Installation and usage manual
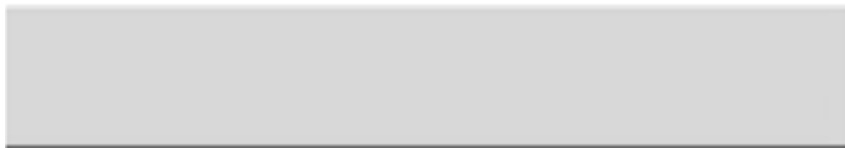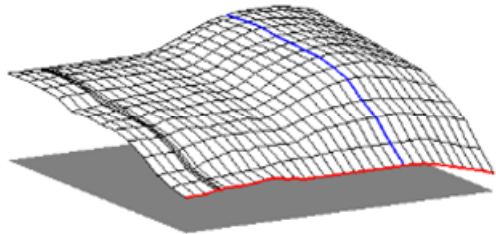
EcuPlus

TC-I *Easy K*

Version 1.1
English

Release

EcuPlus Team
ITALY

Last update, 12th December 2018
It is believed that the information in this document is right related to the date of printing. EcuPlus does not assume any responsibility about incorrect or missing content or damage resulting from this guide.
Moreover it is underlined that the information in this document is subject to change without notice and has not to be interpreted as obligation on EcuPlus side.
We are grateful for references to mistakes or for improvement proposals in order to offer an even better product in the future.

1.0 Introduction

Thank you for having bought the EcuPlus products and we hope you can get the best satisfaction from it. This manual will help you understanding functional, installation and management requirements of your additional EcuPlus.

This manual will help you understanding functional, installation and management requirements of your additional EcuPlus.

As reported by the regulations IFMAR, EFRA, ignition timing can not be changed with the engine running but only with engine stopped, therefore <u>the usage of EcuPlusTC-I Easy series in titled competitions, IS NOT ALLOWED.</u>

In this chapter you can find the following information:

1.1 Information about this Manual

1.2 Conventions and terminology used

1.3 Product warranty

1.4 Technical support

1.5 Package contents

1.1 Information about this Manual

Quickly look for information

The usage manual provides the following aids to facilitate the usage:

At the beginning of each chapter, you will find the executive summary while in the heading you can see which chapter and paragraph you are reading.

> ➢ In the footer you can see the version of the user manual

> ➢ Use of the graphic symbols to focus on the importance of the information displayed

1.2 Conventions and terminology used

In the following table, there are described the conventions used in this manual about the symbols.

⚠ WARNING	Dangerous operation for your safety
🛑	Operation not allowed
ℹ	Relevant information
⚠	Pay attention

- **TDC**
  Top Dead Center of the piston

- **BDC**
  Bottom Dead Center of the piston

- **FlyWheel/Air Gap**
  Is the distance between the rotor and the stator (ignition coil)

- **Ignition Timing**
  we mean the advance angle in crank degrees or displacement millimeters of the piston respect to TDC and it is the time when the ignition system burst the spark plug.
  The ignition timing can be delayed respect to the TDC.

- **EGT**
  Exhaust Gas Temperature

- **FlyWheel**
  Flywheel of the ignition system

- **Run**
  It is the session of the engine usage considered from its ignition until the engine off. Every time the engine starts, it starts a new run.

- **Run time**
  It describes the time elapsed from the ignition of the engine until the time of reading.

- **Peak**
  It is the maximum peak reached by RPM.

- **Calibration**
  EcuPlus setting file containing functional and management information of the Ecu, with timing correction maps for the engine currently in use.

- **Coil**
  Ignition coil

- **Mapping**
  Two-dimensional representation (RPM x Ignition Timing) of the advance correction management map.
   Maps (8) are contained in the calibration file.

- **Killer-Switch**
  Engine-Off button

- **Firmware**
  Firmware is a software constituted by instructions that are executed inside the Ecu. The Ecu firmware can be updated any time by the user, in order to allow the use of the most up to date functionalities.

