

DM01 Display


Functionality Introduction

Product Name: Intelligent LCD display

Part Number: DM 01



	Signature	Date
Editor	Leo Liao	2020.03.26
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 杭州威狐智能科技有限公司 Hangzhou VeloFox Intelligent Technology Co., Ltd.	Doc No.	
	Version	1.03

Documents modification history

Version	Editor	Date	Contents
V1.02	Leo Liao	2020.04.26	1. changed the original interface after power-on 2. modified the setting interface, the information indicated 3. added the remark for the RANGE feature 4. modified the definition of the data clean function
V1.03	Leo Liao	2021.02.22	1. Add declaration content 2. Revise description of functions 3. Revise standard outlet definition 4. Other revisions

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		Version	1.03

Declaration

DM01 functional definition is a function definition description of the standard-version DM01 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 DM01 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 DM 01 functional definition, please consult our sales or technical support team.

Our company (VeloFox ®) reserves all the rights to interpret and explain DM01 functional definitions.

Hangzhou Velofox Intelligent Technology Co., Ltd

A. Product introduction	5
1. Product name and model	5
2. Product Introduction	5
3. Range of application	5
4. Appearance and size	5
5. Display coding rules	6
B. Product manual	7
1. Specifications	7
2. Function overview	8
3. Installation	8
4. Interface	9
4.1 Boot interface	9
4.2 Basic interface and operation	9
4.3 Function interface introduction	10
5. Button defination	15
5.1 Button name:	15
5.2 Definition of button operation	15
6. Basic function operation	16
6.1 Turn on/off the display	16
6.2 Assist level switch	16
6.3 Information switch	17
6.4 Light control function	17
6.5 Speed information switch	18
6.6 Walk assist function	18
6.7 Battery power indicate and the assist power output	19
7. Setting function	20
8. Data clearance	23
9. Error information	24
10. Wire defination	25
10.1 Standard wires definition:	25
10.2 Standard conversion wire specifications:	26
C. Package specifications	27
D. Note	27

 Hangzhou VeloFox Intelligent Technology Co., Ltd.	Doc No.	
	Version	1.03

A. Product introduction

1. Product name and model

LCD display for electric power assist bikes

Product model: DM01

2. Product Introduction

- ✧ IMD craft, 2.5D chamfer, 4H extra hard glass screen.
 - ✧ B/W contrast, 1.3-inch VA segment LCD.
 - ✧ Integrated one-piece button, perfect hand feeling.
 - ✧ Excellent outdoor design, IP65 waterproof level.
 - ✧ Waterproof serial port, convenient for maintenance.
- **Following functions are optional, please consult our sales team for more details**
- ✧ Standard USB (Type B) charging port, charging current 800mA.
 - ✧ Bluetooth communication functionality.

3. Range of application

Suitable for electric assist bicycles compliant with EN15194:2017 regulatory standards.

4. Appearance and size

The shell material of DM09 is PC+ABS. And the material of the window is applying high hardness IMD craft, 2.5D chamfer. Adapt to assembled on ϕ 22.2mm handle bar.



