# MXL
## *YAMAHA R1 K4 K5 K6*
## *YAMAHA R6 K4 K5*

MXL for Yamaha R1 R6  is a product designed to offer the maximum amount of information with the minimum effort
for the installation. It directly connects to the bike Engine Control Unit, in order to get , without any extra sensor, the following data:

- **rpm**
- **speed**
- **water temperature**
- **air temperature**
-

From the bike sensors, it receives:

- **oil pressure status**
- **fuel level status**
- **turning lights signal**
- **Hi Beam signal**
- **Neutral signal**
- **Battery level**

Besides, MXL offers the possibility to manage **5 freely configurable channels**. The configuration can be executed by our Race Studio software, using  a normal PC.

MXL for Yamaha can be used in three different modes::

1. **Running mode:** normal mode: shows and, in case of MXL Pista, records, the engine data and the diagnosis codes.
2. **Setting  mode**:  by this mode, it is possible to set  some engine parameters. In Setting Mode it is possible to modify the engine mapping.
3. **Diagnostic Mode:** by this mode, we can manage problems and errors in the Engine Control Unit.

## POWER ON

MXL for Yamaha R1/R6 can be installed on both stock bikes and on bikes powered by original YEK kits

Turning the power ON, MXL automatically recognizes which ECU tis installed in the bike, working in two different ways. The two ECUs that can be managed are:
1.  STOCK ECU  ⇗ STD ECU
2.  YEC KIT       ⇗ KIT ECU
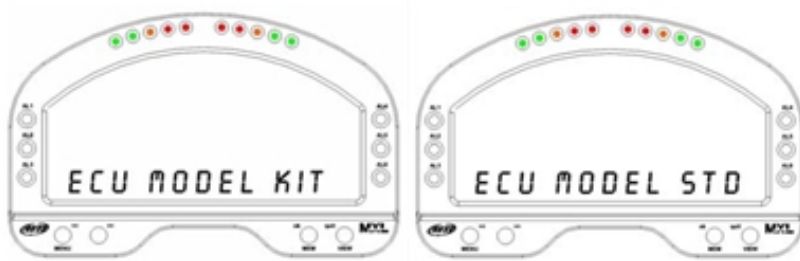


## RUNNING MODE

After having recognized the ECU, MXL starts operating in RUNNING MODE. I twill show and manage these information :

**MXL PISTA**

| | | |
|---|---|---|
| RPM | from ECU | Shown and logged |
| BACK WHEEL SPEED | from ECU | Shown and logged |
| WATER TEMPERATURE | from ECU | Shown and logged + ALARM LED |
| AIR TEMPERATURE | from ECU | Shown and logged + ALARM LED |
| OIL PRESSURE STATUS | from bike sensors | ALARM LED |
| FUEL LEVEL ALARM | from bike sensors | ALARM LED |
| BLINKING LIGHTS | from bike sensors | ALARM LED |
| HIGH POWER LAMP | from bike sensors | ALARM LED |
| GEAR NUMBER ( NEUTRAL INCLUDED) | Calculated, with neutral input management | Shown and logged |
| YAMAHA_ERR | from ECU | Shown and logged |

**MXL STRADA**

| | | |
|---|---|---|
| RPM | from ECU | Shown |
| BACK WHEEL SPEED | from ECU | Shown |
| WATER TEMPERATURE | from ECU | Shown + ALARM LED |
| AIR TEMPERATURE | from ECU | Shown + ALARM LED |
| OIL PRESSURE STATUS | from bike sensors | ALARM LED |
| FUEL LEVEL ALARM | from bike sensors | ALARM LED |
| BLINKING LIGHTS | from bike sensors | ALARM LED |
| HIGH POWER LAMP | from bike sensors | ALARM LED |
| GEAR NUMBER ( NEUTRAL INCLUDED) | Calculated, with neutral input management | Shown |
| YAMAHA_ERR | from ECU | Shown |

In Running Mode MXL shows the data in accordance to the following layout:
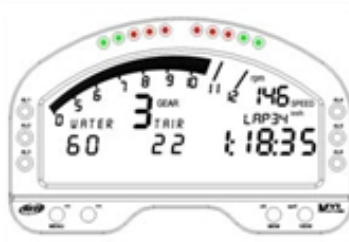


It is possible to change layout, information and alarm position by Race Studio Software Configuration Menu.