- **EcuPlus Manager Tool**
  It is the software developed for the complete management of the Ecu and compatible with every Windows OS.
- **Ecu**
  Engine Control Unit

1.3 Product warranty

This product is designed and manufactured to the highest standards to give high quality performance, ease of use and installation.
In case of problems during installation or use of the product, please refer in first instance to the instructions or the information contained in the user manual. If the product proves defective, EcuPlus arranges for its repair, replacement, refund or the provision of related spare parts under the terms of the warranty in force in the country where it was purchased.
The warranty begins on the day the product is purchased and ends after two years (24 months). If defects occur due to a fault in material or workmanship during the warranty period, EcuPlus provides the repair or replacement of the product at its own expense. In case of product replacement, the start date of the warranty is the date of purchase of the original product.
The costs of shipping, are to be payed by the consumer.
The warranty is valid only if the warranty card that attaches the electronic unit, filled in all its parts by the purchaser and accompanied by valid proof of purchase (sales receipt to the consumer), is presented at the warranty intervention request.

- The warranty does not cover damage caused and does not apply in the following cases:
- The purchase documents have been altered in any form or made unreadable.
- You have performed repairs, modifications or alterations to the product by unauthorized people.
- The product is not used properly and therefore not respecting the instructions in the instruction manual.
- There are defects caused by misuse, improper use not in accordance with the recommended operation of the product.
- There are defects caused by accessories or additional devices connected and not recommended by EcuPlus.

➢ There are defects caused to the product accidentally including, without limitation, abnormal voltage, exposure to fire or accidents related to the sport.

➢ The serial number (serial number) on the product should not be in any way made illegible or deleted, otherwise void warranty

➢ The warranty parts subject to wear following use as connecting cables, connectors, box enclosing and temperature probes that do not have manufacturing defects.

➢ After the warranty period, assistance actions will be expounded by charging the parts replaced, the cost of labor and transport, according to the rates in vigor.

After the warranty period, the assistance interventions will be performed by debiting the replaced parts, labor and transport costs, according to the rates in force.

1.4 Technical support

Do you need support?

Before contacting EcuPlus it is suggested to carefully read the instructions and refer to the section on troubleshooting (chapter 7).

You can obtain technical support by writing to: postmaster@ecuplus.it

1.5 Package content

1.5.1 Standard equipment (Kit code: K.TC-I)

➢ EcuPlus TC-I *Easy K* with standard maps uploaded cod. U.TC-IEK
➢ USB programming cable cod. H.TTL-TCI-E
➢ Installation manual

1.5.2   Optionals

➢ Cylinder temperature measurement kit cod. T.TK-P2E
➢ Exhaust gas temperature measurement kit cod. T.TK-P3E

2.0 Operation of EcuPlus

In this chapter you find the following information:

2.1 Operation overview

2.2 Ecu functionality

2.1 Operation overview

The EcuPlus TCI *Easy K* is a control unit compatible with ignition systems TCI-IKEDA for ignition flywheels with two magnets of 60, 70 and 89mm diameter.
It allows to monitor the engine by measuring its time of operation, the rotation speed, the engine or the exhaust gas temperatures and various other parameters, it also corrects the ignition timing.
The EcuPlus, appropriately corrects the advance only in delay, therefore, the combination of the Ecu retarding characteristic together with the enough static advance, allows to correct the advance freely and accurately obtaining the improvement of the engine performance.
Furthermore, the particular electronic circuit of the ECU improves the quality of the ignition spark by making more stable the ignition point of the fuel mixture in the entire range of rpm.

2.2 Ecu functionality

• Engine temperature reduction
• Increase the torque and horsepower
• Reduce the torque and power gaps at low and medium rpm
• Extends the top engine speed
• Fuel consumption reduction
• Engine or exhaust temperature measurement
• Current and previous run time measurements
• Engines total time measurement (up to 4 different)
• Engine speed measurement
• Maximum car model speed
• Programmable maintenance notice
• Timing ignition tuning
• Engine failure prevention
• Ready to use and further configurable with the EcuPlus Manager software tool
• In-Circuit Self Safety function
• Compatible with all IKEDA ignition systems
• Upgradable firmware

The EcuPlus units are a great help to the development of your models.

3.0 Ecu connection and installation

**In this chapter you can find
the following information:**

3.1 Overview
3.2 Tools needed
3.3 EcuPlus TC-I installation
3.4 Measure and adjustment of Flywheel Air Gap

3.1 Overview

EcuPlus assumes knowledge of the fundamental principles of mechanics and of disassembly and reassembly techniques of these engines.
Without such a knowledge
Without this knowledge you can affect the safety, the efficiency and the reliability of the engine.

