

## Repair Card

### 1. Symptoms

Write the symptoms of the problem, giving as much detail as possible.

### 2. Payment method

- : Consent is not required if repair costs are 5,250 yen or less.  
: Consent required if repair costs money.

\* Fill out the "Repair Sheet" on our website and send it with the product to be repaired. (Click "Repairs" on the upper right of the website, and then click "Repair Sheet" on the left.)

Contact below for inquiry about the product: \_\_\_\_\_

**KEYENCE CORPORATION** Service Section, Hobby Department  
1-3-14 Higashi Nakajima, Higashi Yodogawa-ku, Osaka 533-8555  
Tel: +81 06-6379-1191 Fax: +81 06-6379-1190  
<http://hobby.keyence.co.jp/>  
e-mail:hobby@keyence.co.jp

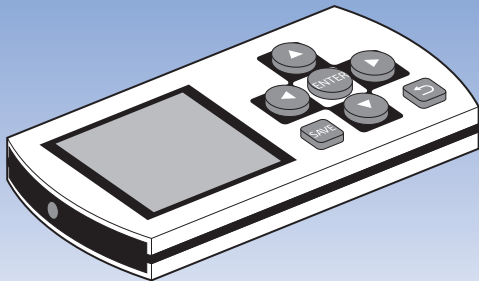
Distributor's name (Shop name, address, and tel. no.)

Aggressive Drive Effector

# TAO



## TAO Instruction Manual



# KEYENCE

## Precautions



### WARNING

Make sure to read the following precautions carefully to avoid potential injury, fire, and electric shock.

## Handling

“TAO” is a precision equipment. Please be careful in handling since damage arising from dropping, disassembling, or remodeling the product may damage the product.

## Avoid water and humidity

Do not use “TAO” in a rainy weather or a place accessible to liquids. In case the product gets wet by accident, remove all cables immediately, turn off the power, and wipe off the wet part. Do not turn on the power until it is fully dried. Also, do not use a dryer etc. for drying at all times. It will damage the product. Note that any damage caused by wetting the product cannot be repaired.

## Repairs

Do not try to repair damaged products by yourself at all times. In case of damage, stop using the product and request our company for repair.

\* Disassembled or remodeled product will not be covered by the warranty.

## Charging

Only use the auxiliary AC adapter and the USB cable to charge “TAO”. It may damage the product if this is not followed.

## Introduction

### Setting mode of TACHYON (amplifier)

(Refer to P.10 of “TACHYON Instruction Manual”)

TACHYON is equipped with two kinds of memory area. The preset value by TAO uses the memory at the [Program Card Mode]. Since the setting of the TACHYON main body is saved in the [ESC Mode], mutual interference is eliminated.

## About the Product

Thank you for purchasing “TAO”, a dedicated effector for the brushless system. The KEYENCE brushless system demonstrates a synergistic effect when used with TACHYON (brushless amplifier), LUXON (brushless motor), and TAO (effector). Each frequency of drive (advance), neutral brake, and brake, which determines the characteristics of the amplifier, can be set separately, and the output characteristics can be changed individually as well. Also with LUXON’s angle adjustment function, the motor’s characteristics can be changed. (Refer to P.8) These settings can be saved up to three patterns and easily confirmed by the liquid crystal display with backlights. In this way, settings can be changed during operation to achieve comfortable driving that satisfies your driving desires. Please enjoy the sophisticated brushless system.

### CAUTION

TAO is a dedicated effector for our company’s products, “TACHYON” and “LUXON”. It is not compatible to any competitor’s brushless products. Note that we will not be responsible for any damage which arises by using TAO with competitor’s product, as well as repairs.