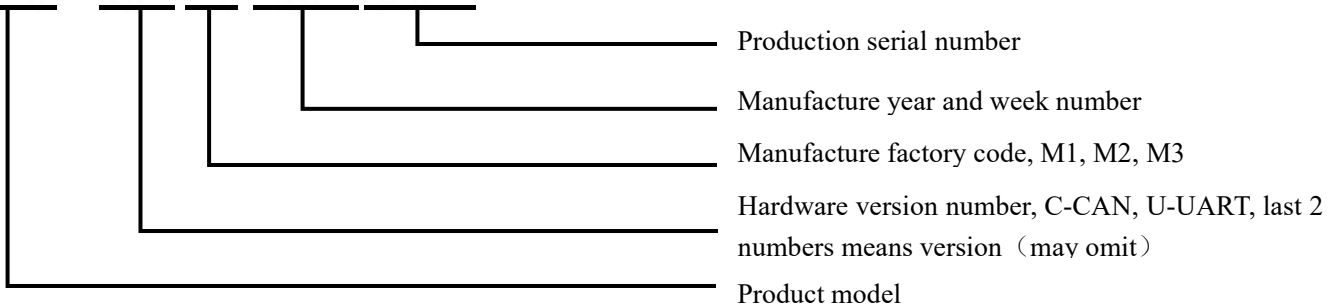
5. Display coding rules



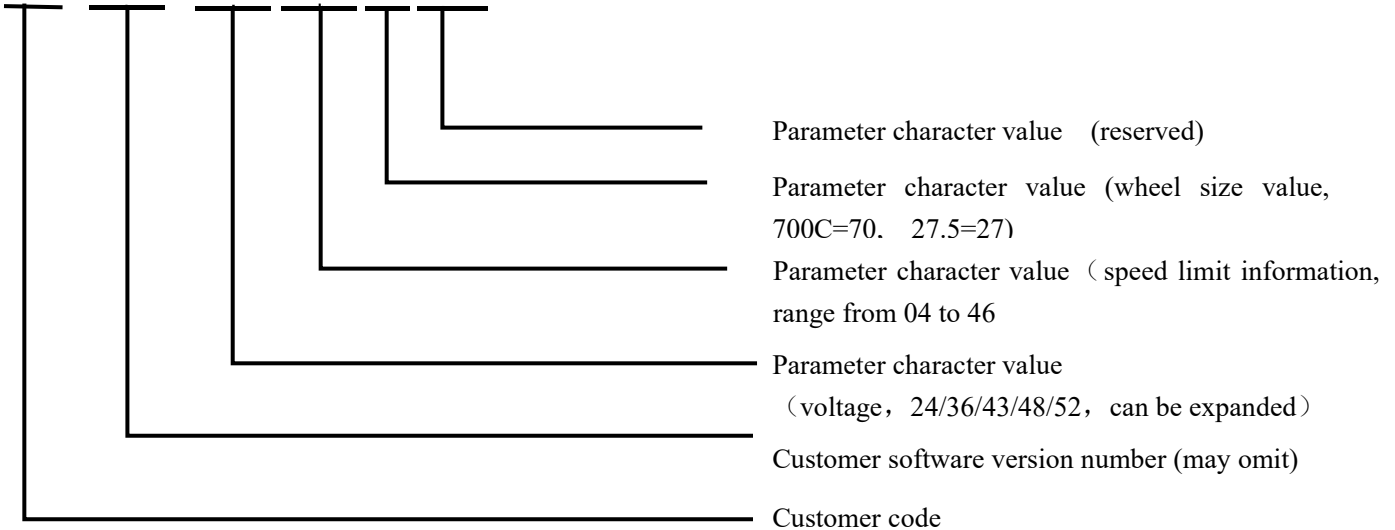
DM01-C01M020340001
A08.01-36V2570XX

As shown as above picture,

DM01-C01M020340001




A08.01-36V2570XX



B. Product manual

1. Specifications

- ① Power supply: DC 24V/36V/48V
- ② Rated current: 12mA
- ③ Shutdown leakage current : <1uA
- ④ Screen specification:1.3" VA segment screen
- ⑤ Communication method: UART/ CAN-BUS 2 modes
- ⑥ Operating temperature: -20° C ~ 60° C
- ⑦ Storage temperature:-30° C ~ 80° C
- ⑧ Waterproof level: IP65

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	Version	1.03

2. Function overview

- ① Five buttons, separated walk assist button, good hand-feeling
- ② 6 power assist level
- ③ Units: Metric/Imperial switchable
- ④ Speed display: Real-time speed,maximum speed,average speed
- ⑤ Battery indicator with percentage display.
- ⑥ Endurance mileage indicate
- ⑦ Headlight on/off status indication and control
- ⑧ Mileage indicate: Trip mileage (TRIP), total mileage (ODO)
- ⑨ Walk assist function
- ⑩ Parameter setting function
- ⑪ Error code indicate

*** Charge function and Bluetooth are optional**

3. Installation

- ① Open the display lock clip, set the display in the left handlebar (standard handlebar size: Φ 22.2).Adjust to a position easy to operate tighten and fix the screw by M3 hexagon. Tightening torque: 0.8N.m.

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

- ② display connected with controller by 5 pin connector as required drawings.

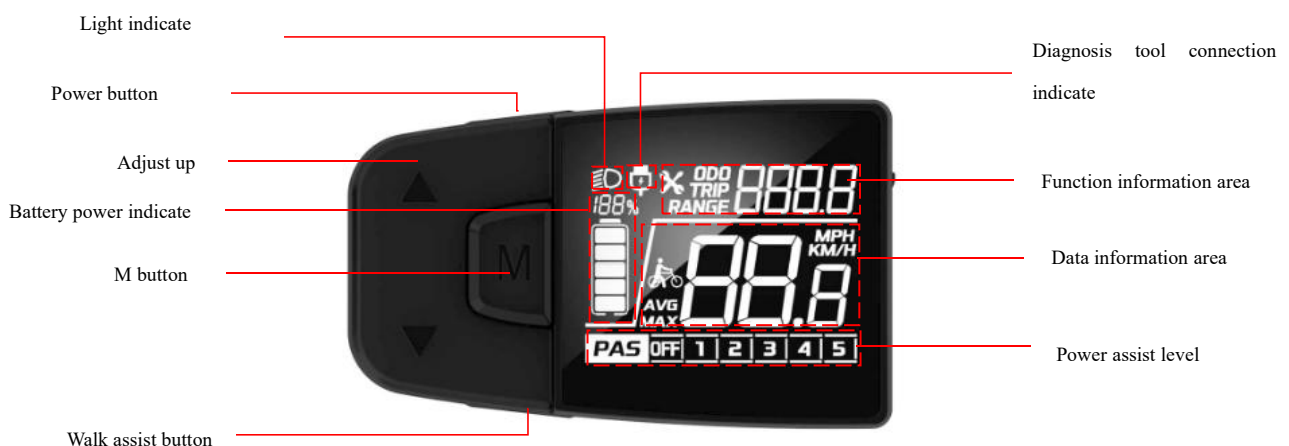
4. Interface

4.1 Boot interface



Boot interface, after turn on the display for 2 seconds, all segments of the display are on. After communication build, display gets the assist level information, TRIP/ODO information and so on. Show the real-time information from controller.(information can be customized).

4.2 Basic interface and operation



① Power indicate: The display establishes communication with the battery BMS to retrieve battery level information, which is then shown according to the protocol message. The battery level information is displayed both as a battery bar indicator and a remaining percentage indicator.

