electric bike outfitters

KT-LCD3 User Manual

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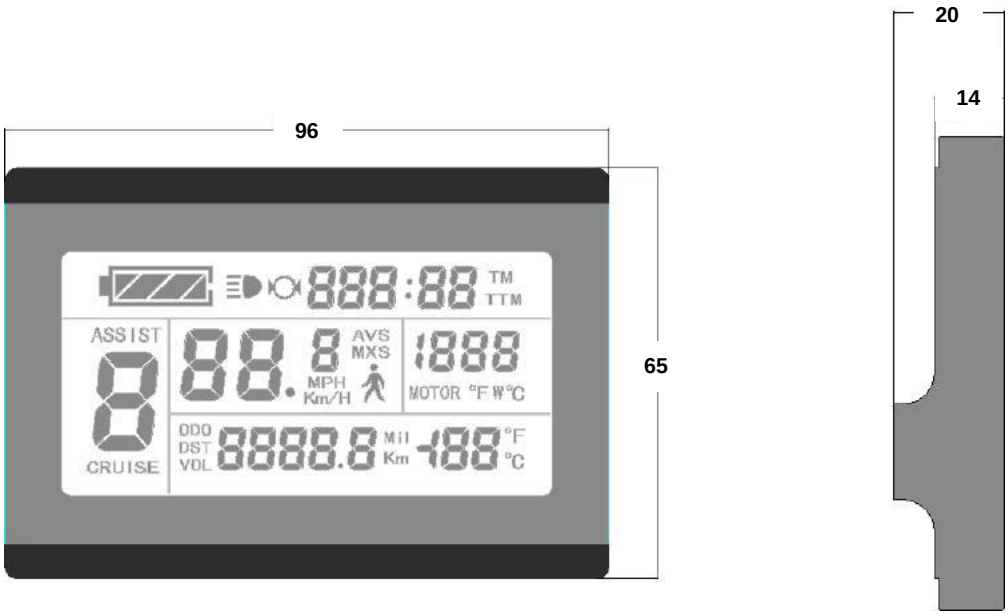
PREFACE

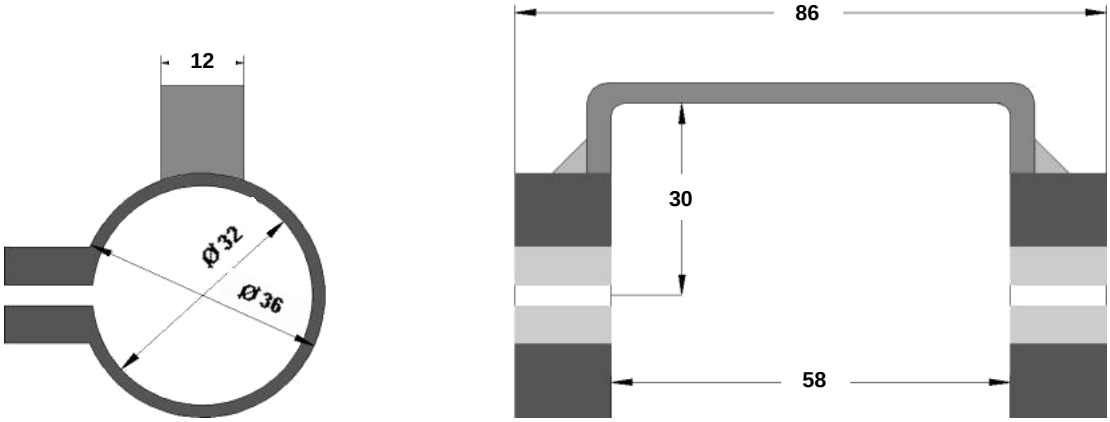
This manual aims to help the user understand and familiarize themselves with the KT-LCD3 functions, operation, setting the e-bike Parameters, how to achieve the best match of the e-bike components to improve performance of the electric bike system. The manual covers installation, operation, parameter setting of the LCD and how to use it properly, which help user setup the functionality of the electric bike system.

OUTLOOK AND SIZE

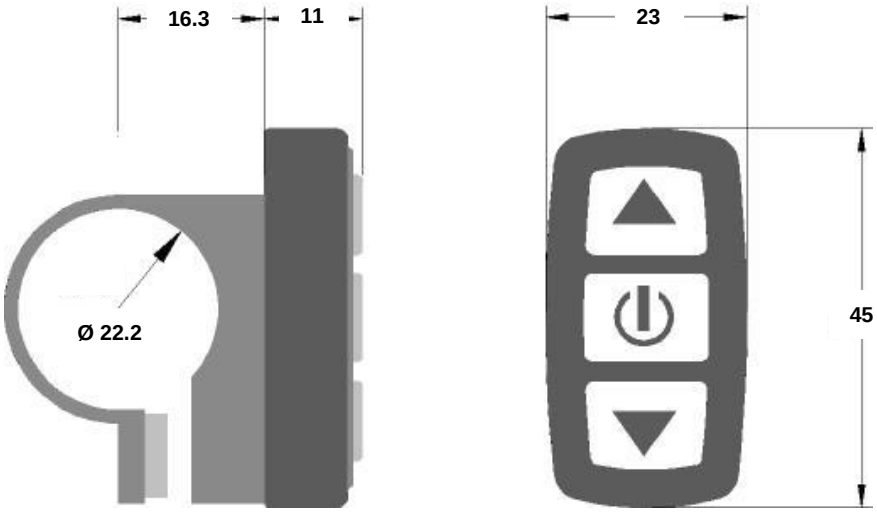
LCD Dimension (mm)



Dual Bracket Mounting Dimension (mm)



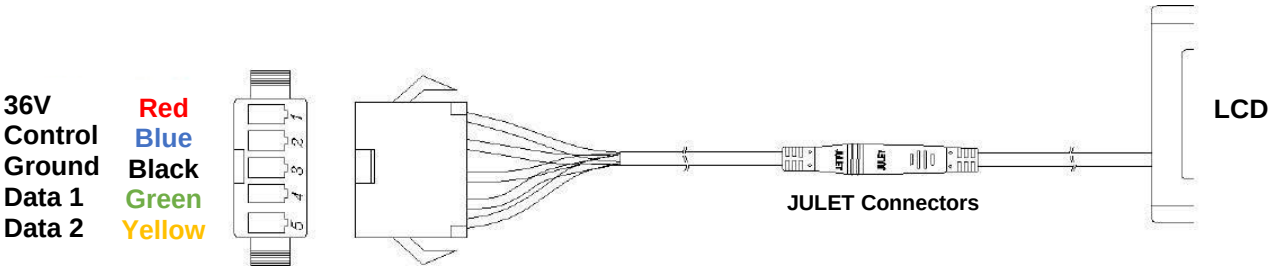
Button Control Box Dimensions (mm)

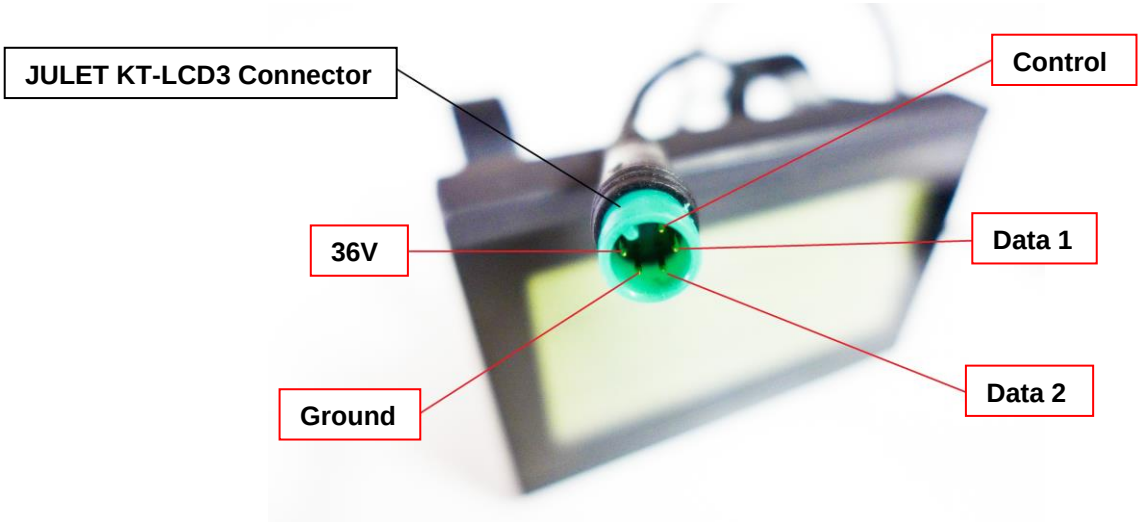


Main Material and Color

The KT-LCD3 and button control box are primarily constructed of polycarbonates (PC) and are of a dark gray or black color.

Wiring Schematic

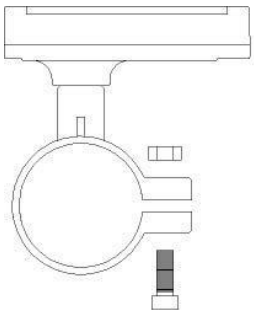




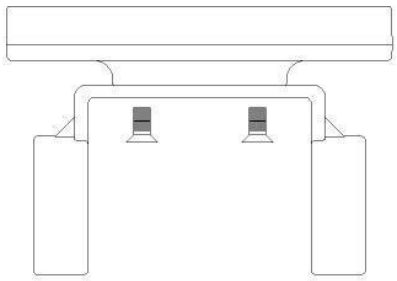
INSTALLATION INSTRUCTION

Using the appropriate methods and fixtures, mount the LCD screen and button box onto the handle bar to the rider's desires. Refer to the following images below for installation on specific handle bar diameters. While the e-bike is off, connect the necessary wiring and check to make sure all connections are firmly attached. Finally, remove the protection film from the display.