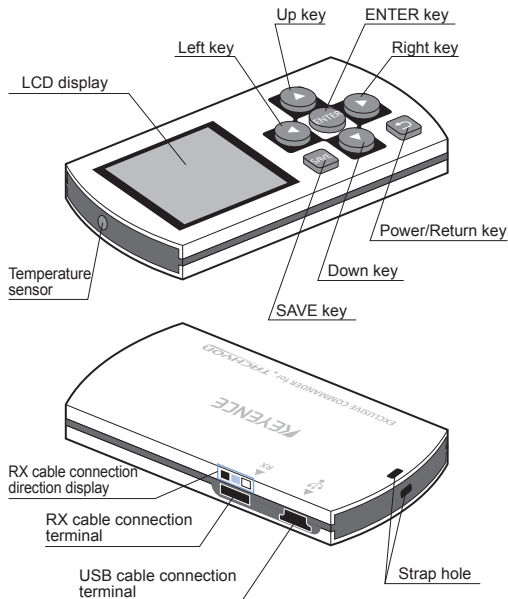
## Specifications

Outer dimensions	90(W) x 40(H) x 11(D) mm (Excluding the protruding part)
Weight	36 g
Battery	Li-Po DC 3.7 V 250 mAh
Charging power	DC 5.0V
Display	1.6 inches
Measurable temperature	0 °C - 150 °C
Measurable time	00:00:00 - 99:59:59
Charging time	3.5 hours
Operation time	5 hours (Continuous use)

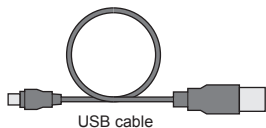
## INDEX

Name of Parts	5
Auxiliaries	6
Before Use	6
Connection to TACHYON (Amplifier)	7
Power ON/OFF	8
Major Settings	8
Data Transfer to TACHYON	9
Set Mode	9
Setting Items of [Set Mode] and [Preview]	10
Set Mode	12
Data Link	14
Preview	16
Thermometer	18
Stop Watch	20
Calendar	22
User Name	23
Default Screen	24
List of Preset Data (Default Values)	24
Index	26
Repair Conditions / Warranty	27

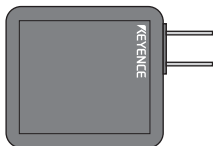
## Name of Parts



## Auxiliaries

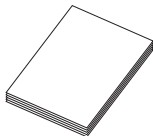


USB cable



AC adapter

Input: AC100V-AC240V  
50/60Hz 75mA  
Output: DC5V 500mA

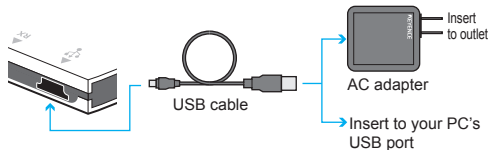


TAO Instruction Manual  
(This manual)

## Before Use

### Charge

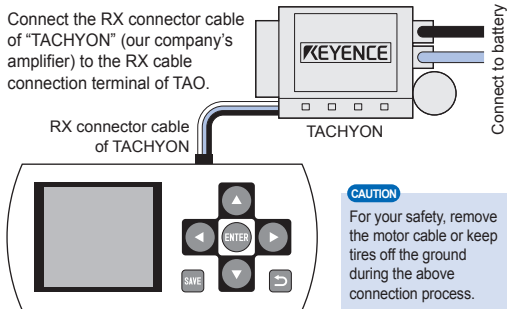
Before using, make sure to charge TAO with the AC power at your home or with your PC's USB port. An AC adapter and the auxiliary USB cable are used for charging. While charging, a sign indicating "charging" will appear on the upper left of the LCD. When the charging is completed, the "charging" sign will disappear and the charging stops automatically.



## Connection to TACHYON (Amplifier)

(Data Transmission /Reception)

Connect the RX connector cable of "TACHYON" (our company's amplifier) to the RX cable connection terminal of TAO.



## Preparations for data transmission/reception (two-way communication)

- Turn on the power of TACHYON.  
(Connect it with a charged battery. Communication cannot be achieved when the power is off.)
- Set TACHYON to [Program Card Mode]. The main LED of TACHYON will light up in red.  
(Refer to P.10 of "TACHYON Instruction Manual" for details.)
- Insert TACHYON's RX connector to the RX cable connection terminal of TAO. Confirm that the connector is inserted in the correct direction.  
(A sticker which indicates the cable's color is placed on the RX cable connection terminal of TAO. It may cause damage when inserted in an opposite direction.)