When you turn the power on the first time, MXL starts "Gear calibration feature" and it will show "RUNNING GEAR CAL".



The user has to follow this procedure in order to see the actual gear number

PS: You are supposed to run this procedure every time you change the transmission ratio

Yamaha ECU offers a diagnostic feature ( RUNNING MODE ): here down you can find the meanings of the error codes

| CODE | DESCRIPTION |
|------|-------------|
| 11 | Camshaft sensor problem |
| 12 | Pick Up Sensor problem |
| 13 , 14 | Air Pressure Sensor problem |
| 15 , 16 | TPS Sensor problem |
| 17 , 18 | Engine valve EXUP |
| 19 | Stock Bike Sensor Problem |
| 20 | Air Pressure Sensor problem |
| 21 | Water Temperature Sensor problem |
| 22 | Air Temperature Sensor problem |
| 23 | Air Pressure Sensor problem |
| 30, 41 | Max g Sensor problem |
| 33 | Cylinder #1 ignition problem |
| 34 | Cylinder #2 ignition problem |
| 35 | Cylinder #3 ignition problem |
| 36 | Cylinder #4 ignition problem |
| 42 | Speed sensor or Neutral Sensor problem |
| 43, 46 | Injection system problem |
| 47 | EXUP valve position sensor problem |
| 48 | EXUP servo problem |
| 50 | Internal ECU problem |

Please, refer to the Yamaha official documentation or to YEC official documentation in order toh ave a complete description of the problems.

☐ In case Diagnostic Feature reads more than one error, the YAMAHA ERR item will show the different codes sequentially

☐ YAMAHA_ERR is not shown in the default configuration. You can anyway change the configuration using race Studio System Manager .

## DIAGNOSTIC MODE

Diagnostic Mode let us monitor the proper behavior of the sensors and of the ECU outputs. You can swap from Running Mode to Diagnostic Mode, when the engine is OFF
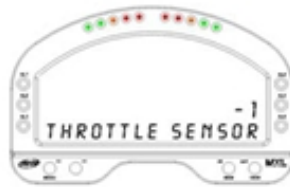
☐ *HOW TO ENTER INTO DIAGNOSTIC MODE.*
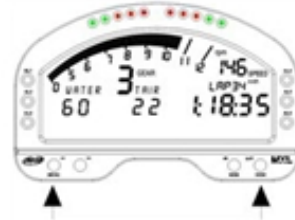


From Running Mode you have to push the pushbuttons **MENU** << and **VIEW QUIT**                                        , then **MENU** << or >> .

DIAG MODE is going to show the information about the different sensors in different pages. Please, use the pushbuttons >> and << for changing page.



The pages will be as follows:

| PAGE | DESCRIPTION | SHOWN DATA |
|------|-------------|------------|
| THROTTLE SENSOR | Master throttle angle | Valve open angle ( from 0° to 125° ) |
| ATMO PRESSURE | Atmosphere pressure | Atmosphere pressure Kpa |
| INTAKE PRESSURE | Air Input Pressure | AirBox pressure Kpa |
| INTAKE TEMP | Air Temperature | Air temp  °C |
| WATER TEMP | Water temperature | Water temperature °C |
| VEICHLE SPEED | Shows incremental pulses number read by the sensor | Read pulses from 0 to 999  . |
| OVERTURN SENSOR | Value read by the anti - overturn sensor | Voltage value * 10 ( from 0 to 50 ) |
| BATTERY VOLTAGE | Battery voltage | Battery voltage |
| SWITCH ( STOCK BIKE ) | Stock bike status | 1 = ON ( stock on )<br>0 = OFF ( stock down ) |
| SWITCH ( YEC KIT ) | Gear switch status ( Yec Kit) | 1= ON<br>0 = OFF |
| SELECT SWITCH ( STOCK BIKE ) | Neutral switch | 1 = Neutral<br>0 = gear |
| SELECT SWITCH ( YEC KIT ) | MAP selection switch status | 1 = SB<br>0 = ST |
| IGNITION COIL 1 | When you select and de-select the engine off switch, you turn the coil on 5 times ( the shown value is not important  ). | |
| IGNITION COIL 2 | | |
| IGNITION COIL 3 | | |
| IGNITION COIL 4 | | |
| INJECTOR 1 | When you select and de-select the engine off switch, you turn the injector on 5 times ( the shown value I snot important   ). | |
| INJECTOR 2 | | |