Ø 31.8 Handlebar Diameter Install



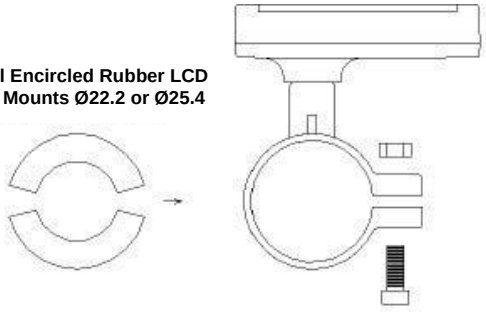
LCD and Bracket Side View



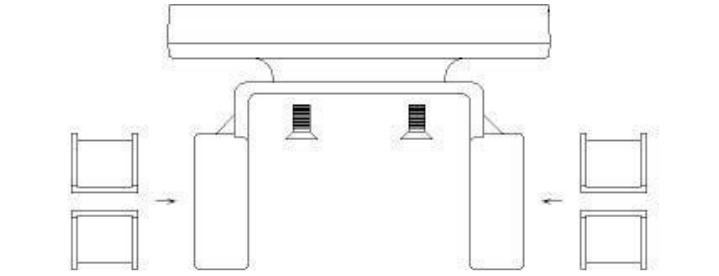
LCD and Bracket View

Ø 22.2 Handlebar Diameter Install

Optional Encircled Rubber LCD Bracket Mounts Ø22.2 or Ø25.4

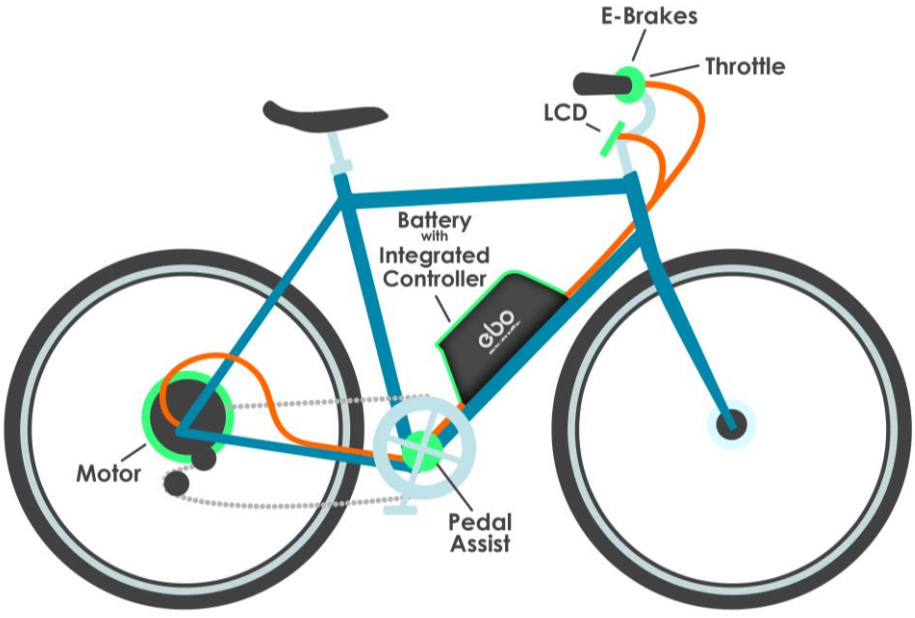


LCD and Bracket Side View



LCD and Bracket View

Installed KT-LCD3

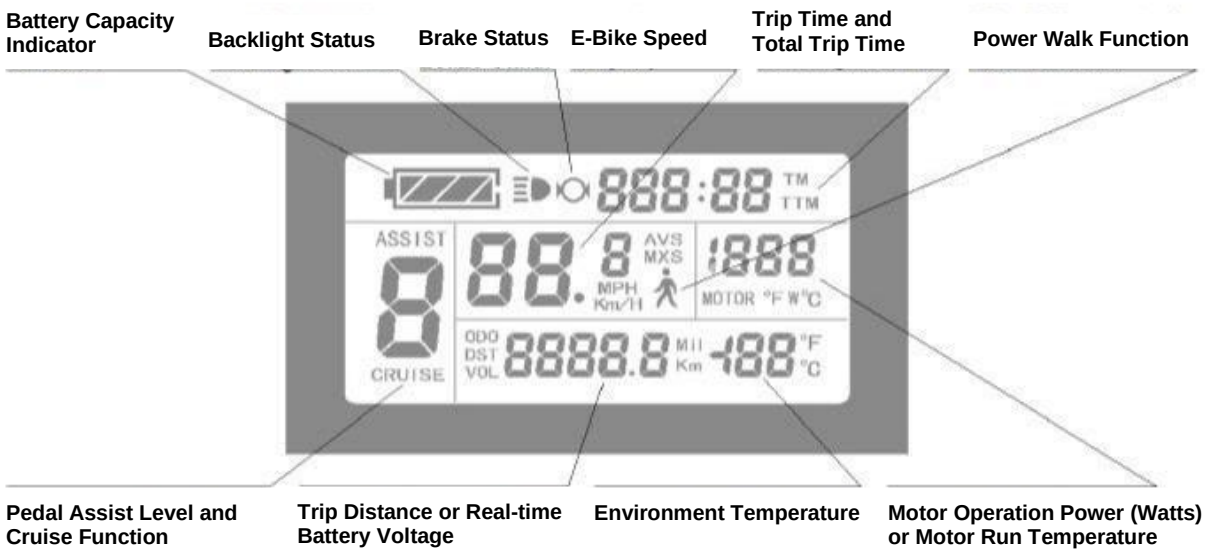


FUNCTION OVERVIEW

KT-LCD3 provides a variety of functions such as electric bike controls and electric bike status digitally displayed to meet the trip demands.

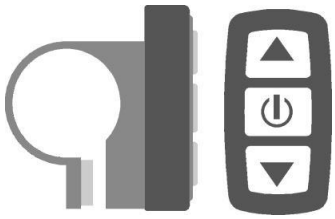
- Trip time display (with displays of a single trip time (**TM**) and total trip time (**TTM)**);
- Trip speed display (with displays of real-time speed (Km/H or MPH) and a single maximum speed (**MXS**) and a single average speed **(AVS**));
- Trip distance display (with displays of a single trip distance (**DST)** and total trip distance (**ODO**));
- Functions of throttle;
- Functions of pedal assist system;
- Pedal Assist Level (**ASSIST**);
- 6Km/H power walk ( ) function;
- Cruise function (**CRUISE**);
- Battery capacity indicator ( );
- Real-time battery voltage (**VOL**) display;
- Motor power and temperature (**MOTOR**) display;
- Brake display ( );
- Turn on backlighting and lights ( );
- Environment temperature (**°C or °F)** display;
- Data clearing;
- Fault code display;
- User Parameter setting
- 24V, 36V, 48V supply voltage can automatic identification and be compatible

DISPLAY CONTENT



BUTTON DEFINITION

KT-LCD3 is designed with the display in the center of the handlebars and electric bike control buttons next to the left-hand grip of the handlebars for ease and safety.
There are three buttons on the operating panel of the box, which are icons of button (UP), button (DOWN) and button (POWER).



Button Control Box and Operating Panel

BASIC OPERATION

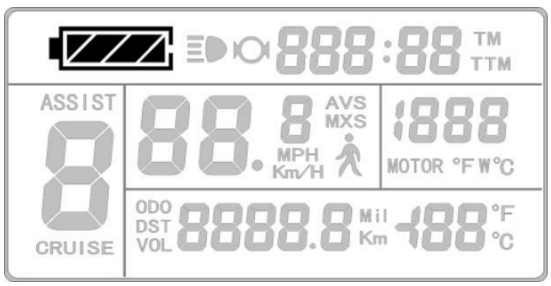
On/Off

To turn on or off, hold down button for ***2 seconds***. System will automatically shut down when stationary and not in use for ***five minutes***. *Note: System requires PAS or throttle in use for a constant of 20 – 25 seconds to activate*. When powered off, the power consumption of the LCD and controller is zero.

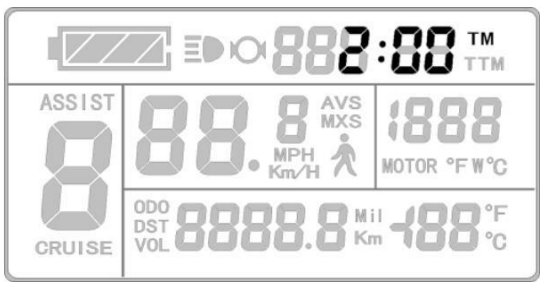
Display Interface

Display 1: The LCD is configured to enter this display on start-up.

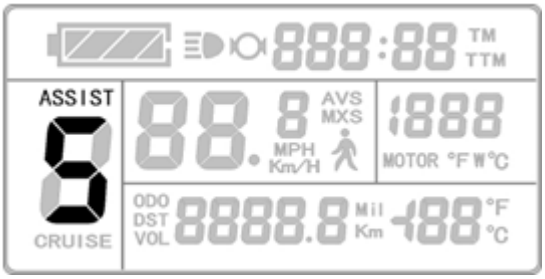
The following are shown on display 1.