Numerical values set by TACHYON can be used at TACHYON's [ESC Mode].

### Turn on the power



Press and hold the return key for more than 2 seconds to turn on the power.

### Turn off the power



Press and hold the return key for more than 2 seconds to turn off the power.

- \* The power will turn off automatically after 5 minutes without operation.
- \* The preset values which are saved, calendar, and user name are stored in the memory even after the power is turned off

## Major Settings

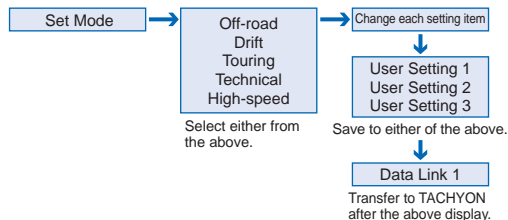
- (1) **Frequency setting** (Drive, neutral brake, brake)  
The setting item for determining the output characteristics of the entire amplifier. It is recommended to set the frequency firstly according to the category and course layout. Each can be set in four levels; 2, 4, 8, and 16KHz.
- (2) **Power setting** (Initial speed, neutral brake power, brake power)  
Enables to change the initial speed and the strength of each brake.
- (3) **Function setting**  
Enables to set the maximum speed of advance/reverse, with or without reverse, and cut-off voltage.
- (4) **Angle adjustment of LUXON (motor)**  
Enables to change the characteristics of LUXON.

\* Refer to P.10 and P.11 for contents of each setting.

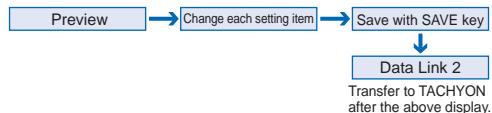
\* Refer to P.12 for setting instructions.

## Data Transfer to TACHYON

- (1) When using preset data (Default value: Refer to P.25) (P.12, P.13)



- (2) When using data transferred to TACHYON (P.16, P.17)



## Set Mode

This is a program mode to change the output characteristics of TACHYON (amplifier) and LUXON (motor). Numerical values which are set/saved at this mode will be stored inside TAO (effector). Five types of data including "Off-Road", "Drift", "Touring", "Technical", and "High-Speed" are preset as basic operation modes.

Since the preset values are rough standards, each value should be changed and saved to "User Setting 1-3". (P.12, P.13)

## Setting Items of [Set Mode] and [Preview]

### COV (Cut Off Voltage) (Changing cut-off voltage) Caution 2 (Refer to P25)

This is a function to stop the driving before the receiver becomes out of control by voltage reduction during a driving operation. When lithium polymer battery is used, this function enables to prevent battery damage caused by over discharge. It is recommended to set a relatively high voltage since unstable voltage may be caused depending on battery usage or individual difference.

Values which can be set	Ni-cd / Mi-MH / Li-Fe...4.5/4.8/5.0/5.2/5.5/5.8/6.1V Li-Po 2-cell...6.6/6.9V, Li-Po 3-cell...9.9/10.4V
-------------------------	---

**CAUTION!** Make sure to set the voltage higher than the guaranteed minimum voltage indicated on your battery. It may damage the battery if used below the guaranteed minimum voltage.

### FWD/REV <Forward / Reverse> (Switching the backward driving function ON/OFF)

Backward driving is enabled when the function is set ON.

Values which can be set	ON/OFF
-------------------------	--------

### BrakePower

This is an adjustment for the braking force which is applied when the throttle lever is moved from neutral position to the brake side. Higher numerical value means stronger brake power.

Values which can be set	0%,2%,4%,...,46%,48%,50% (2% steps)
-------------------------	-------------------------------------

### NeuBrake <Neutral brake> (Neutral brake power)

This is an adjustment for the braking force which is applied when the throttle lever is returned to neutral position. Higher numerical value means stronger neutral brake power.