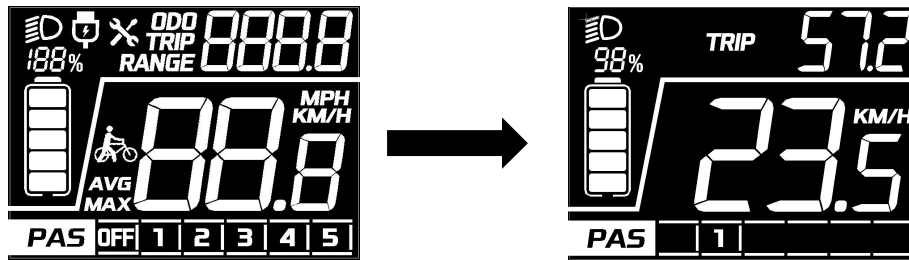
- ② Current speed and unit: Displays the current riding speed. The default unit is KM/H, and the speed is shown with one decimal place.
- ③ Trip and ODO: The unit is defaulted to KM. Trip mileage is displayed with one decimal place, with a maximum value of 9999. Total mileage has a maximum value of 9999.
- ④ Error information: show error icon ✖, and show the error code accordingly in the function area.
- ⑤ 6 power assist levels: including an OFF mode. The OFF mode indicates no assist output.



- ⑥ light indicate: When external headlights are present and turned on, the display will show the headlight indicator icon ☹

4.3 Function interface introduction

Boot interface and basic function interface



After powering on, the display shows the full-screen interface for 2 seconds. Once communication is established and information is successfully retrieved, the display will switch to the normal riding display interface.

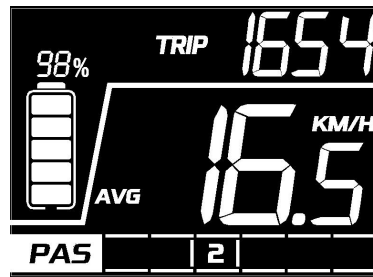
The display reads and shows the gear information stored in the controller, retrieves and displays information from the battery BMS, and continuously shows other information in real time.

Other function interface

Trip indicate

The top-left corner displays the icon **TRIP**. The trip mileage is shown in the function display area using 4 **8**, with one decimal place retained. After exceeding 999.9 KM, decimal places will not be displayed. The maximum value is 9999 KM, and values exceeding this will be shown as the actual TRIP mileage modulo 10000.

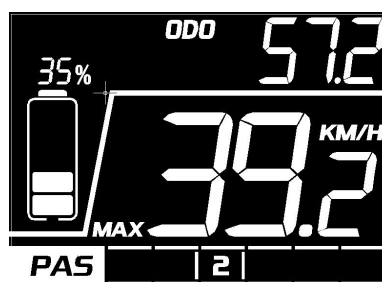
Trip mileage does not display units. The actual unit displayed depends on whether the system is set to metric or imperial units.



ODO indicate

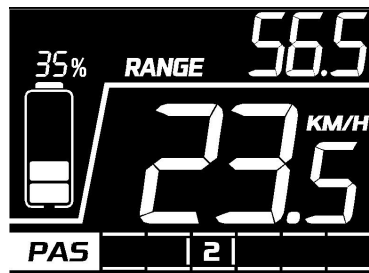
The top-left corner displays the icon **ODO**. The total mileage is shown in the function display area using 4 **8**. After exceeding 999.9 KM, decimal places will not be displayed. The maximum value is 9999 KM, and values exceeding this will be shown as the actual ODO mileage modulo 10000.

The ODO value needs to be reset to zero using a service tool. Total mileage does not display units. The actual unit displayed depends on whether the system is set to metric or imperial units.



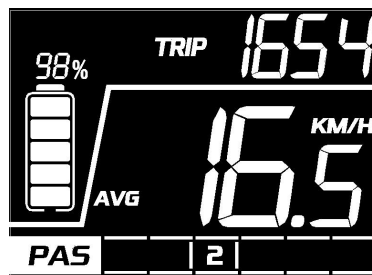
Endurance mileage indicate

The display reads the remaining range information provided by the controller and shows it. The top-left corner displays the **RANGE** icon, and the specific mileage value is shown in the function display area using 4 **8**. The value is displayed with one decimal place, with a maximum value of 999.9 KM.



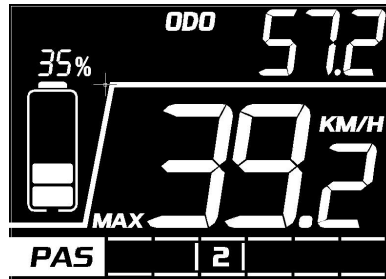
Average speed indicate

Displays the average riding speed within the current trip mileage segment, with a maximum value of 99.9 KM/H.



Max speed indicate

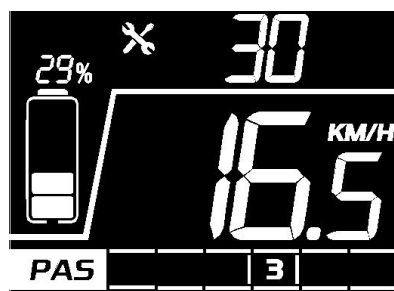
Displays the maximum riding speed within the current trip mileage segment, with a maximum value of 99.9 KM/H.