Battery Capacity Indicator



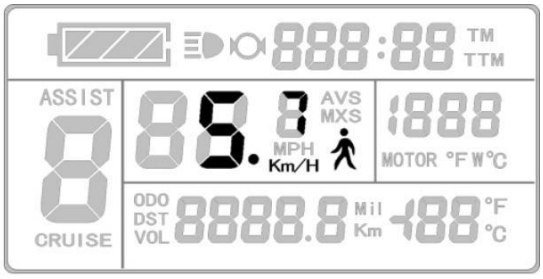
Single Trip Time (TM)



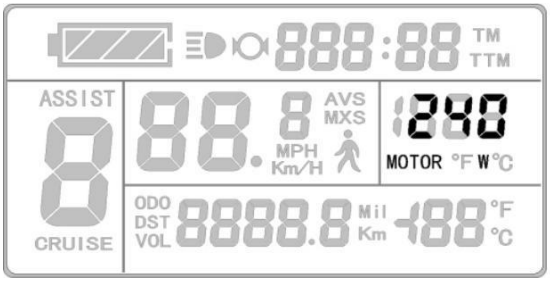
Pedal Assist Levels

Real-Time Trip Speed (Km/H)

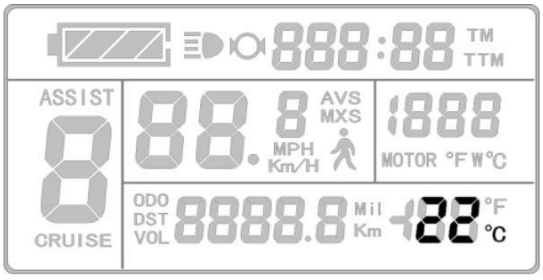
Single Trip Distance (DST)



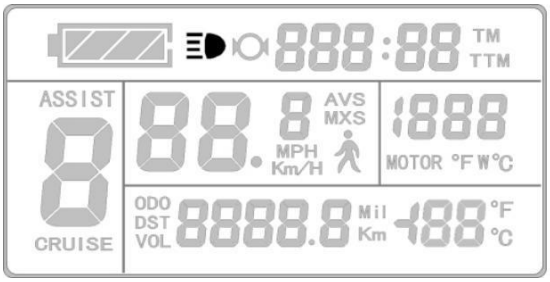
6Km/H Walk Function



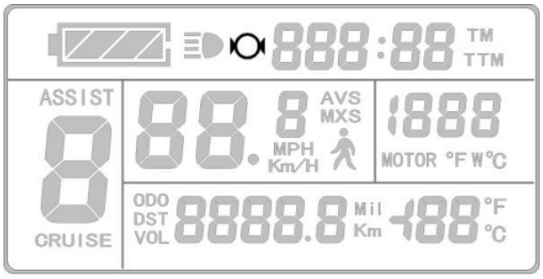
Motor Operation Power



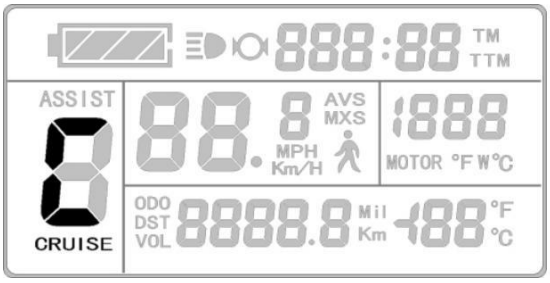
Environment Temperature



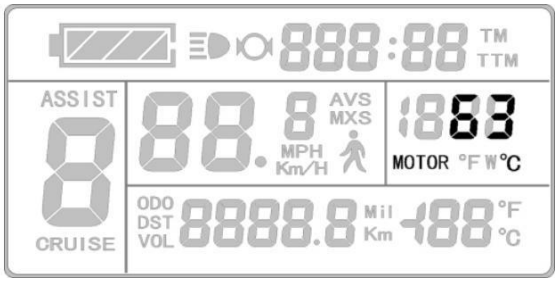
Backlight



Brake Status



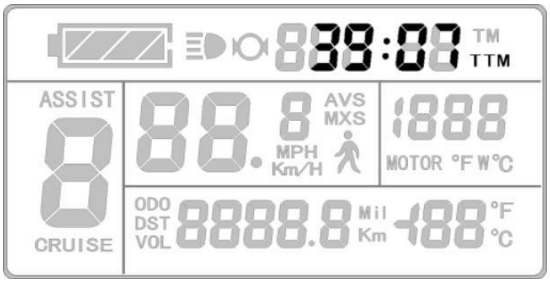
Cruise Function (CRUISE)



Motor Running Temperature

Display 2: To enter display 2, press the button while in display 1. The interface will display as shown below.

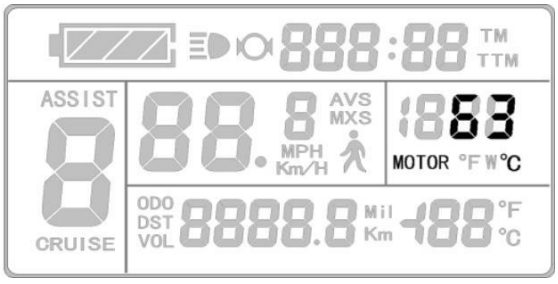
Display 2



Total Trip Time (TTM)

Total Trip Distance (ODO)

Single Average Speed (AVS)



Motor Operating Temperature

Once the e-bike is in riding mode, after five seconds display 2 automatically reverts to display 1. The original motor power is replaced by the motor running temperature as shown below. To return to motor output, cycle through the displays back to display 1.

Display 3: To enter display 3, press the button while in display 2. The interface will display as shown below.

Display 3

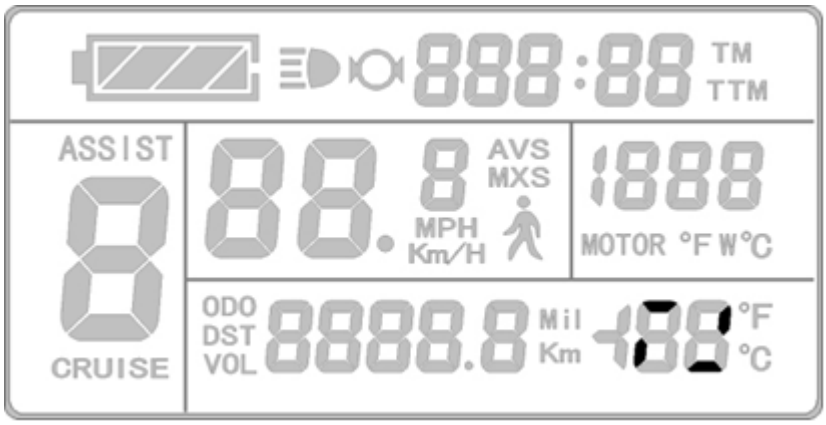
Single Maximum Speed (MXS)

Real-Time Voltage (VOL)

Once the e-bike is in riding mode, after twenty seconds the single maximum speed will return to real-time speed (Km/H) as shown below.

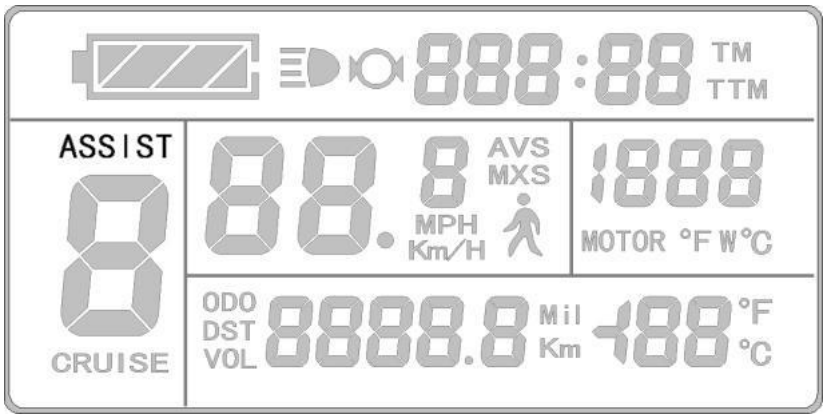
To return to display 1, press button.

Display of Powered Motor: When motor is powered, the LCD will display and animate the following interface to indicate the motor is drawing power. This will only last a duration of ***5 - 20 seconds*** before reverting to display 1. The interface will appear as follows.



Display of Powered Motor

Display of Power-Assist: When motor is operating under power-assistance, the display interface flashes the “ASSIST” sign. The indicator will cease after ***5 - 20 seconds***.



Display of Power-Assist

Battery Capacity Indicator

The KT-LCD3 can identify 24V, 36V, 48V battery capacities when used with supporting controllers. When the battery capacity is over 70%, four bars from the battery indicator will be displayed. As the battery capacities drop, the bars will change accordingly. Once the power capacity is less than 15%, the battery indicator will be empty and show zero bars. If the power display frame flashes, it is due to voltage shortage where the controller will power off.

Pedal Assist System (PAS)

Press button or button to adjust the pedal assist level (ratio), changing the motor power output. Range of pedal assist is between 1 and 5 (this can also be configured according to the rider’s requirements), where one provides the lowest power and five provides the highest. When the PAS level is set to zero, the pedal assist function is off.