Values which can be set	0%,2%,4%,...,46%,48%,50% (2% steps)
-------------------------	-------------------------------------

### MotorTiming (Angle adjustment of LUXON)

Top speed and torque can be changed by electrical adjustment of the advance angle.

Values which can be set	0°,2°,4°,6°,...,26°,28°,30° (2°steps)
-------------------------	---------------------------------------

**CAUTION!** Be careful when adjusting the advance angle. The amplifier and the motor may overheat, depending on the number of motor turns or conditions including gear ratio etc.

### InitialSpeed

Initial speed is the acceleration value at zero-start. Higher numerical value means

higher effectiveness. Make sure to set an adequate value since excessive value may cause spinning tires, depending on the grip condition of the road surface.

Values which can be set	0%,2%,4%,...,46%,48%,50% (2% steps)
-------------------------	-------------------------------------

### FWDspeed <Forward speed> (Maximum speed restriction of advance side)

This setting is for adjusting the speed of when the throttle lever is fully moved to advance side. Lower numerical value means more restrictions on the maximum speed.

Values which can be set	50%,60%,70%,80%,90%,100%
-------------------------	--------------------------

### REVspeed <Reverse speed> (Maximum speed restriction of backward side)

This setting is for adjusting the speed of when the throttle lever is fully moved to the brake side. Lower numerical value means more restrictions on the maximum speed. (Not available when the backward function is off.)

Values which can be set	25%,50%,75%,100%
-------------------------	------------------

*About the frequency to be set, described below.* Frequency indicates the number of ON/OFF signals toward the proportional system's throttle work. (Ex: 2KHz...2,000 times/sec, 16KHz...16,000 times/sec)

### DriveFrq <Drive frequency>

As to the throttle work, lower numerical value means [Torque/Acceleration feeling=Strong], while higher numerical value means [Torque/Acceleration feeling=Linear (Smooth)].

Values which can be set	2KHz / 4KHz / 8KHz / 16KHz
-------------------------	----------------------------

### NeuBrkFrq <Neutral brake frequency>

As to the throttle work, lower numerical value means [Deceleration force/Deceleration feeling=Strong], while higher numerical value means [Deceleration force/Deceleration feeling=Linear (Smooth)].

Values which can be set	2KHz / 4KHz / 8KHz / 16KHz
-------------------------	----------------------------

### BrakeFrq <Brake frequency>

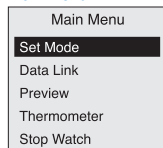
As to the throttle work, lower numerical value means [Deceleration force/Deceleration feeling=Strong], while higher numerical value means [Deceleration force/Deceleration feeling=Linear (Smooth)].

Values which can be set	2KHz / 4KHz / 8KHz / 16KHz
-------------------------	----------------------------

### Reverse (Switching the rotation direction of the motor)

The rotation direction of the motor changes by switching ON/OFF.

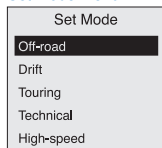
## Main Menu



Select "Set Mode" with the up/down key, and press the ENTER key.



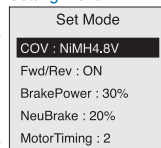
## Set Mode Menu



Select the desired mode with the up/down key, and press the ENTER key.



## Setting Menu



InitialSpeed : 36%  
FwdSpeed : 100%  
RevSpeed : 50%  
DriveFrq : 8KHz  
NeuBrkFrq : 8KHz  
BrakeFrq : 2KHz  
Reverse : OFF



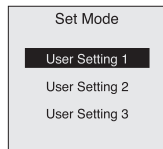
Ex: When "Off-road" is selected at the Set Mode Menu, as shown in the left figure.

Select the item to be adjusted with the up/down key, and press the ENTER key.

The value of each item can be changed repeatedly before pressing the SAVE key.



