Technical Manual

Votani NewX1 MAX

v1.4, Dec. 2017

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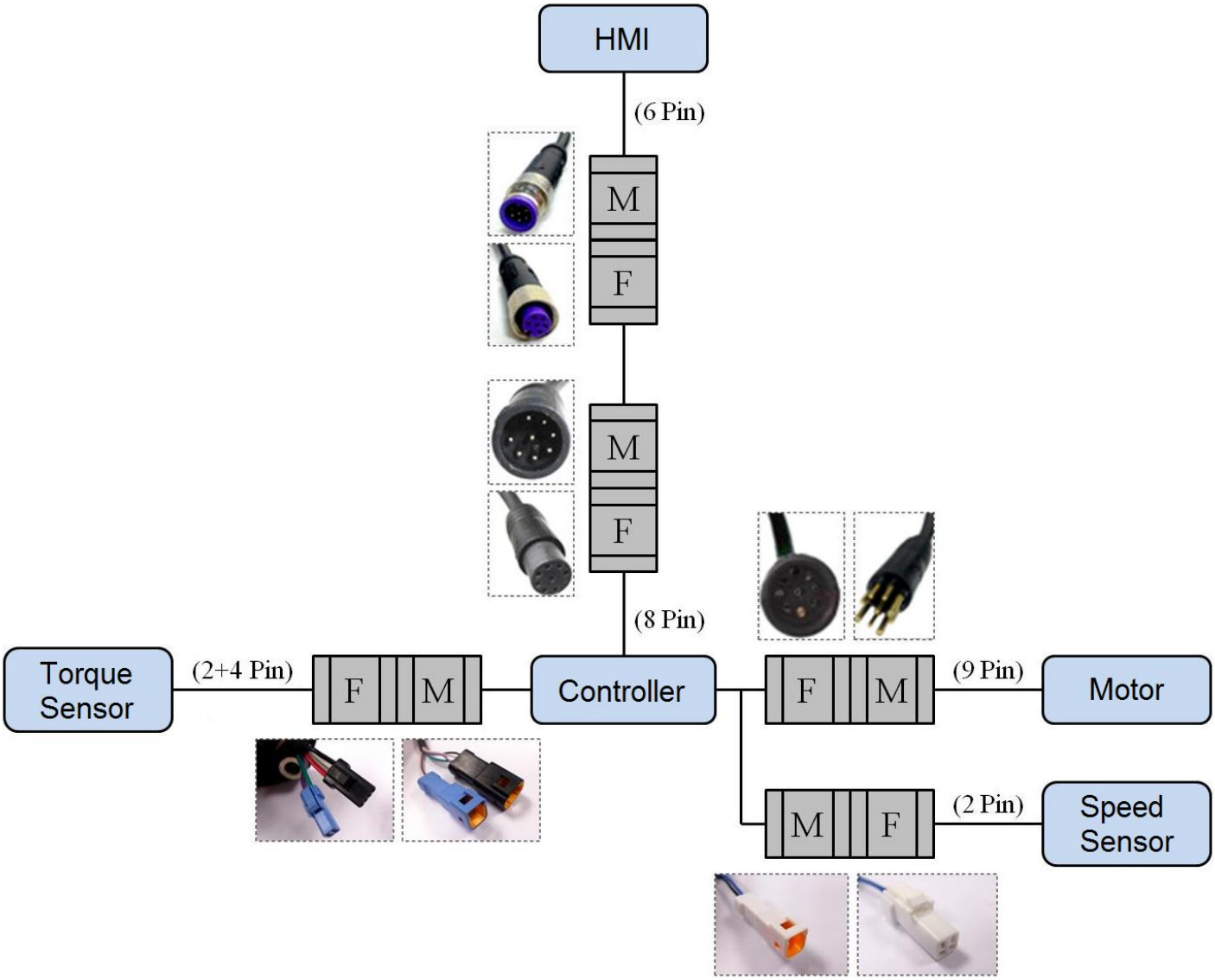

HMI
(6 Pin)
M
F
M
F
(8 Pin)
Torque Sensor
(2+4 Pin)
F
M
Controller
F
M
(9 Pin)
Motor
M
F
(2 Pin)
Speed Sensor

1.1 Specification

1.1.1 Controller

Model	A-Type
Operating temperature	-15°C to 50°C (5°F to 122°F)
Storage temperature	-15°C to 100°C (5°F to 212°F)
Storage humidity	10% to 85%
ROHS	Confirms the ROHS of PTC
Function	1. Over voltage protection 2. Over current protection 3. Stall protection 4. Speed limitation 5. UART communication 6. BLDC driver with hall 7. Battery communication
Output power	250W
Operating voltage	36V regular (Range: 30V to 42V)
Efficiency	92%

1.1.2 Speed Sensor

Model	BigStone Speed
RPM resolution	1 Impulses / Rotation
Weight	N.A
Operating voltage	5V
Clockwise	Yes
Counterclockwise	No
Direction	Yes

1.1.3 Motor

Model	250W Mid Motor
Operating temperature	-20°C to 85°C (-4°F to 185°F)
Storage temperature	-20°C to 65°C (-4°F to 149°F)
Storage humidity	<40%
Weight	<3.8kg
ROHS	Yes
Noise	<55dB
Max RPM	80RPM
Max torque	>80Nm
Rating output	250W
Operating voltage	36V regular (Range: 24V to 48V)
Efficiency	>78%
RPM resolution	12 Impulses / Rotation
Operating voltage	5V
Clockwise	Yes
Counterclockwise	No
Direction	Yes

1.1.4 HMI

Model	Central LCD HMI
Active area	100 (L) x 75 (W)
Operating temperature	-15°C to 50°C
Storage temperature	-15°C to 70°C
Storage humidity	10% to 90%
Display type	LCD display
LCD / LED type	FSTN, Positive, COG
Viewing direction	6 o'clock
ROHS	Confirms the ROHS of PTC
Information	ODO, Trip, RPM, Message, Speed, Battery indicator
Assistant level	3 assistance level

1.1.5 Battery

Item	Rate performance	Remark
Battery	2150mAh	SONY
	2750mAh	LG
Typical capacity	Above 10750mAh ± 5% (11) Above 12900mAh ± 5% (13) Above 16500mAh ± 5% (17)	Rate discharge capacity after rate charge
Nominal voltage	37V	
Maximum charge voltage	42.5V	CV mode charging voltage
Voltage at end discharge	31.34V	Stop discharge when anyone cell reach to 2.5 ± 0.02V
Max. charge current	4A	
Suggestion continuous discharge current	10A	≦389W
Suggestion maximum discharge current	12A	≦555W
END of charge condition	50mA	I min
Operation temperature	0°C to 45°C	Charge
	-10°C to 55°C	Discharge
Storage temperature	-10°C to 45°C (<1 month)	The best temperature in transport is 20°C to 25℃
	-10°C to 35°C (>1 month)	
Power consumption normal mode	≦50mA	
Sleep mode	≦1mA	
shutdown mode	≦100μA	

2. Operation

2.1 Battery

2.1.1 Start usage

To install the battery, please put the battery inside the cradle and push it until locked.

To remove the battery, please turn the key and pull the battery out from the cradle at the same time.

LED behaviors :

(1) Charging : One way scrolling (from 0 to current level)

(2) Fully charged : LEDs all ON

(3) Power on progress :

LED 1 – ON : 6% ~ 20%, FLASH : 0% ~ 5%

LED 2 – ON : 21% ~ 40%

LED 3 – ON : 41% ~ 60%

LED 4 – ON : 61% ~ 80%

LED 5 – ON : 81% ~ 100%

(4) Power off progress : LED 1, 3, 5 are ON

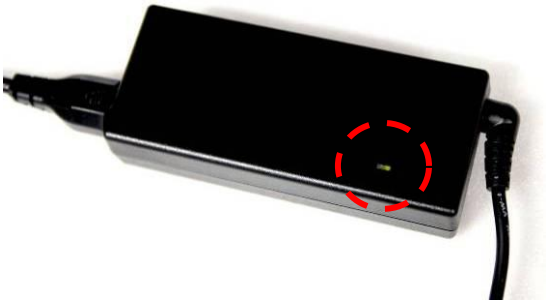
2.1.2 Charge

1. General use instructions

A. Connect the cable from charger to battery, and then insert the plug.

B. While the charger starts charging, the led shows red color.

While the charger standby or finishes charging, the led shows green color. If you are done charging, disconnect the charger from the battery before removing the power plug from power socket.



2. Charging time

The charging time depends on the remaining energy in the battery and the charger current. The acceptable charger input voltage is AC 100 - 240 V ~ 4A (50 / 60Hz).

If the battery is completely discharged, you can estimate the charging time by the following calculation example：

The estimated charging time is the battery's capacity divided by the charger's current. The standard new X1 max battery is 11 Ah and the standard new X1 max charger is 4A.

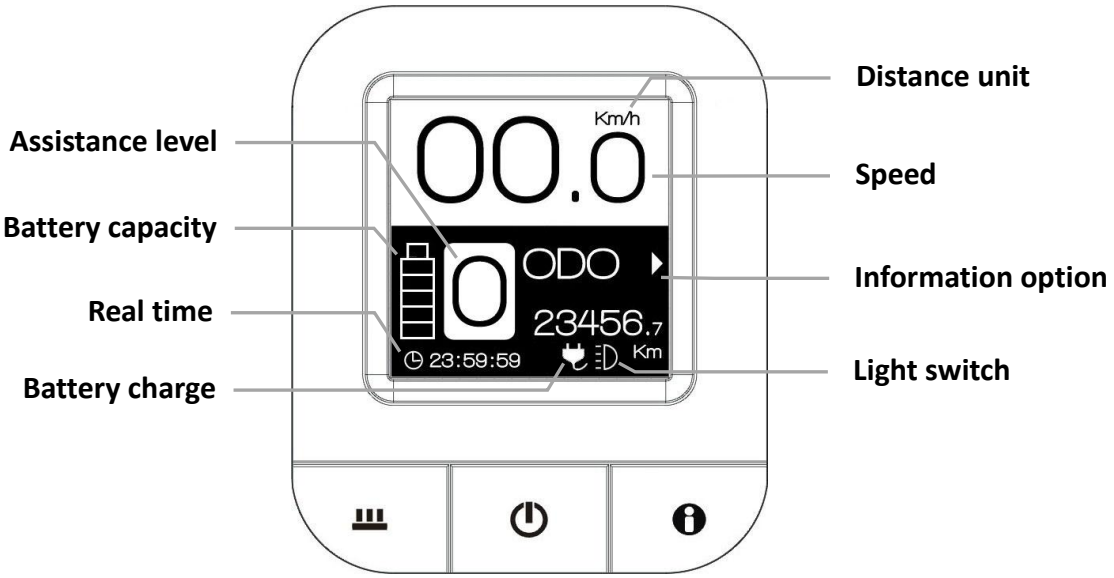
Estimated charging time = 11 / 4 = 2.75 hours

2.1.3 Important safety notes for battery charging

- Use only the battery charger delivered with the product.
- Use only dry charger, undamaged power cable and charger.
- Replace damaged power cable and charger immediately.
- Remove any possible foreign object from the charging socket, such as dusts, ice or snow before plugging in.
- Using any battery charger other than the one delivered with the product may cause overheating of the battery or even a risk of explosion.
- Deep discharging of battery may result in internal damage.
- There is a fire risk if the temperature of battery rises up to a dangerous level.
- Avoid deep discharging of battery while in use or storage.
- If not in use, the battery should be charged fully at least every 3 months.
- Do not expose the bike in a storage temperature lower than -20°C (-4°F) or higher than 60°C (140°F). Please note that the internal structure of battery may be overheated to damage due to high temperature greater than 60°C, particularly exposed to direct sunlight.
- Do not use the charger at a humid place or an ambient temperature lower than -10°C (14°F) or higher than 40°C (104°F).
- The battery and charger are maintenance-free. Do not attempt to disassemble or modify the battery or charger.
- Do not expose the battery to high voltage.
- It is advised not use battery with damaged casing.
- Do not cover the battery or the charger while charging is in progress.

2.2 HMI

2.2.1 Display information



- Speed

  Display of current speed, and precision is decimal point one.

- Assistant level

  There are totally 3 levels for choice when you are riding.

  When the system is turned on again, it will return to "0".

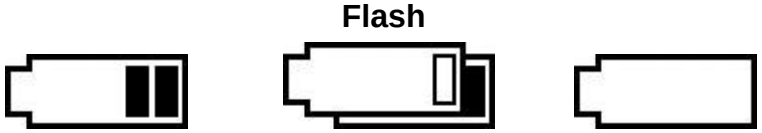
  With level 0 you will feel like riding a regular bike without any electrical assistance.

  With level 3, it will support you the maximum power.

- Battery capacity

  The battery sign on HMI will tell you how much capacity is left in your battery when the system is on. The following illustration shows how much power is left.

96% ~ 100% | 81% ~ 95% | 61% ~ 80% | 41% ~ 60%



21% ~ 40% | 1% ~ 20% | 0%

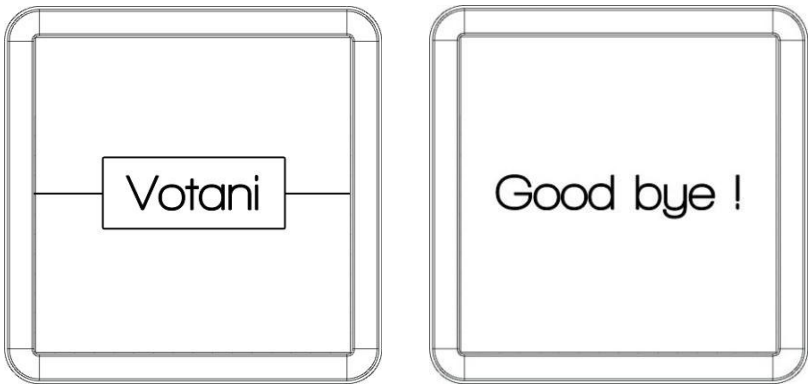
Battery capacity is 0% when the battery light flashes, please charge immediately.

2.2.2 Function key description

(Power) (Light) (Up) (Down) (Information)

- Power

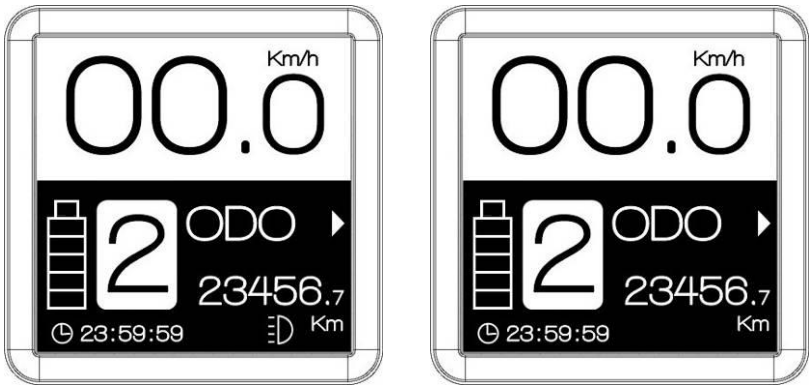
  Make sure the battery is installed; press [Power] button to turn on/off the system.



(ON) (OFF)

- Light switch

  Press [Light] button to turn on/off the screen backlight, front and rear light on bike.



(ON) (OFF)

- Assistance model setting

  Press [+] or [–] button to change the output power of the motor.

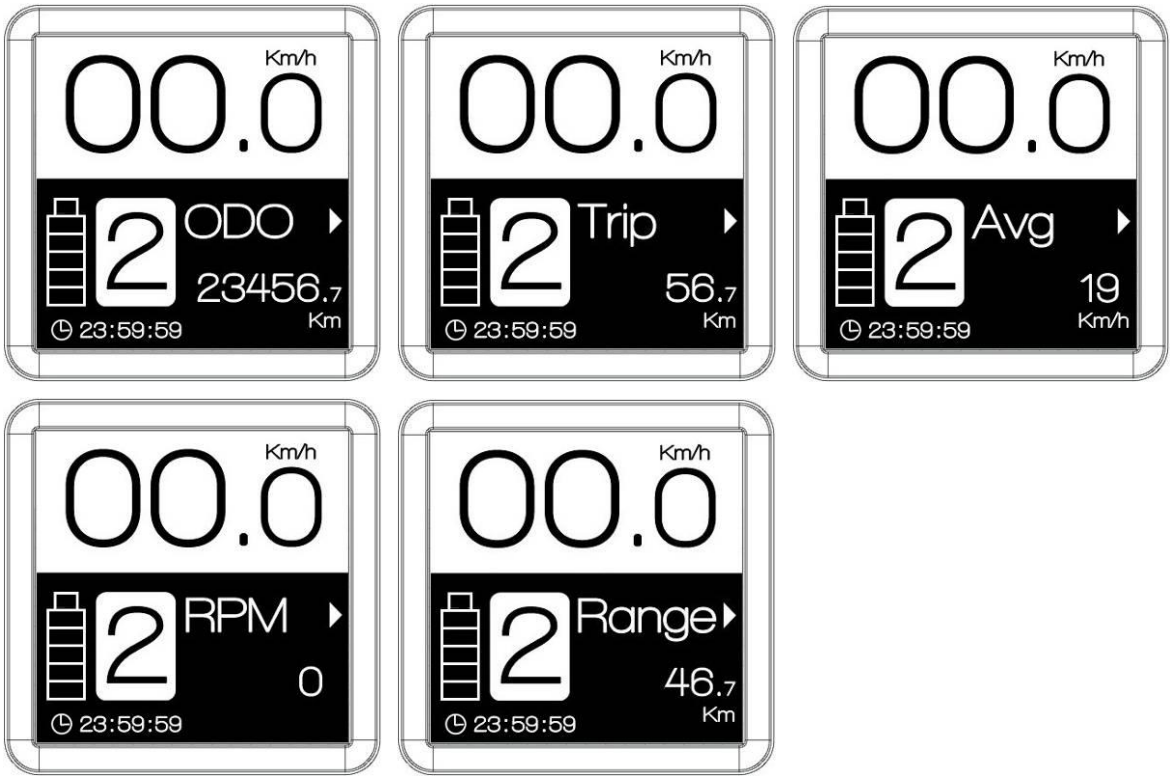
- Function setting

  Press and hold [i] button for 1.5 seconds to enter function selection.

- Information selection

  Press [i] button to toggle the different trip information shown on screen.

  For example: ODO, Trip distance, Average speed, RPM and Range distance.



【Note】

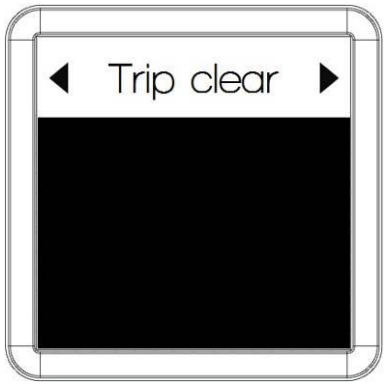
The "information" buttons are located in both handle bar and main display with the same function.

2.2.3 Function settings

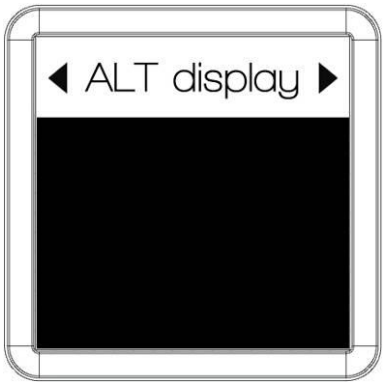
When entering function setting mode, press [+] or [–] button to select different functions.

To enter these functions, you can press [i] button, or press and hold [i] button for 1.5 seconds to leave it.

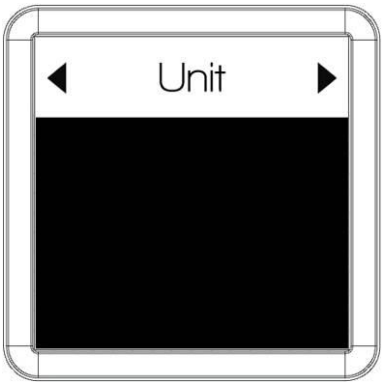
< Function page >



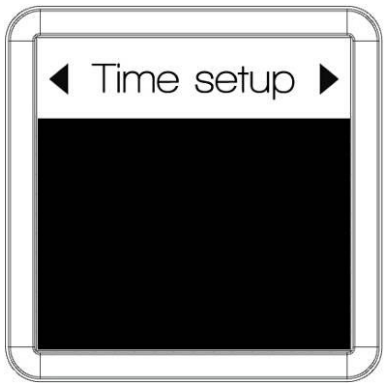
Trip clear



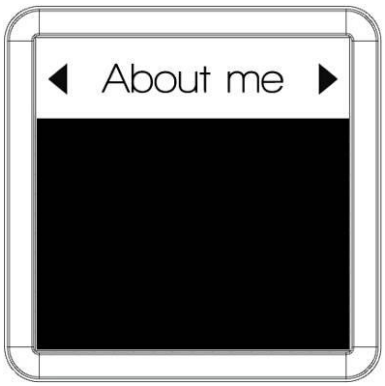
Information rotation display setting



Distance unit

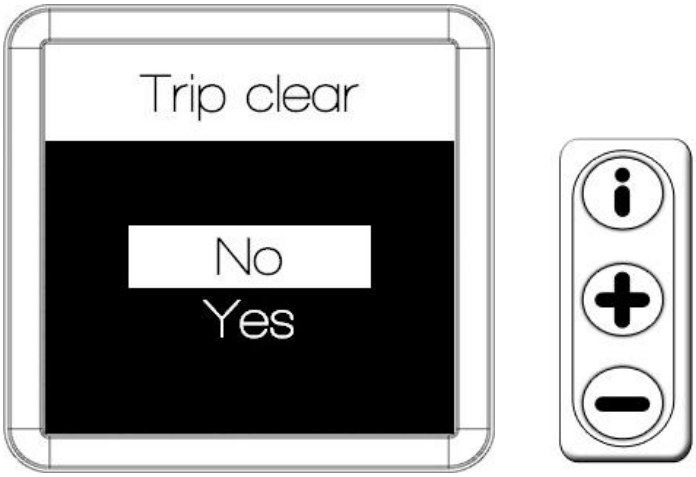


Time setting



Information

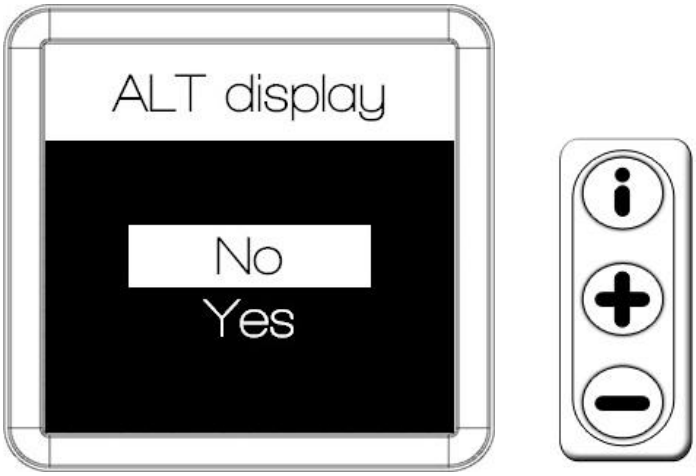
- Trip clear



Press [+] or [–] button to clear the trip, and press [i] button to confirm.

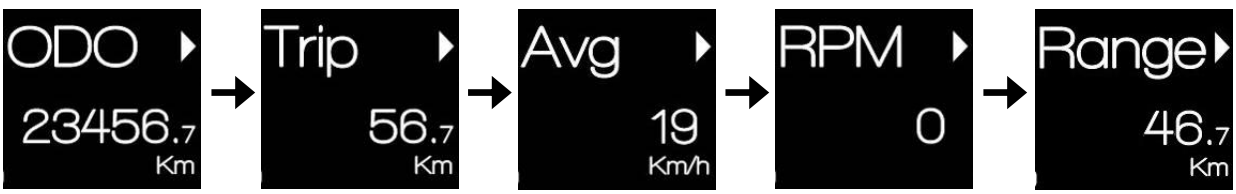
<Note> When you clear trip, average speed will be reset.

- Information rotation display setting

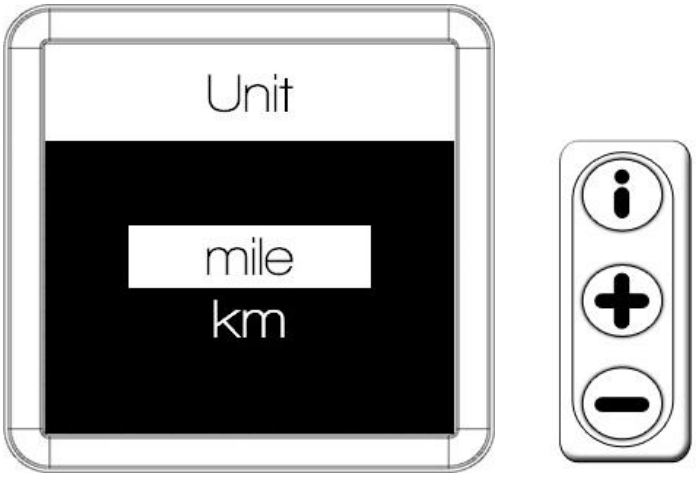


Press [+] or [–] button to select "Yes" to activate it or "No" to leave, and press [i] button to confirm.

With this function enabled, the screen will show as below, and information options automatically alternates for every 2 seconds.



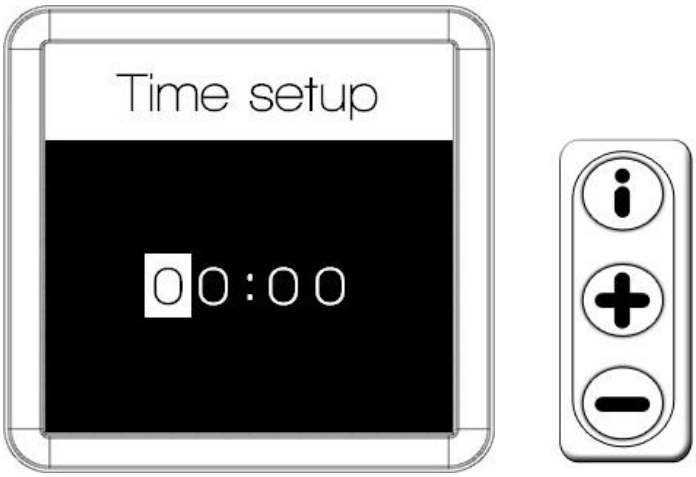
- Distance unit



Press [+] or [–] button to select km or mile, and press [i] button to confirm.