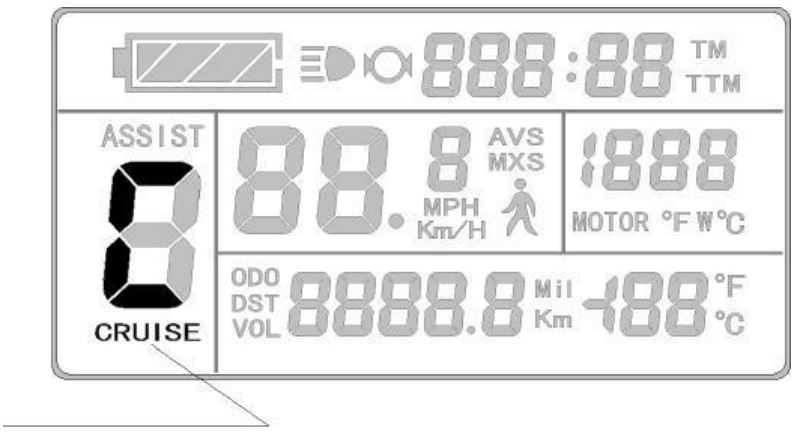
Power Walk Function

Users can use power walk function for assistances while walking alongside the e-bike or riding in crowds. Hold button and the motor will provide power until e-bike reaches 6 Km/H. The LCD assists

function icon will flash indicating the function is active. By releasing the button, the function will be deactivated.

Cruise Function

When the e-bike is traveling above 7Km/H, hold button for ***3 seconds*** to set the cruise function. The LCD will display "CRUISE" and "C" to indicate that the cruise function has been activated (as seen in the figure below). Brake or hold any button to deactivate cruise. *Note: This feature only works if it has been activated through the Parameter settings (check C7 in Parameter setting).*

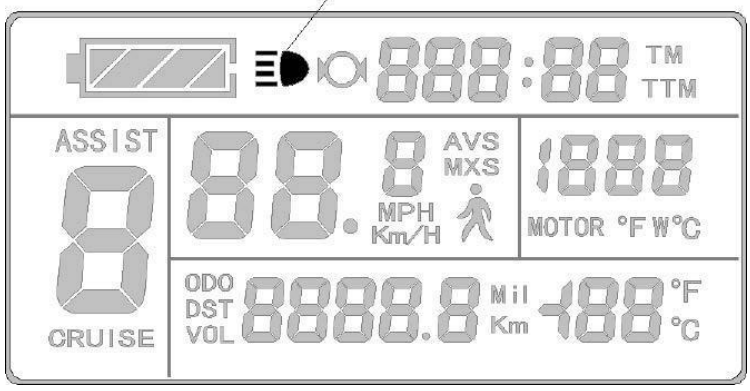


Cruise Function

Backlight

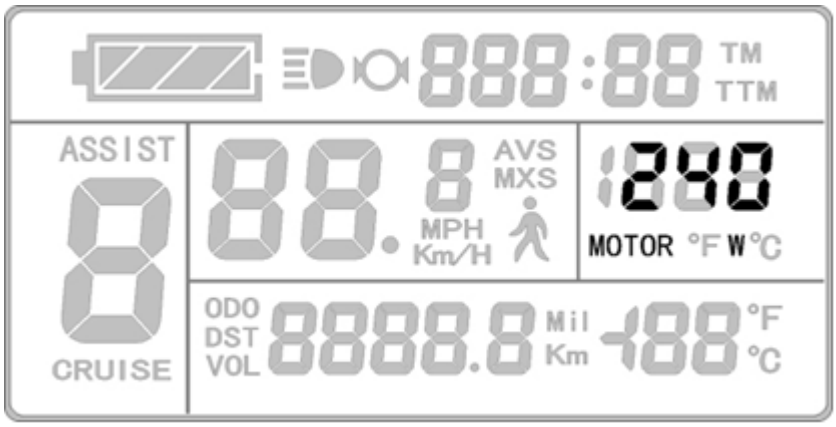
To turn on or off LCD backlight and e-bike, hold button for ***3 seconds***.
When this function is activated, the display will show sign to indicate it is on.

Backlight Status



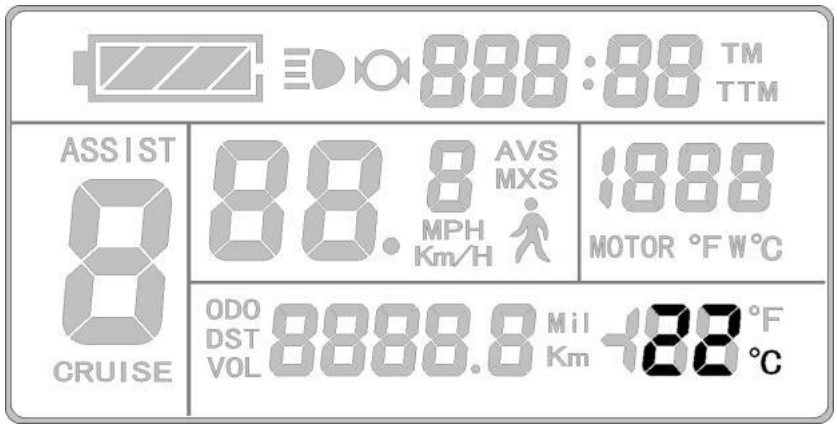
Motor Operating Power and Temperature

While e-bike motor is in use, real time output power from the motor is displayed on the LCD. The operating temperature of the motor can be displayed with supporting sensors installed in the motor to output the temperature. When the motor operating temperature exceeds the warning value, temperature display flashes to alarm the rider. In this circumstance, the motor controller will offer the appropriate protection to motor and auto shutoff.



Ambient Temperature

Upon start-up the environment temperature is displayed on the bottom right hand corner. The displayed figure may not accurately indicate the environment temperature immediately after start up, however will adjust within 10 minutes.



Single Data Clearing

After ***five seconds*** after turning on LCD, while on display 1 hold both the button and the button simultaneously for ***3 seconds***. The single trip time (TM) and single trip distance (DST) will flicker. Press button and the record contents of both will be cleared. If there are no operations within five seconds of (TM) and (DST) flashing, the LCD will return to display 1, and the original record content will be saved.

Automatically Prompt Interface

Error Code Display: When there are issues with the electronic control system of the e-bike, the LCD will automatically display (flicker) a fault code. This cannot be removed until fault is fixed. Refer to **Error Code & Definition Table** for reference.

Motor operating temperature alarm: When the motor operating temperature exceeds the warning value, the motor operating temperature display flashes to alarm the rider, while the controller will provide the appropriate protection to the motor.

Error Code Display

Error Code & Definition Table:

Error Code	Definition
01_info	Throttle Abnormality
03_info	Motor Hall Signal Abnormality
04_info	Torque Sensor Signal Abnormality
05_info	Axis Speed Sensor Abnormality
06_info	Motor or Controller Short Circuited

USER SETTING

The KT-LCD3 LCD provides users with 3 depths of settings:

- General Setting
- P Parameter Setting
- C Parameter Setting

To enter the general project setting, simultaneously hold button and button for ***3 seconds*** within ***5 seconds*** of turning the LCD on. The current setting will be indicated by a flashing sign. To scroll through the menu, press the button. Once the general project menu has been cycled through, the display will cease flashing. Now enter the P Parameter settings by simultaneously holding button and button for ***3 seconds***. The same method to scroll through the menu can be applied and the LCD will flash specific icons indicating the setting currently open.

Once the flashing has stopped, hold down both the and button again to progress to the C Parameter settings. To exit these settings at any stage, simply hold down the button where the LCD will return to display 1. If no button operation occurs for ***60 seconds*** while in a settings menu, the KT-LCD3 will discard changes and return to display 1. To exit at any moment, hold and the LCD will discard any unsaved changes and revert to display 1.

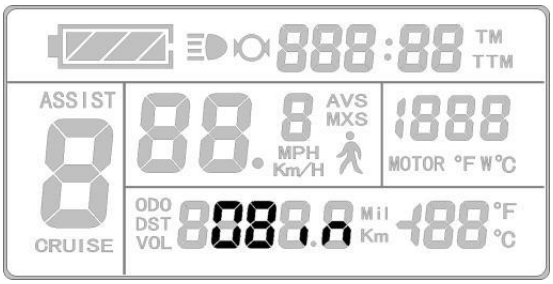
GENERAL SETTING

Maximum Trip Speed

Turn on LCD, and within ***5 seconds*** of start-up simultaneously hold button and button for ***3 seconds*** to enter general project settings. “MXS” and the speed will be displayed, indicating the maximum riding speed (Refer to image below for illustration). To adjust, press the button to increase or button to decrease the speed. Once desired speed has been selected, **press the button to confirm** changes and move onto wheel diameter.

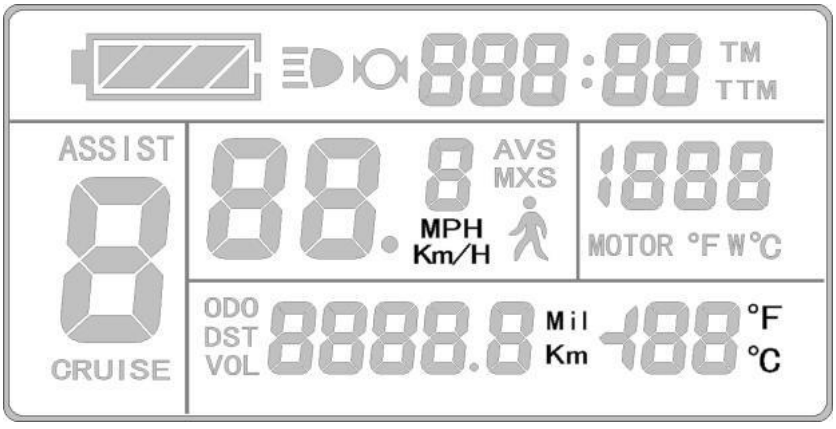
Wheel Diameter

While in the general setting, cycle through the menu using the button until the values of wheel diameter are flashing. Use the button and button to scroll through the selection of the following wheel diameters: 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 700C and 28 inches. **Confirm selection by pressing the button**.



Units

While in the general setting, cycle through the menu using the button until the values of units are flashing (as shown below). Use the button and button to scroll through the selection of units. **Confirm selection by pressing the button**.