## Destination Selection Screen



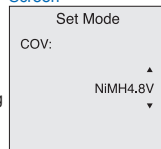
Select the destination to save with the up/down key, and press the ENTER key. The data is saved and returns to the Main Menu.



When finished setting, press the SAVE key to display the Destination Selection Screen.

When setting other items continuously

## Preset Value Change Screen



Ex: When "COV <Cut Off voltage>" is selected at the Setting Menu, as shown in the above figure.

Select the desired numerical value with the up/down key, and press the ENTER key to change the value. If the value does not need to be changed, press the return key to return to the Setting Menu.



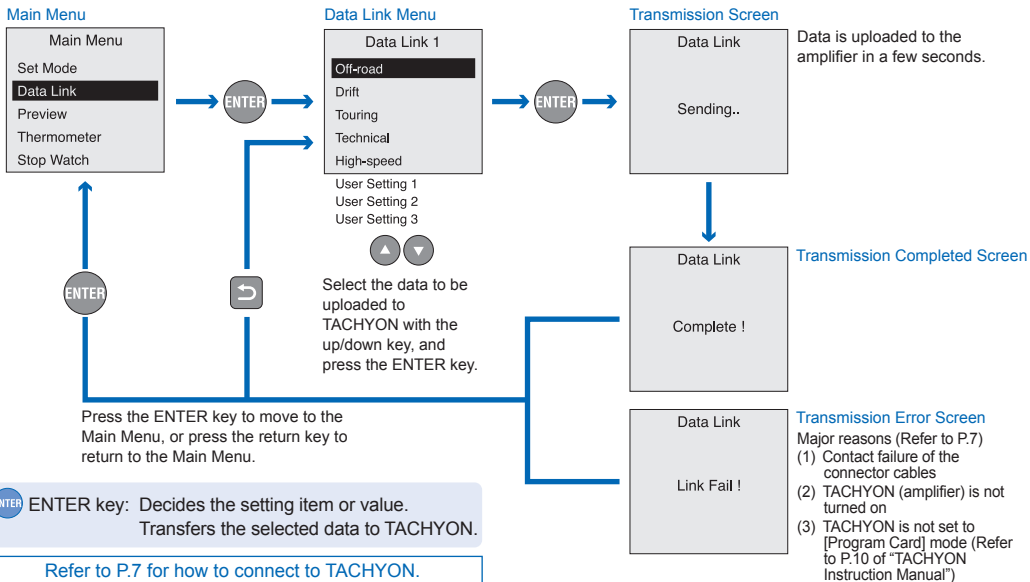
ENTER key: Decides the setting item or value.



Return key: Returns to the prior screen.

Transmits the values of the items set by TAO to TACHYON. This data will be stored in the [Program Card] area of TACHYON.

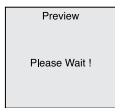
\* The below figure is an example of selecting "Off-road" from the preset program.



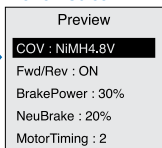
Enables to confirm the contents of the data sent from TAO (data used at TACHYON's [Program Card] mode). As with the Set Mode, setting items can also be changed from this screen and uploaded directly to TACHYON.

**CAUTION** "Preview" is an intercommunication mode of TAO and TACHYON (amplifier). A message "Link Fail!" (error) will be displayed if TAO and TACHYON is not connected correctly (When conditions described in P.7 is not satisfied).

## Main Menu



## Preview Screen

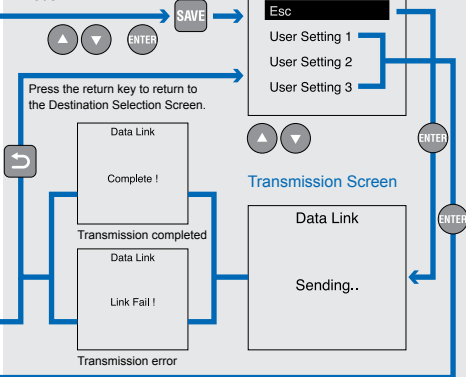


InitialSpeed : 36%  
FwdSpeed : 100%  
RevSpeed : 50%  
DriveFrq : 8KHz  
NeuBrkFrq : 8KHz  
BrakeFrq : 2KHz  
Reverse : OFF

Press the return key to return to the Main Menu.