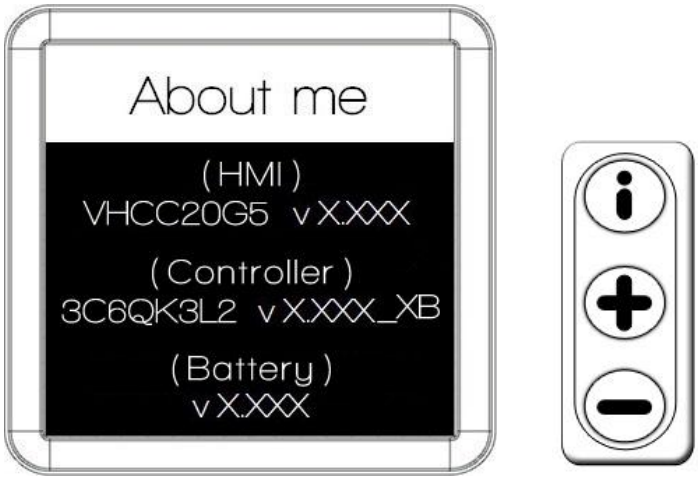
The speed and distance are shown in "km/h" or "mph" and "km" or "mile" respectively.

- Time setting



Change the time at the cursor, and press [+] or [–] button to change the number, then press [i] button to the next. After all the numbers have been set, press [+] or [–] button to select "O" to confirm it or "X" to re-input. Press [i] button to confirm.

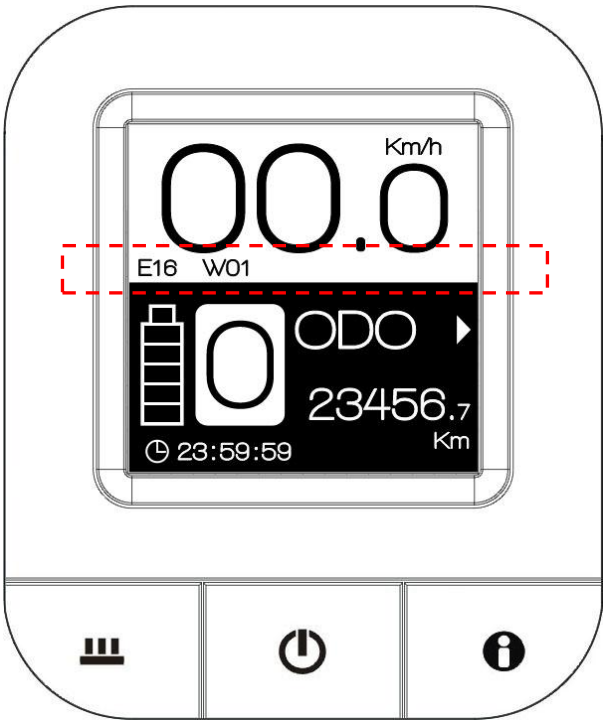
- Information



Show version of HMI and controller, and press [i] button to confirm leave it.

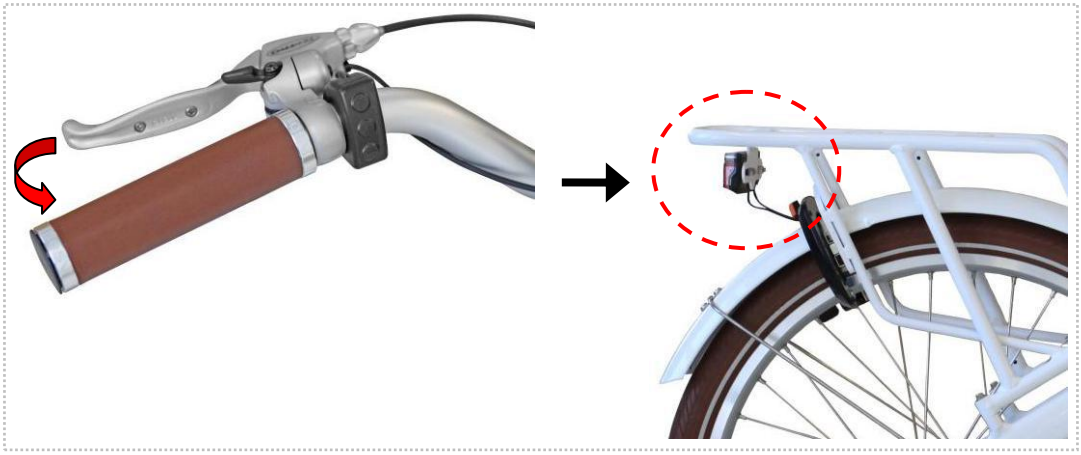
2.2.4 Message

This message only shows when system needs to tell issues.
(Please refer to "5.1 Error or warning alert")



2.3 eBrake

When the e-brake lever is pressed, the motor will stop giving assistance and the rear light will become lighter at the same time.



3. Disassembling components

3.1 Drive assembly

A. Controller

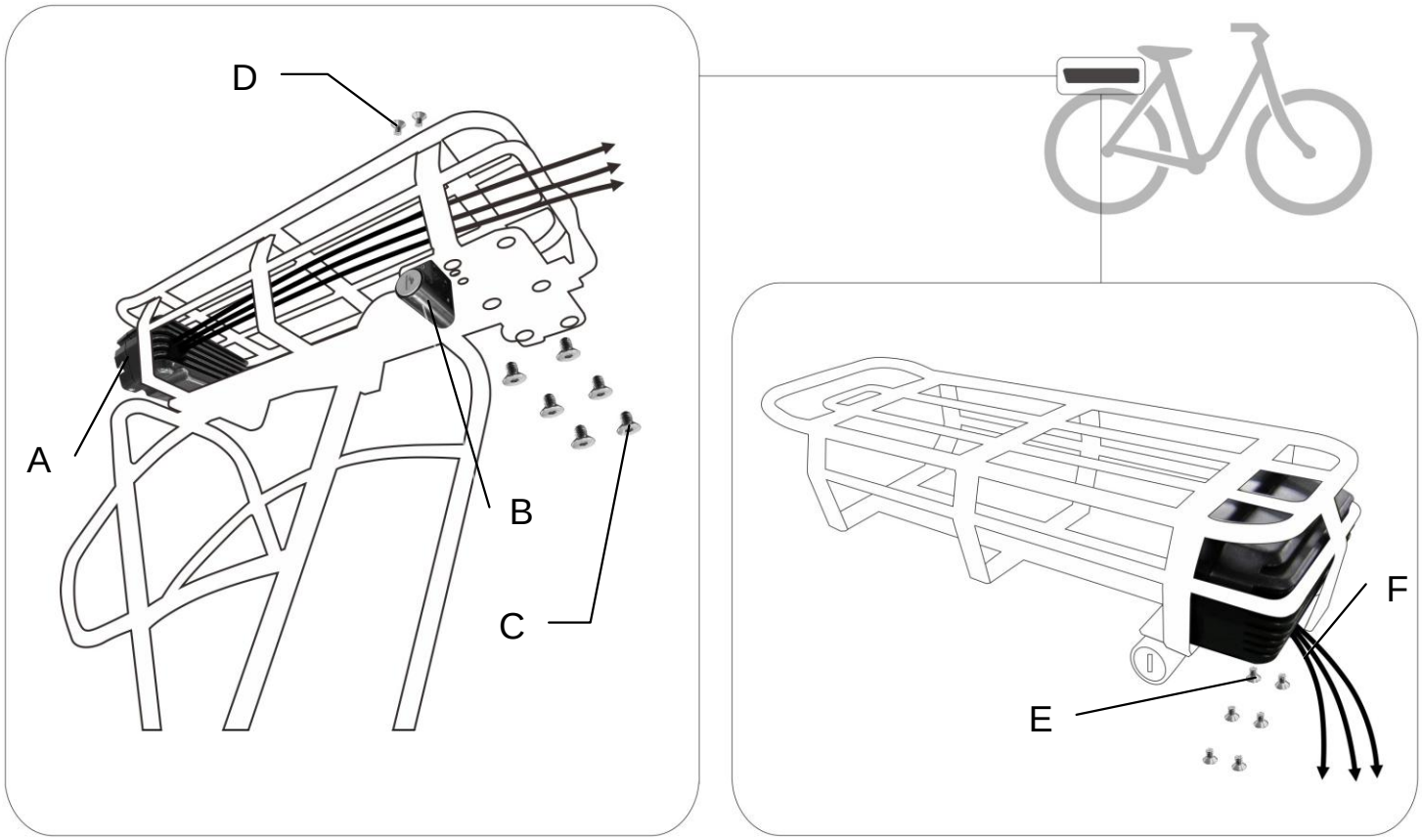
B. Switch key

C. M4*8L screw x 6

D. M5*8L screw x 2

E. M4*8L screw x 6

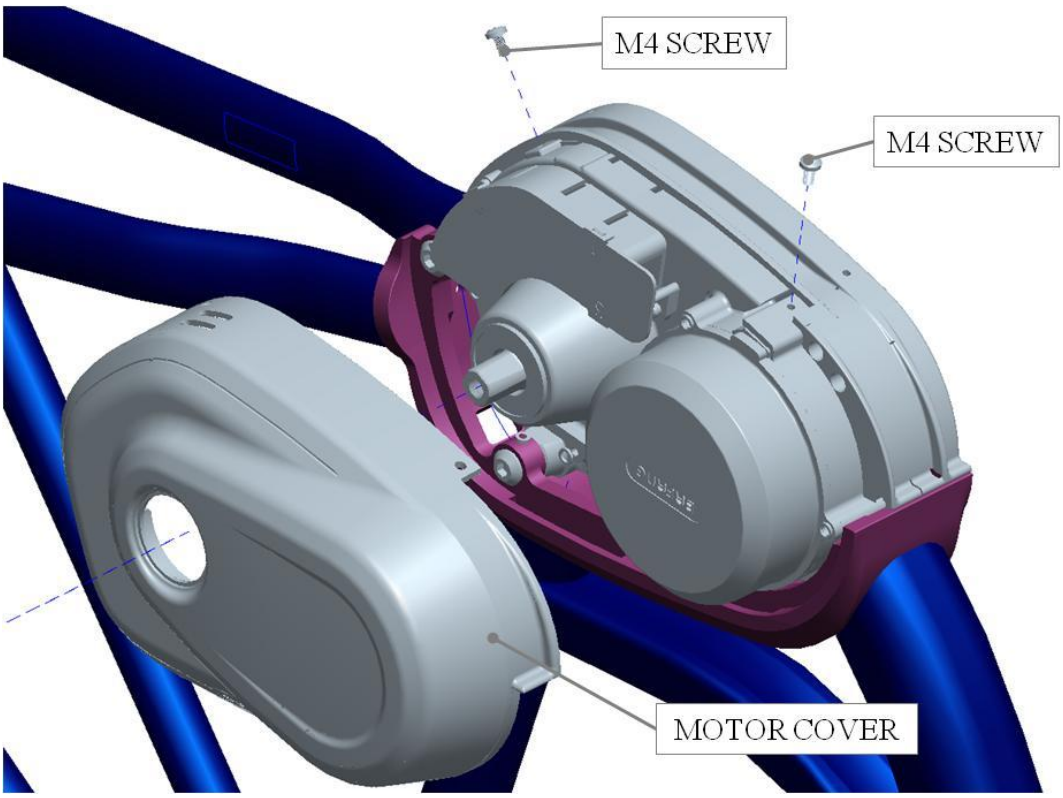
F. Controller cable



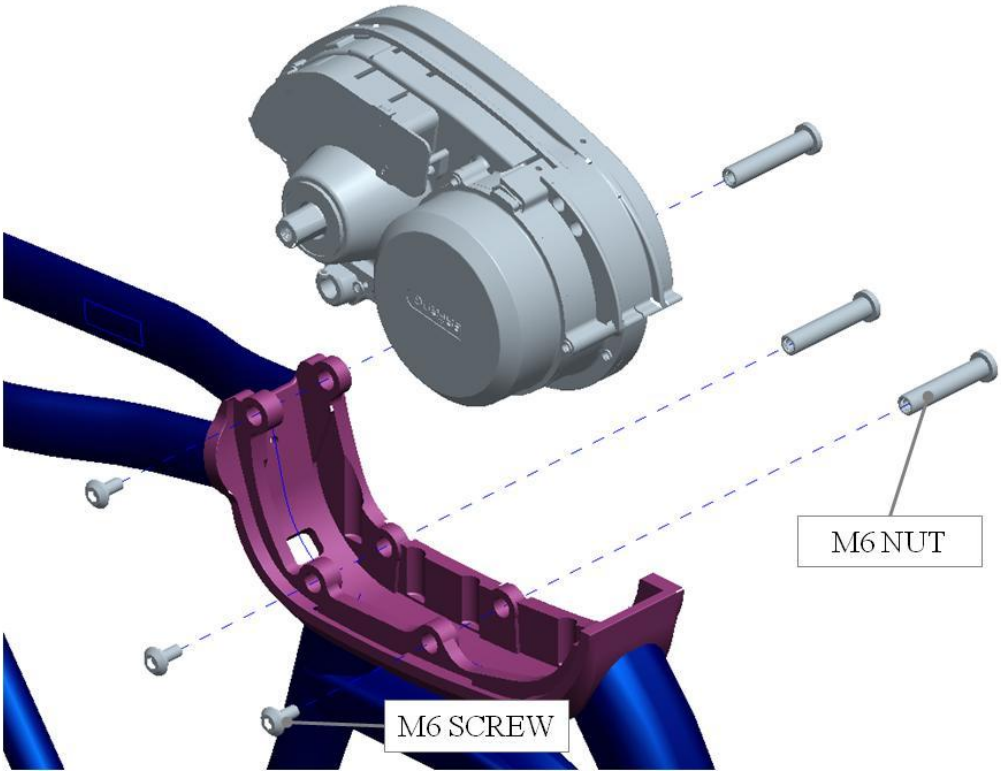
Note ! Once you finish the replacement of controller, please refer to section 4.3.6 to calibrate the sensor.

3.2 Motor

A. Remove 2 M4 screws under the Mid-Motor. And then remove the Motor Cover.



B. Remove 3 M6 Bolts and disassemble the Mid-Motor.

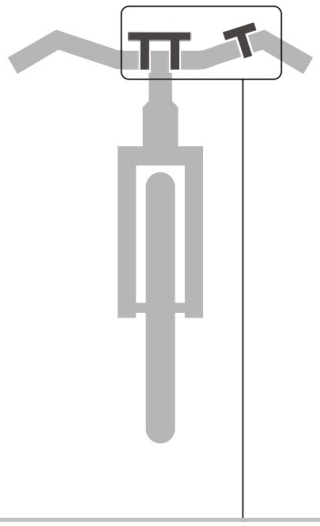


3.3 HMI

A. Nut M3

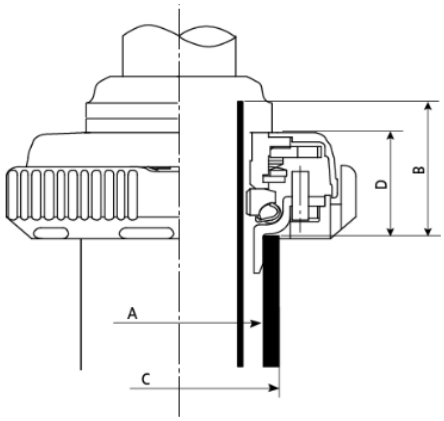
B. M3*8 cap head screw x 1

C. M4*20 bolt x 2



3.4 Shimano components

A. HP-NX10 Head parts of Shimano



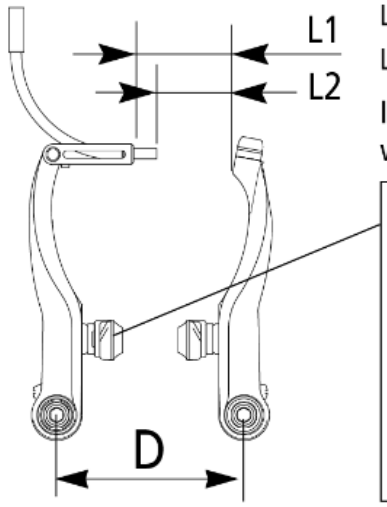
Model No.	***HP-NX10***
A (mm)	ø29.85 - 30.0 or ø30.01 - 30.2
B (mm)	30.5 - 31.5
Front fork stem thread size	BC 1" X 24T.P.I
C (mm)	ø38 (max.)
D (mm)	21.7
Head tube material	Steel

B. SL-3S41E Shifting lever of Shimano

Series		**NEXUS**
Model no.		SL-3S41E
Color	**1**	-
	2	Black
	3	-
Shifter type		REVOSHIFT
Top-Normal		-
Speeds		3
Compatiable internal geared hub type		NEXUS INTER-3
I-SPEC compatiable		-
Shift lever position adjust		-
Shift lever cable adjust		-
Max. multiple shifts		2
Release function	**MULTI RELEASE**	-
	INSTANT RELEASE	-
	2-WAY RELEASE	-
OPTICAL GEAR DISPLAY		Window
LED Positioning Light		-

Multi-Bearing Construction		-
Shift lever bracket	**Material**	Resin
	Finish	Resin
Main lever body	**Material**	-
	Finish	-
Release lever body	**Material**	-
	Finish	-
Base cover	**Material**	Resin
	Finish	-
Shift lever cable	**Material**	Stainless steel
	Finish	-
Recommended shift lever Outer Casing		OT-SP40
Stainless clamp bolt		-
Brake lever integrated		-
Brake Lever Size		-
Left Hand Brake Lever		-
Clamping Diameter (mm)		22.2
Note		

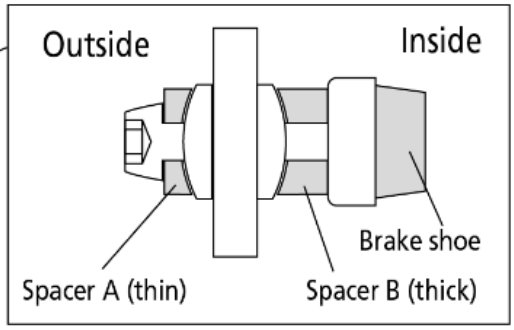
C. BR-T4000 V-Brake of Shimano

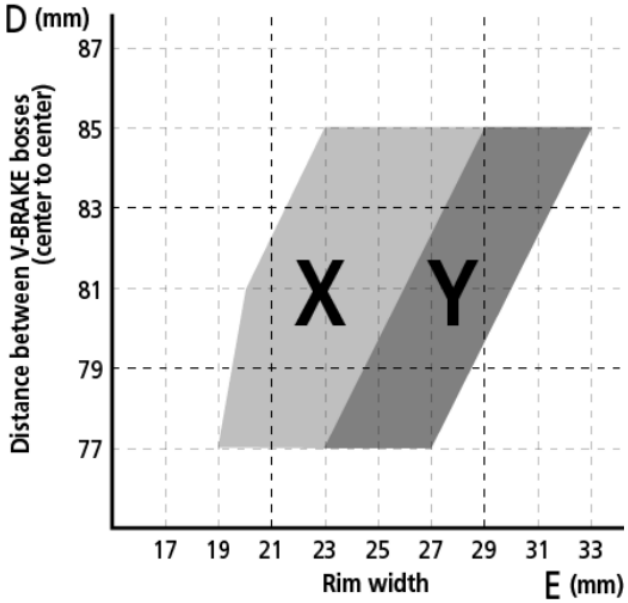


L1 > 32 mm

L2 > 25 mm

If L (L1, L2) is too narrow, the left and right links will come in contact, and the brakes will not work.





Spacer A position	Spacer B position	Graph area
Outside	Inside	X area
Inside	Outside	Y area

NOTE

- As with normal cantilever brakes, the Shimano V-BRAKE is designed for installation on frames with a 80 mm distance between bosses (center to center). Please refer to the graph for suitable rim width and boss distance combinations. If the brakes are used in conditions outside what is recommended, the brake performance may be adversely affected.
- Some rim width and boss combinations may require the reversal of A and B spacers in order to obtain the required L1 and L2 dimensions.
- If the L dimensions of the frame are too large, interference may be created between the riders legs and the brakes.
- To specify optimum set up and obtain the required minimum dimension L, refer to the graph above and the table below relating to boss distance, rim width, and spacer positioning.

D. SG-3R40 Rear Hub of Shimano

UM-38E0A-005-00　　ご使用方法

内装ハブ（ローラーブレーキ / Vブレーキ / ディスクブレーキ）

ユーザーマニュアルは以下にてご覧いただけます。
http://si.shimano.com

重要なお知らせ

- ユーザーマニュアルに記載されていない自転車への取付け、調整などにつきましては購入された販売店または代理店へご相談ください。なお、自転車安全整備士、自転車技士など専門知識を有する方むけのディーラーマニュアルはウェブサイト(http://si.shimano.com)で公開しています。
- 製品の分解、改造はおこなわないでください。

安全のため、必ずこの「ユーザーマニュアル」をよくお読みの上、正しくご使用ください。

安全のために必ずお守りください

交換作業を必要とする事項は販売店または代理店へご相談ください。

⚠ 警告

- 自転車は、製品によって取扱いが多少異なることがあります。したがって、ブレーキレバーへの入力や自転車の操作特性などを含め、個々の自転車のブレーキ系統の適切な操作を充分理解し慣れるようにしてください。ブレーキ系統の操作が適切でないと自転車のコントロールを失い、転倒して大怪我をする可能性があります。適切な操作については、自転車専門店にご相談いただき、また自転車の取扱い説明書もよくお読みください。ご自分の自転車にお乗りになって、ブレーキ操作などを練習していただくことも大切です。
- 乗車前に車輪が固定されていることを確認してください。転倒して大怪我をすることがあります。
- ユーザーマニュアルはよくお読みになった後、大切に保管してください。

⚠ 注意

- 変速レバーは必ず１段ずつ変速操作してください。その際、ペダルの踏力は弱い状態で行ってください。強くペダルを踏んでいる時に、無理やり変速レバーを操作したり、一気に多段変速したりすると、足がついていかずにペダルから足を踏み外し、転倒事故につながることがあります。
  また、変速レバーを軽いギアへ一気に変速させるとアウターケーシングが変速レバーから飛び出す場合があります。変速が終わると元に戻りますので機能への影響はありません。
- ローラーブレーキ / ディスクブレーキをひんぱんに使用した場合、ブレーキ部周辺が高温になる場合があります。走行後しばらく（30分位）は、ブレーキ部周辺に手をふれないよう注意してください。

使用上の注意

- ペダルを軽く踏みながら変速ができますが、変速したあとで確実な変速動作のため、ハブ内部の爪とラチェットの間でまれに音が発生する場合があります。
- 下記の現象はいずれも内装変速構造によるものであり、内部の故障ではありません。

発生する現象	ハブの種類	発生するギア位置
ペダルが回転している時に音が発生する。	7段ハブ	2、3、4、5、6、7速
	3段ハブ	2、3速
クランクを反対にまわしたり、自転車をうしろに押した場合に音が発生する。	8段ハブ	5、6、7、8速
変速をサポートする機構が内蔵されており、変速時にサポート機構が動いた場合、音や振動が発生する。	8段ハブ 3段ハブ (SG-3R75-Aは除く)	全速
ギアの位置によって変速の感触が違う場合がある。	8段ハブ 7段ハブ 5段ハブ 3段ハブ	全速
走行中にペダルの回転を止めると音が発生する。	7段ハブ 3段ハブ (SG-3R75-Aは除く)	全速
	5段ハブ	4、5速

- 製品の性能を維持するために、使用開始から2年間に一度（頻繁に乗車される場合は5,000kmごと）を目安に、自転車購入店もしくはプロショップで、内部のグリスアップなどのメンテナンスを推奨します。またメンテナンスの際は、シマノ内装ハブ専用グリスまたは、オイルキットを推奨します。専用グリス・オイルキットを使用されない場合、変速機が正常に作動しない等のトラブルの原因となる可能性があります。
- 内装ハブは完全防水ではありません。ハブが浸水するような場所でのご使用、高圧洗浄は内部の錆の原因となりますのでお控えください。
- ギアは定期的に中性洗剤で洗浄してください。またチェーンを中性洗剤で洗浄し注油することも、ギア及びチェーンの寿命を延ばす効果があります。
- チェーン飛びが発生するようになった場合は、ギアとチェーンを販売店または代理店で交換してください。
- ベルクランク部分には、絶対に足をかけないでください。変速不具合の原因となります。
- 変速時は、ペダルを止めるかペダルの踏力を弱くして変速してください。スムーズに変速できます。
- 変速操作はよく練習してください。
- 通常の使用において自然に生じた摩耗及び品質の経年劣化は保証いたしません。

乗車前の日常点検項目

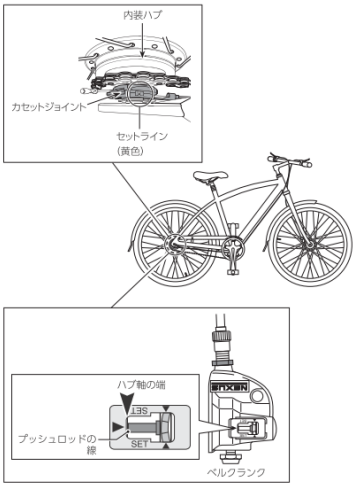
乗車前には下記に記載する項目を点検ください。異常のあった場合は販売店または代理店へご相談ください。

- 変速はスムーズに行えますか。
- カセットジョイントのセットラインは正しい位置にありますか。
- ベルクランクのプッシュロッドは正しい位置にありますか。
- 操作時にふだんと異なる音はしませんか。

＊変速ケーブル調整の点検方法(セットライン位置、プッシュロッド位置)はシフティングレバーのユーザーマニュアルをご覧ください。

各部の名称

内装ハブの仕様により構成部品は異なります。



製品改良のため、仕様の一部を予告なく変更することがあります。

お客様相談窓口
☎ 0570-031961　Fax. 072-243-7847
株式会社シマノ
堺市堺区老松町3丁77番地 〒590-8577

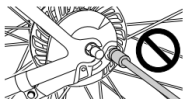
E. BR-IM45-R Rear Brake of Shimano

SI-8G80C-001-00

安全の為に必ずお守りください

⚠ 警告

- 自転車のブレーキは、製品のモデルによって取扱いが多少異なることがあります。したがって、ブレーキレバーへの入力や自転車の操作特性などを含め、個々の自転車のブレーキ系統の適切な操作を充分理解し慣れるようにしてください。
  ブレーキ系統の操作が適切でないと、自転車のコントロールを失い事故のもとになり、また大怪我を招くとも限りません。
  適切な操作については、自転車専門店にご相談いただき、また自転車の取扱い説明書もよくお読みください。ご自分の自転車にお乗りになって、ブレーキ操作などを練習していただくことも大切です。
- 前ブレーキを強くかけると前輪がロックし、自転車が前方向に転倒して重傷を負う可能性があります。
- インナー固定ボルトは、実車組み付け状態で締め付けを絶対に行わないでください。インナー固定ボルトの脱落の原因となり得ます。