| INJECTOR 3 | |  |
|---|---|---|
| INJECTOR 4 | |  |
| AI SOLENOID ( solo STOCK ) | When you select and de-select the engine off switch, you turn the AI solenoid on 5 times | |
| MAIN RELAY | When you select and de-select the engine off switch, you turn the main relay on 5 times | |
| FAN RELAY ( solo STOCK ) | When you select and de-select the engine off switch, you turn the Fan Relay on 5 times | |
| PROJECTOR RELAY | When you select and de-select the engine off switch, you turn the projector relay on 5 times | |
| EXUP | EXUP open angle | EXUP open angle in degree |
| SUBTHROTTLE | When you select and de-select the engine off switch the sub throttle position changes from totally open to totally close | Sub-throttle position in degrees |
| ERRCODEEEPROM ( solo STOCK ) | Cylinder number, in case of some errors in the ECU eeprom | Cylinder number ( from 1 to 4). Shows 0 in case of no error. |
| ERRHAPPENED ( solo STOCK ) | Shows the sequence of the errors that have been found | Shows the sequence of the errors that have been found . (range from 11 to 50). |
| ERRHAPPENEDCLR ( solo S TOCK ) | Shows the number of the errors that have been found. It is possible to reset it moving the engine switch from OFF to ON. | In case of No error, it shows 0, else a number from 1 to 25 |
| MANAGEMENT NUM | Shows the Program Control Number | Value from 0 to 255 |

In order to exit from DIAG MODE, you have to turn the power OFF and ON again on both MXL and ECU.

NB: in order to better understand and solve errors and problems, please, refer to Yamaha or YEC manuals.
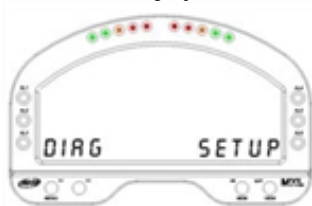
## SETUP MODE .

The Setup Mode let us change some parameters in the Engine Map inside the ECU. In dependence upon the ecu ( STOCK or YEC ) it is possible to change different parameters.

□ *HOW TO ENTER SETUP MODE*
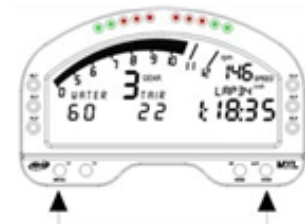


After having entered the Running Mode, please, push  **MENU <<** and **VIEW QUIT**                    : when MXL show the following layout:



you can enter the mode pushing **OK MEM**  or **QUIT VIEW** .

Setup Mode will show the parameters that you can change. Several different pages are available. In order to swap from a page to the other, please, push >> or << . In order to modify the value of a parameter, you have to select the parameter, push **OK MEM** to show the value, push >> or << to change the value then push **OK MEM** again to save the value and exit. ( Please, push anyway **OK MEM** also in case the value has not been changed).
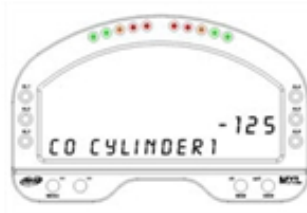


## STOCK ECU

In case your bike has the **STOCK ECU** you can change **ONLY** the injection times ( and, consequently, CO value) for every cylinder. This can me done both with the engine OFF or ON.