Press the ENTER key to return to the Main Menu.

Values can be changed or saved in the same way as Set Mode.



**ENTER** ENTER key: Decides/transfers the setting item or value.

**SAVE** SAVE key: Selects the destination to save.

•When ESC is selected:

Press the ENTER key to transfer the data set at the Preview Screen directly to TACHYON.

•When User Setting 1-3 is selected:

Press the ENTER key to temporarily save the data set at the Preview Screen inside TAO. When transferring the data to TACHYON, operate from Data Link (P.14, P.15).

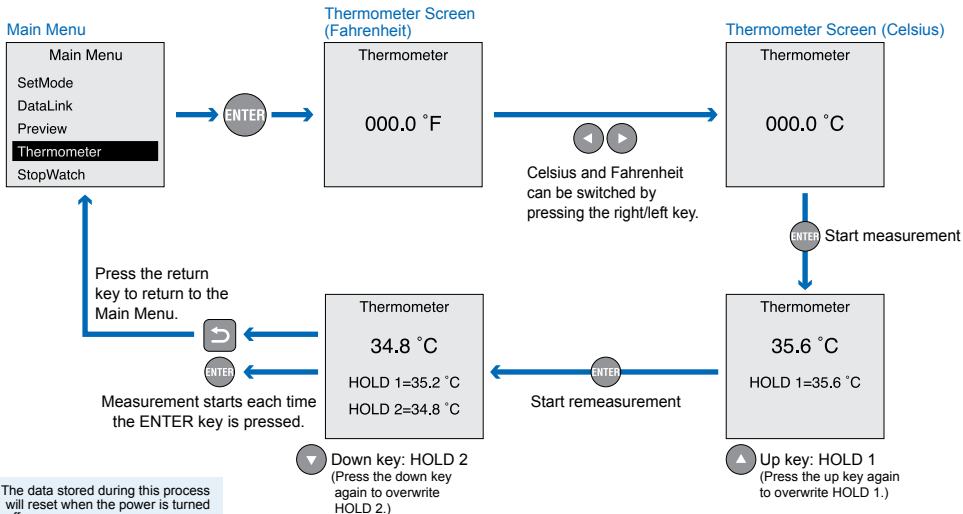
Refer to P.7 for how to connect to TACHYON.

## Thermometer

This function serves as an infrared thermometer. It can also store data of two kinds of temperatures (HOLD) and display them. With this function, changes in temperature of the road surface, as well as the temperatures of the amplifier/motor before and after driving can be easily confirmed. Hold the temperature sensor located at the upper side of TAO (P.5) close to the object to be measured (close about 5cm far), and press the ENTER key to measure the temperature.

**CAUTION** The temperature displayed is a rough standard. Note beforehand that it may be influenced by the surrounding environment.

- ENTER** ENTER key: Measures the temperature.
- ▲ ▼** Up/Down key: Saves the measured temperature (HOLD 1, 2).



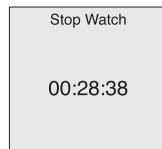
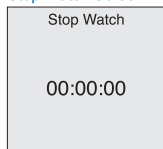
\* The data stored during this process will reset when the power is turned off.

## Stop Watch

### Main Menu



### Stop Watch Screen

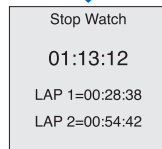


Press the ENTER key to start counting. Press the ENTER key again to stop.

Press the return key at the clear screen to return to the Main Menu.



Press the right/left key to clear all.



While counting, a split time can be measured by pressing the up/down key. Press the ENTER key to stop the time count.

ENTER Time count is continued if the ENTER key is pressed at this screen. However, the lap time is deleted.