Error code indicate

The display shows a fault maintenance ✖ icon in the top-left corner based on the received message information, and displays the specific fault code in the function display area, flashing at 1 Hz. When a fault code appears, the display will not show the ODO, TRIP, or RANGE symbols, but other functions will continue to display normally. The motor will respond according to the corresponding fault information

Interface shown as below:

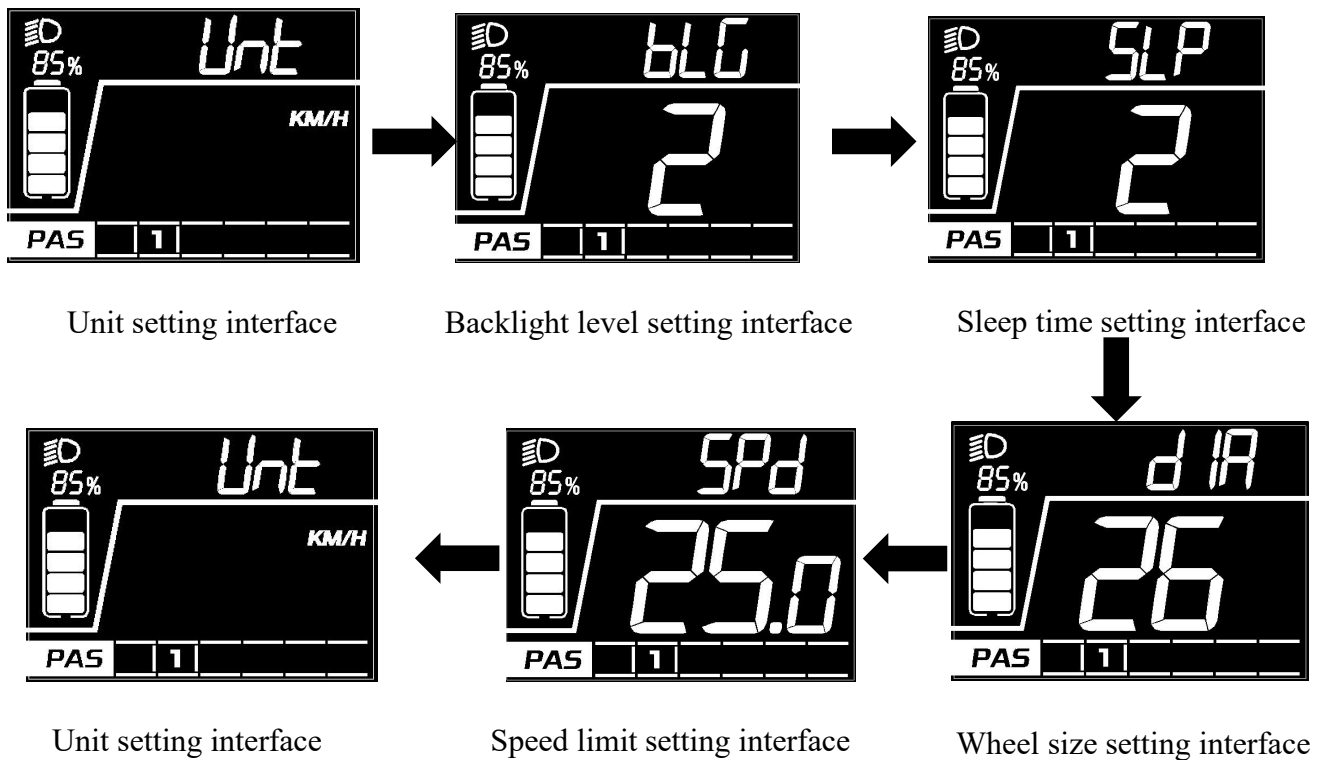


Setting interface

Within 10 seconds turned on the display, long press M button to enter setting interface. Short

press \leftarrow to switch items loop. Short presses \wedge 、 \vee will cycle through the settings menus. In any settings menu, short pressing the M button enters parameter edit mode, causing the corresponding parameter to flash at a frequency of 1 Hz. At this point, short presses \wedge 、 \vee buttons will modify the parameter. Press and hold the M button to exit edit mode, stopping the flashing. Press and hold the M button again to exit the settings menu and return to the main screen.

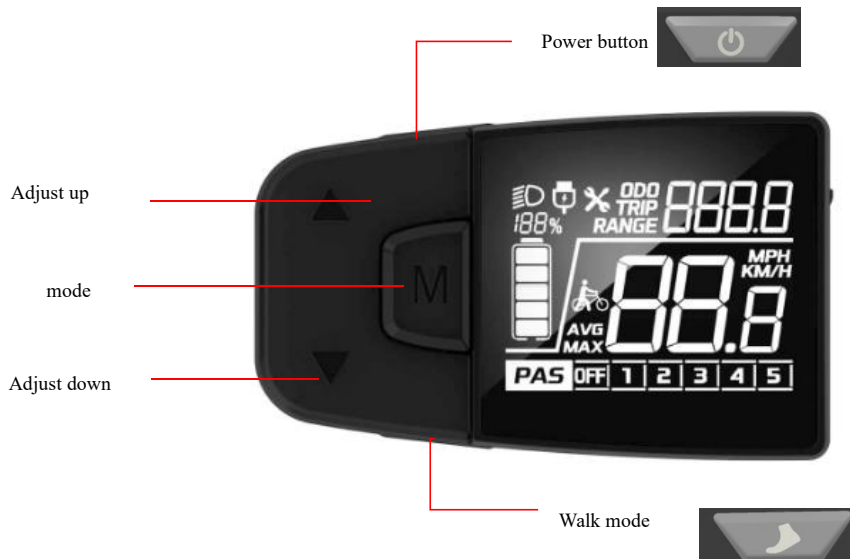
Short presses \vee will cycle through the settings and information read modes in a specific sequence. Short presses \wedge will sequentially return to each settings menu.