3.2 Tools needed

For the Ecu installation, only few tools are needed and in detail they are:

- 3mm allen key
- 4mm allen key
- electrician scissors
- tong to crimp ties lugs
- nylon cable ties or biadhesive Velcro
- 0.35 or 0.45mm thickness gauge (just to check the air-gap flywheel/coil)

Ensure that the connection is a good quality one otherwise the Ecu could not work or suddenly stop working.

3.3 EcuPlus TC-I *Easy K* installation

**Estimated time: 15min**

Ecu installation is easy:

1) remove the the ignition flywheel crankase cover

2) identify the switch off and connect the Ecu wires in parallel to the two Killer-switch terminals:

Red lead of the harness with red wire of the Killer-switch or positive coil terminal

Black lead of the harness with black wire of Killer-switch or negative coil terminal
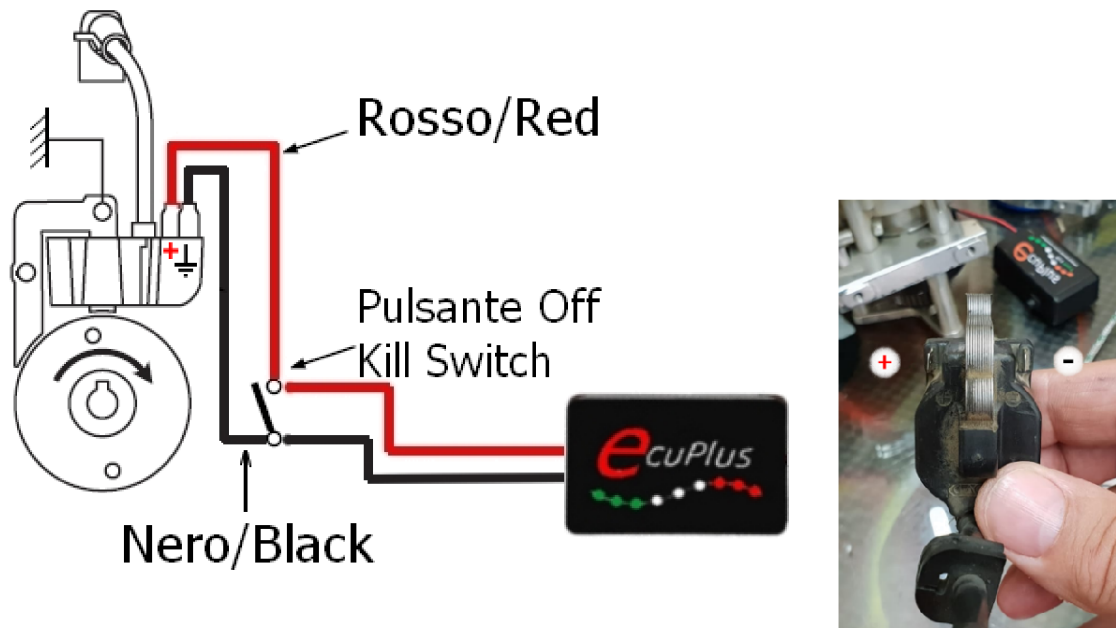
ℹ️ Ensure that the connection is a good quality one otherwise the Ecu could not work or suddenly stop working.

🛑

If the polarity of the connection is inverted, the engine can not start.

- verify that the fixed advance of keying matches the value specified in the specification that accompanies each calibration

- verify that Air Gap corresponds to the 0.35mm suggested value, see instructions in par4.4

- After you have reinstalled and verified the correct assembly of each disconnected part, verify that the engine starts regularly.

- Fasten the Ecu using biadhesive velcro or nylon cable ties taking care avoiding high temperature areas. Due to vibrations, it is recommended not to install the Ecu directly on the engine.

Once the installation is completed, to profitably use all the functionalities provided by the Ecu, it is necessary to set up the ignition type that your engine has. When you buy the Ecu, the installed calibration is for 60mm flywheels.

3.4 Measure and adjustment of Flywheel Air Gap

Due to the operational nature of this type of installations, the resulting advance value is guaranteed only if the air-gap between the coil and the ignition flywheel corresponds to that one prescribed and given in the following table.

Flywheel AirGap	0.40mm ± 0.05

For the measurement, use a standard gauge or, even better, a card having the proper thickness and in case there are different values, proceed to register.
The slots formed in the coil attachment, allow you to register the Air Gap.

Air Gap registration method:

- Loosen the screws securing the coil
- Put the measuring card between the rotor and the coil
- Push hard on the coil in direction of the flywheel and tighten the screws respecting the prescribed tightening.