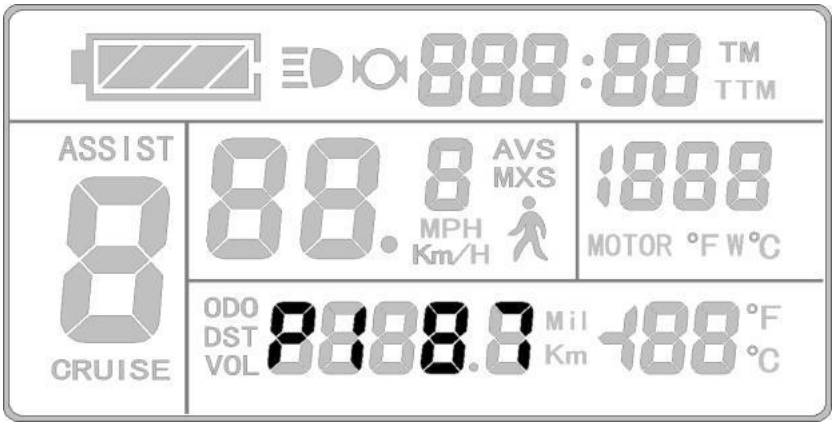
Definition Table of Metric/Imperial Units:

Unit	Metric	Imperial
Speed	Km/H	MPH
Distance	Km	Mil
Temperature	°C	°F

PARAMETER SETTING

Enter the P Parameter settings by cycling through the General Project Settings to the end (*when display ceases flashing*) and simultaneously holding button and button for ***3 seconds***. If required to exit at any Parameter, hold button for ***2 seconds***. Use the button and button to select the value and **confirm selection by pressing the button**. The Parameter will be saved and the LCD will enter the next P Parameter settings.

P1 Motor Characteristic Parameter Setting



P1 Display

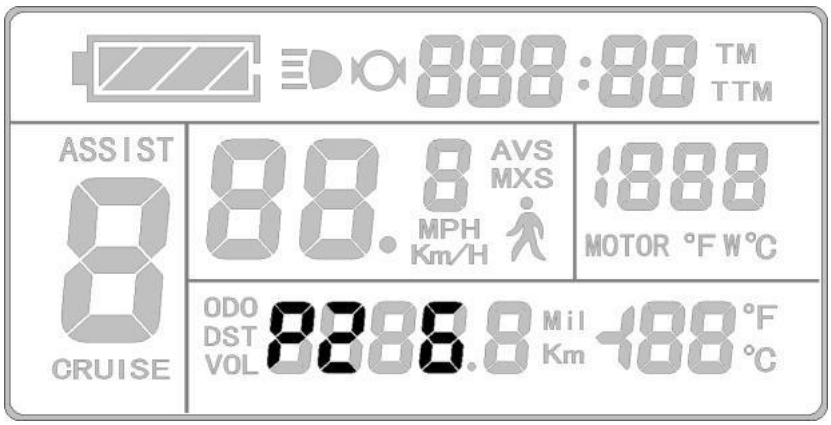
The P1 settings are a motor characteristic Parameter where:

P1 = Motor Gear Reduction Ratio × Number of Rotor Magnets

Rounding to a full number is necessary. The P1 setting ranges between 1 and 255.

P2 Wheel Speed Pulse Signal Setting

The P2 Parameter setting will display on the LCD after the P1 Parameter setting has been selected and confirmed. The KT-LCD3 will display as follows:

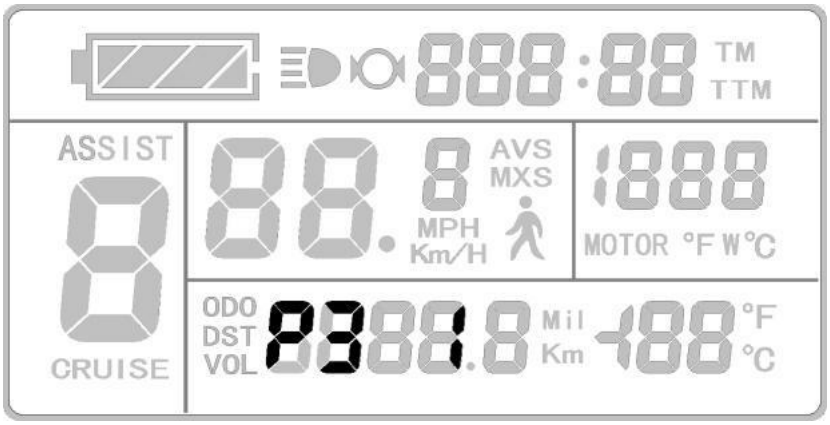


P2 Display

The P2 Parameter is a setting mode for wheel speed pulse signal. If wheel generated 1 pulse signal by a revolution, the P2 value should be set to 1. If the wheel generated 6 pulse signals by a revolution, P2 should be set as 6. If users did not configure the Parameter then P2 can be set to 0. The selection of P2 values ranges from 0 to 6.

P3 Throttle Assist Level Control Setting

The P3 Parameter setting will display on the LCD after the P2 Parameter setting has been selected and confirmed. The KT-LCD3 will display as follows:



P3 Display

P3 Parameters affect the pedal assist system (PAS) control setting. When the value is set to 0, the throttle is dependent on the PAS level ratio. This means when the PAS level ratio is 1, the throttle will provide the least amount of power, whereas when it is 5, the throttle will provide the most power. If the P3 Parameter is set to 1, the throttle independent from assist levels and will provide maximum power regardless of the PAS level chosen.

P4 Throttle Activation Setting

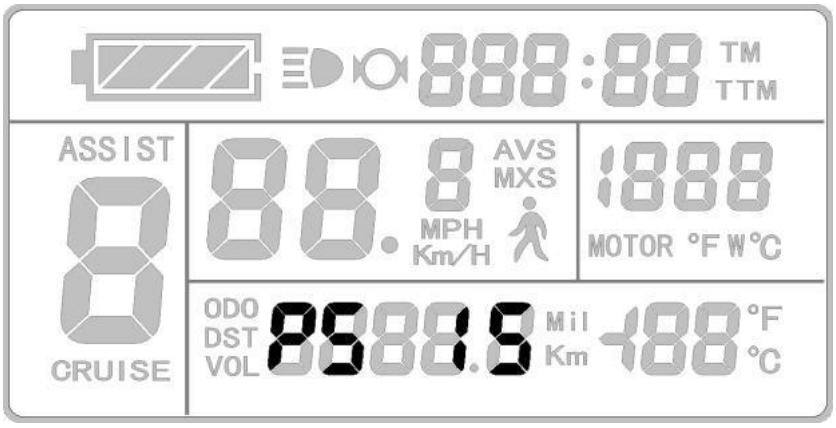
The P4 Parameter setting will display on the LCD after the P3 Parameter setting has been selected and confirmed. The KT-LCD3 will display as follows:

P4 Display

The P4 settings is for controlling the throttle activation. When the P4 Parameter is 1, the throttle is under "delayed startup" where the throttle will only activate the motor after the motor has been activated via Pedal Assist System. Setting the P4 to 0 will set the throttle to activate the motor when triggered.

P5 Power Monitoring Setting

The P5 Parameter setting will display on the LCD after the P4 Parameter setting has been selected and confirmed. The KT-LCD3 will display as follows:



P5 Display

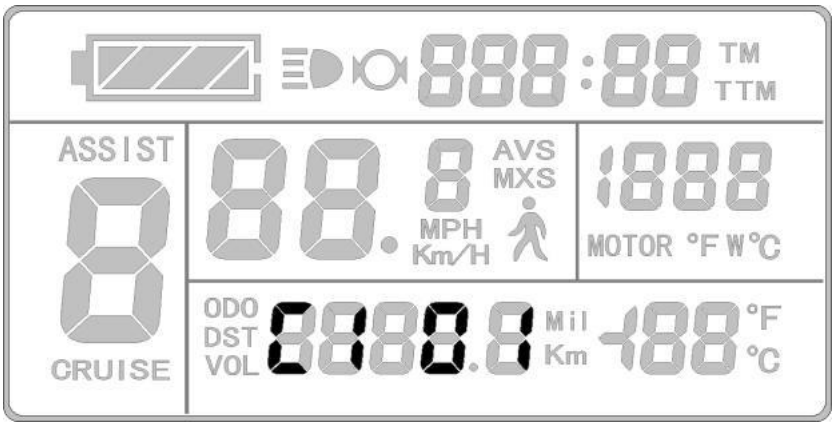
The P5 Parameter is power monitoring mode. When the value is set to 0, the power monitoring is in "real-time voltage" mode where the method to determine the battery capacity is based on real-time voltage. Once the P5 Parameter is set to a specified value, the power monitoring is in "smart power" mode where the value set is determined by the battery characteristics. Such that, 24V lithium batteries are typically set between 4-11, 36V lithium batteries set between 5-15 and 48V lithium batteries set between 12-20. The P5 Parameter setting ranges from 0-40.

C PARAMETER SETTING

Enter the C Parameter settings by cycling through the P Parameter Settings to the end (*when display ceases flashing*) and simultaneously holding button and button for ***3 seconds***. If required to exit at any Parameter, hold button for ***2 seconds***. Use the button and button to select the value and **confirm selection by pressing the button**. The Parameter will be confirmed and the LCD will enter the following C Parameter settings.