- SB-8S20/ST-8S20/SB-7S45/BL-IM60/BL-IM65/BL-IM45 のブレーキレバーには、モード切替えが装着されています。BR-IM81-R/BR-IM80-R/BR-IM55-R/BR-IM45-R は必ず C-R のモード位置でご使用ください。

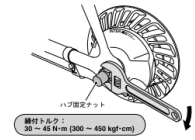
- ブレーキアームをフレームに固定するときは、チェーンステーのサイズに合ったアームクリップをクリップボルトとクリップナットで指定の締付トルクでしっかりと締付けてください。
  クリップナットは、ナイロンインサートロックナット（緩み止めナット）を使用してください。クリップボルト、クリップナット及びアームクリップはシマノ製をお勧めします。なおアームクリップは、チェーンステーに合ったものをご使用ください。
  ブレーキアームのクリップナットが破損すると、クリップボルトまたはアームクリップが破損すると、ブレーキアームが回転し突然ハンドルがとられたり、車輪がロックして転倒し大怪我をすることがあります。
- **製品を取付ける時は、必ず取扱い説明書等に示している指示を守ってください。**またその際、シマノ純正部品の使用をお勧めします。
  ボルトまたはナット等が緩んだり、製品が破損すると、突然に転倒して怪我をする場合があります。
- 乗る前には必ず前後のブレーキが正しく作動するかどうか確認してください。
- 路面がぬれていると、タイヤがスリップしやすくなります。タイヤがスリップすると転倒して危険ですので、スピードを控えて、早めの滑らかなブレーキ操作をしてください。
- 取扱い説明書はよく お読みになった後、大切に保管してください。

⚠ 注意

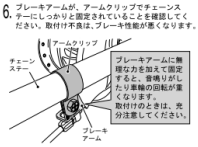
1. シマノインター M ブレーキシステムは、長い下り坂でブレーキを連続して使用されますと、ブレーキ内部が高温になりブレーキの効きが弱くなったり、内部のグリスがなくなりブレーキの効きが急に強くなる等の異常が発生する場合があります。
   シマノインター M ブレーキシステムは、ISO(4210)/DIN(79100-2) 等の規格を基本に設計しています。それらの規格は、総重量が 100kg での性能をうたっています。但し、BR-IM81-R は総重量が 130kg を想定した設計をしています。
   総重量が 100kg（BR-IM81-R は 130kg）を越える場合には、ブレーキカ不足・耐久性不足等の不具合が生じることも為りますので、そのことを考慮してご使用ください。
2. シマノインター M ブレーキの性能を最大限に発揮させるため、必ずシマノブレーキケーブルとブレーキレバーをセットでご使用ください。

3. ハブ固定ナットが袋ナットの場合は、フォークエンドの幅が 7mm 以上あるフレームをご使用ください。
4. ブレーキユニットが、ハブ本体にブレーキ取付ワッシャーで確実に固定されていることを確認してください。

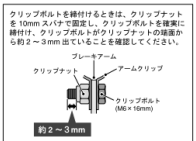
5. 車輪がフレームに、ハブ固定ナットで確実に固定されていることを確認してください。



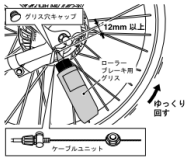
6. ブレーキアームが、アームクリップでチェーンステーにしっかりと固定されていることを確認してください。取付け不良は、ブレーキ性能が悪くなります。



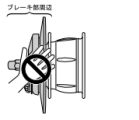
クリップボルトを締付けるときは、クリップナットを 10mm スパナで固定し、クリップボルトを確実に締付け、クリップボルトがクリップナットの端面から約 2 ~ 3 mm 出ていることを確認してください。



7. 使用中、次のことが発生した場合には、即刻使用を中止し、販売店で点検・修理をしてください。
   1) ブレーキをかけたとき、音鳴りがした場合
   2) ブレーキの効きが異常に強すぎる場合
   3) ブレーキの効きが異常に弱すぎる場合
   1) と 2) の場合は、ブレーキグリスの不足が考えられますので、販売店でローラーブレーキ専用グリスを補給してください。
   グリスを補給するとき、必ずケーブルユニットを取り外してください。次にグリス穴キャップを取り、チューブを穴の奥まで 12mm 以上差し込んで、車輪を中ぐくり回転させながら適量（約 5g）注入してください。補給後、ブレーキの効きや音鳴りがしない か確認してください。



8. ブレーキをひんぱんに使用した場合、ブレーキ部周辺が高温になる場合があります。走行後しばらく（30分位）は、ブレーキ部周辺に手をふれないよう注意してください。



9. ブレーキケーブルがさびると、ブレーキの効きが悪くなります。効きが悪くなった時は、新しいシマノ純正ブレーキケーブルと交換し、再度ブレーキの効きを確認してください。
10. ブレーキユニットは分解できません。分解するとトラブルや故障の原因になります。

使用上の注意：

- スポークは、6 本組または 8 本組で編まれた車輪を使用してください。ラジアル組の車輪は使用できません。スポークや車輪の破損またはブレーキ時に音鳴りの発生する恐れがあります。
- インターMブレーキは、従来のハンドブレーキと異なり、ドラム内部にグリスが封入されているため、タイヤ回転がわずか重たくなっています。(特に冬期)
- 通常の使用において自然に生じた摩耗および品質の劣化は保証いたしません。
- 取扱い方法または調整方法について疑問のある方は、購入された販売店にご相談ください。

SI-8G80C-001

BR-IM81-R
BR-IM80-R
BR-IM55-R
BR-IM45-R
インターMブレーキ

ご使用方法

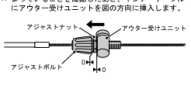
INTER M

機能を充分に発揮させるため、下記のラインナップによる使用を推奨いたします。

ブレーキ本体	BR-IM81-R/BR-IM80-R/ BR-IM55-R/BR-IM45-R
ハブ本体	SG-8R36/SG-8R31/SG-7R46
レバー	SB-8S20/ST-8S20/SB-7S45/ BL-IM60/BL-IM65/BL-IM45
ブレーキケーブル	

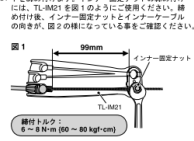
ブレーキケーブルの取付け

1. アジャストボルトとアジャストナットが完全に締まっていることを確認したあと、インナーケーブルにアウター受けユニットを図の方向に挿入します。

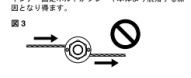


2. インナー固定ボルトユニットの裏面の刻印が“R”であることを確認したあと、インナーケーブルの穴に、インナーケーブルを通します。

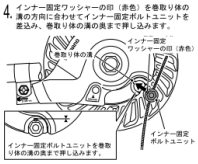
3. 下図の状態になるようにセットし、インナー固定ナットを締め付けます。インナー固定ナットの締め付けには、TL-IM21 を図 1 のように使用ください。締め付け後、インナー固定ナットとインナーケーブルの向きが、図 2 の様になっている事をご確認ください。



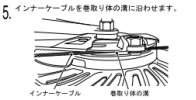
インナー固定ボルトは、実車組み付け状態で締め付けを絶対に行わないでください。インナー固定ナットとインナーケーブルの向きが、図 3 の様になり、インナー固定ボルトがブレーキ本体より脱落する原因となり得ます。



4. インナー固定ワッシャーの印（赤色）を巻取り体の溝の方向に合わせてインナー固定ボルトユニットを差込み、巻取り体の溝の奥まで押し込みます。



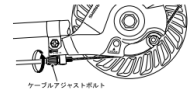
5. インナーケーブルを巻取り体の溝に沿わせます。



6. ブレーキアームの穴にアウター受けユニットを下方から挿入し、穴の奥にスライドさせます。

7. アウター受けユニットがブレーキアームの穴の奥までスムースでいることを確認したあと、インナーエンドキャップを取り付けます。
   その後、インナーエンドキャップがフィンやスポークと接触しないようにしてください。

8. ケーブルアジャストボルトを回してケーブルを張ります。

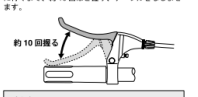


9. インナー固定ボルトユニットを巻き取り体に差し込んだ状態のインナー固定ワッシャーの印（赤色）が下図の様に正常な状態であることを確認してください。

これでブレーキケーブルの取付けは完了です。取外しの際は、逆の手順で行ってください。

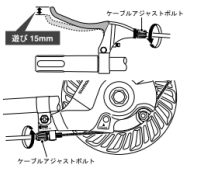
ブレーキケーブルの調整方法

1. ケーブルが張りぎみで、車輪の回転が重くなっていることを確認したあと、ブレーキレバーをグリップに付くまで、約 10 回ほど握り、ケーブルをなじませます。

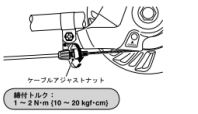


ご注意：
ケーブルがなじんでいないと、短期間で再度ブレーキの調整が必要になります。

2. ブレーキユニットまたはブレーキレバーのケーブルアジャストボルトを回して、ブレーキレバーの遊びが 15mm になるように調整します。
   （ブレーキレバーの遊びとは、レバーを操作していない状態から、レバーを少し引いていくと、急に重くなる所までの引き代のことです。



3. ブレーキレバーを握り、ブレーキの効きを確認したあと、ケーブルアジャストナットでケーブルアジャストボルトを固定します。



締付トルク：
1 ~ 2 N·m (10 ~ 20 kgf·cm)

この取扱い説明書は、ご購入された自転車に装着されているシマノ製自転車部品の取扱い方法を説明しています。ご購入された自転車及びシマノ製自転車部品以外に関するご質問は、ご購入先または自転車製造元へのお問い合わせをおすすめいたします。

※取扱い説明書は以下にてご覧いただけます。
http://techdocs.shimano.com

製品改良のため、仕様の一部を予告なく変更することがあります。

お客様相談窓口
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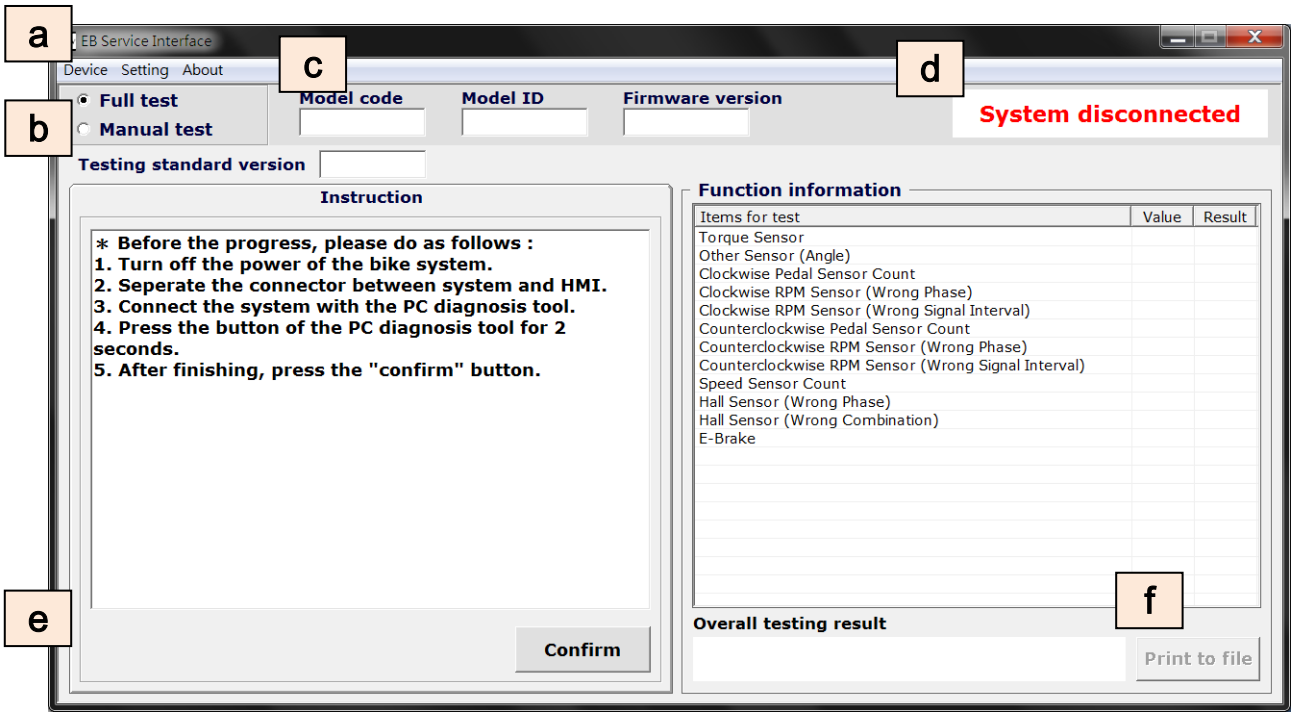
4. Manual of EB Service interface

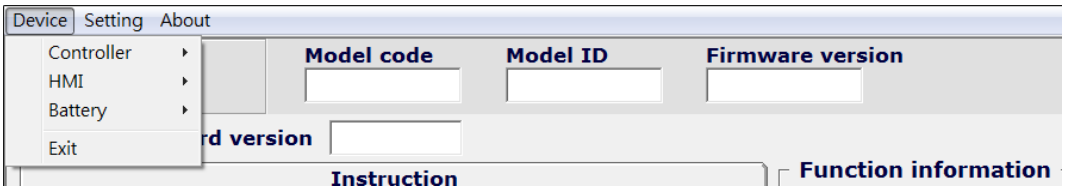
4.1 Resource introduction

A. EB Service interface

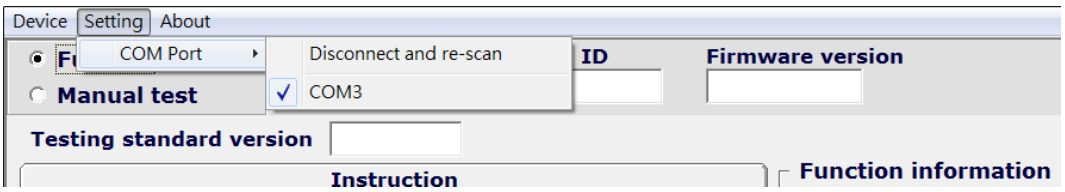


a. Menu :

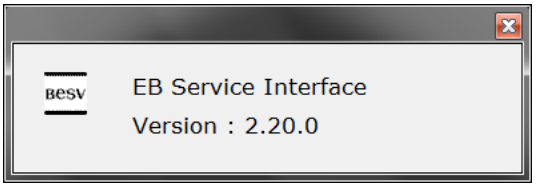
- Device : You can select "Controller" to test the normality of your bike or update firmware of your system; "HMI" to set LCM contrast or update firmware of your HMI; "Battery" to check battery status of your bike.



- Setting : With this function you can re-install your PC diagnosis tool and select a new com port.



- About : The code of EB service interface version.



b. Test mode :

- Full test : With this selection, you can test the normality of the bike step by step, by the indications of EB service interface.
- Manual test : With this selection, you can test the normality of some particular functions manually.

c. Model information :

- Model ID : The code of bike's model.
- Model code : The code of bike's specification.
- Firmware version : The code of bike's firmware version (controller).

d. System Communication :

- If the communication between e-bike and PC are fine, then it will show "System connected", otherwise it shows "System disconnected".

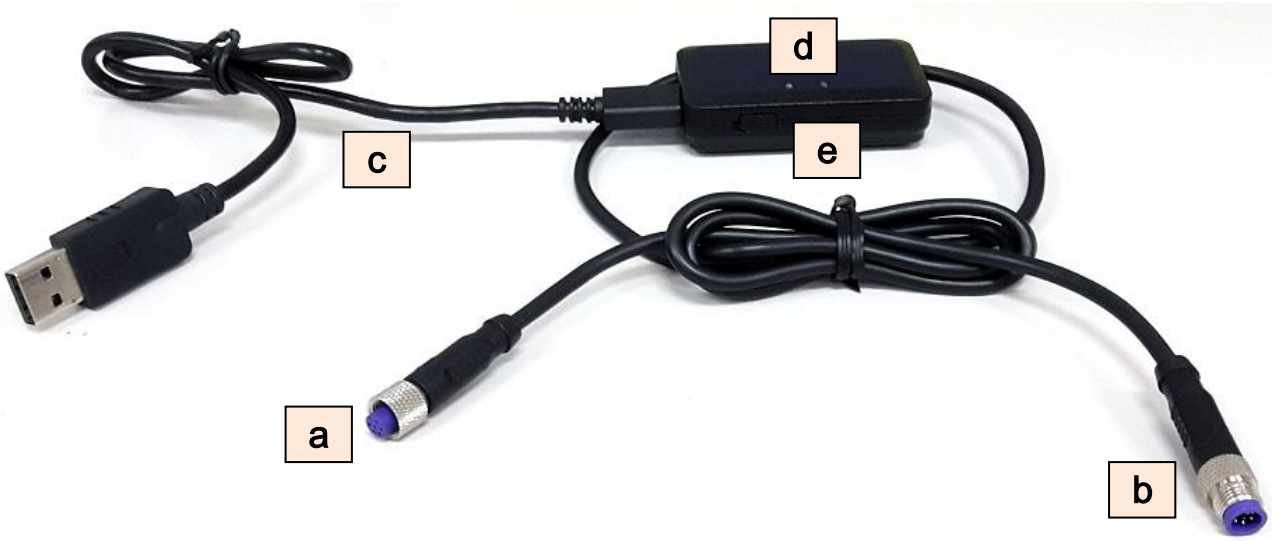
e. The page of "Full test" :

- Testing standard version : The code of INI's file version.
- If you selected "Full test" function, the page will help you with instruction consequently to perform the full normality test of the bike.

f. Function information

- Items for test : This column tells which function items are for test.
- Value : This column tells the data which was read for test by PC diagnosis tool.
- Result : This column tells the judgment of each functions.
- Overall testing result : It tells the overall test result, if there is no error detected by PC diagnosis tool, then it will show "Pass".
- Print to file : After a cycle of test is finished, there will be a button to make file including testing data.

B. Diagnosis Tool



a. Connect the HMI cable with your diagnosis tool.

b. Connect the system cable with your diagnosis tool.

c. Connect the diagnosis tool with your PC USB port.

d. Show LED communication signal.

e. Diagnosis tool switch to left with the HMI communication.
Diagnosis tool switch to right with the system communication.

4.2 Install program

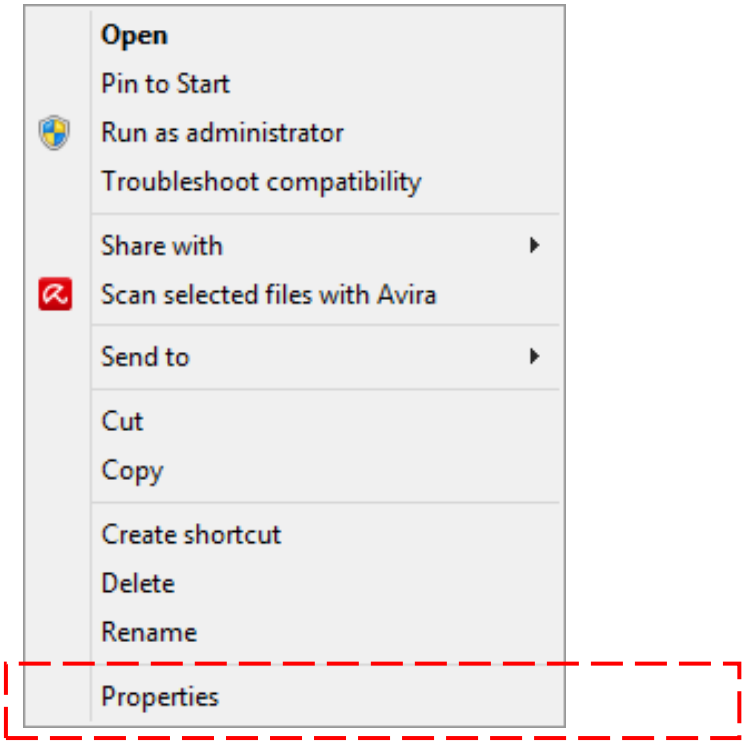
※ Introduction :

- If the program has never been executed in your PC, please follow the section 4.2.1 and 4.2.2 to install driver. After the successful installation, you can progress the updating by section 4.3.2 or 4.4.2.
- If the program had already been executed in your PC, please skip section 4.2.1 and 4.2.2.
- If the program had ever been executed successfully in your PC but fails now, please redo the section 4.2.1 and 4.2.2.

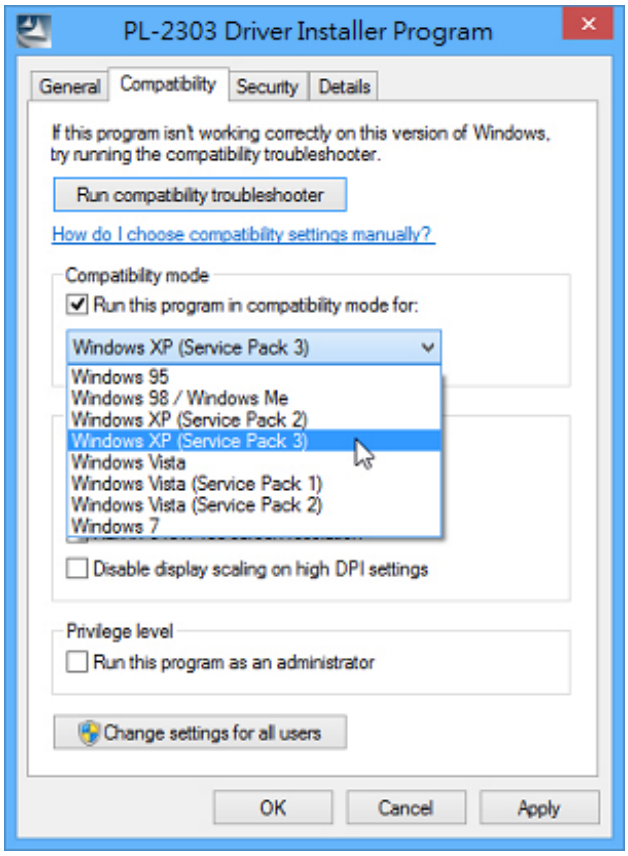
4.2.1 PL2303 driver setup

Note ! The version of driver should be later than v1.12.0

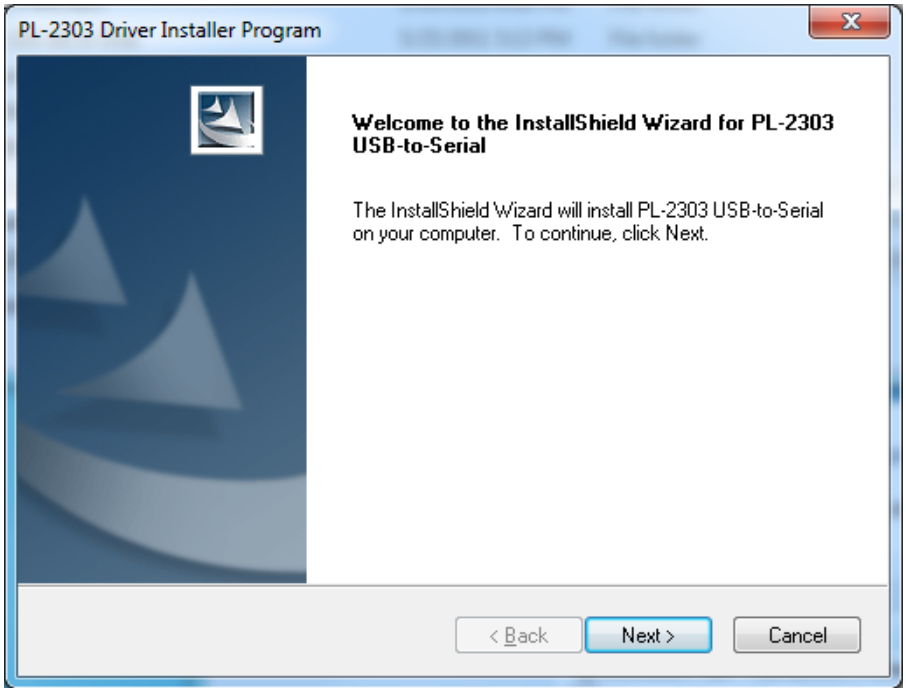
A. Right click the icon of the program, select "Properties" and go to the "Compatibility" tab.



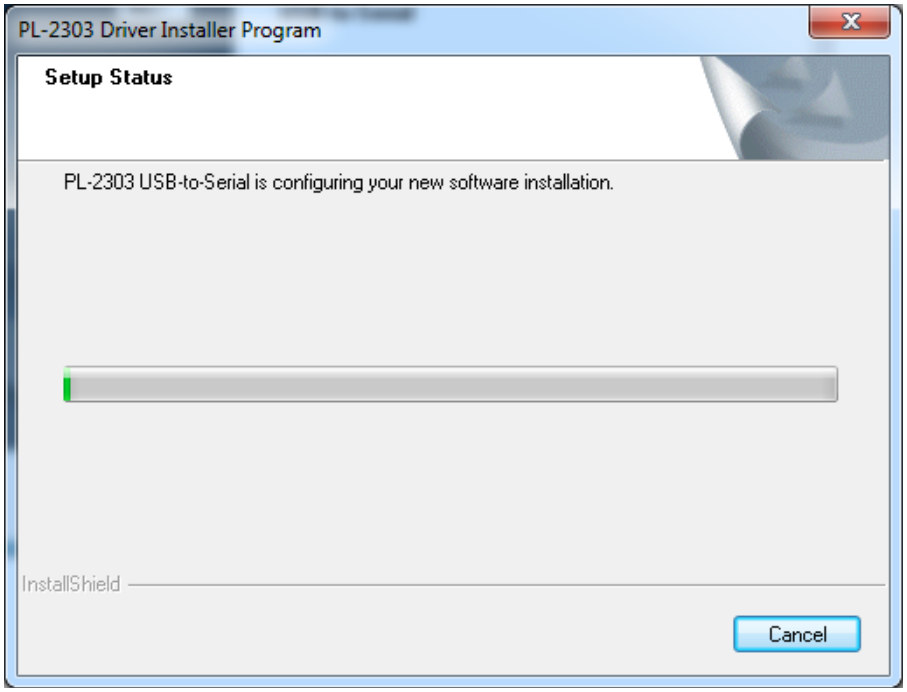
B. Set the compatibility of the programming tool to "Windows XP (Service Pack 3)". Click "OK" and run the program.