The interface of the settings above check part 7 for the operation for the setting function operation.

5. Button definition

5.1 Button name:



Power button: Turn on/off the display

Adjust button: adjust the assist power level while riding and setting function when setting operation.

Mode button: function interface switch and enter to parameter setting interface.

Walk mode button: activate the walk assist function

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

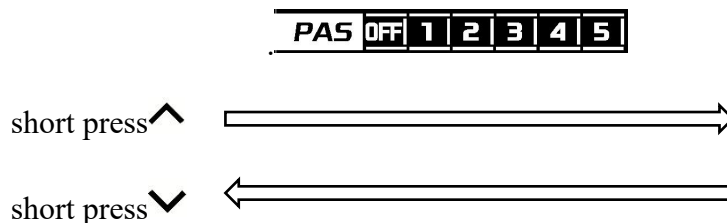
6.1 Turn on/off the display

With the display and controller connected normally, press and hold the button while the display is off to show the full-screen startup interface. The display will then transition to the basic interface and begin normal operation. While the display is on, pressing and holding the button will turn it off. If no operation is performed on the display within the set shutdown time, and the speed is 0 and the bus current is less than 1A, the display will automatically shut down within the set shutdown time.

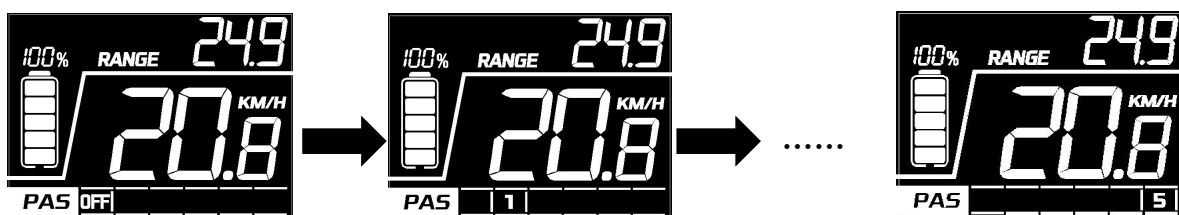
6.2 Assist level switch

Short press 、 button to switch assist level, and change assist mode, there are 6 levels.

PAS icon will show still. 1-5 levels, and off level.



the assist level will not loop. That means when the level gets to level 5, it will need to press button to get to OFF level. It' s the same when adjust up.



6.3 Information switch

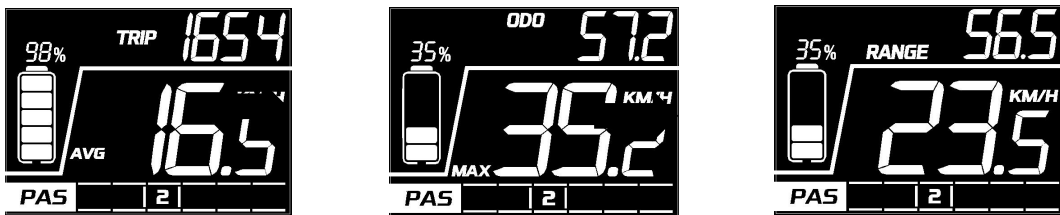
In the powered-on state, a short press of the M button will cycle through TRIP,ODO,RANGE. displaying these function details in a loop:

Trip Mileage (TRIP/AVG) -> Total Mileage (ODO/MAX) -> Remaining Range (RANGE).



When the speed is greater than 0 and the value display area does not show the speed, and if the user does not press the M button for more than 5 seconds, the display will automatically return to the speed display mode.

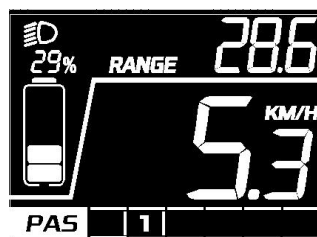
***If the system does not support BMS communication, the display will not be able to obtain accurate RANGE information, and the RANGE item will not be displayed.**

The mode switch interface is as follows:



6.4 Light control function

When the vehicle is powered on and the battery is installed, press and hold the  button to turn on the front light. The top-left corner of the display will show the headlight icon to indicate that the light is on, and the display will function normally. Press and hold the  button again to turn off the front light.






 Hangzhou VeloFox Intelligent Technology Co., Ltd.	杭州威狐智能科技有限公司	Doc No.	
		Version	1.03

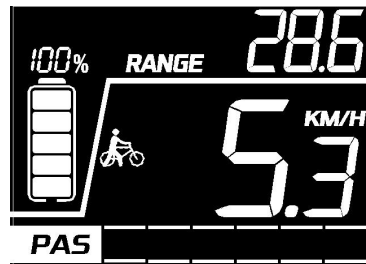
6.5 Speed information switch

In basic function interface, display show the real-time speed, average speed, max speed and mileage information switch. Check 6.3 for the information switches.