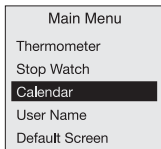
\* The data stored during this process will reset when the power is turned off.

- ENTER ENTER key: Starts or stops time count.
- ▲ ▼ Up/Down key: Saves the lap time. (LAP 1, 2)
- ◀ ▶ Right/Left key: Clears the measured value.

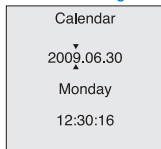
## Calendar

Displays a calendar in the following order (from up to down); <year, month, day>, <day of the week>, and <hour, minutes, seconds>.

### Main Menu



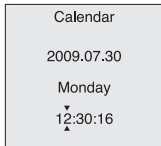
### Calendar Setting Screen



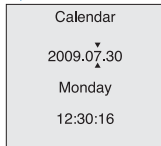
Press the right/left key to move to the digit to be changed.

Press the SAVE key to save the data and return to the Main Menu.

SAVE



Press the ENTER key to move to time setting. It can be changed in the same way as the date.



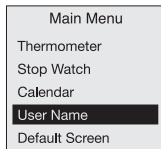
Press the up/down key to change the date and time.

\* Contents saved with the SAVE key will not be reset even when the power is turned off.

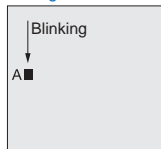
## User Name

User name can be registered up to 15 characters.

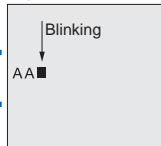
### Main Menu



### User Name Setting Screen



Press the up/down key to display a desired character and decide with the ENTER key.



The cursor will automatically move right to the next position. Decide a character as mentioned above.

After entry, press the SAVE key to save the data and return to the Main Menu.

SAVE

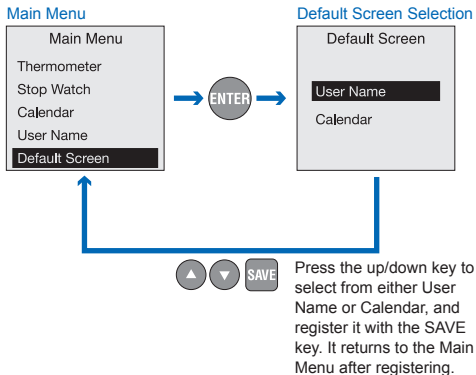
Press the return key to return to the Main Menu without saving the data.

↵

\* Contents saved with the SAVE key will not be reset even when the power is turned off.

## Default Screen

The default screen of TAO can be changed to either [User Name] or [Calendar].



## List of Preset Data (Default Values)

	Off-Road	Drift	Touring	Technical	High-Speed
COV	NiMH4.8V	NiMH4.8V	NiMH4.8V	NiMH4.8V	NiMH4.8V
Fwd/Rev	ON	ON	ON	OFF	OFF
BrakePower	30%	30%	20%	4%	4%
NeuBrake	20%	30%	20%	8%	4%
MotorTiming	2	2	2	4	6
InicialSpeed	36%	50%	0%	16%	20%
FwdSpeed	100%	100%	100%	100%	100%
RevSpeed	50%	50%	50%	50%	50%
DriveFrq	8KHz	8KHz	4KHz	8KHz	16KHz
NeuBrkFrq	8KHz	8KHz	8KHz	8KHz	8KHz
BrakeFrq	2KHz	2KHz	2KHz	2KHz	2KHz
Reverse	OFF	OFF	OFF	OFF	OFF

### CAUTION

#### 1. **SAVE** About SAVE

- The preset value will not be saved if the power is turned off (by auto power-off etc.) while setting the items (before save).
- Operations including setting, save etc. can be continued during charging. (P.6)

#### 2. About the display of Cut Off Power (COV)

Only two types, <Ni-MH> and <Li-Po>, are displayed on the screen.

When using <Ni-Cd> or <Li-Fe> batteries, use with <Ni-MH> display.