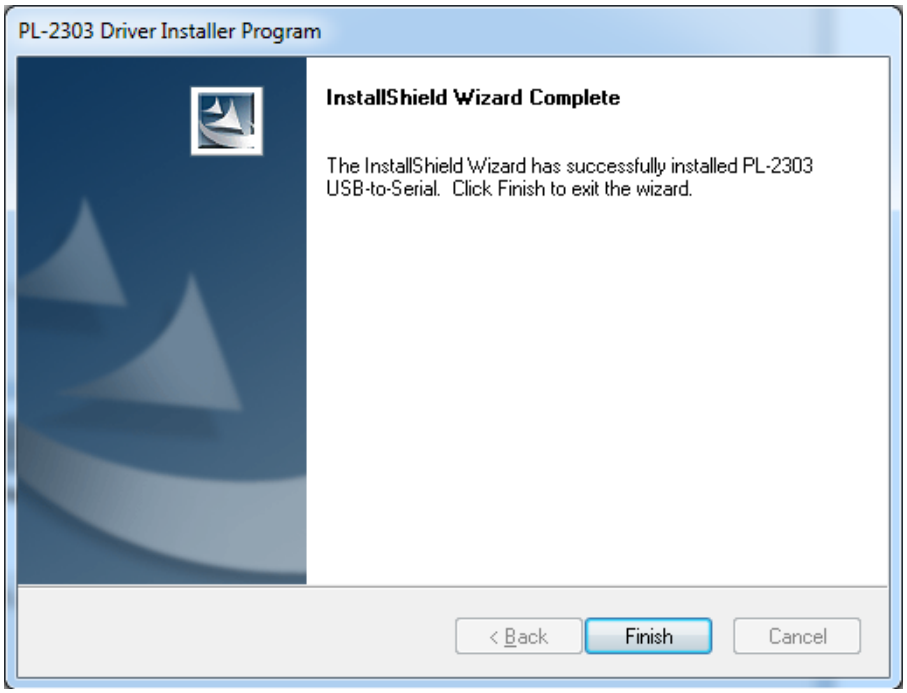
C. The Install Shield Wizard will be displayed to inform you that the PL-2303 USB-to-Serial driver will be installed on your computer. Click the "Next" button to continue.



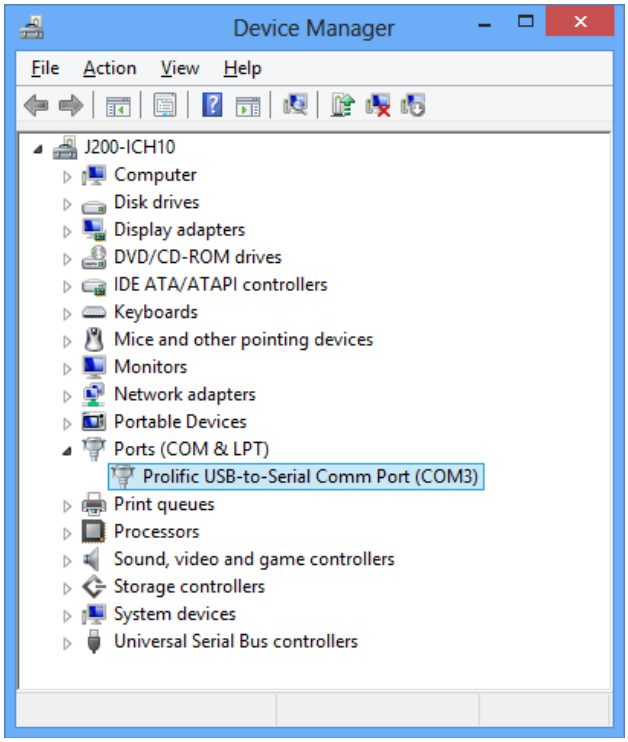
D. The PL-2303 Driver Installer Program will then start to install the drivers needed.



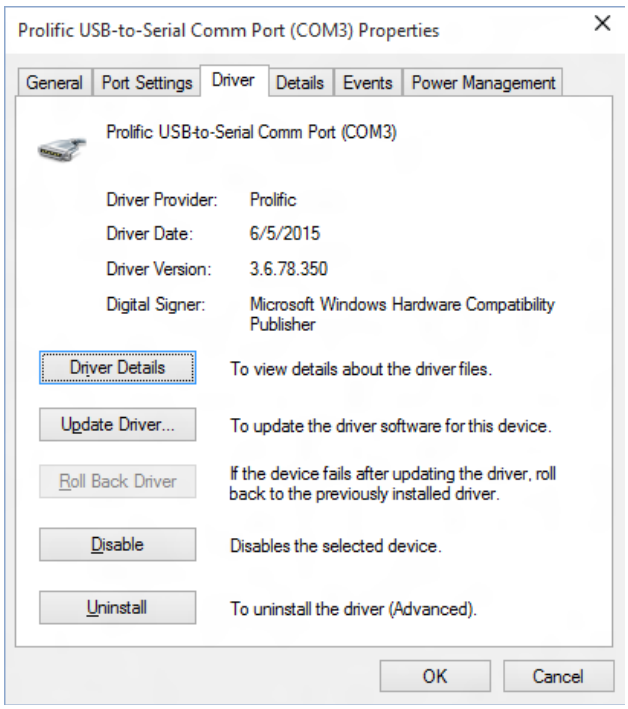
E. Click the "Finish" button to close the Install Shield program.



F. Re-plug the USB to Serial adapter to the PC USB port. Windows should be able to detect the driver. Go to "Device Manager" and check for the "Prolific USB-to-Serial Comm Port" device and the COM port number assigned by Windows.

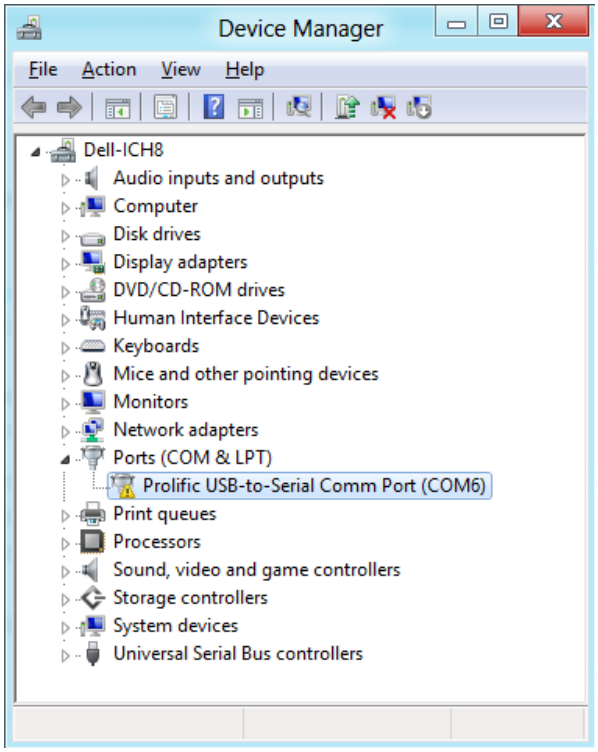


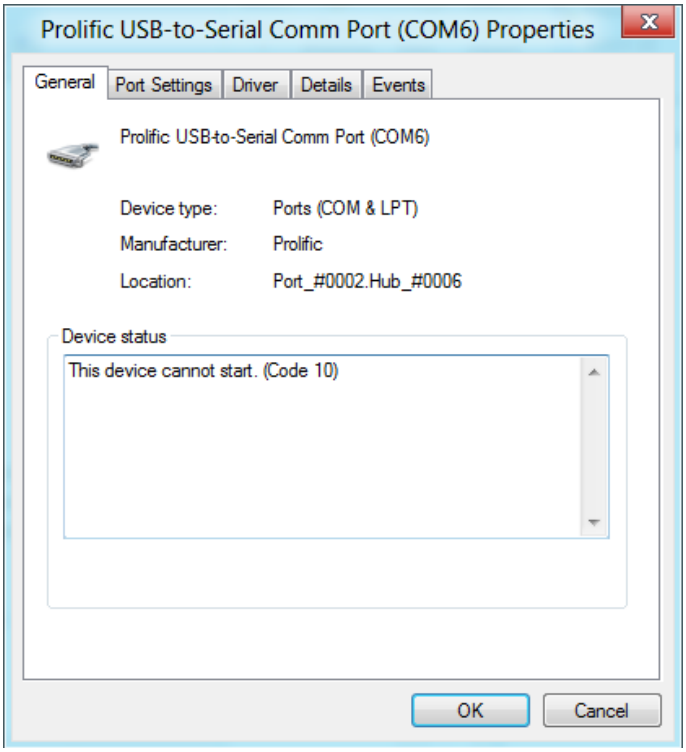
G. You can also confirm the driver version by right-clicking on the "Prolific USB-to-Serial Comm Port" device and select Properties and Driver tab.



Warning !

If there is still any trouble shown in "Device manager" in Windows XP or Windows 7, please save the screen photo and contact with Service center.

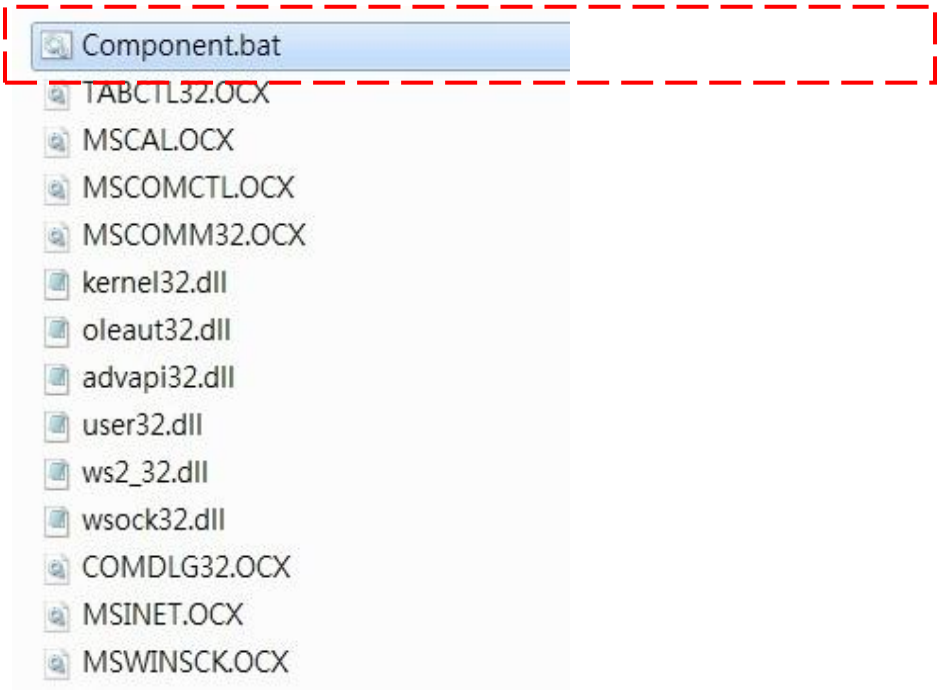




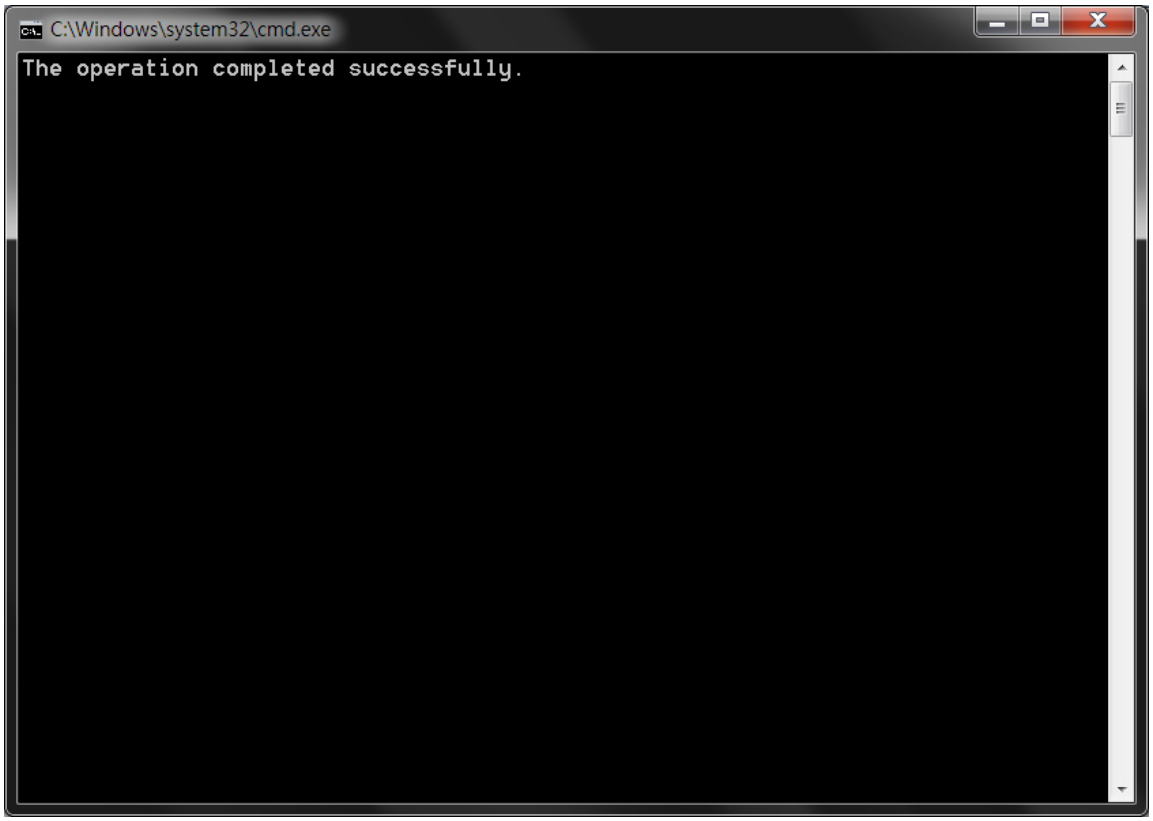
4.2.2 Component installer

- Install in Windows XP or Windows 7

A. Double click on "Component.bat".

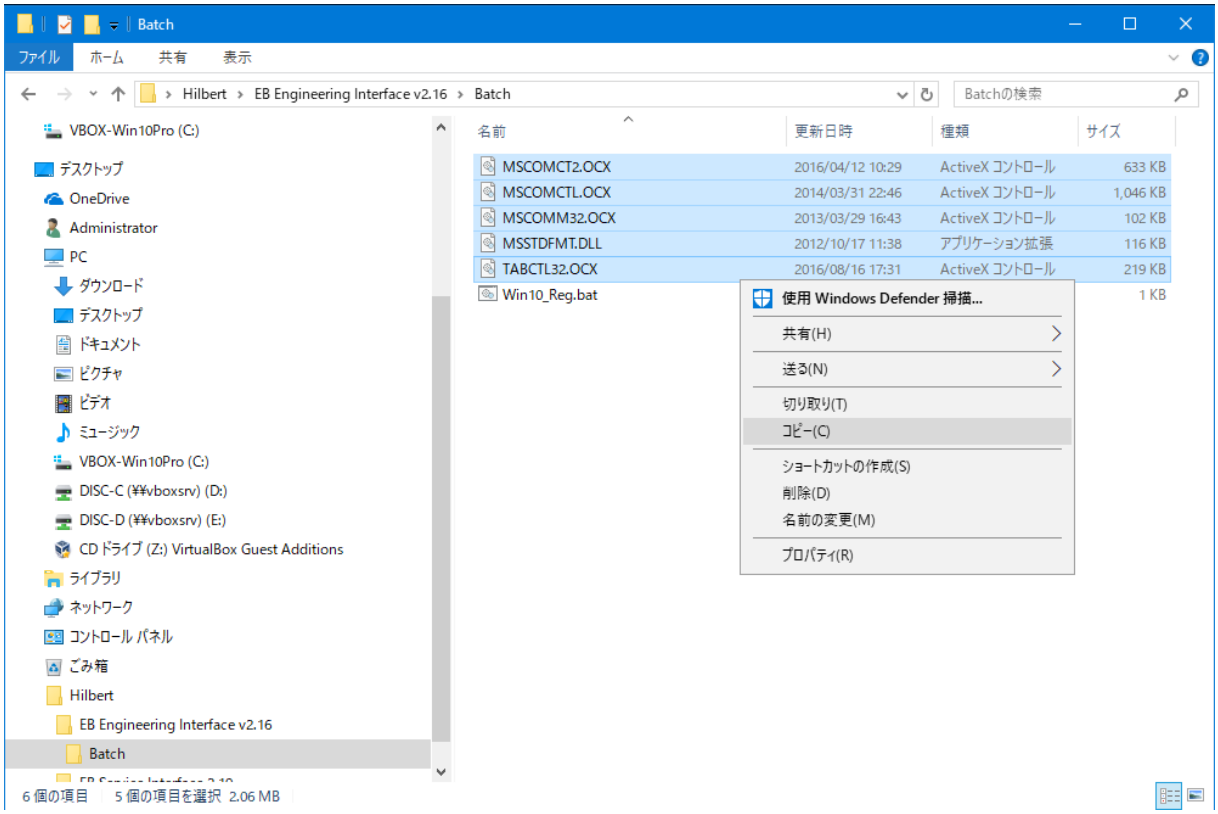


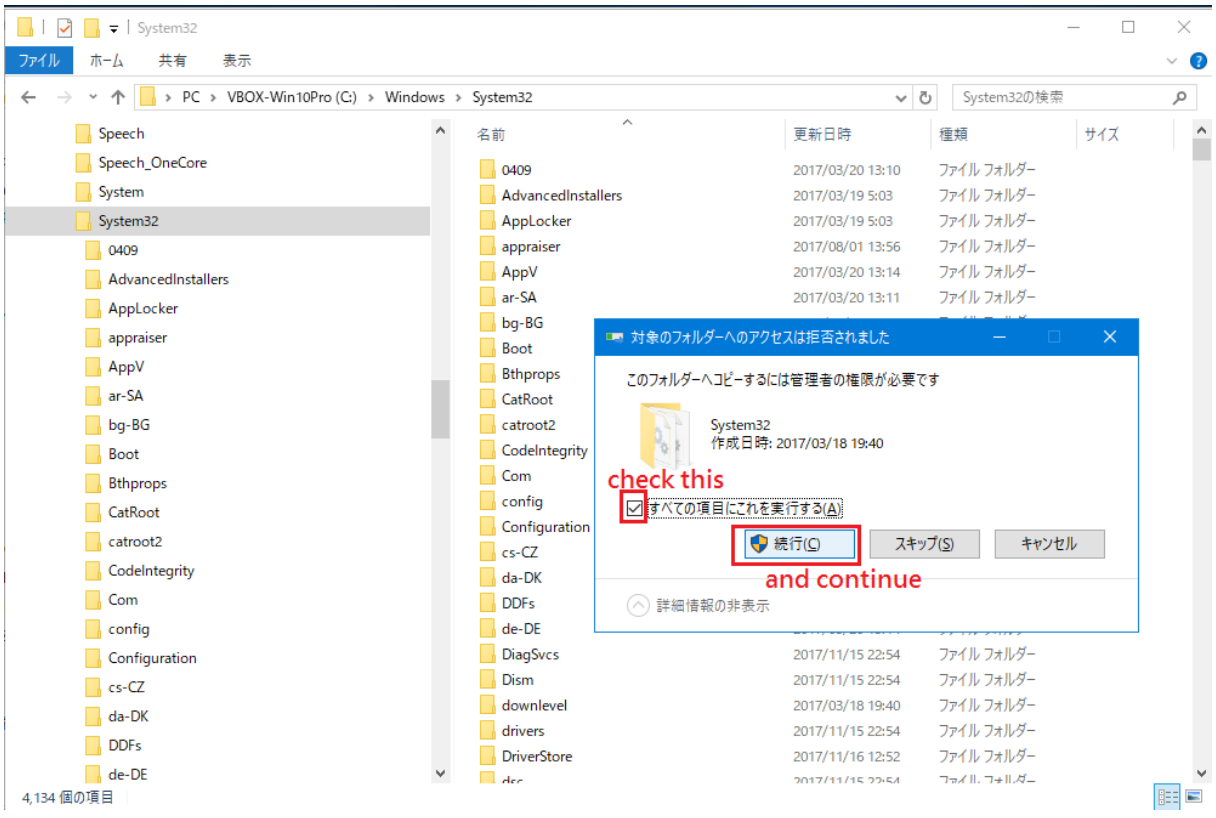
B. After the program is installed into the system, the cmd option will be closed automatically.

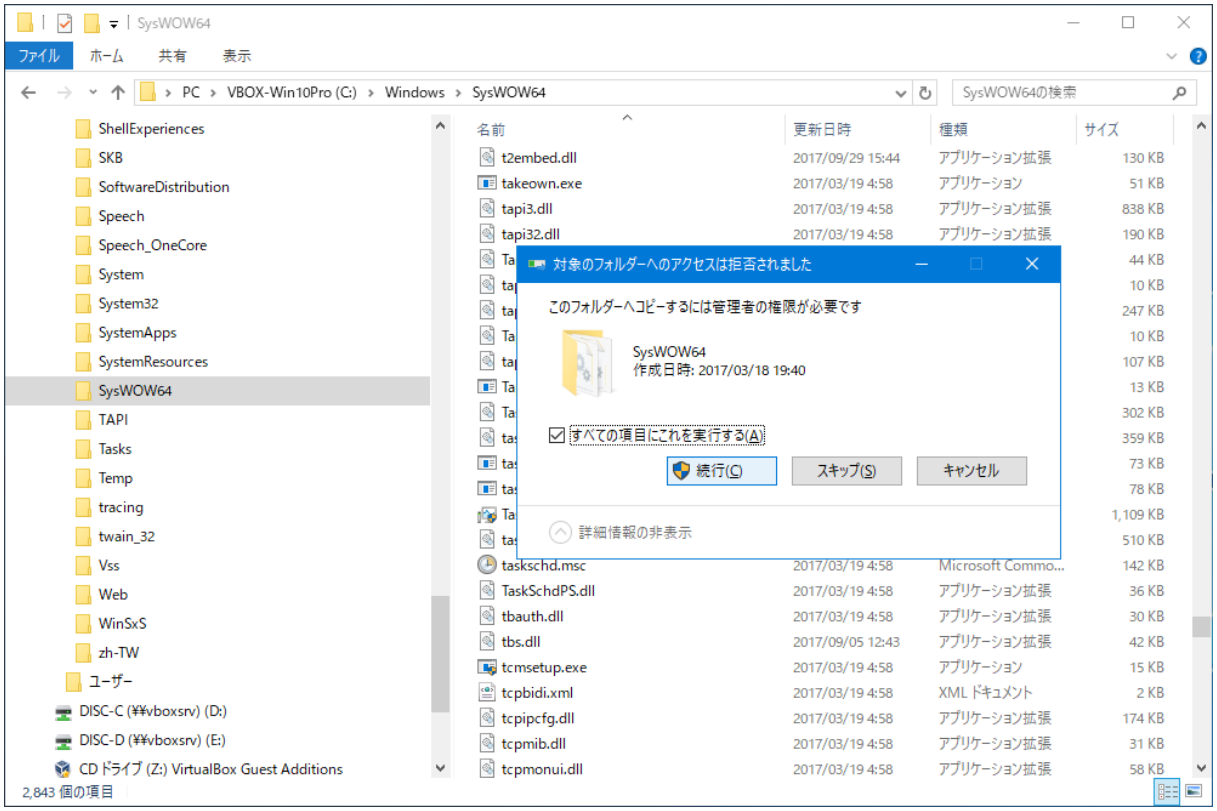


- Install in Windows 10

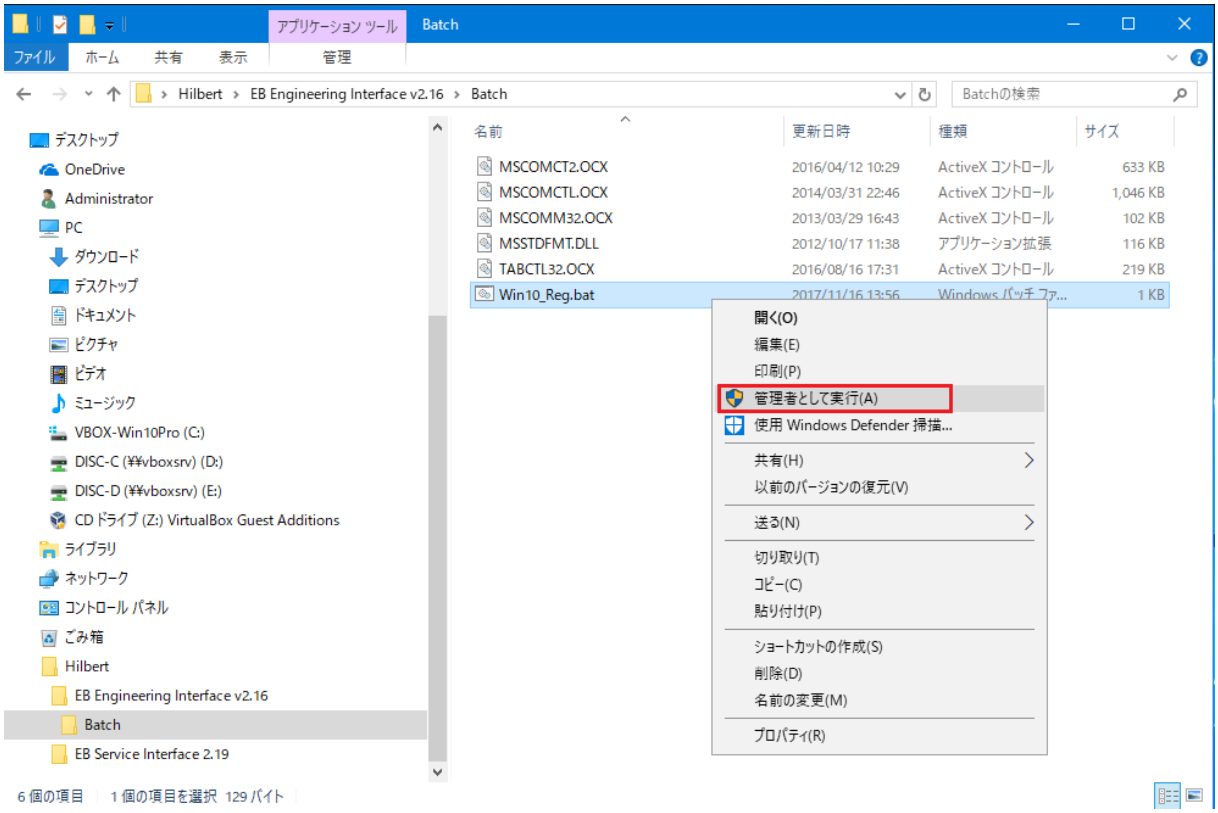
A. Copy all files in the Batch directory to "C:\Window2\System32" and "C:\Window2\SysWOW64".