6.6 Walk assist function

When speed is 0, long press  button to enter walk assist mode, motor output according to the setting speed, display show the walk assist icon and the real-time speed. PAS level show as follow . Release  button or any other button pressed system will get out of walk assist mode, motor turns off, display get back to the basic function interface.








The interface show as below:



6.7 Battery power indicate and the assist power output

Battery level information includes both a battery bar indicator and a remaining percentage indicator. When the battery level is normal, the display shows the battery level in 1-5 bars based on the battery capacity. If the battery capacity drops below 5% or the battery voltage falls below the under voltage threshold, the display will indicate under voltage with the battery bar showing 0 bars. The battery outline will flash at 1 Hz, the motor will provide no assist, gear switching will be disabled, and the adjustment buttons will be non-functional, with the display showing the **OFF** mode. To exit under voltage mode, the system must be power-cycled, with the voltage exceeding the under voltage threshold and the battery capacity being $\geq 5\%$.


The battery capacity percentage and battery level display icons are as follows (percentage must be provided by 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

● Remark about battery indicate:

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 shown

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		Version	1.03

3. Range information show hypen - - - -



4. When the voltage is lower than the undervoltage

(considering the current influence the voltage, converted to the voltage value at 0 current)

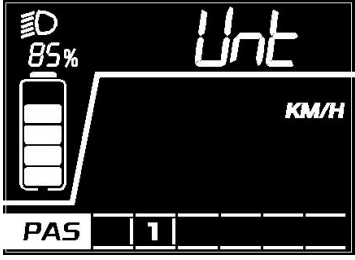
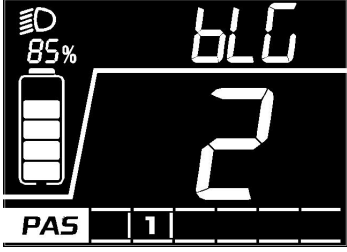
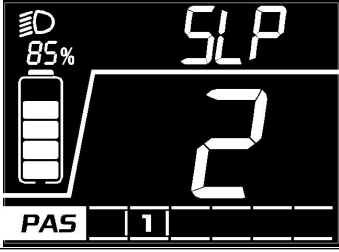
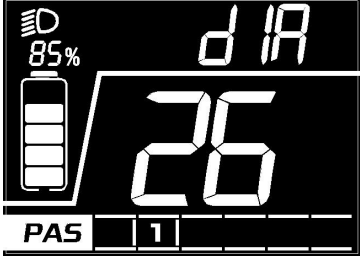
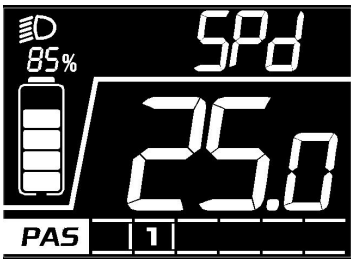
Before establishing communication with the battery on startup, the percentage will not be displayed. The battery bar will show full bars and flash at 2 Hz. After reading the battery level, the flashing will stop and the percentage will be displayed. If communication is not established within 5 seconds after startup, the flashing will stop and the percentage will not be displayed.

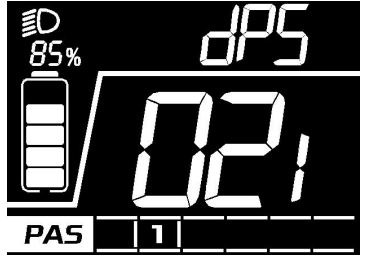
7. Setting function

Display provides specific parameter setting function. 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 discrepancy.

10 seconds within display turned on, long press M button, display enter the setting interface. Short press M to confirm the choosing of items. When the item picked, the current selected parameter blink at 1Hz. In any interface of the setting mode, short press ,  to select the parameter, short press M to confirm the parameter. In any interface of the setting mode, long press M to save the parameter and get back to the up level interface. In any grade of the setting mode, short press M button to enter each setting interface.





The first setting interface is the system unit parameter setting:

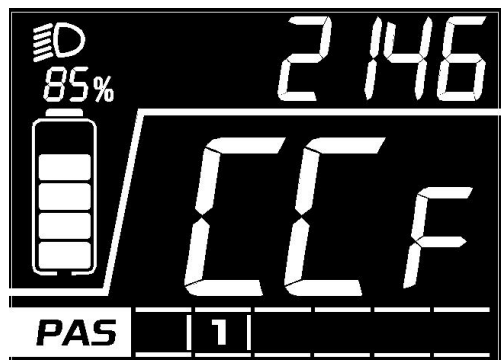
Setting item	Interface	Description	Setting data	Remark
Unit setting		UNT=Unit	Value=KM/H MPH	Default Value=KM/H KM/H—Metric MPH—Imperial
Backlight level setting		bLG=Back light	Value= 1, back light level 60% Value= 2 back light level 80% Value= 3 back light level 100%	Default Value= 1
Auto shutdown time		SLP= Auto sleep	Value=0-30 min	Step=5 min 0 means display will not auto shutdown
Wheel size setting		dIA=Wheel diameter	Value= 12, 14, 16, 20, 24, 26, 27, 27.5, 28, 700C, 29, CCF (Default unit, inch)	Default value=26; *when value=CCF, customer can enter wheel circumference value (mm). Check detail information below.
Speed limitation setting		SPd=Speed limitation	Value=5-46, step value is 1, unit is km/h .	Default: 25

Display Software version		DPS=display software version	Value= fixed value	Read only
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* Note : wheel size setting will need the support information from controller’s communication protocol.