C1 Pedal Assist Sensor Setting

The C1 Parameter setting will display on the LCD after the P Parameter settings. The KT-LCD3 will display as follows:



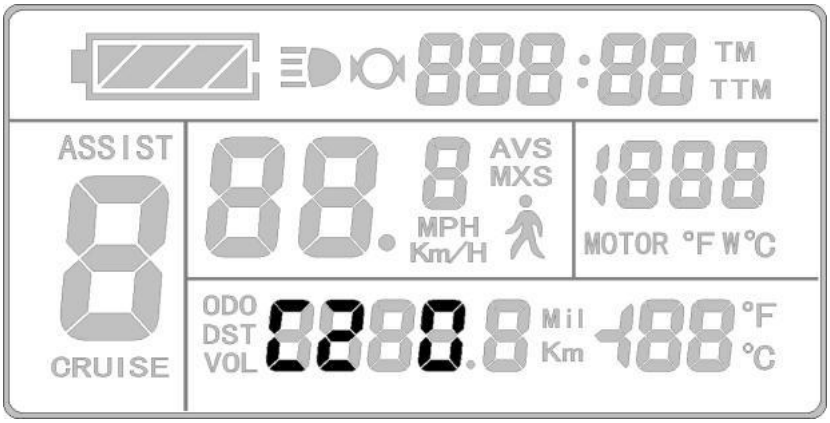
C1 Display

C1 settings are the pedal assist sensor Parameters. Its definition is shown in the following table. As it can be seen from the table, the values for this forward parameter range from 0 to 3. Parameter range 4 to 7 are reverse pedal assist settings.

Pedal Assist System Forward Plastic Sensors Disc	C1 Value	Start Sensitivity
Forward 5 Magnet Signal	00	Standard
	01	Lower
	02	Lowest
Forward 8 Magnet Signal	00	Higher
	01	Standard
	02	Lower
Forward 10 Magnet Signal	01	Highest
	02	Standard
	03	Lower
Forward 12 Magnet Signal	01	Highest
	02	Higher
	03	Standard

C2 Motor Phase Classification Coding Mode

The C2 Parameter setting will display on the LCD after C1 settings. The KT-LCD3 will display as follows:

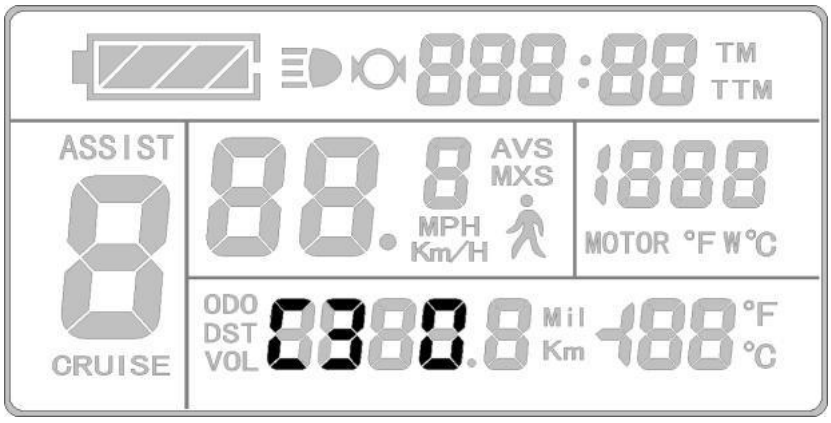


C2 Display

C2 Parameters set the different phases of the motor when using a sine wave drive. The default value is 0, indicating that the used Quantum motor phase is standard. When the Parameter is set as a specified value, a particular motor phase is selected. The range of values for C2 are between 0-7.

C3 Pedal Assist Level Initialization

The C3 Parameter setting will display on the LCD after C2 settings. The KT-LCD3 will display as follows:

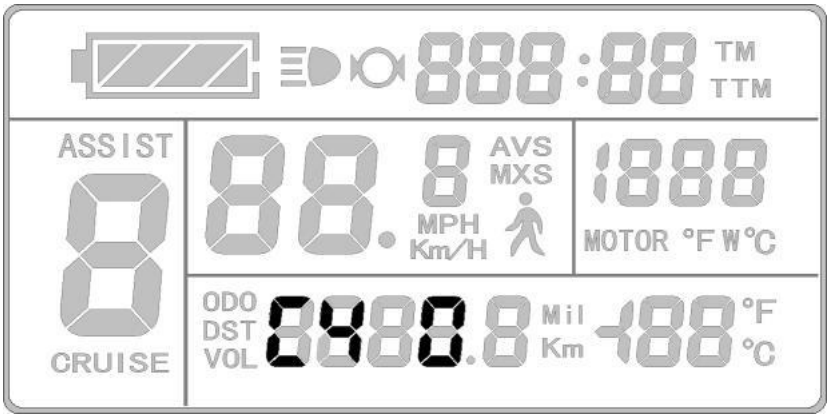


C3 Display

C3 Parameters are settings for the pedal assist level ratio from 0 – 8.

C4 Throttle Function Setting

The C4 Parameter setting will display on the LCD after C3 settings. The KT-LCD3 will display as follows:



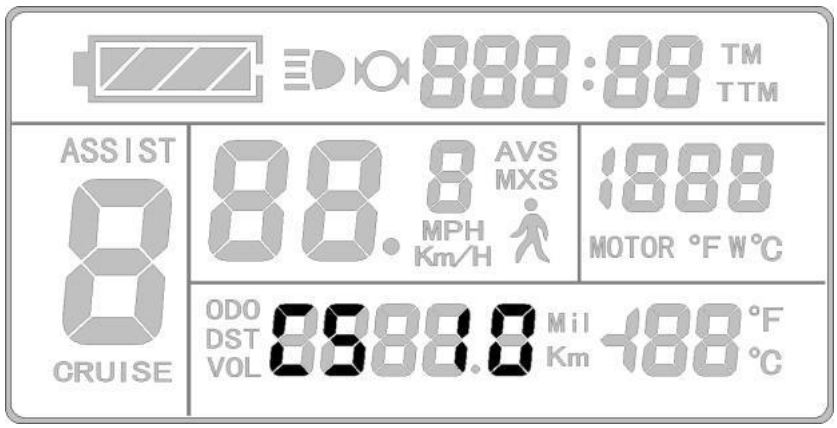
C4 Display

C4 settings are for the throttle functions. The setting range is 0-5. This is accompanied by a table below, defining each value.

C4 Value	Throttle in PAS Level = 0	Throttle in PAS Level = 1 - 5
0	No Throttle	Full Throttle Control
1	No Throttle	Throttle Limited to 6Km/h
2	No Throttle	Throttle Speed Programmed to Rider's Specification
3	Full Throttle Control	Full Throttle Control
4	No Throttle	Throttle is Dependent of PAS Level and Entered Ratio: 30 - 60
5	No Throttle	Full Throttle Control

C5 Controller Maximum Current Setting

The C5 Parameter setting will display on the LCD after C4 settings. The KT-LCD3 will display as follows:



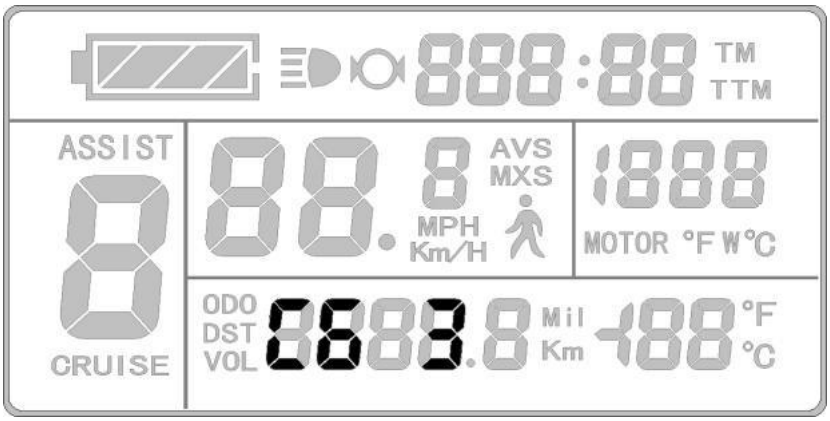
C5 Display

C5 settings are for controlling the maximum operating current. The default value is 10 and value ranges from 0 to 10. Refer to table below for definition of each value.

C5 Value	Maximum Current Value (A)
00	Undefined
01	Undefined
02	Undefined
03	Maximum Current Value ÷ 2.00
04	Maximum Current Value ÷ 1.50
05	Maximum Current Value ÷ 1.33
06	Maximum Current Value ÷ 1.25
07	Maximum Current Value ÷ 1.20
08	Maximum Current Value ÷ 1.15
09	Maximum Current Value ÷ 1.10
10	Maximum Current Value

C6 Backlight Brightness Setting

The C6 Parameter setting will display on the LCD after C5 settings. The KT-LCD3 will display as follows:



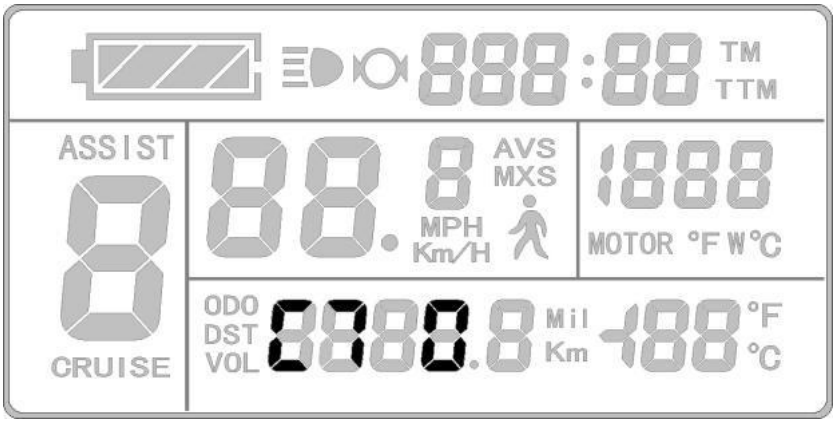
C6 Display

C6 settings are for the LCD's backlight brightness. The default value is 3 and the setting range is 1-5.