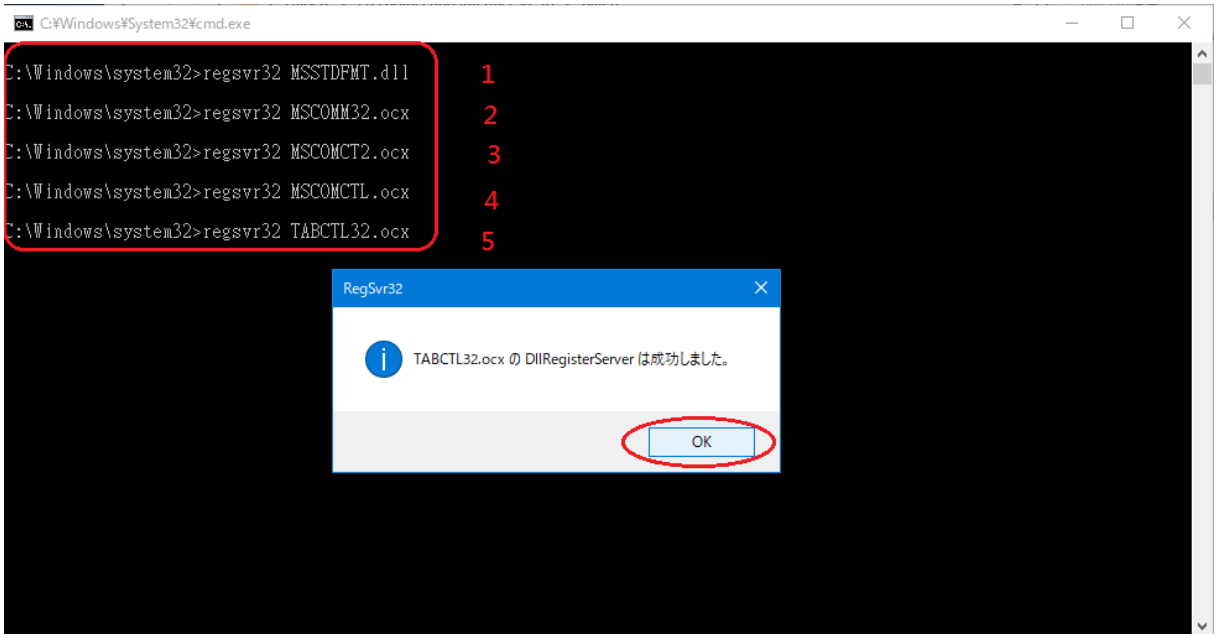




B. Win10_Reg.bat → right click, and select "run as administrator" to register the files.



C. Press OK. (five files are registered successfully)

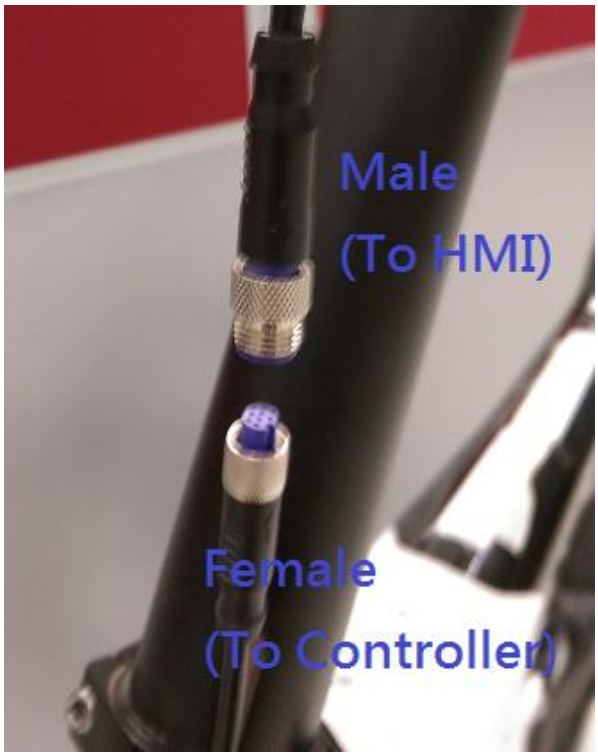


4.3 Controller

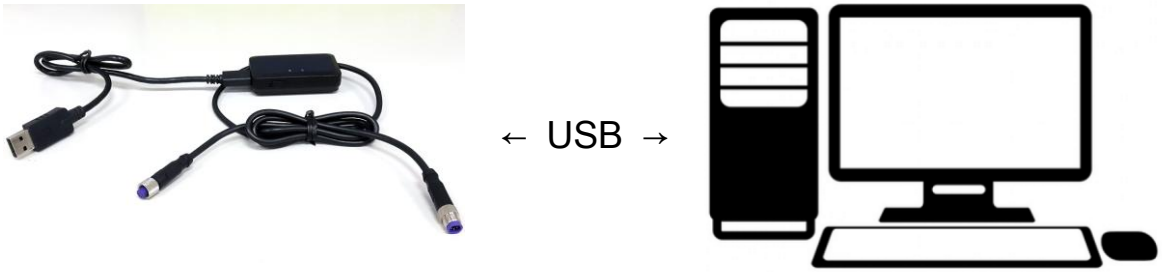
4.3.1 Connect to controller with Diagnosis tool

A. Please turn off the power of the bike. (Press and hold power button at least 3 sec)

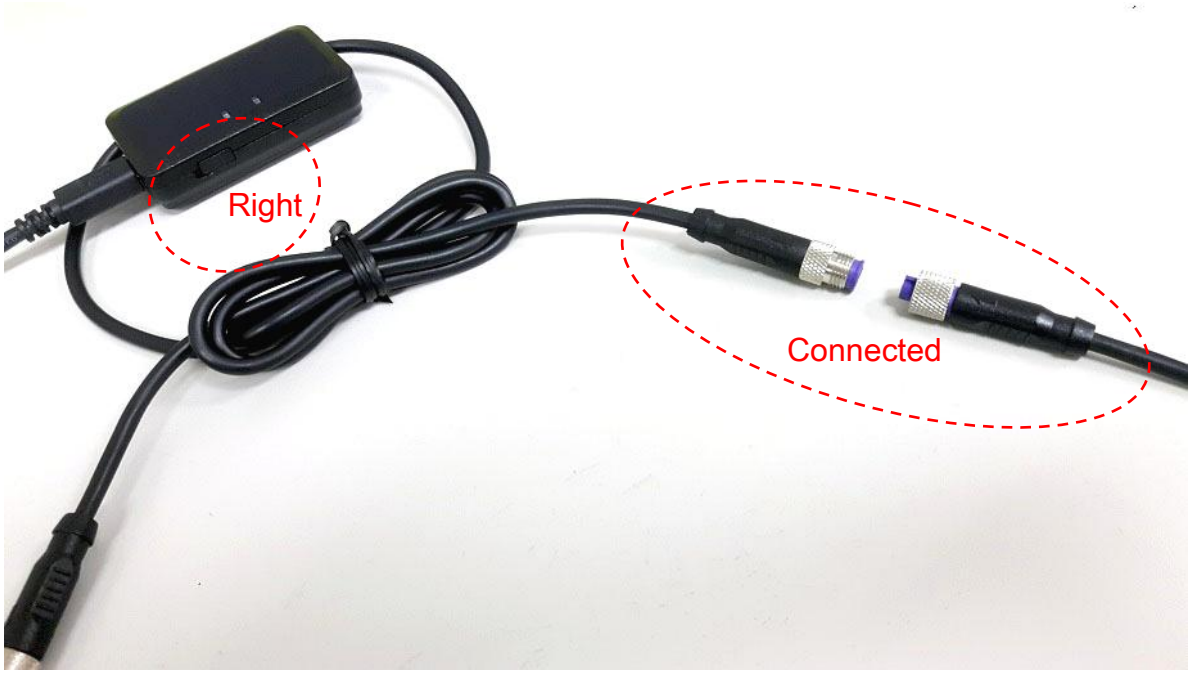
B. Disconnect the connector between the HMI and controller. It's at the left side of the bike.



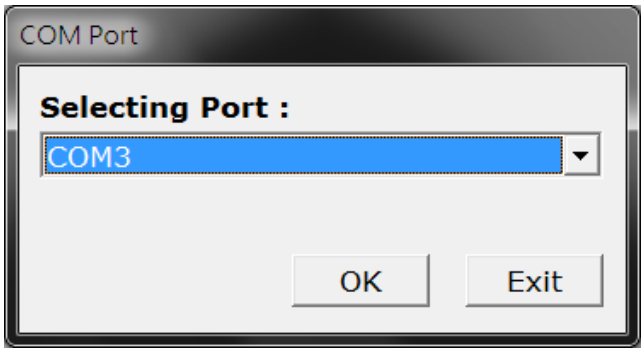
C. Connect your diagnosis tool with your PC.



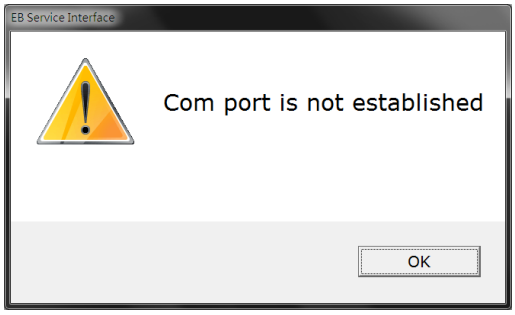
D. Connect the system with your PC diagnosis tool; then PC diagnosis tool switch to the right.



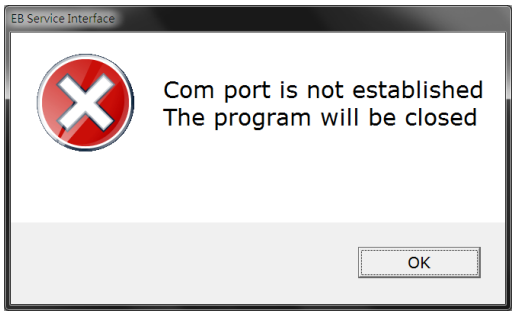
E. Execute the "EB service interface" in your PC. If you have already successfully installed your PC diagnosis tool, there will be a table showing and needing your selecting com port. (To know which port your PC diagnosis tool is relative to, you could check the Window's device program.)



- If no com port is available, it will show as below. Please try to well install your PC diagnosis tool and press OK. If this case always happens, please try another USB port of you PC, or change another PC.

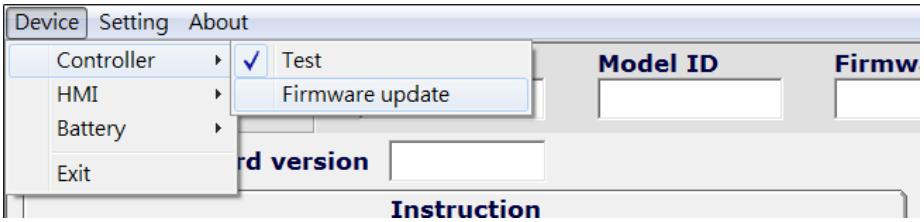


- If it tries and fails for many times, the program will be closed.



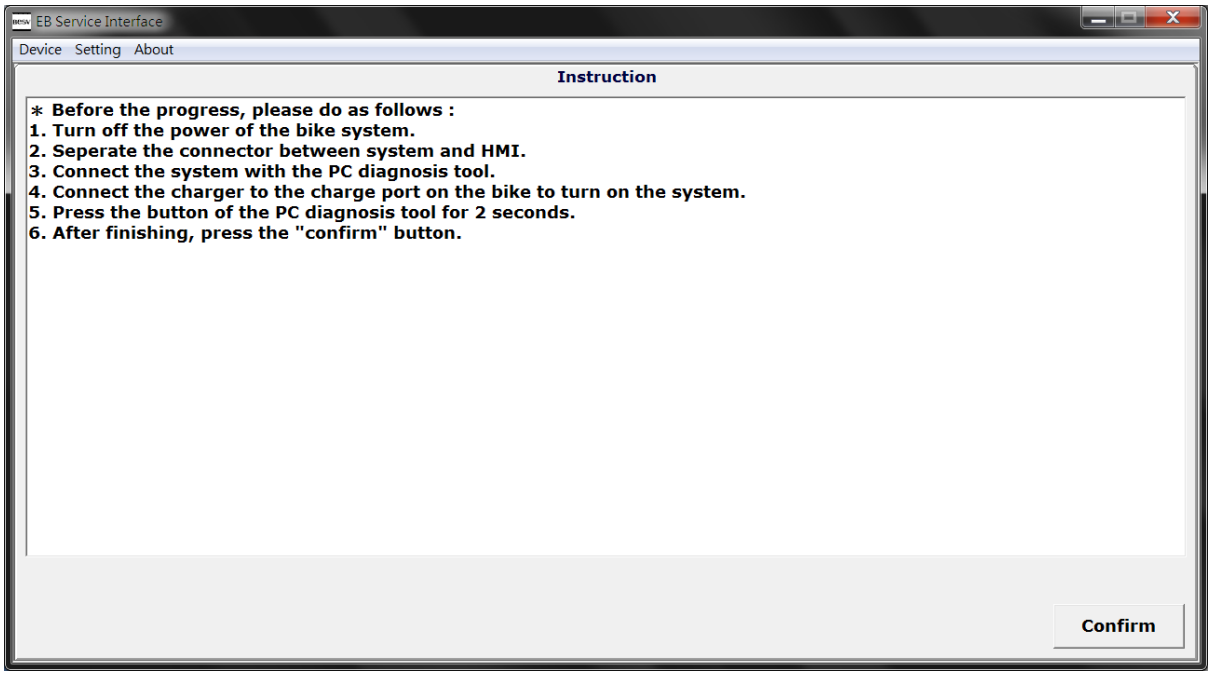
4.3.2 Firmware update

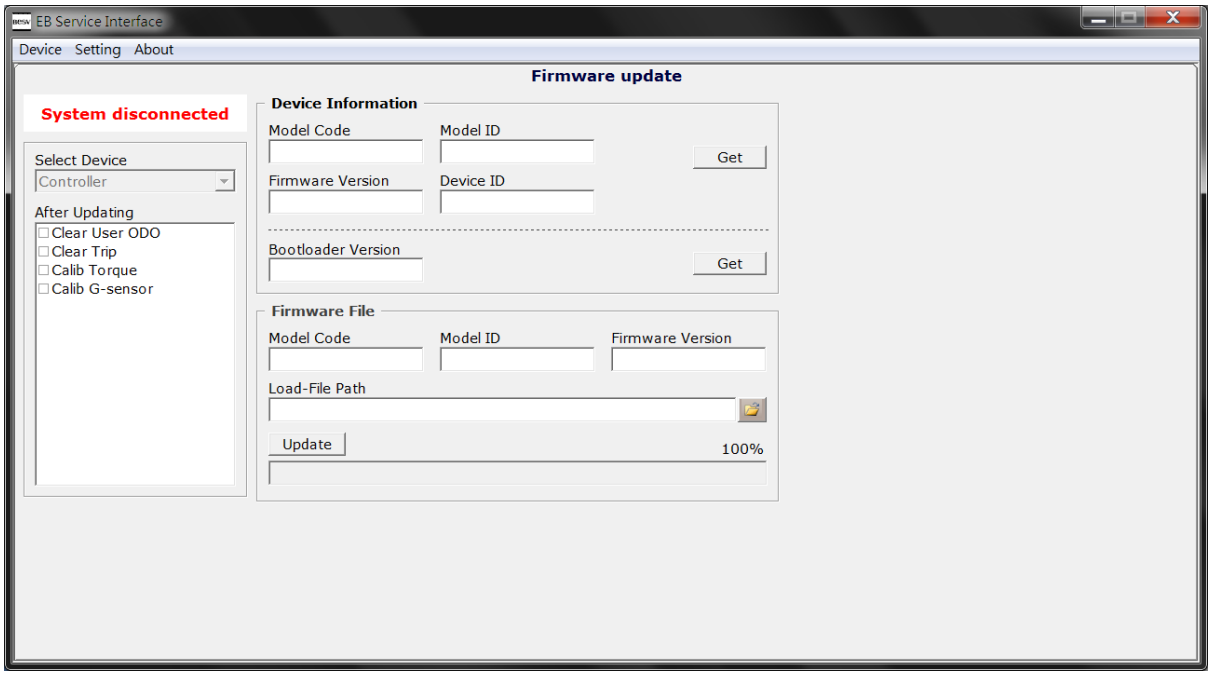
A. Select "Device → Controller → Firmware update" to update firmware of your system.



B. After all the progresses of beginning are done, please press "confirm" button.

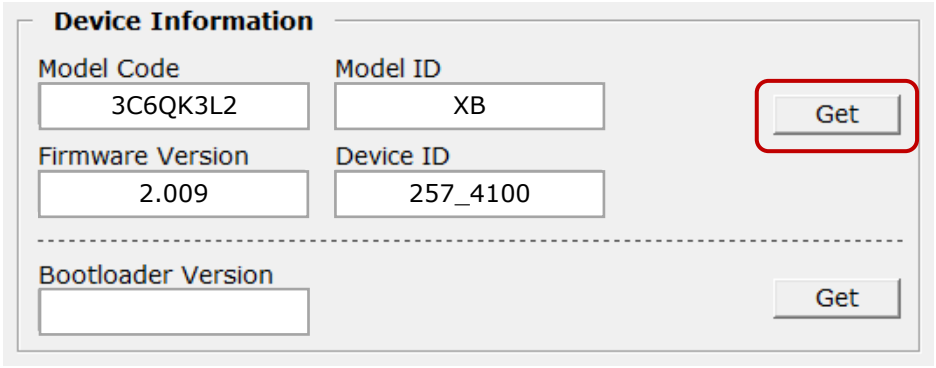
(Refer to 4.3.1)



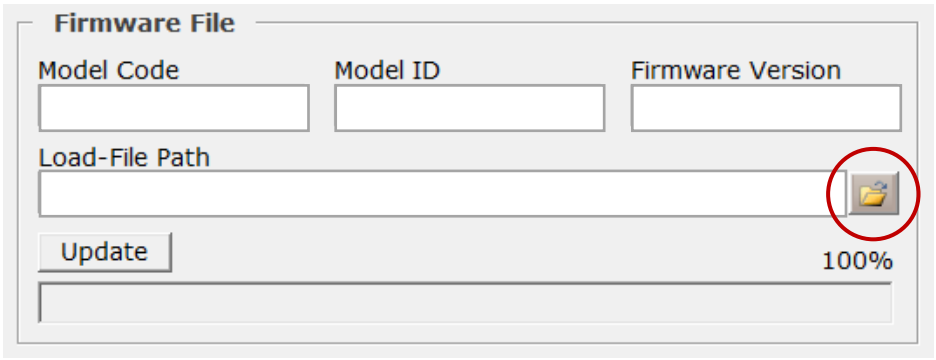


C. Connect the charger to the charge port on the bike to turn on the system.

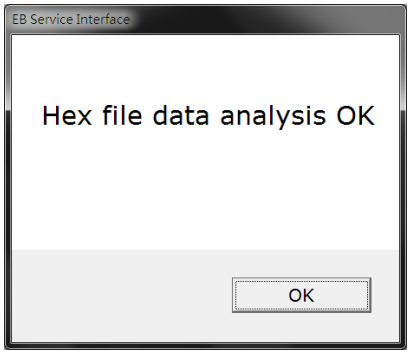
D. You can press [Get] button to check the current firmware version of the target device.

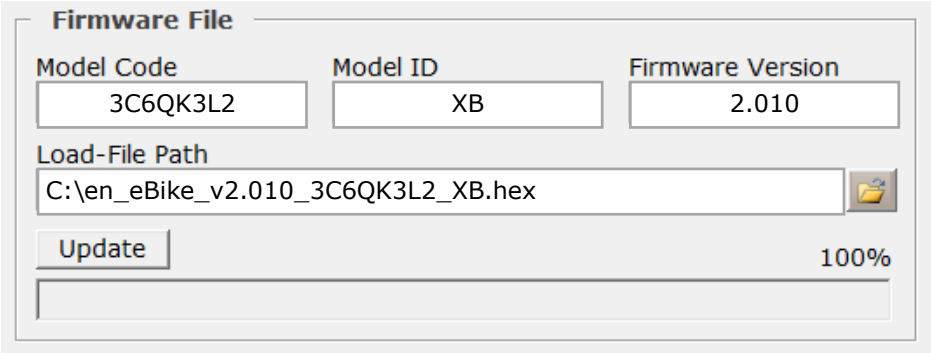


E. Press [Load] button ( ) to import the firmware file.

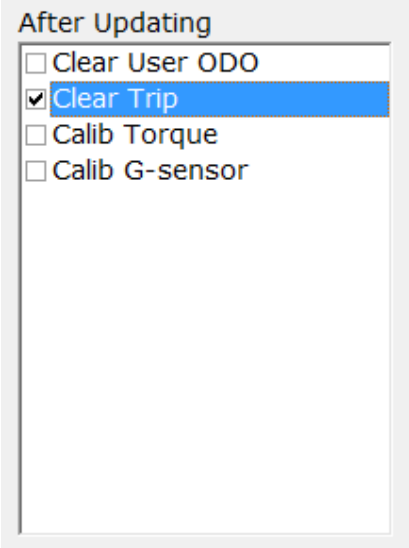


F. After loading the file, there will be a message to tell the hex file imported successfully or not.

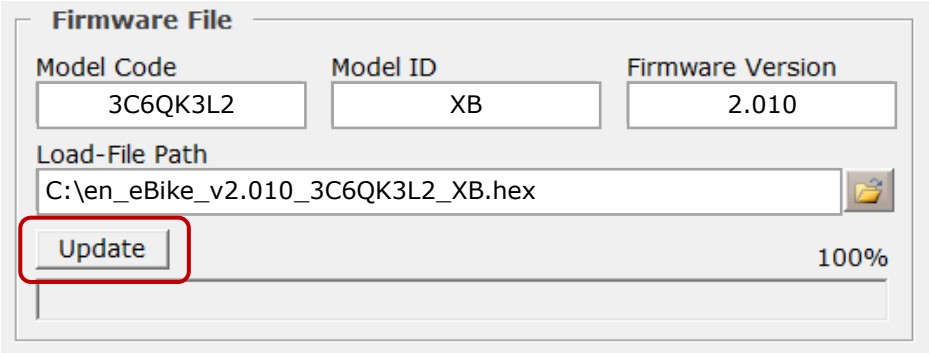


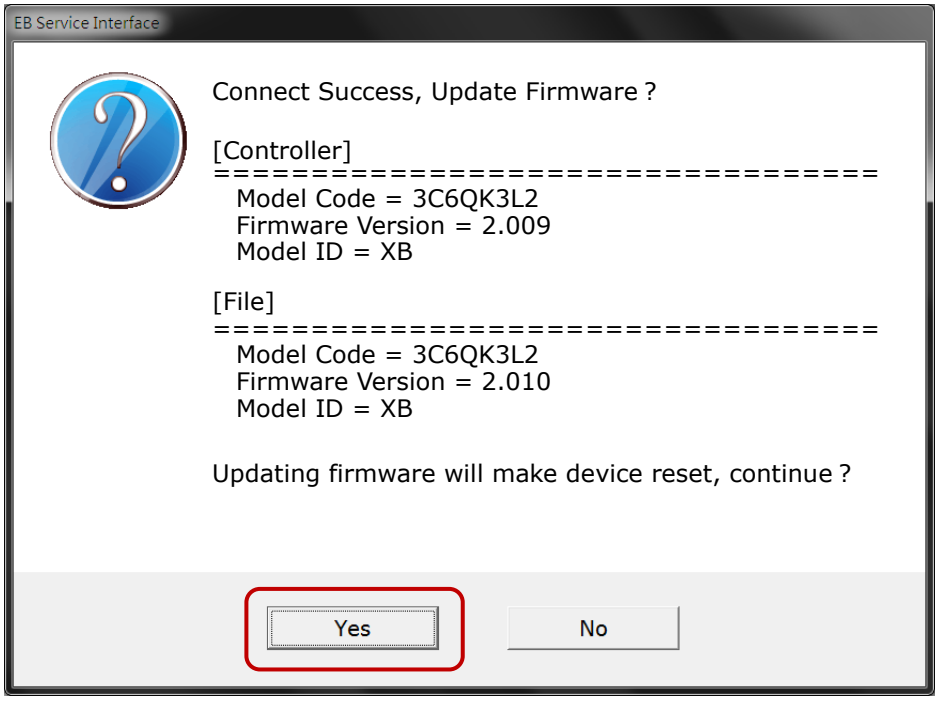


G. Select additional process that you want to execute after updating.

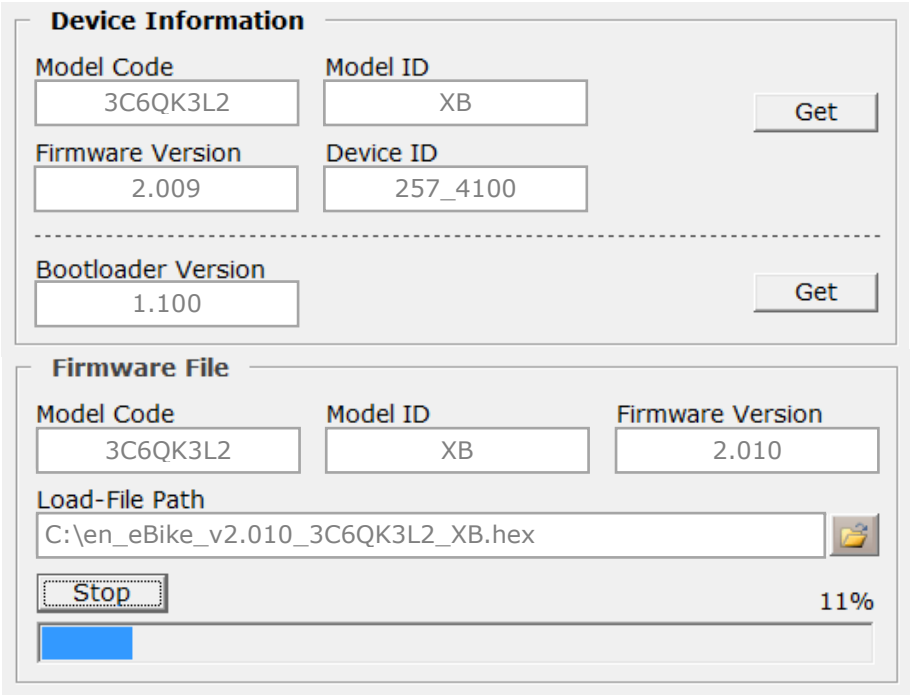


H. Press [Update] button. At the same time, the "EB service interface" will try to acknowledge the adaption of default loader inside target device.

