% \leq \text{SOC} < 5\%$		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

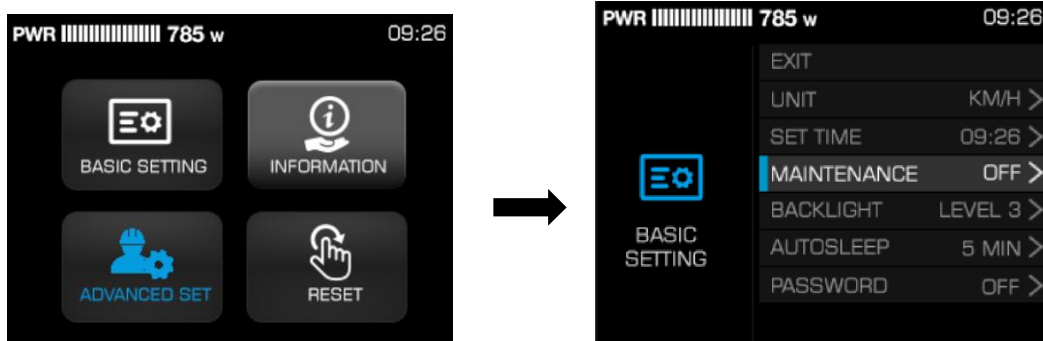


## 7 Setting function

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  to enter setting interface, short press  ,  button to switch between setting interfaces. Under any setting interfaces, short press  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  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:



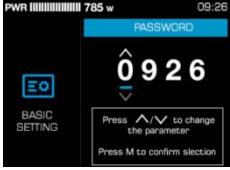



Under any setting interfaces, short press  to enter the next level menu, and long press  button to return to the previous level menu.



First level parameter setting interface, and the description of each parameter interface is as following:

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, 60% Value= LEVEL 2, 80% Value= LEVEL 3, 100%	Default Value= LEVEL 3
Auto shutdown time		Auto sleep	Value=OFF, 5-30 min	Default Value=5min OFF means no auto shutdown
		Password	Value= OFF and	Default



<p>Power on Password setting</p>			<p>ON;  When is ON, user is allowed to set 4-digit password</p>	<p>value: OFF</p>
<p>Display info</p>		<p>Display information</p>	<p>read only</p>	<p>According to communicat ion protocol</p>
<p>Battery info</p>		<p>Battery information</p>	<p>read only</p>	<p>According to communicat ion protocol</p>
<p>Controller info</p>		<p>Controller information</p>	<p>read only</p>	<p>According to communicat ion protocol</p>



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## 8. Advanced setting function




### 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's 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

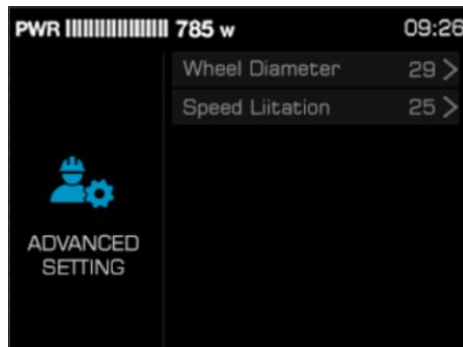
After selecting the advanced setting in the first-level menu, short press  button to enter the login password. Short press  button to select the corresponding password digit in the 4-digit password field. The selected password digits will be highlighted with a white background.

Short press  ,  to edit password value, and short press  button again to confirm the input. The password input interface is as follows:



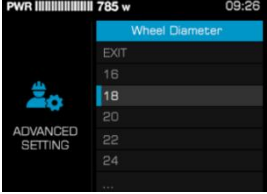

After the password is typed correctly, advanced setting is entered, divided into two-page contents.

Short press  ,  to pick and select.





Advanced setting interface, and the description of each parameter interface is as following:

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



## 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 any of the

function interfaces (not basic interface), long press  button to activate data clearance

window, and short press  ,  button to select accordingly. To remove the

pop-up clearance window, long press  button or remain no operation for 30s.

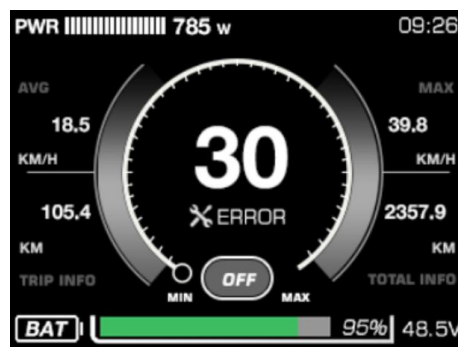


After clearance, the subtotal mileage TRIP is 0, average speed, and max speed is 0. Riding analysis is also 0. ODO information can't be cleaned manually on the display, professional service tools are required.

## 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

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"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

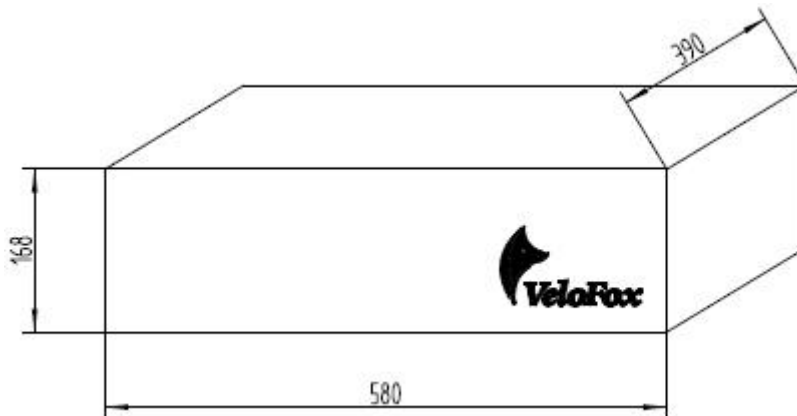
(\* The corresponding error codes of different system protocols are different. If error code appears, please communicate with our sales and technical support team to verify and confirm!)



## 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

- ✧ 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