⚠️

The deviation in excess from the limit value, has negative effects on the management of the advance (significant delay), moreover the instant of the Ecu ignition will be delayed, while lack deviations of Air Gap, can cause contact between moving parts, damaging them irreparably. It is therefore imperative that the distance is between the limit values (0.35-0.45mm).

3.5 Thermocouple input

Probe type
The Ecu has an input for temperature measurement, able to detect temperatures between 0 ° C and 700 ° C.
Compatible probes are **K Type:** (Chromel (Ni-Cr) (+) / Alumel (Ni-Al) (-).

Accuracy of the acquisition system:.

from 0 to 350°C   -> ±0,5%

from 351 to 500°C   -> ±1,5%

from 501 to 700°C   -> ±2,0%

Internal cold joint compensation allows the unit to operate at ambient temperatures between 0 and + 50 ° C.

The fixed acquisition frequency is 5Hz and starts with the 7500 G / min regime.

Connettore:

Type: Binder 719 series

Pin 1 = Thermocouple (-)
Pin 2 = Not connected
Pin 3 = Thermocouple (+)

The contacts are brass and gold-plated.

Connecting the thermocouple is not necessary to have the Ecu functioning.

The ECU is not compatible with temperature probes of the following type: **J, T, E, N, B, R, S, NTC, PTC.**

3.6 Usb communication interface

USB - RS232TTL

The serial communication interface is integrated in the programming wiring and provides communications between the ECU and the management software. The interface communication speed of is automatically set by Sw.

Cod. H.TTL-TCI-E

Windows automatically recognizes the chip embedded in the cable, but in any case, the specific and updated interface drivers are automatically installed during the installation process of the EcuPlus Manager software tool.

This type of cable is specific to EcuPlus ECUs and no other USB cable can be adapted.

4.0 TC-I *Easy K* Ecu Setup

**In this chapter you can find
the following information:**

4.1 Choice of ignition type

4.2 Correction maps

4.3 Control and regulation of fixed advance

4.4 Measure and adjustment of Flywheel Air Gap

4.1 Choice of ignition type

If the flywheel installed on your engine is different from the base one, then it is necessary to change the setting.
For how to set the ignition type, it is needed to act through the settings menu (see section 4.1) or by the EcuPlus Manager Tool.

If you use the ECU with the ignition type setting incorrect, the ECU is still able to show RPM and temperature correctly, but the Timing management will be ineffective.

Type: 89mm Zenoah

(Select this type of ignition for the original flywheel with IKEDA-D coil)

Type: 60mm

(select this type of ignition for all 60mm flywheels with IKEDA-D type coils)
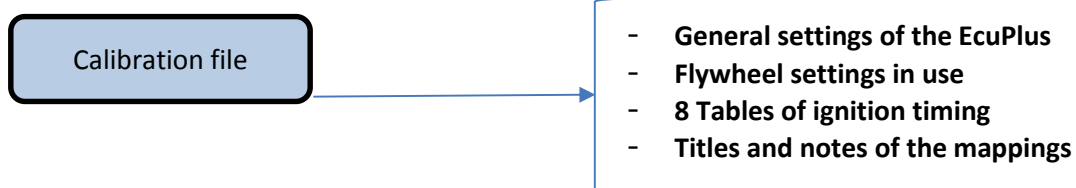
Tipo: 70mm

(Select this type of ignition for the Bergonzoni flywheel with IKEDA-D coil)

If you have another type of ignition system, please check compatibility on the web site http://www.ecuplus.it or contact postmaster@ecuplus.it assistance.

4.2 Correction maps

The EcuPlus is programmed with maps developed for ZENOAH engines prepared by EcuPlus and are updated to the date of sale. However, the research and development of engines continues and may be available maps more efficient or suitable for new solutions not yet loaded into your ECU. You should therefore verify any availability on the official website, page: "Calibration".

Information contained in the calibration file:

Calibration file

- **General settings of the EcuPlus**
- **Flywheel settings in use**
- **8 Tables of ignition timing**
- **Titles and notes of the mappings**

The EcuPlus has eight different pre-programmed mappings in addition to the "Original" operating mode.
The EcuPlus has 8 different pre-programmed maps that can be selected from the EcuPlus Management tool, together with the "Original" mode of operation.