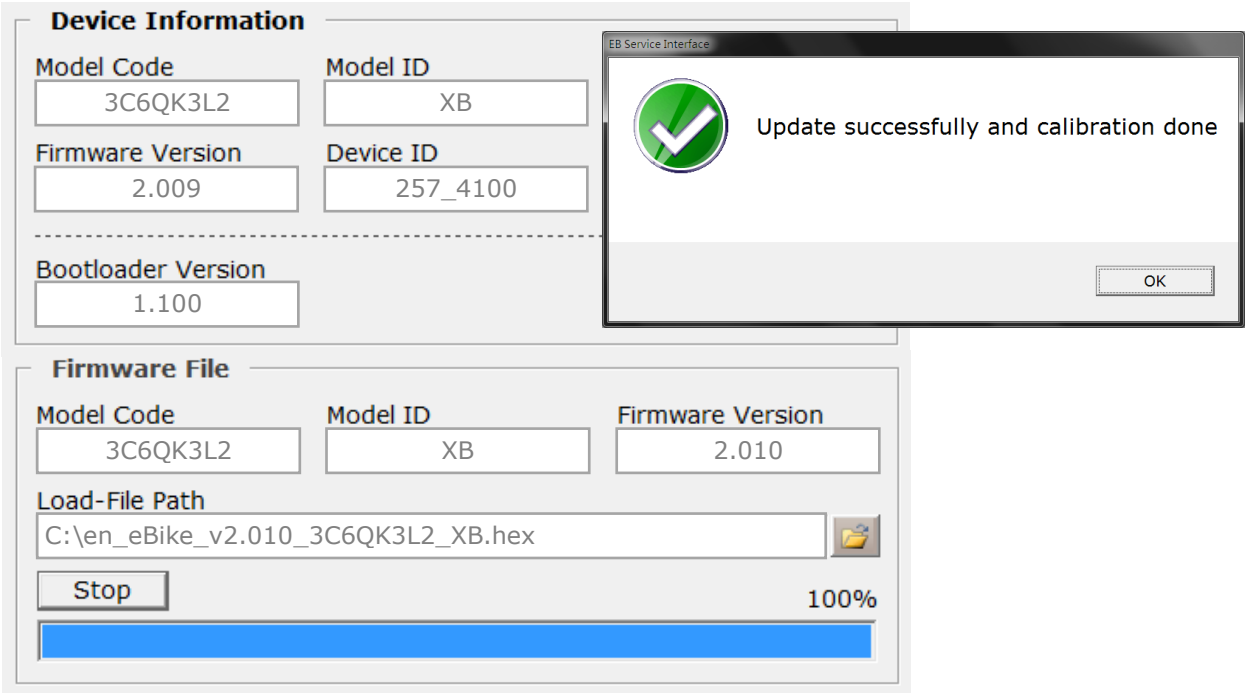




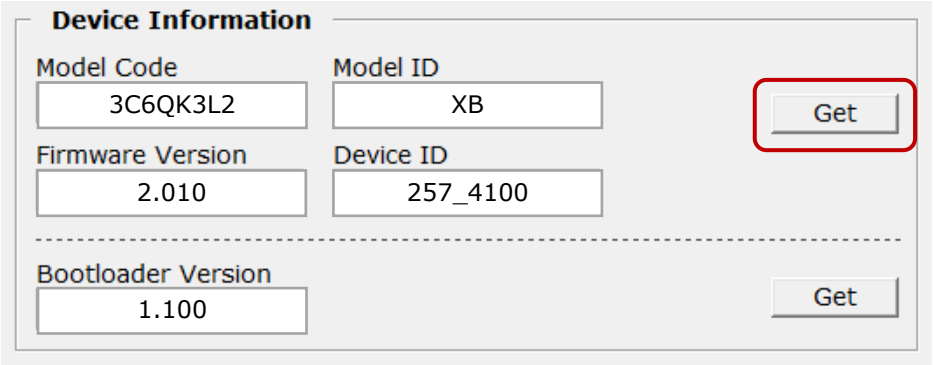
I. If the adaption is accepted, the updating progress will start and progress are showed as below.



J. If the progress is done completely, it will show message as follows.



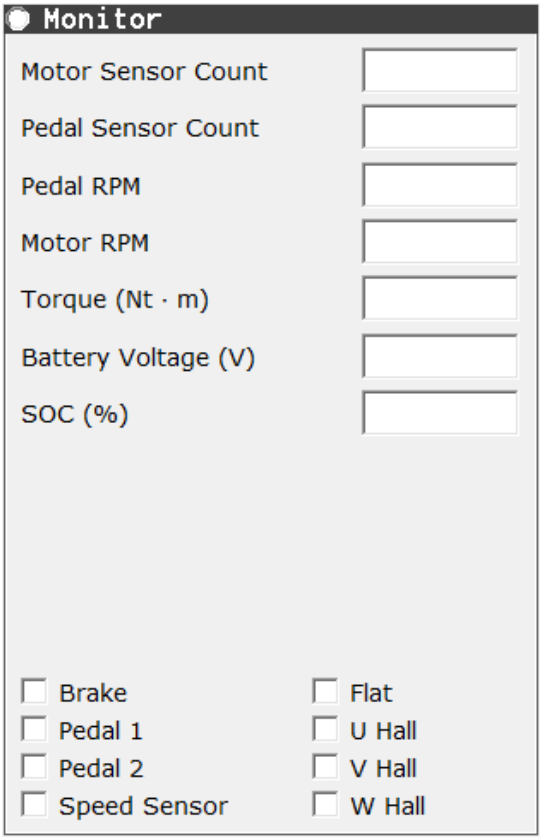
K. After updating, you can press [Get] button to check the new firmware version of the target device, and it should be changed the same as updated file.



L. Separate the connectors from PC, and reconnect HMI and controller. Then disconnect the charger and turn off then turn on the system.

4.3.3 Monitor

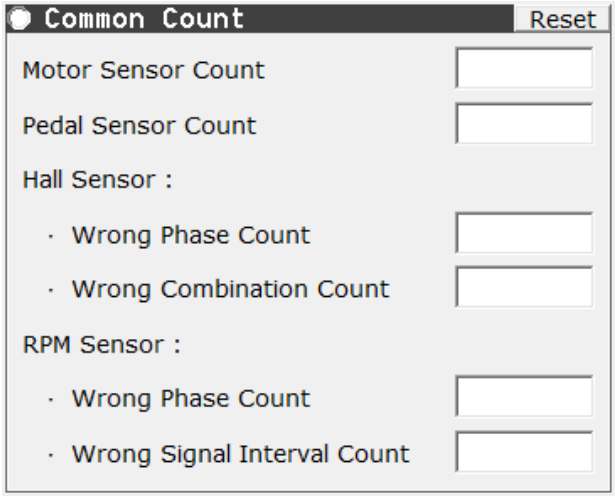
Show the current status of the bike.



4.3.4 Sensor signal count

Accumulate value of the motor sensor or pedal sensor.

[Reset] button : Clear all of the accumulated value.



4.3.5 Wheel setup

[Get] button : Show previously saved wheel circumference.

[Set] button : Input the wheel circumference. (Please refer to "Wheel circumference list")

4.3.6 Angle sensor calibration

Before you progress this function, please make sure the bike is put on the flat ground without pedaling.

4.3.7 Toque sensor calibration

Calibrate the sensors of the bike.

While calibrating, "Do Not Pedal" to make sure calibrate correctly.

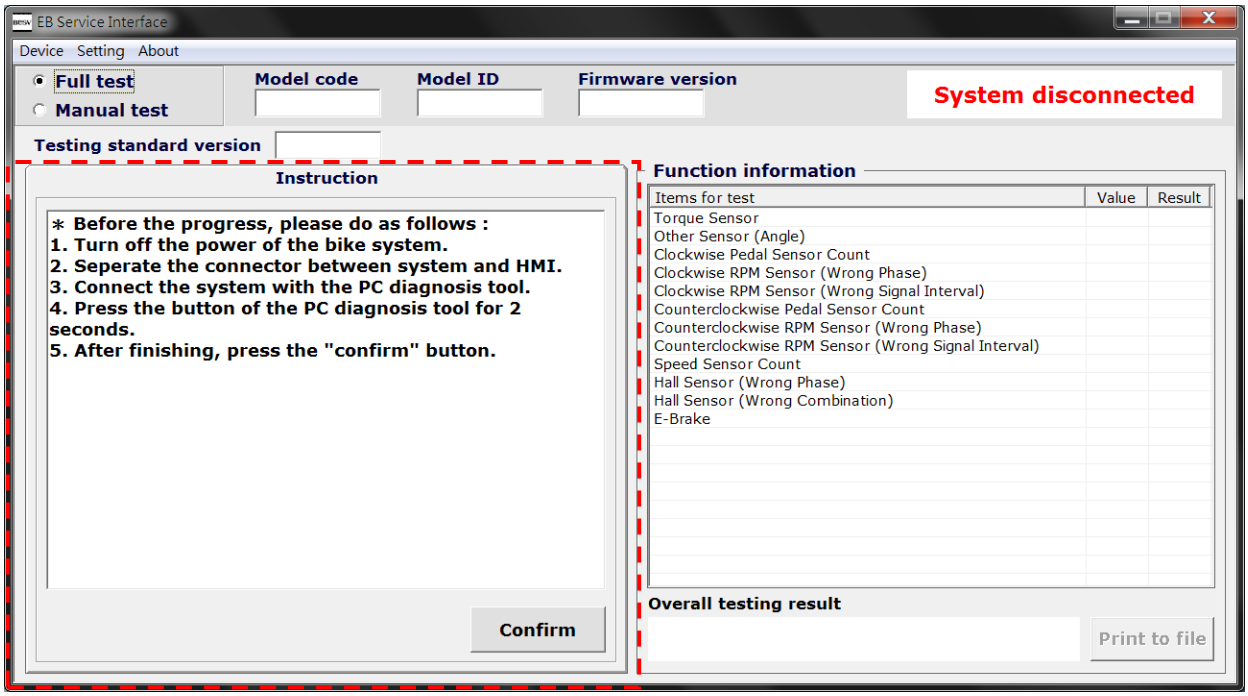
※ Wheel circumference list

ETRTO	Wheel size	Wheel circumference (mm)	ETRTO	Wheel size	Wheel circumference (mm)
	24 x 1-1/8 Tubular	1795	44-559	26 x 1.6	2051
	24 x 1-1/4	1905	47-559	26 x 1.75 x 2	2070
	24 x 1.75	1890	50-559	26 x 1.9	2089
	24 x 2.0	1925	54-559	26 x 2.00	2114
	24 x 2.15	1965	57-559	26 x 2.215	2133
	26 x 1 (559mm)	1913	37-590	26 x 1 3/8	2105
	26 x 1 (650c)	1952	37-584	26 x 1 3/8 x 1 1/2	2086
	26 x 1.25	1953	20-571	26 x 3/4	1954
	26 x 1-1/8 Tubular	1970	32-630	27 x 1 1/4	2199
	26 x 1-3/8	2068	28-630	27 x 1 1/4 fifty	2174
	26 x 1-1/2	2100	40-622	28 x 1.5	2224
	26 x 1.40	2005	40-622	28 x 1.75	2268
	26 x 1.50	1985	40-635	28 x 1 1/2	2265
	26 x 1.75	2023	37-622	28 x 1 1/8 x 1 5/8	2205
	26 x 1.95	2050		650 x 35A	2090
	26 x 2.0	2055		650 x 38A	2125
	26 x 2.1	2068		650 x 38B	2105
	26 x 2.15	2070	18-622	700 x 18c	2102
	26 x 2.35	2083	20-622	700 x 20c	2114
47-305	16 x 1.75 x 2	1217	23-622	700 x 23c	2133
47-406	20 x 1.75 x 2	1590	25-622	700 x 25c	2146
37-540	24 x 1 3/8a	1948	28-622	700 x 28c	2149
47-507	24 x 1.75 x 2	1907	32-622	700 x 32c	2174
23-571	26 x 1	1973	37-622	700 x 35c	2205
40-559	26 x 1.5	2026	40-622	700 x 40c	2224

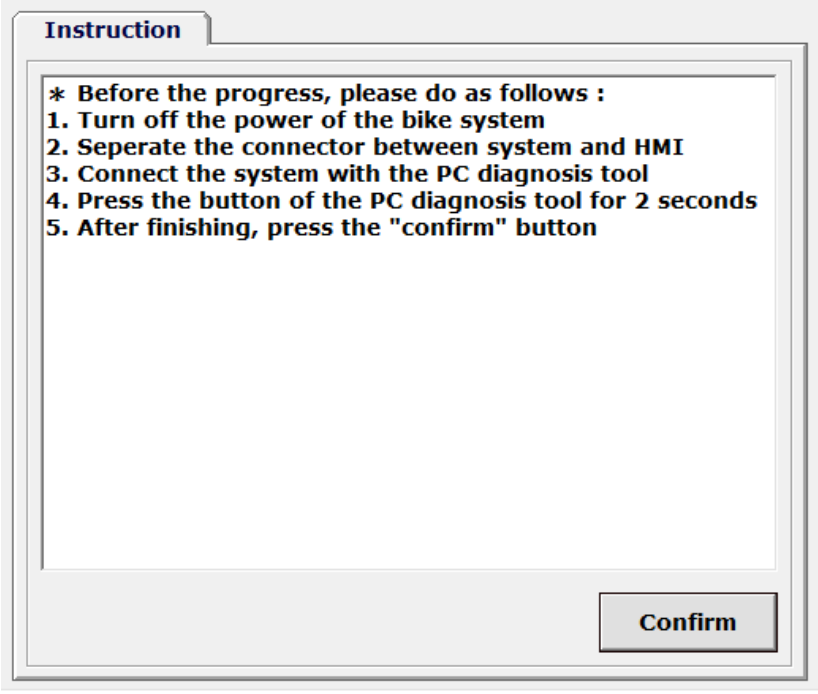
4.3.8 Full test

In "full test mode", the "EB service interface" will help you the process to test the bike. The instructions may be different by models, so please carefully read the content listed, and follow the steps.

A. In the beginning of "Full test" mode, there are several process should be done.

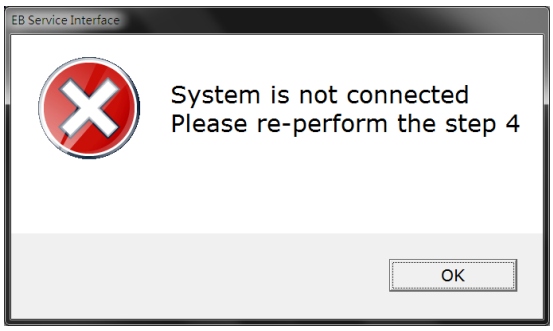


B. After all the progresses of beginning are done, please press "confirm" button. (Refer to 4.3.1)

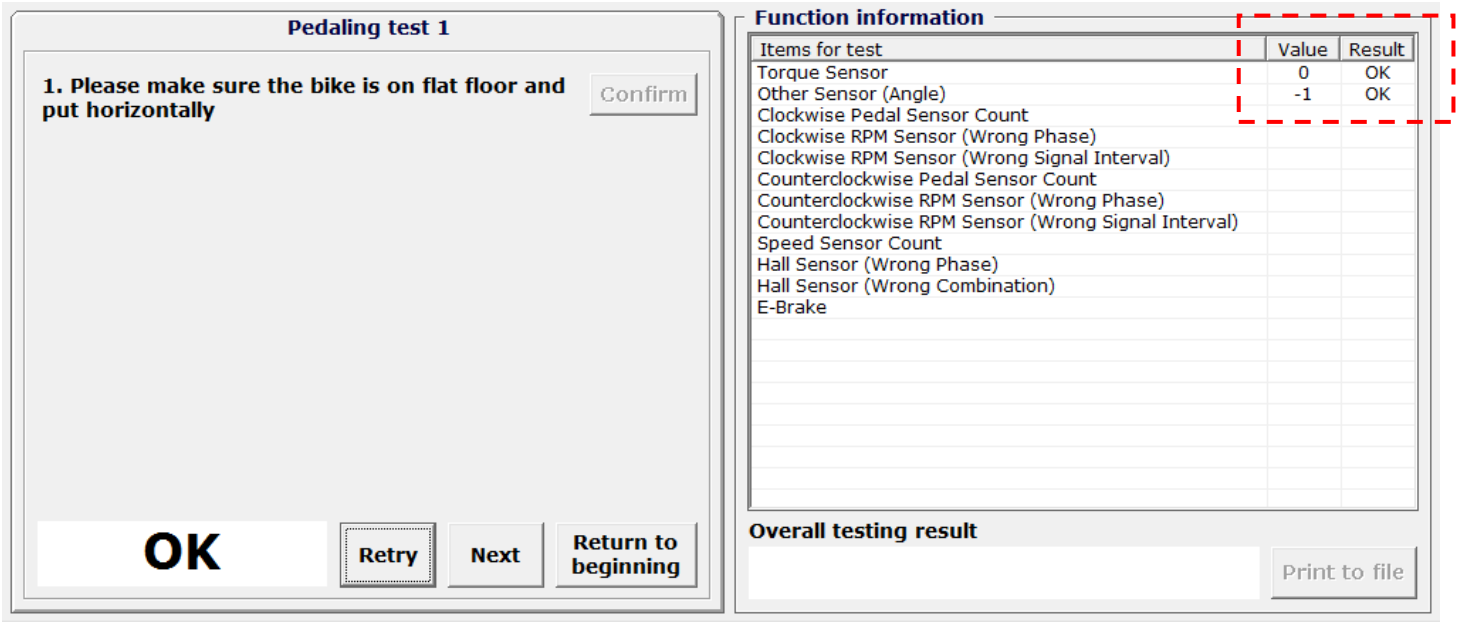


- After that, the EB service interface will try to read basic information.

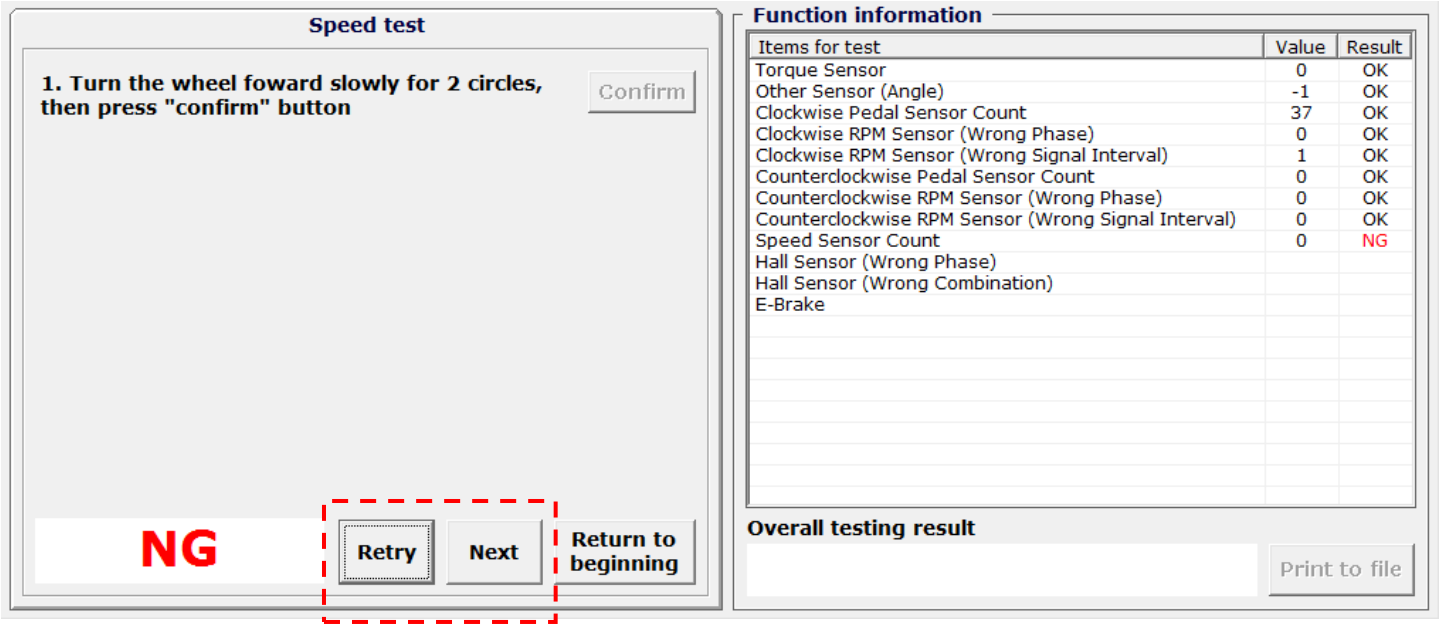
- If it fails, it will show some indication for you to fix it.



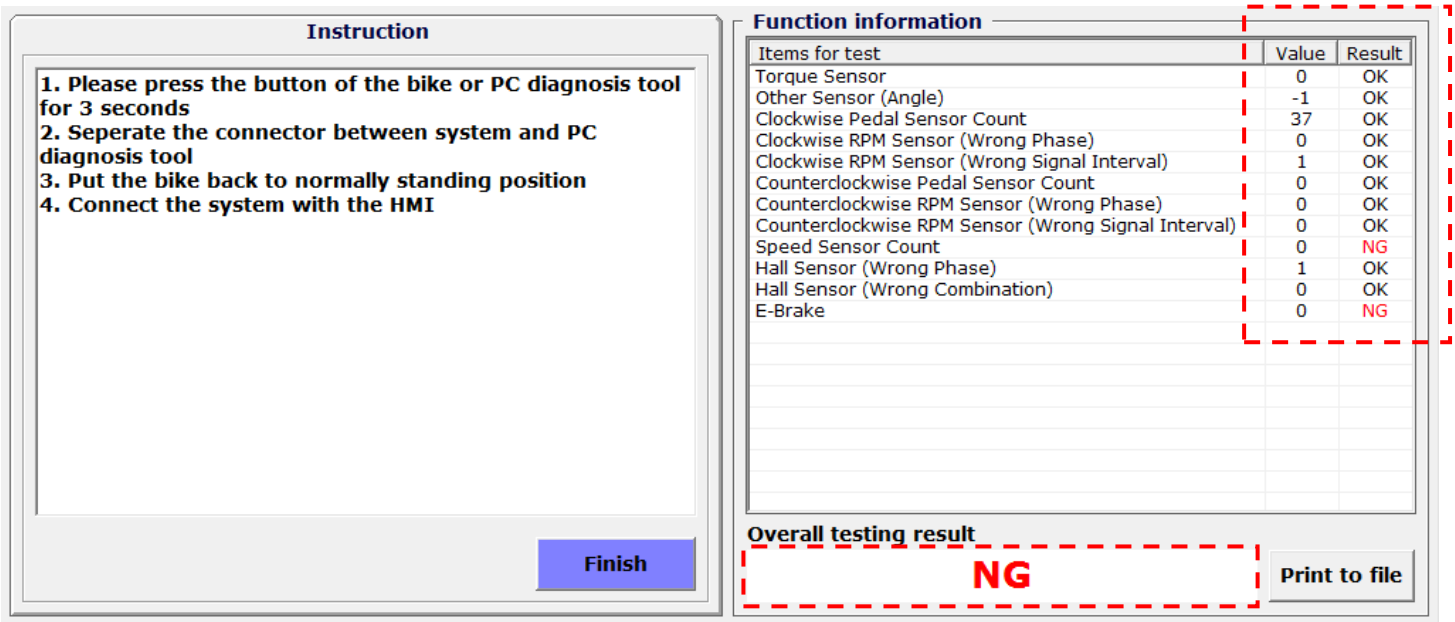
C. After the confirmation of beginning process, the EB service interface will start to guide the test progress consequently. Each test item will give instructions and need to be followed with some easy manual operation. After judgment, the result of each item will be shown independently.



D. After each item was done, commonly there will be selections "Retry" and "Next" to decide repeat this test or keep going on.