When wheel size setting choose CCF value, allow user to define the wheel’ s Circumference value of the system. (Four digit length value, unit: mm)


Long press M to select CCF, data area blink **CCF** icon, at the same time function area , The thousandths field blink, short press 、 button to switch parameter, short press M to switch to next data, long press M to confirm the data of each digit. During the switch, the 4 digit on the screen’ s right up corner  blink from the thousandths field at 2Hz. After wheel data entered and confirmed, long press M to exit the setting and back to the up level interface. The data will be recorded to the controller. If user selected CCF wheel size setting, next time enter the wheel size setting, it will show CCF interface directly.



Reference table for the corresponding circumference value of common wheel diameter:

					
ETRTO		kmh mph	ETRTO		kmh mph
47-305	16x1.75x2	1272	32-630	27x1 1/4	2199
47-406	20x1.75x2	1590	28-630	27x1 1/4 Fifty	2174
37-540	24x1 3/8 A	1948	40-622	28x1.5	2224
47-507	24x1.75x2	1907	47-622	28x1.75	2268
23-571	26x1	1973	40-635	28x1 1/2	2265
40-559	26x1.5	2026	37-622	28x1 3/8x1 5/8	2205
44-559	26x1.6	2051	18-622	700x18C	2102
47-559	26x1.75x2	2070	20-622	700x20C	2114
50-559	26x1.9	2089	23-622	700x23C	2133
54-559	26x2.00	2114	25-622	700x25C	2146
57-559	26x2.125	2133	28-622	700x28C	2149
37-590	26x1 3/8	2105	32-622	700x32C	2174
37-584	26x1 3/8x1 1/2	2086	37-622	700x35C	2205
20-571	26x3/4	1954	40-622	700x40C	2224
	14x1.75	1046		12x1.75	957

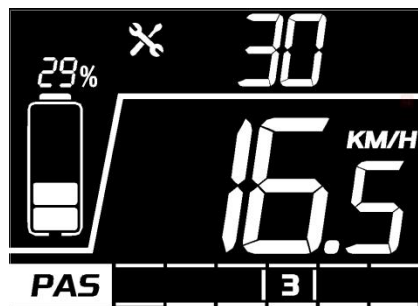
8. Data clearance

When display is on and show TRIP interface, long press M button to clear the TRIP information, after long-press M the icon  blinked in 1Hz, if you short press M during 30s, the data be cleaned. Without any operation, it will go back to normal. After clearance, the trip value is 0, average speed and max speed is 0. ODO information can't be clearance on the display manually, need to be clear by service tools.

9. Error information

Display can warn the bike faults and show error codes on the interface when faults are detected. Detailed error code show on the function area and blink at 1Hz. When error code shown, display will not show ODO, TRIP, RANGE icon, other functions show normally. User press M button in error status, display can show ODO,TRIP,RANGE icon and data. After 5 seconds, interface gets back to error interface.

Interface show as below:



Ba Fang protocol' s error code information table (the error codes of different system protocols are different)

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

(* Different communication protocols are different in error code system. If an error code appears, please communicate with our sales and technical support team to verify and confirm.!)

10. Wire definition

10.1 Standard wires definition:

Our company has defined the standard wiring for the display according to typical applications. The standard wiring requires matching conversion harnesses. We have specific standards for the length and interface of these conversion harnesses. If these standards cannot be met, a custom adapter cable will need to be made. The wiring status of the standard sample is shown in the diagram below:

*All displays products are open to harness and connector customization.