C6 Value	Backlight Brightness
1	Dimmest
2	Darker
3	Standard
4	Brighter
5	Brightest

C7 Cruise Function Setting

The C7 Parameter setting will display on the LCD after C6 settings. The KT-LCD3 will display as follows:



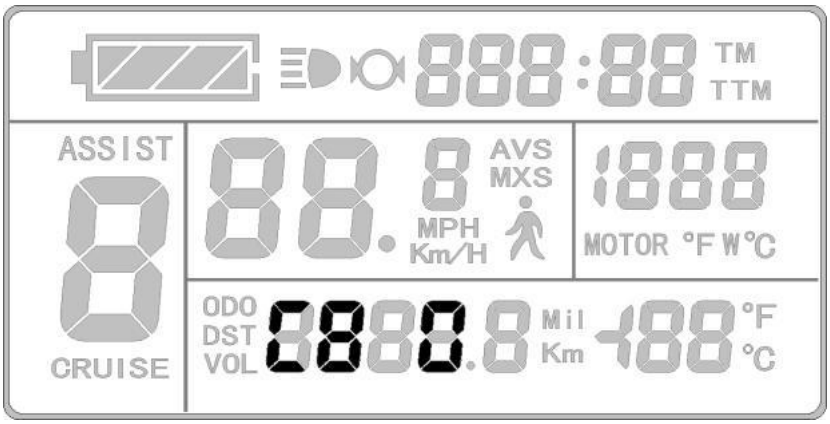
C7 Display

The cruise function settings can be found in C7. Refer to the following table for definitions of C7 values.

C7 Value	Cruise Function
0	Disabled
1	Enabled

C8 Motor Operating Temperature Display Setting

The C8 Parameter setting will display on the LCD after C7 settings. The KT-LCD3 will display as follows:



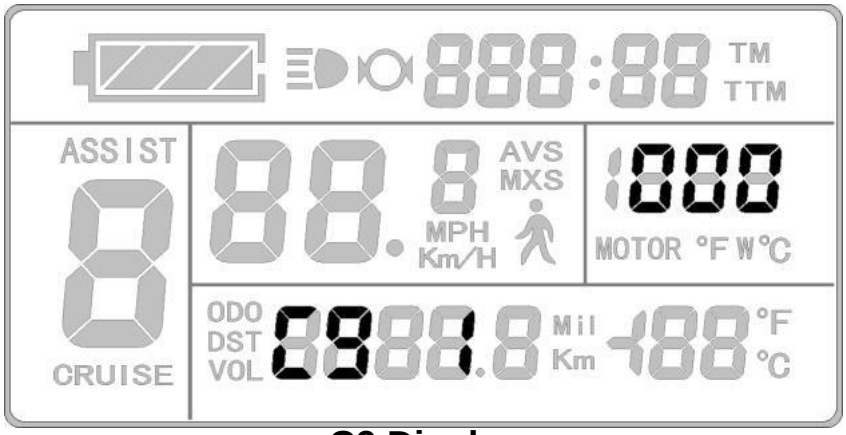
C8 Display

C8 is settings for the motor operating temperature display. Refer to the following table for definitions of the C8 values.

C8 Value	Motor Operating Temperature Function
0	Disabled
1	Enabled

C9 Startup Password Setting

The C9 Parameter setting will display on the LCD after C8 settings. The KT-LCD3 will display as follows:

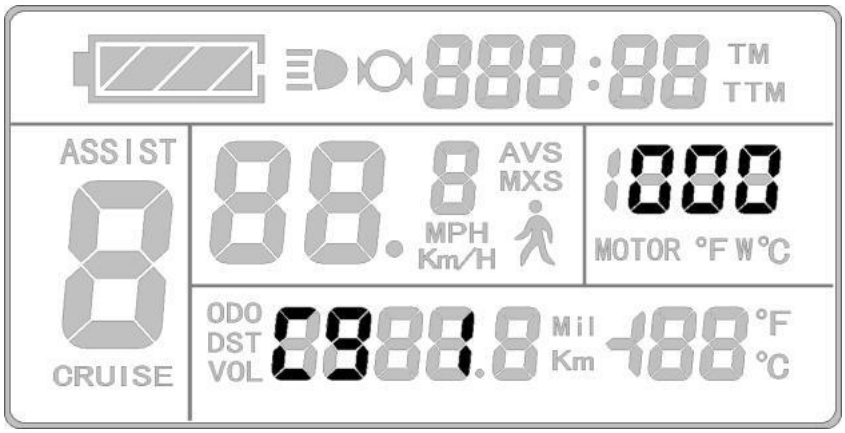


C9 Display

C9 is the settings for password feature upon startup. The default value is 0. Refer to the following table for definition of the function.

C9 Value	Password Function
0	Disabled
1	Enabled

When the feature has been enabled and confirmed by pressing the button, the display will change to the following.



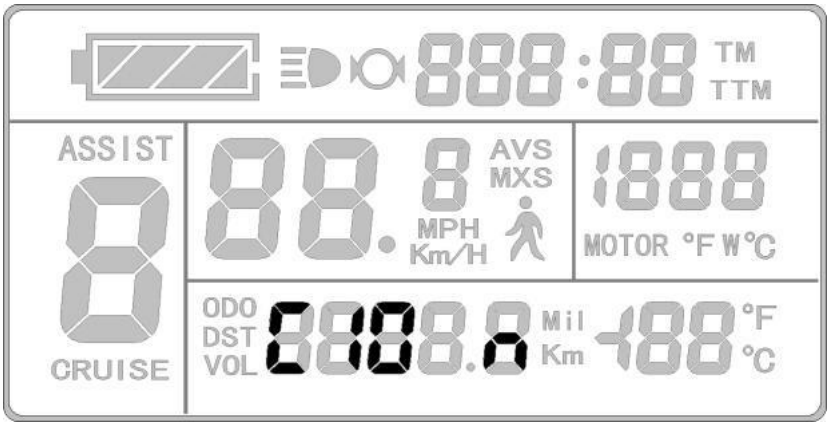
Password Setting Interface

From here the rider can set the 3-digit passcode starting from the left and sequentially progress to the right. Password value range is 000-999. Select the values with the button, button, and confirming the selection with the button.

PLEASE NOTE: If password is forgotten, the Parameters can only be copied (see Parameter copy) by data source LCD prior to being decoded.

C10 Restore Default Setting

The C10 Parameter setting will display on the LCD after C9 settings. The KT-LCD3 will display as follows:



C10 Display

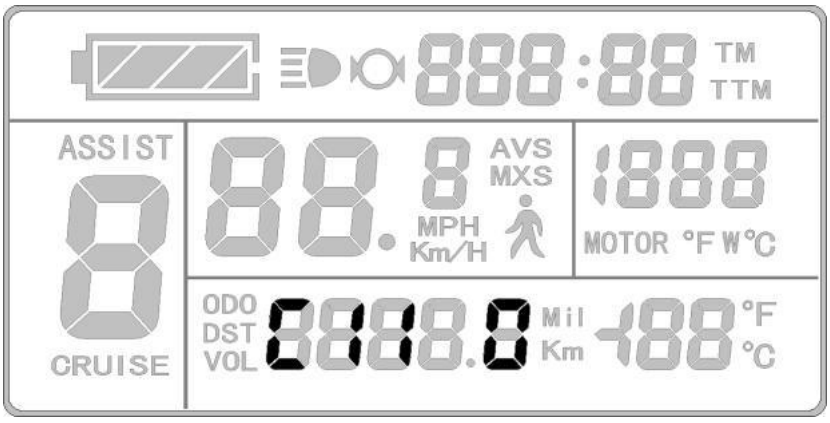
C10 restores the KT-LCD3 LCD to default settings. Refer to table below for definitions.

C10 Value	Restore Default Setting
n	Disabled
y	Enabled

To restore the LCD to default settings, select the C10 value "y" to enable the function and hold the button for ***2 seconds***. All Parameters will restore to default values and the LCD will return to display 1.

C11 LCD System Version Setting

The C11 Parameter setting will display on the LCD after C10 settings. The KT-LCD3 will display as follows:



C11 Display

C11 is LCD attribute settings. The setting range is 0-2. Refer to following table for definition of values.

C8 Value	LCD Attribute
0	LCD uses LCD3 new version of communication protocol, compatible with LCD1 and LCD3
1	LCD uses LCD1 and LCD2 old version communication protocol, it is not compatible with LCD3
2	As data source for copying Parameters, the LCD transfers the new LCD3 Parameter to other LCDs

C12 Controller Minimal Voltage Setting

The C12 Parameter setting will display on the LCD after C11 settings. The KT-LCD3 will display as follows:

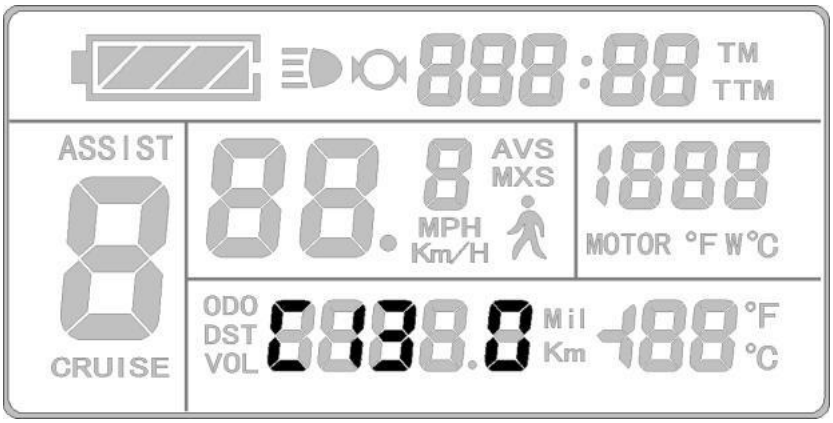
C12 Display

C12 Parameters are settings for the controller's minimum operating voltage (voltage shortage value). Refer to the following table to calculate the minimum voltage.