E. After a batch of test, there will be an "overall testing result" judging the normality of the whole bike.

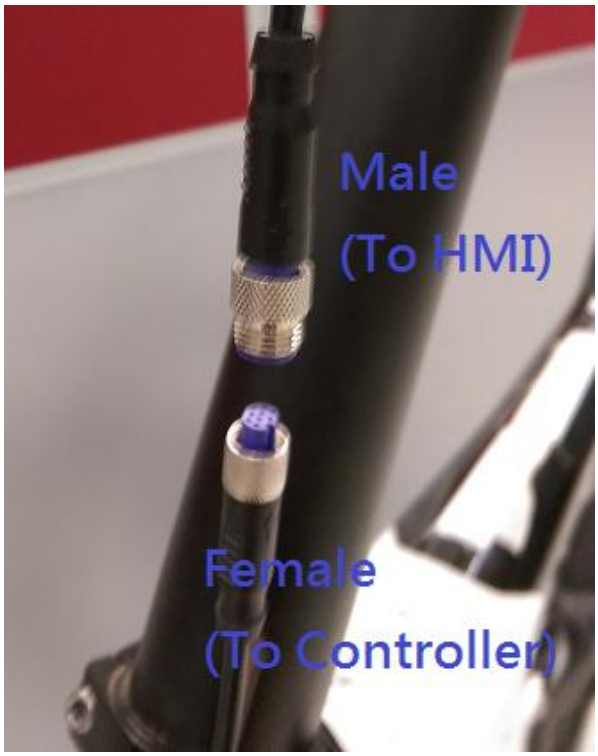


4.4 HMI

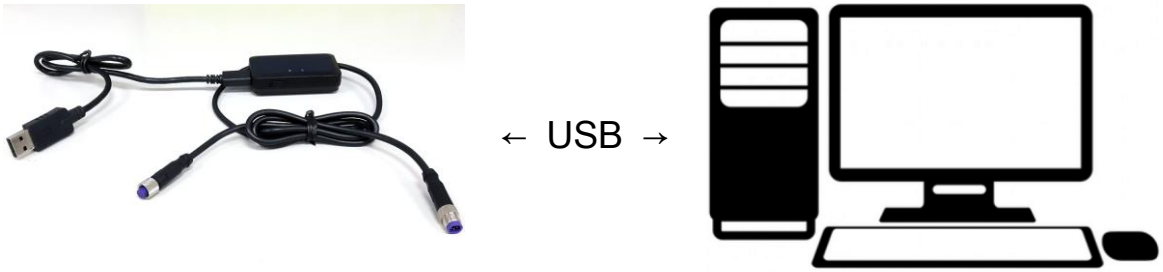
4.4.1 Connect to HMI with Diagnosis tool

A. Please turn off the power of the bike. (Press and hold power button at least 3 sec)

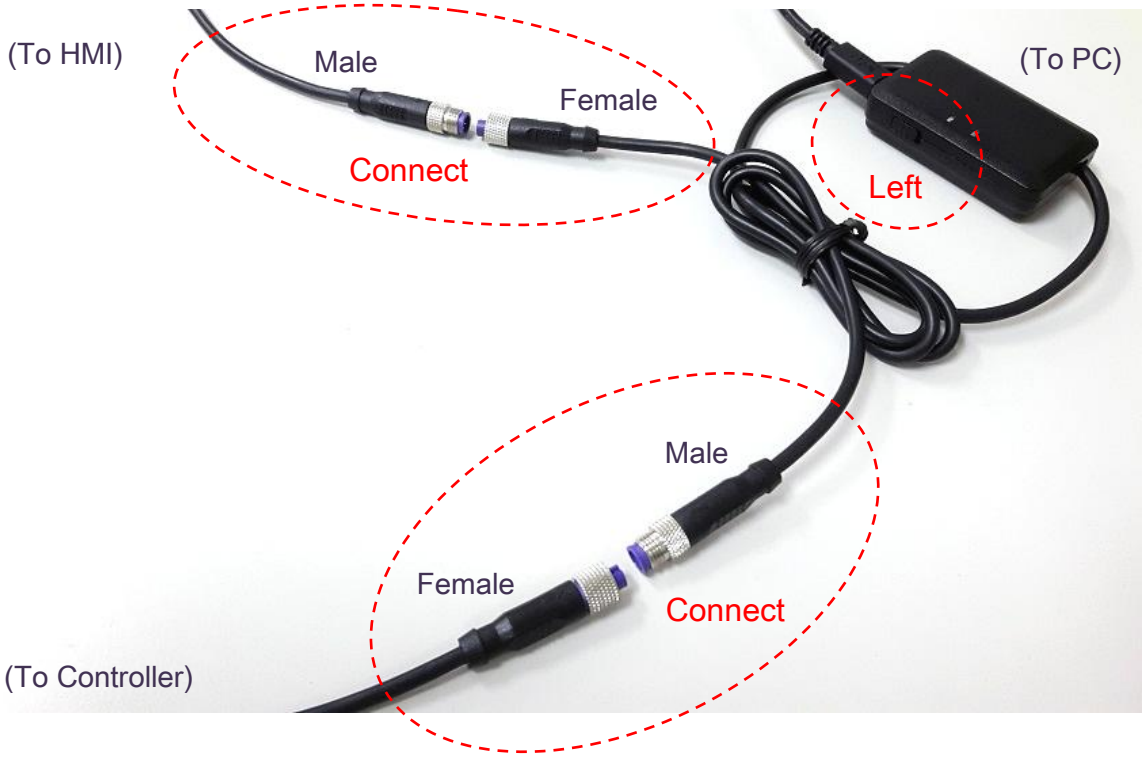
B. Disconnect the connector between the HMI and controller. It's at the left side of the bike.



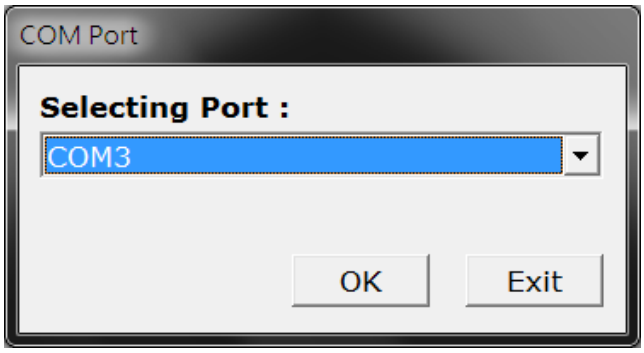
C. Connect your diagnosis tool with your PC.



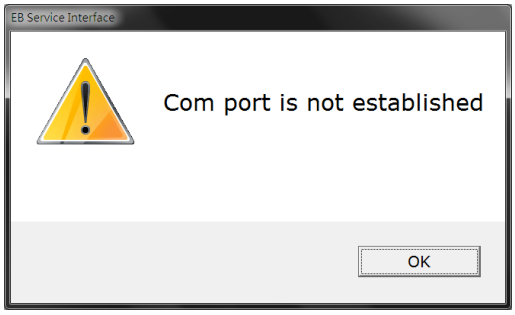
D. The PC diagnosis tool is connected with a turning cable to one the end of the cable of HMI and the other one is connected with a turning cable to the end of the cable of system which is provided battery power; then PC diagnosis tool switch to the left.



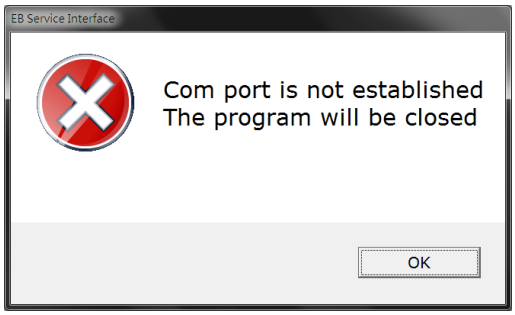
E. Execute the "EB service interface" in your PC. If you have already successfully installed your PC diagnosis tool, there will be a table showing and needing your selecting com port. (To know which port your PC diagnosis tool is relative to, you could check the Window's device program.)



- If no com port is available, it will show as below. Please try to well install your PC diagnosis tool and press OK. If this case always happens, please try another USB port of you PC, or change another PC.

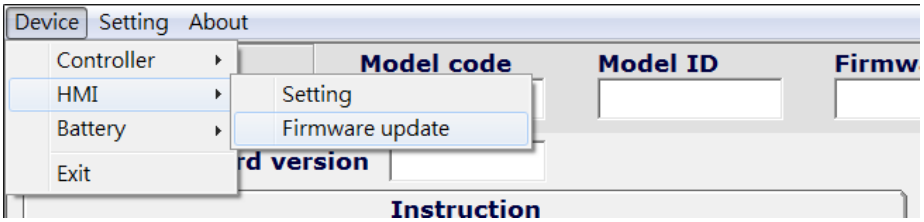


- If it tries and fails for many times, the program will be closed.



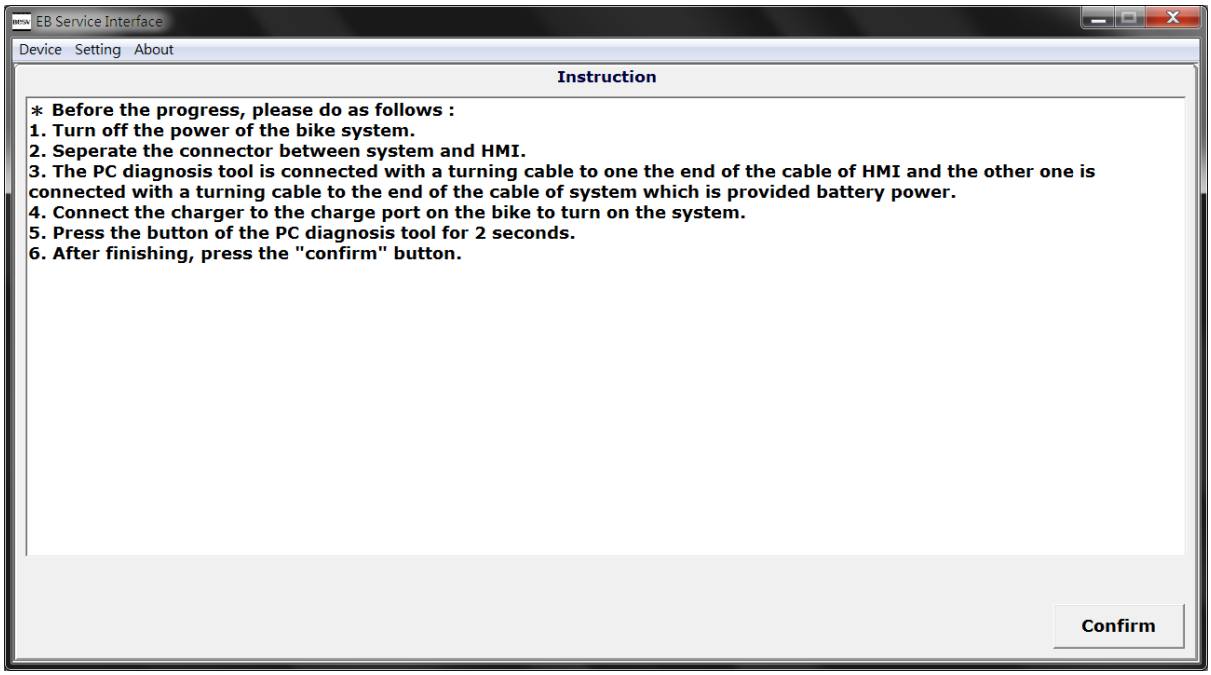
4.4.2 Firmware update

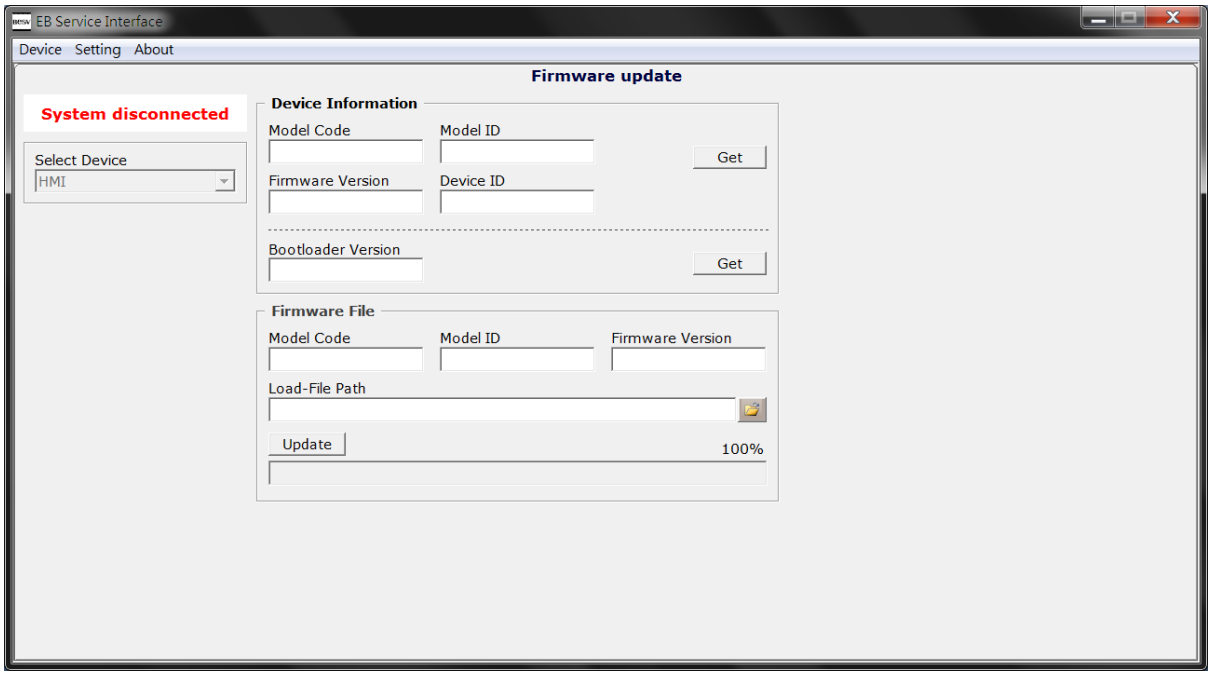
A. Select "Device → HMI → Firmware update" to update firmware of your HMI.



B. After all the progresses of beginning are done, please press "confirm" button.

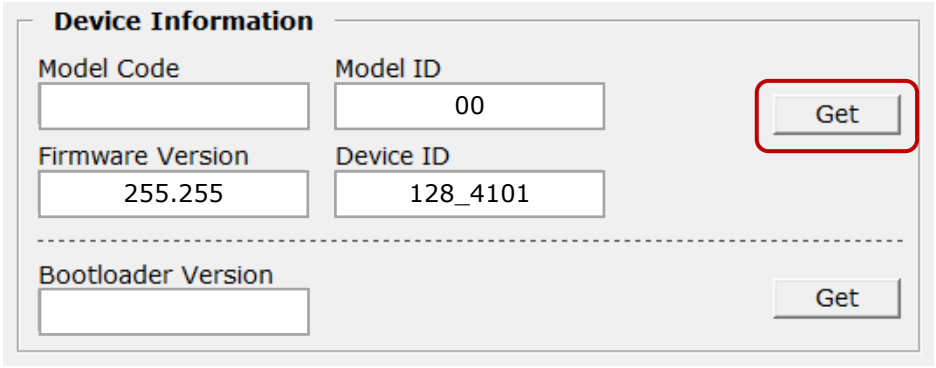
(Refer to 4.4.1)



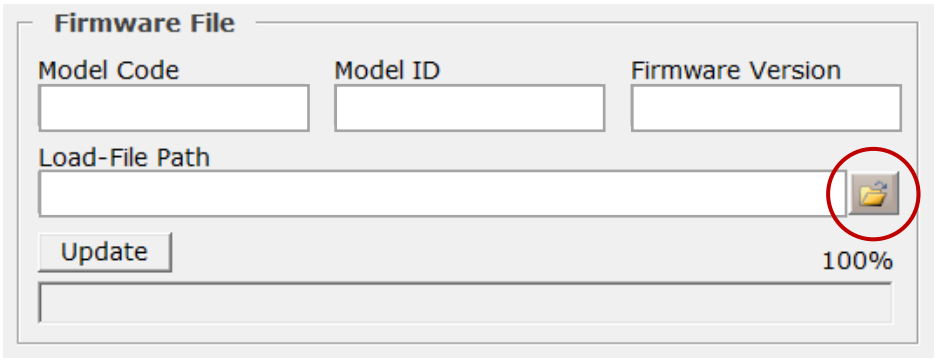


C. Connect the charger to the charge port on the bike to turn on the system.

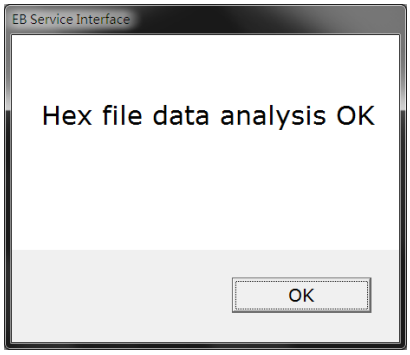
D. You can press [Get] button to check the current firmware version of the target device.

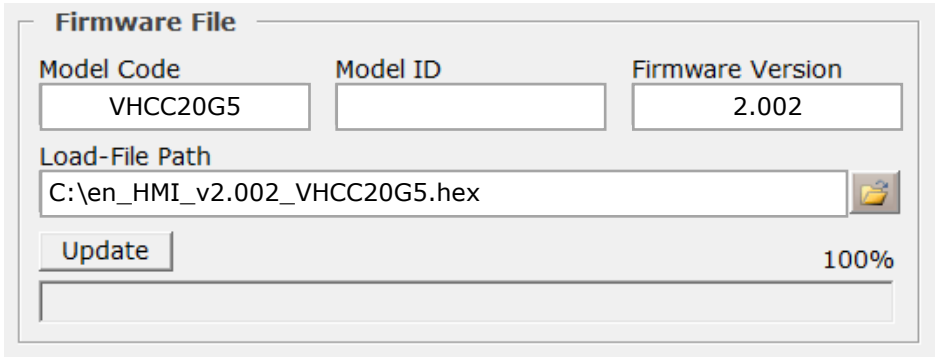


E. Press [Load] button ( ) to import the firmware file.

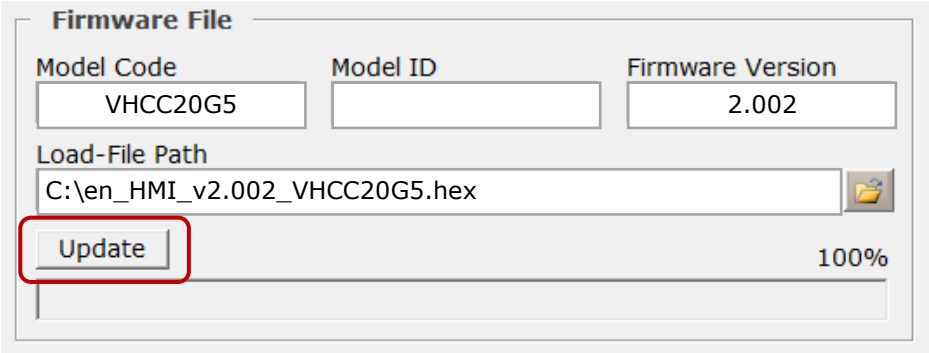


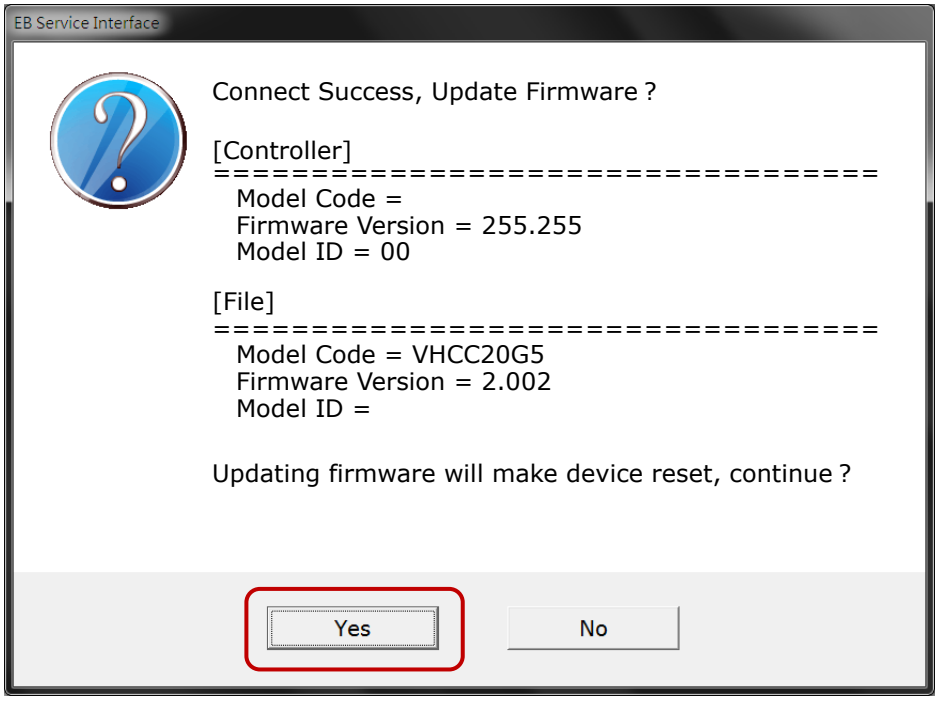
F. After loading the file, there will be a message to tell the hex file imported successfully or not.



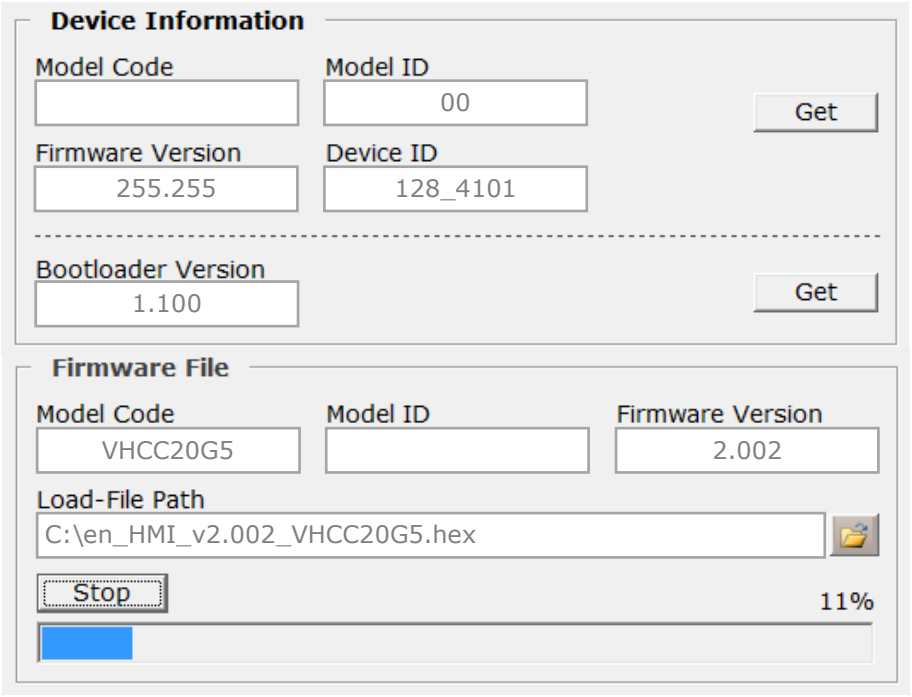


G. Press [Update] button. At the same time, the "EB service interface" will try to acknowledge the adaption of default loader inside target device.

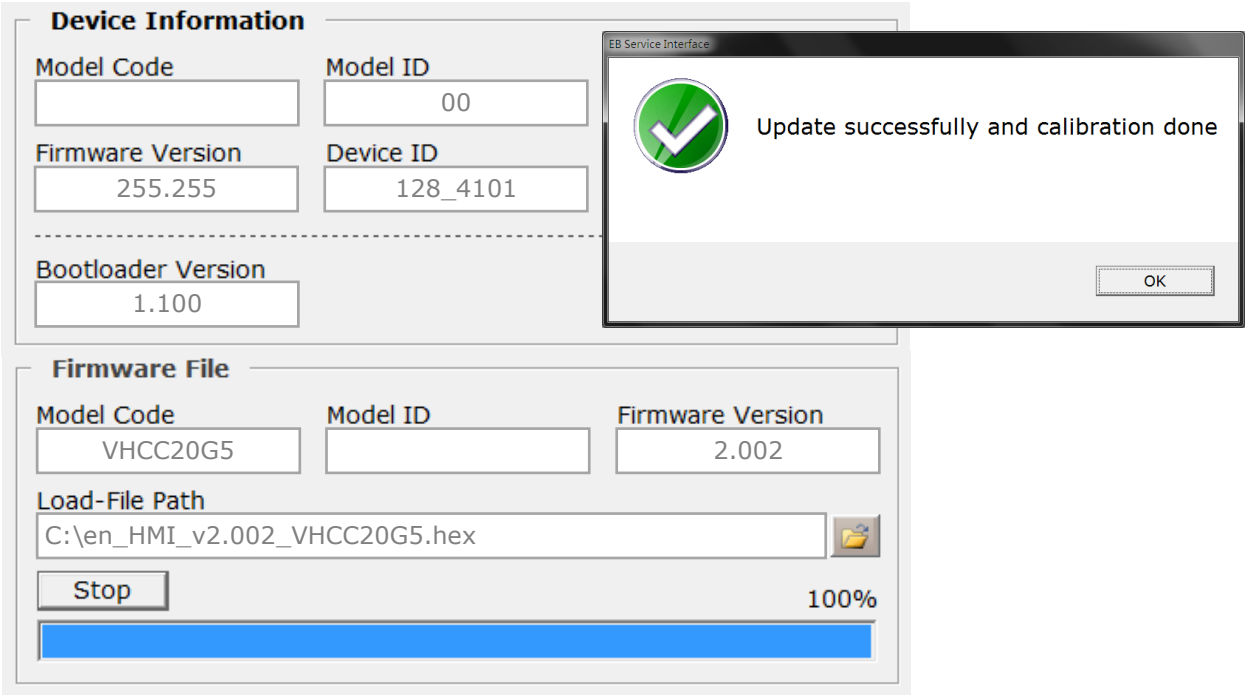




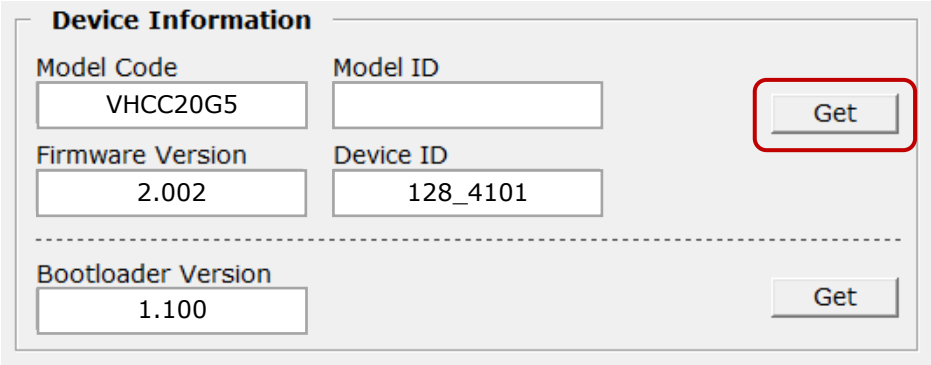
H. If the adaption is accepted, the updating progress will start and progress are showed as below.



I. If the progress is done completely, it will show message as follows.



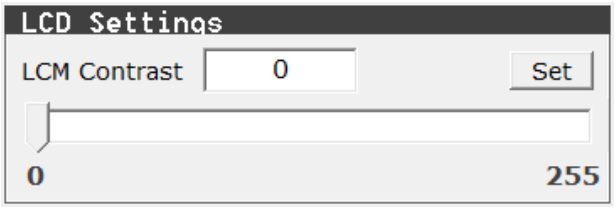
J. After updating, you can press [Get] button to check the new firmware version of the target device, and it should be changed the same as updated file.