Thanks to the Management Tool software that can be downloaded free of charge from the web, it is possible to select new calibrations as well as save information in the Ecu, set maintenance parameters and much more (see software manual).

For those who feel and want to create or modify the mappings, we suggest to consult the user guide of the software tool with the recommendation to perform the tuning of the Timing only if in possession of the necessary knowledge. To do this, take a look at the document describing the techniques for maps developing and their effects, which can be found on the official website at the "documentation" page.

5.0 Operative modes and usage of the Ecu
**In this chapter you can find
the following information:**

5.1 Ecu switch ON

5.2 Start the timing correction

5.3 Ecu switch OFF

Once installed, EcuPlus TC-I will automatically turn ON and OFF according to the operation of the engine.
It will therefore ensure the acquisition and storing of the relevant information together with the management of the timing correction without any intervention by the pilot.

5.1 Ecu switch ON

The EcuPlus TCI Easy K, is automatically activated as soon as the engine is running at a certain RPM threshold that depends on the ignition system installed.
The indicative activation thresholds are outlined below and also vary depending on the Coil / Flywheel Air Gap and also on the general state of the ignition system:

flywheel IKEDA-D 70/89mm	about 2000 RPM
flywheel 60mm	about 2250 RPM

From these RPMs onwards, the Ecu starts counting the operating time.

The timing correction and the acquisition peak values, starts from the RPM indicated in the following table and it is the same for all types of flywheels. The value is programmed into the ECU and can not be changed by the user.

For all flywheels	7500 RPM

The data log storage occurs when the RPMs are below this threshold.

Note: The ECU operation is only guaranteed with two magnets flywheels.

5.2 Ecu switch OFF

The Ecu switching OFF, happens automatically: as soon as the engine RPM drops below the thresholds:

flywheel IKEDA-D 70/89mm	about 2000 RPM
flywheel 60mm	about 2250 RPM

6.0 Technical data

Microcontroller	Architecture 8bit RISC
Acquisition engine speed and maximum measurable speed	8bit 0-25000 Rpm
Number of programmable maps	8 + Original configuration
Size of each correction map	32 Step X 1
Compatibility communication interface	USB
Digital Inputs/outputs	None
Analog Inputs/outputs	None
Input thermocouple	1 Channel IN K-Type (0-700°C)
Start correction timing	7500 Rpm
Operating temperature range	-25°C… +75°C
Compatibility system	TC-I IKEDA D
Measures (LxWxH)	60x35x15 mm
Weight	45g
Absorption current	typical 20 mA @ 9 V DC
Box enclosing	Abs
Protection level	IP 67 IEC 60529

The ECU is protected against short circuit, reverse polarity, over voltage for all inputs/outputs and is also immune both to and from the radio frequency transmission typical of the radio controls. The case of the ECU is resistant to vibration, abrasion, temperature and water. The special construction and sealing, make it completely immune to humidity. The protection level is IP67.

6.1 Cleaning and maintenance

⚠️

Clean with soap and water or mild detergent to avoid damaging the protective.
The use of unblocking or fluxes is generally permitted.

7.0 Troubleshooting guide

Case n°	Anomaly description	Resolution	Notes
1	**Engine does not crank**	a) Check Ecu connections on coil terminals and polarity. b) EcuPlus damaged, replace it.	
2	**During engine operation, occasionally occur pops at muffler and operation irregularities.**	a) Check Ecu connections on coil terminals.	
3	**The engine starts and runs regularly but the acquired data do not change between one test and another.**	b) Be sure to turn off the engine at a speed below 7500 RPM and **ONLY** after a minimum of one second of operation in this phase. c) The clutch attachment point is too low; adjust it.	
4	**The acquired data RPM, are inconsistent.**	a) Check the goodness of the connections to the coil terminals. b) Possible over-rev due to skating on land, grass or wheels contact loss.	
5	**The acquired temperature data are inconsistent.**	a) Check the quality connection of the temperature probe connector b) Replace the temperature probe	
6	**No sensible performance variation is noticed.**	a) Check that the current selected map is not the "Original" one. b) Check that the current ignition type is correctly selected and that fixed advance corresponds to that indicated in calibration details. c) Check that uploaded maps are right for the current engine configuration and do not present inconsistencies (Use the EcuPlus Manager Tool).	

Get more Information!

Visit our Website for:

> News

> Products

> Software

> Support

> Contacts

www.ecuplus.it