C12 Value	Minimum Voltage (V)		
	24V Controller	36V Controller	48V Controller
0	Default Value-2V	Default Value-2V	Default Value-2V
1	Default Value-1.5V	Default Value-1.5V	Default Value-1.5V
2	Default Value-1V	Default Value-1V	Default Value-1V
3	Default Value-0.5V	Default Value-0.5V	Default Value-0.5V
4	Default Value=20V	Default Value=30V	Default Value=40V
5	Default Value+0.5V	Default Value+0.5V	Default Value+0.5V
6	Default Value+1V	Default Value+1V	Default Value+1V
7	Default Value+1.5V	Default Value+1.5V	Default Value+1.5V

C13 ABS Brakes and Anti-Charge Control Setting

The C13 Parameter setting will display on the LCD after C12 settings. The KT-LCD3 will display as follows:



C13 Display

C13 Parameters are settings for the ABS braking strength and anti-charge control. Refer to the following table for definitions of each C13 value.

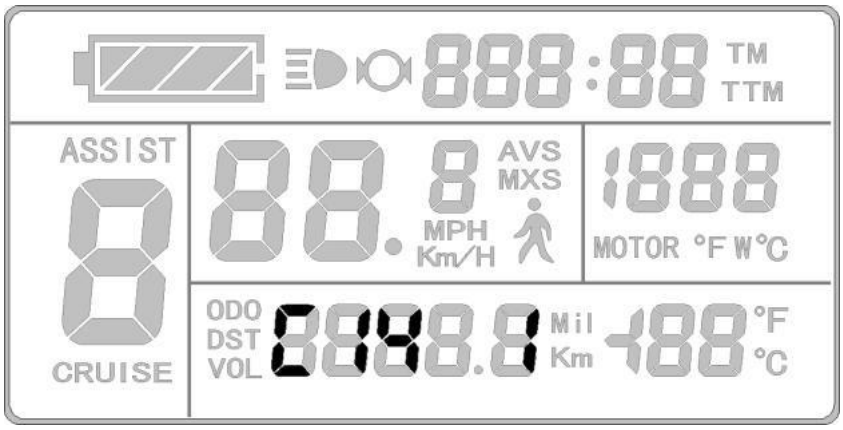
C13 Value	ABS Braking Strength	Energy Recovery Efficiency
0	None	None
1	Class 1 Braking Strength	Best energy recovery
2	Class 2 Braking Strength	General energy recovery
3	Class 3 Braking Strength	Weaker energy recovery
4	Class 4 Braking Strength	Poor energy recovery
5	Class 5 Braking Strength	Bad energy recovery

The recommended value for the C13 Parameter is 1. Other options should be selected with caution for use. Seek professional advice for assistance.

Be sure to note: the higher the braking intensity level, the higher the braking strength will be which results in greater damage to the motor shaft.

C14 Pedal Assist Tuning Setting

The C14 Parameter setting will display on the LCD after C13 settings. The KT-LCD3 will display as follows:



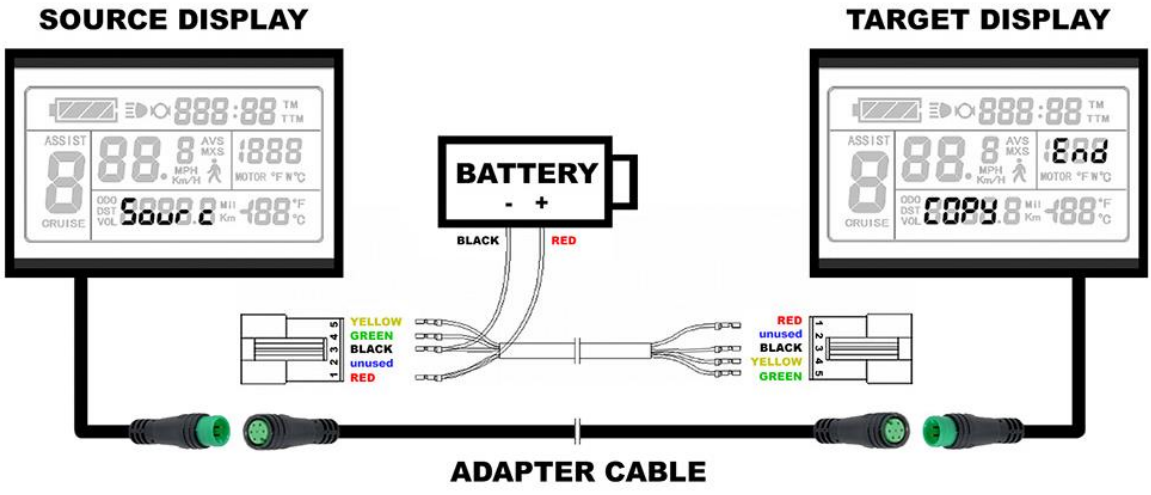
C14 Display

C14 is the Parameters for pedal assist tuning. The default value is 2. Refer to the following table for definition of each value.

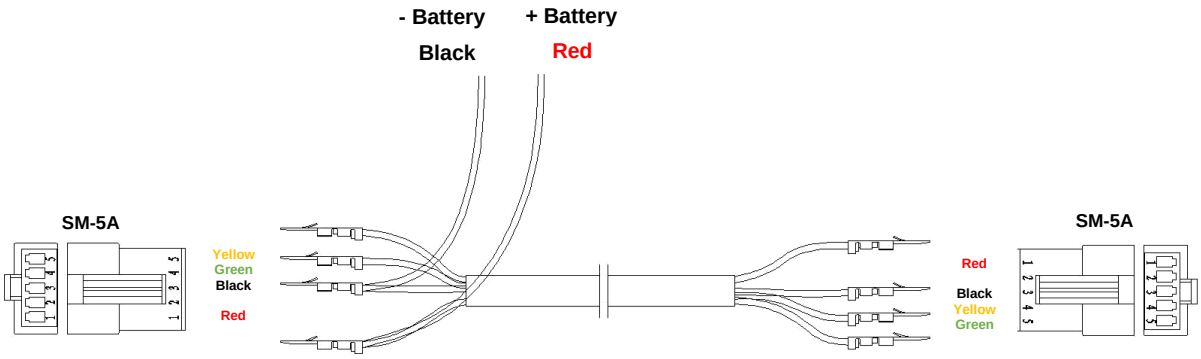
C14 Value	Assist Strength of Pedal Assist
1	Weaker
2	General
3	Stronger

PARAMETER COPY

Set Parameters (including general project Parameters, P Parameters and C Parameters) of any KT-LCD3 LCD can be copied to another KT-LCD3 LCD. This can be done via C11 LCD Attribute Setting, where the LCD can become a data source. Use special wiring cables to configure the LCD as shown below.



LCD Parameter Copy Wiring Diagram



Special Wiring Cable

Correctly configure and wire the LCDs and provide a power supply of 48V, 36V or 24V (VB + positive power supply). Hold button of the source LCD until start up. Within 5 seconds, simultaneously hold button and button for 2 seconds. If successfully completed, the LCD will copy the Parameters and display the following interface.

Successful Copy Display

Please Note: Both C9 start up password and C11 LCD attributes cannot be copied. And LCD3 LCD can only copy to LCD of same model.

VERSION INFORMATION

EBO KT-LCD3 V1.0

Released on October 17, 2017

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DEFAULT SETTINGS

Setting	Default Value	Description
LIM	72km/h	Maximum Speed Setting • 32km/h and Remove Throttle for **Class 1** • 32km/h for **Class 2** • 72km/h or 45km/h for **Class 3**
DIM	20”	Wheel Diameter
UNT	3	Imperial Units
P1	46, 87, 100	Motor Gear Reduction Ratio X Rotor Magnets • Geared 350W/750W Motors - 87 • Geared 500W Motors- 100 • Direct Drive Motors 750W - 46
P2	0, 1, 5, 6	Wheel Speed Pulse Signal Setting • Gen 1/2 350W Motors - 0 • Gen 3 350W Motors - 1, 5, or 6 (Determined by number of magnets and HAL sensor model) • Geared 500W Motors - 1 • Direct Drive Motors - 0
P3	1	Throttle Assist Level Control Setting
P4	0	Throttle Activation Setting
P5	12, 15	Battery Voltage/Capacity Monitoring (36V - 12, 48V - 15)

C1	1	Number of Magnets in Pedal Assist Disc
		• BZ-4(8) PAS - 1
		  ○ Lower Sensitivity - 2
		  ○ Higher Sensitivity -0
		• BZ-10 PAS - 2
		• EBO IPAS - 2
		• D12 PAS - 3
		• V12 PAS – 7

C2	0	Motor Phase Classification
C3	0	Pedal Assist Level Initialization
C4	2 **32**	Throttle Function Settings
C5	8	Controller Current Adjustment
C6	3	Backlight Brightness Adjustment
C7	0	Cruise Control Function
C8	0	Motor Operating Temperature Displayed
C9	0	Password Setting
C10	n	Restore Defaults
C11	0	LCD3 System Version
C12	4	Controller Maximum Voltage Adjustment
C13	0	ABS Brakes and Anti-Charge Control
C14	2	Pedal Assist Tuning Setting • Weaker PAS - 1 • Stronger PAS - 3