K. Separate the connectors from PC, and reconnect HMI and controller. Then disconnect the charger and turn off then turn on the system.

4.4.3 LCD setting

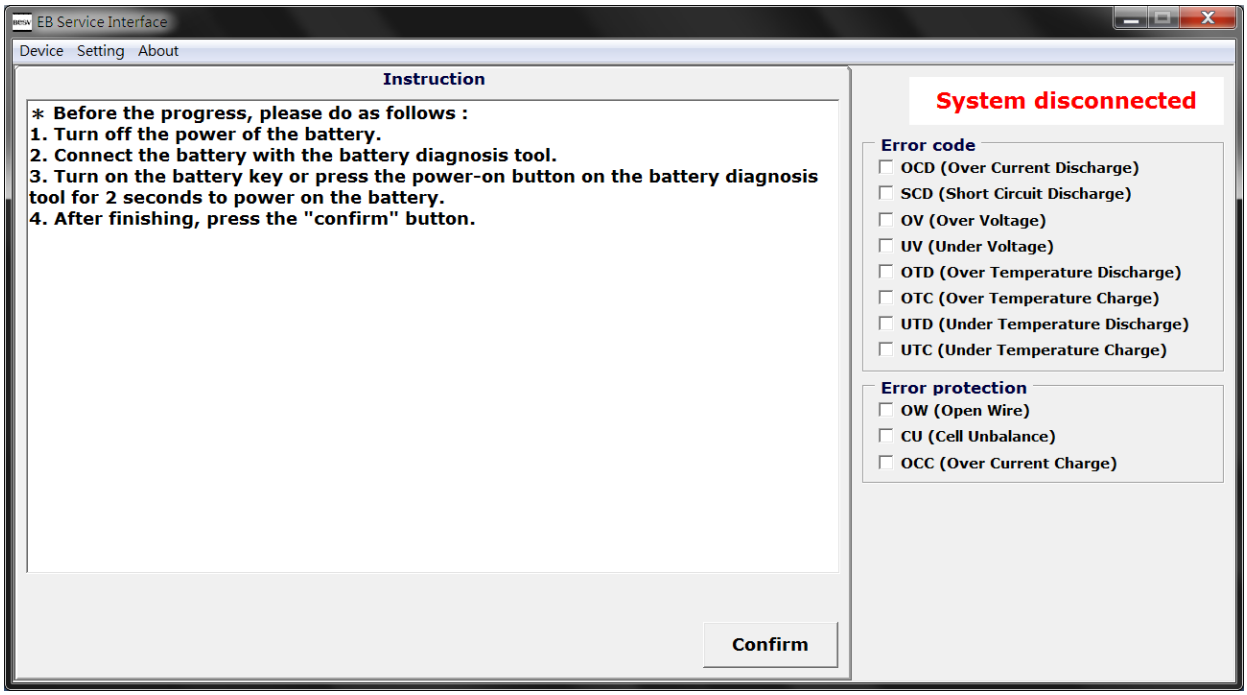
Calibrate the HMI screen contrast.



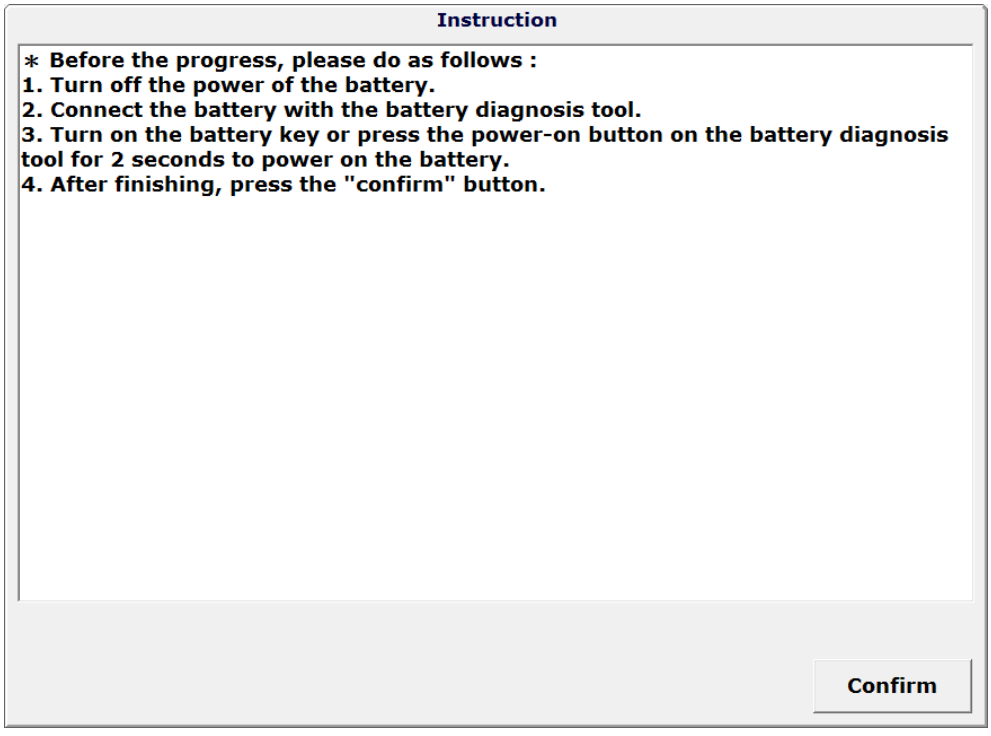
4.5 Battery

With "battery function" of it will help you check the battery of bike. The instructions may be different by models, so please carefully read the content listed, and follow the steps.

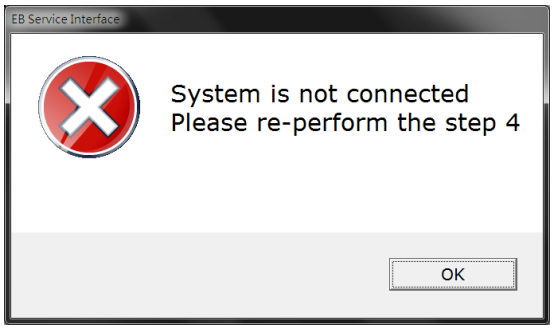
A. In the beginning of "Battery" function, there are several process should be done.



B. After all the progresses of beginning are done, please press "confirm" button. (Refer to 4.3.1)



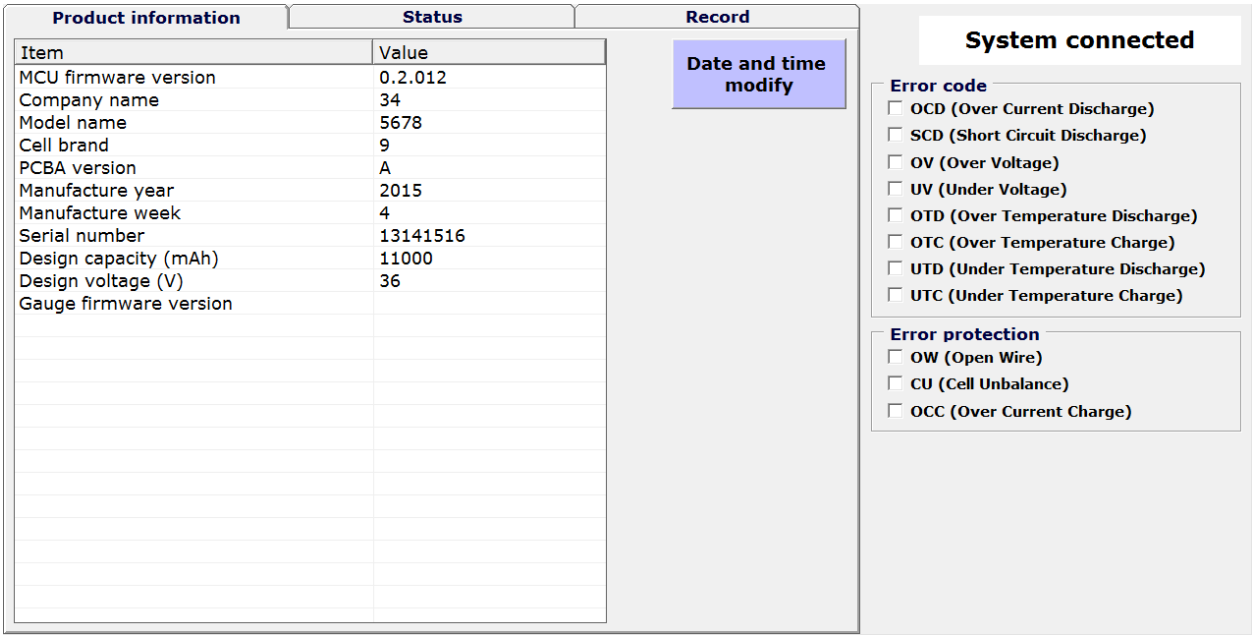
- After that, the EB service interface will try to read information. If it fails, it will show some indication for you to fix it.



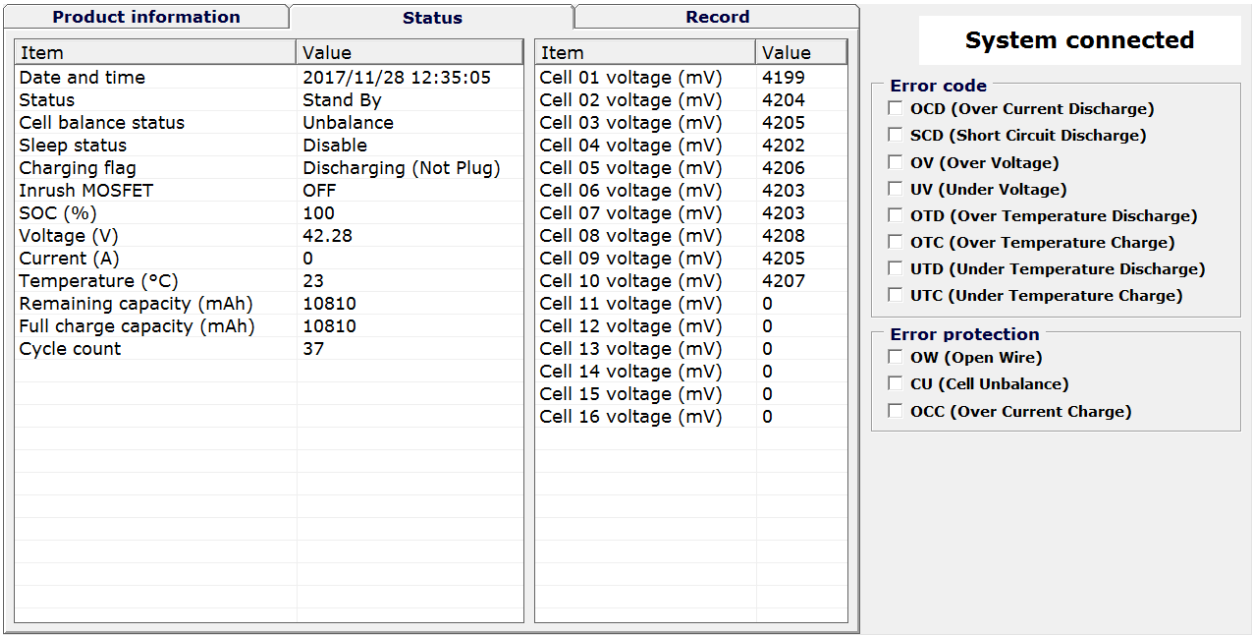
C. There are 3 major categories of battery information listed by this function.
"Product information" tells the basic specification and producing data.
"Status" shows the current condition of battery to confirm the normality of battery.
"Record" lists important event which was memorized inside the battery.
With this information, the normality of battery's usage can be traced and confirmed.

- Product information

  [Date and time modify] button : modify the battery's date and time.



- Status



Product information | Status | Record

Item	Value
Date and time	2017/11/28 12:35:05
Status	Stand By
Cell balance status	Unbalance
Sleep status	Disable
Charging flag	Discharging (Not Plug)
Inrush MOSFET	OFF
SOC (%)	100
Voltage (V)	42.28
Current (A)	0
Temperature (°C)	23
Remaining capacity (mAh)	10810
Full charge capacity (mAh)	10810
Cycle count	37

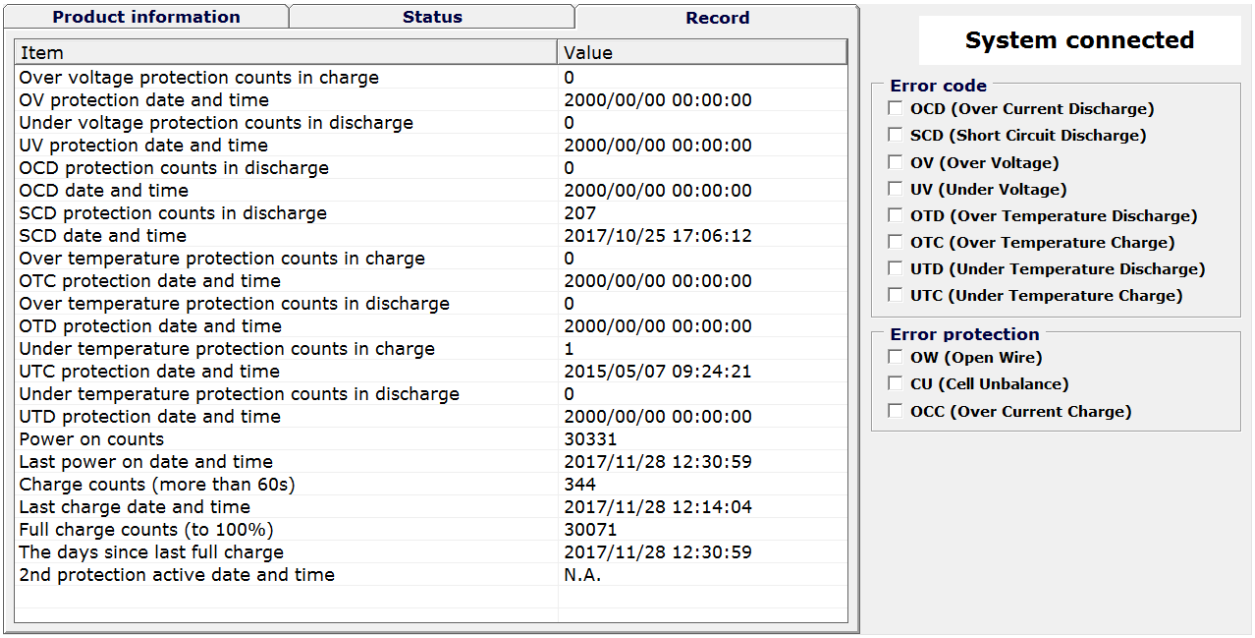
Item	Value
Cell 01 voltage (mV)	4199
Cell 02 voltage (mV)	4204
Cell 03 voltage (mV)	4205
Cell 04 voltage (mV)	4202
Cell 05 voltage (mV)	4206
Cell 06 voltage (mV)	4203
Cell 07 voltage (mV)	4203
Cell 08 voltage (mV)	4208
Cell 09 voltage (mV)	4205
Cell 10 voltage (mV)	4207
Cell 11 voltage (mV)	0
Cell 12 voltage (mV)	0
Cell 13 voltage (mV)	0
Cell 14 voltage (mV)	0
Cell 15 voltage (mV)	0
Cell 16 voltage (mV)	0

System connected

Error code
- ☐ OCD (Over Current Discharge)
- ☐ SCD (Short Circuit Discharge)
- ☐ OV (Over Voltage)
- ☐ UV (Under Voltage)
- ☐ OTD (Over Temperature Discharge)
- ☐ OTC (Over Temperature Charge)
- ☐ UTD (Under Temperature Discharge)
- ☐ UTC (Under Temperature Charge)

Error protection
- ☐ OW (Open Wire)
- ☐ CU (Cell Unbalance)
- ☐ OCC (Over Current Charge)

- Record



Product information | Status | Record

Item	Value
Over voltage protection counts in charge	0
OV protection date and time	2000/00/00 00:00:00
Under voltage protection counts in discharge	0
UV protection date and time	2000/00/00 00:00:00
OCD protection counts in discharge	0
OCD date and time	2000/00/00 00:00:00
SCD protection counts in discharge	207
SCD date and time	2017/10/25 17:06:12
Over temperature protection counts in charge	0
OTC protection date and time	2000/00/00 00:00:00
Over temperature protection counts in discharge	0
OTD protection date and time	2000/00/00 00:00:00
Under temperature protection counts in charge	1
UTC protection date and time	2015/05/07 09:24:21
Under temperature protection counts in discharge	0
UTD protection date and time	2000/00/00 00:00:00
Power on counts	30331
Last power on date and time	2017/11/28 12:30:59
Charge counts (more than 60s)	344
Last charge date and time	2017/11/28 12:14:04
Full charge counts (to 100%)	30071
The days since last full charge	2017/11/28 12:30:59
2nd protection active date and time	N.A.

System connected

Error code
- ☐ OCD (Over Current Discharge)
- ☐ SCD (Short Circuit Discharge)
- ☐ OV (Over Voltage)
- ☐ UV (Under Voltage)
- ☐ OTD (Over Temperature Discharge)
- ☐ OTC (Over Temperature Charge)
- ☐ UTD (Under Temperature Discharge)
- ☐ UTC (Under Temperature Charge)

Error protection
- ☐ OW (Open Wire)
- ☐ CU (Cell Unbalance)
- ☐ OCC (Over Current Charge)

5. Trouble shooting

5.1 Error or warning alert

- Error code

Code	Description	Action
E01	Motor is stalled	Please carry the bike forward manually. If there is obvious obstruction, please change the motor. If it is smooth, please change the motor or controller to verify which parts is failed.
E02	Speed sensor is abnormal	Turn off the system and make sure the connectors connected well between the controller and motor. Turn on and do the riding test. If the error still occurs, please change the motor or controller to verify which parts is failed.
E04	The communication between controller and battery fails while power on	Generally it will be recovered automatically. If it happens frequently, please turn off the system, then remove the battery and check both connectors on the bike and battery. Install the battery and turn on the system. If the error occurs, please check the metal pin priority, and then update the HMI firmware. If the error still occurs, please change the battery or controller.
E05	Motor is driving hard	If it happens seldom while the bike is climbing uphill, it should be a normal protection. However if it always happens on flat road, please change motor or controller to verify which parts is failed.

Code	Description	Action
E06	Battery report error	Turn off then turn on the system. If the error still occurs, please change the battery.
E07	Torque value is abnormal	Turn off then turn on the system. If the error still occurs, please change the torque sensor or controller to verify which parts is failed.
E08	Torque initial value is abnormal	Turn off then turn on the system. If the error still occurs, please refer to the technical manual and use PC service interface to calibrate the torque sensor.
E09	Temperature is too high in the controller	Please turn off the system and wait for 60 minutes to cool down the system. Turn on the system, if the error still occurs, please change the controller.
E10	Voltage is too high in the controller	Turn off then turn on the system. If the error still occurs, please remove the battery measure the voltage. If the voltage is more than 42V, please change the battery, else please change the controller. (Different types of battery may have different appearance, please refer the (+) pin and (-) pin definition below) 
E11	Voltage is too low in the controller	Please charge the battery with the charger until battery is fully charged. If the error still occurs, please change the controller.

Code	Description	Action
E12	Current is too large in the controller	Turn off then turn on the system. If the error still occurs, please change the controller.
E16	Halls' arrangement is mismatch	Turn off the system and make sure the connectors connected well between controller and motor, then turn on. If the error still occurs, please change motor or controller to verify which parts is failed.
E57	The communication between HMI and controller fails.	Turn off then turn on the system. If the error still occurs, please change the HMI or controller to verify which parts is failed.
E82	Battery is OW (Open Wire) protection	Turn off then turn on the system. If the error still occurs, please change the battery.
E83	Battery is CU (Cell Unbalance) protection	Turn off then turn on the system. If the error still occurs, please change the battery.
E84	Battery is OCC (Over Current Charge) protection	Turn off then turn on the system. If the error still occurs, please change the battery.

- Warning code

Code	Description	Action
W01	The communication between the controller and battery is not stable.	Generally it will be recovered automatically. If it happens frequently, please update the HMI with firmware (version 2.004S2 or higher), and replace a HMI with hardware (version 2.0 or higher). If no, please replace the HMI and update to new version firmware. Please remove the battery, and confirm the metal pin was drawn back or not. If yes, please change the abnormal parts. Install the battery and turn on the system. If the error still occurs, please change the battery or controller.
W02	Motion sensor of controller fails	Generally it will be recovered automatically. If it happens frequently, please update the HMI with firmware (version 2.004S2 or higher). If no, please update to new version firmware. Install the battery and turn on the system. If the error still occurs, please change the controller.
W03	The assistance is limited because of controller's temperature	The system can still work, but the power may be limited. You can keep using it, or turn off the assistance and wait for 30 minutes until the system cool down. If the warning still occurs after more than 2 hours, please change the controller.

5.2 Procedure

Issue	Step	Check step	Action
No assistance while pedaling.	1	Check if the assistant level is 0 or not.	If yes, please adjust the assistant level >=1. If no, please progress the next step.
	2	Check if the connectors between motor and controller connect well or not.	If yes, please progress the next step. If no, please turn off the system and reconnect the motor's cable.
	3	Connect the diagnosis tool to the system and execute the "EB Service Interface". Use the "Manual test" function with technical manual. Rotate the wheel backwards manually and monitor the "U hall", "V hall" and "W hall" check-boxes. All of the hall sensor check-boxes shouldn't be the same. (checked or non-checked) While rotating, the check-boxes should keep changed at the same time. (checked or non-checked)	If yes, please progress the step 6. If no, please progress the next step.
	4	Replace the standard controller, and check the result again after repeating the progress of step 3.	If yes, please replace the controller. If no, please replace the motor.
	5	Connect the diagnosis tool to system. Rotate the pedal forwards manually, and the "pedal 1", "pedal 2" signals should keep changed, and "RPM" should show value.	If yes, please contact with the manufacturer. If no, please progress the next step.
	6	Replace the standard controller, and check the result again after repeating the progress of step 5.	If yes, please replace the controller. If no, please replace the pedaling sensor.

Issue	Step	Check step	Action
Power outputs while pedaling backwards.	1	Connect the diagnosis tool to system and execute the "EB Service Interface". Choose "Manual test". Rotate the pedal backwards manually, and check if the "Pedal Sensor Count" text-box >1.	If yes, please progress the next step. If no, please contract with the manufacturer.
	2	Replace the standard controller, and check the result again after repeating the progress of step 1.	If yes, please replace the controller. If no, please replace the pedaling sensor.
The assistance level resets to 0 while pedaling.	1	Check if the connectors between motor and controller connect well or not.	If yes, please progress the next step. If yes, please turn off the system and reconnect the motor's cable.
	2	Check if there any damage in motor cable.	If yes, please replace the motor. If no, please progress the next step.
	3	Connect the diagnosis tool to system and execute the "EB Service Interface". Choose "Manual test". Rotate the wheel backwards manually and monitor the "U hall", "V hall" and "W hall" check-boxes. All of the hall sensor check-boxes shouldn't be ticked or non-ticked at the same time, and should keep being ticked or non-ticked while rotating.	If yes, please progress the next step. If no, please replace the motor.
	4	Replace the standard motor and check the normality again.	If yes, please progress the next step. If no, please replace the motor.
	5	Replace the standard controller and check the normality again.	If yes, please contact with the manufacturer. If no, please replace the controller.

Issue	Step	Check step	Action
The assistance is not smooth and discontinuous while pedaling.	1	Connect the diagnosis tool to system and execute the "EB Service Interface". Choose "Device → Firmware update". Check the "Firmware Version" text-box is correct or not.	If yes, please progress the next step. If no, please upgrade the firmware of controller.
	1.1	1. Please check if the sensor cable of controller near the rear carrier is encircled and equipped with EMI core.  2. Please check if the torque sensor's cable inside the motor box is equipped with EMI core. The EMI core should be fixed with cable ties. 	If yes, please progress the next step. If no, please install EMI core.

Issue	Step	Check step	Action
The assistance is not smooth and discontinuous while pedaling.	2	Connect the diagnosis tool to system and execute the "EB Service Interface". Choose "Manual test". Rotate the pedal forwards manually, and the "pedal 1", "pedal 2" check-boxes should keep being ticked or non-ticked and "Pedal RPM" text-box should show value.	If yes, please progress the step 4. If no, please progress the next step.
	3	Replace the standard controller and check the normality again.	If yes, please replace the controller. If no, please replace the pedaling sensor.
	4	Connect the diagnosis tool to system and execute the "EB Service Interface". Choose "Manual test". The initial value of "Pedal Sensor Count" check-box should be 0 or 1. Rotate the pedal forwards manually for 2 circles, and check if the "Pedal Sensor Count" text-box is 31 ~ 33 or not.	If yes, please progress the next step. If no, please replace the pedaling sensor.
	4.1	Connect the diagnosis tool to system and execute the "EB Service Interface". Choose "Manual test". Please do the "Calibrate". After the calibration, the "Torque (Nt.m)" text-box should be 0 or 1. While stamping is on both pedals, the "Torque (Nt.m)" text-box should increase.	If yes, please contact with the manufacturer. If no, please replace the torque sensor.
After turning on system, the HMI is on but can't be operated.	1	Replace the standard HMI and check the normality.	If yes, please replace the HMI. If no, please replace the controller.

Issue	Step	Check step	Action
The HMI immediately turns off after turning on.	1	Replace the standard HMI and check the normality again.	If yes, please replace the HMI. If no, please contact with the manufacturer.
The system can't be turned on or HMI can't be on.	1	Remove the battery, please make the meter's probe (+) contact to battery metal pin (+), and the meter's probe (-) contact to battery metal pin (-), check it is lower than 30V or not. 	If yes, please progress the next step. If no, please progress the step 3.
	1.1	Push the indicator button on battery and check the capacity is 0 or any protection displayed.	If yes, please progress the next step. If no, please progress the step 3.
	2	Charge the battery with charger and the led indicator on charger should work normally.	If yes, please charge the battery fully then test again. If no, please replace the battery.
	3	Replace the standard battery and check the normality again.	If yes, please replace the battery. If no, please progress the next step.
	4	Replace the standard HMI and check the normality again.	If yes, please replace the HMI. If no, please contact with the manufacturer.