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

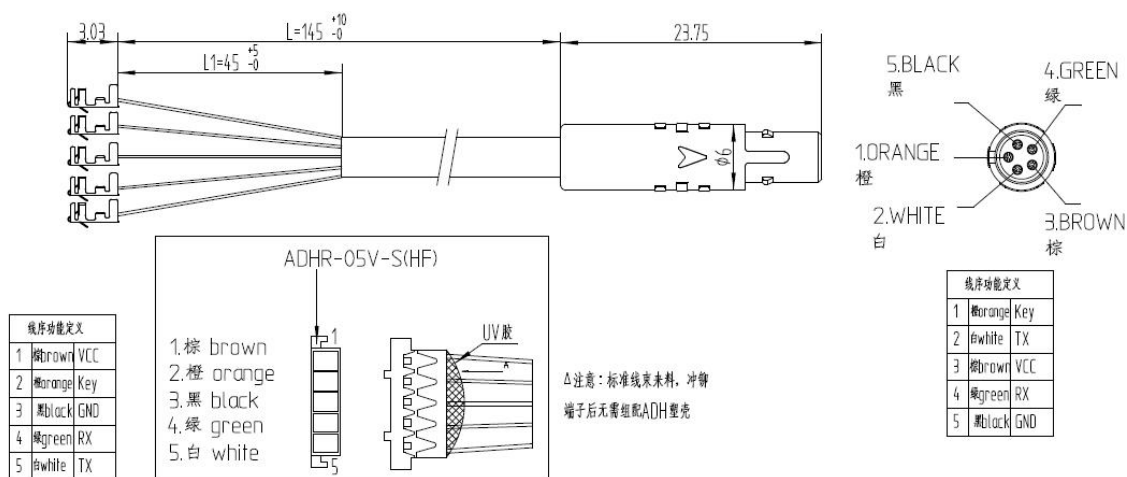
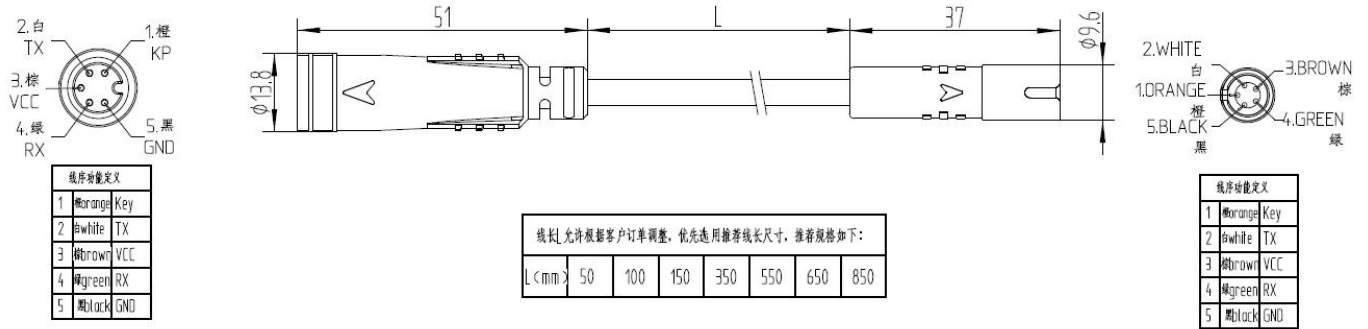


Table 1 Standard wire definition

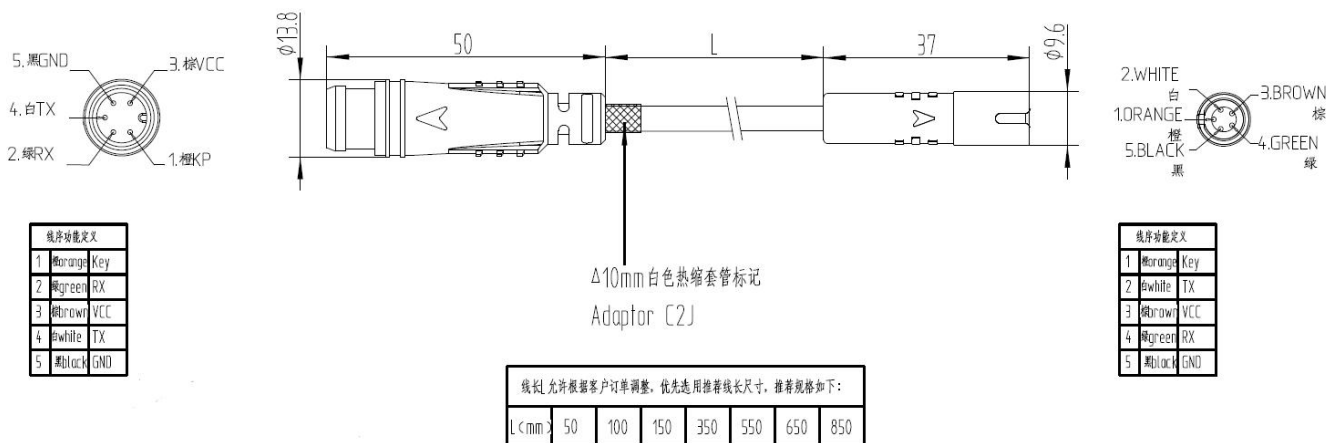
No.	Color	Function
1	Orange(KP)	Power lock control wire
2	White(TX)	Data transmission wire of display
3	Brown(VCC)	Power wire of display
4	Green(RX)	Data receiving wire of display
5	Black(GND)	GND of display
6	reserve	reserve

10.2 Standard conversion wire specifications:

Adaptor-C2H:



Adaptor-C2J:

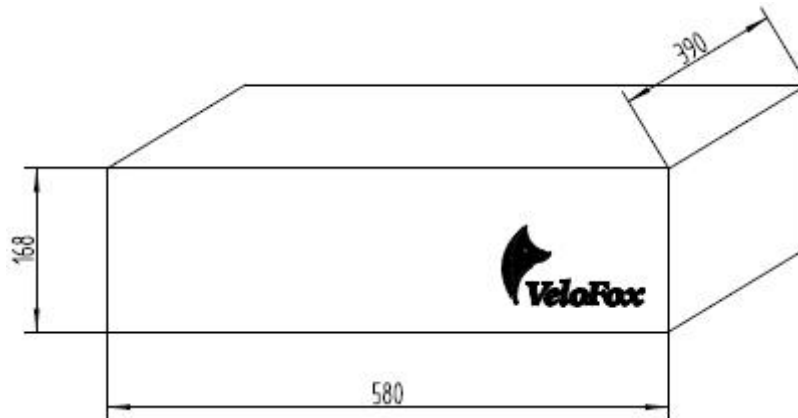


 杭州威狐智能科技有限公司 Hangzhou VeloFox Intelligent Technology Co., Ltd.	Doc No.	
	Version	1.03

C. Package specifications

Standard delivery, in a 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.