The parameters you can ch'ange will so be::

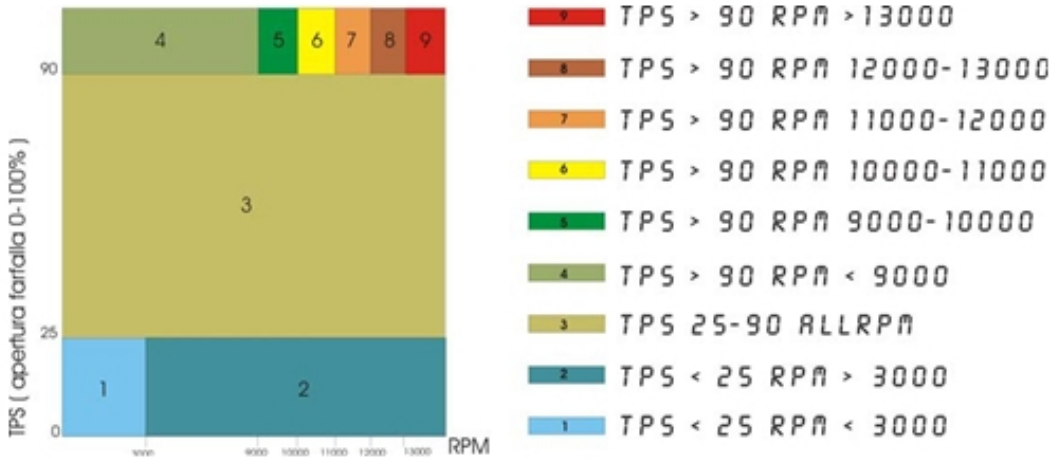| PAGE | DESCRIPTION | VALUE |
|---|---|---|
| CO CYLINDER 1 | Changes First cylinder CO ( the higher is this value the richest is the mixture) | You can insert a value between -128 and + 127. Default value is 0 |
| CO CYLINDER 2 | Changes Second cylinder CO ( the higher is this value the richest is the mixture) | |
| CO CYLINDER 3 | Changes third cylinder CO ( the higher is this value the richest is the mixture) | |
| CO CYLINDER 4 | Changes Fourth cylinder CO ( the higher is this value the richest is the mixture) | |

In order to better understand these values, please, refer to the official Yamaha manual .

## KIT ECU

In case your bike has the YEC KIT ECU, you can change both injection and ignition parameters. You always can reset the parameters in order to swap back to the original configuration.

Dealing with the injection map, it is possible to have richer or leaner air fuel mixture on 9 different points of the map, as shown in the following table



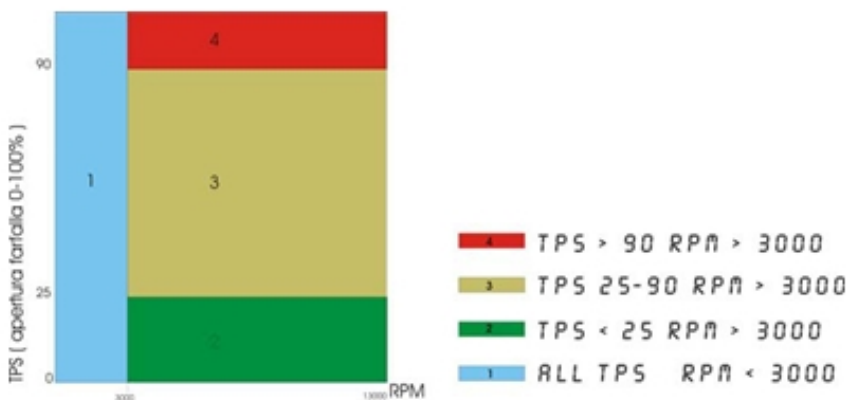| PAGE | DESCRIPTION | VALUE |
|------|-------------|-------|
| TPS<25 RPM < 3000 | Changes the amount of injected gasoline in the first part of the map | Correction in percentage $\pm$ 25% of the value of the map. |
| TPS<25 RPM > 3000 | Changes the amount of injected gasoline in the 2 part of the map | Correction in percentage $\pm$ 25% of the value of the map. |
| TPS 25-90 ALLRPM | Changes the amount of injected gasoline in the 3 part of the map | Correction in percentage $\pm$ 25% of the value of the map. |
| TPS>90 RPM<9000 | Changes the amount of injected gasoline in the 4 part of the map | Correction in percentage $\pm$ 25% of the value of the map. |
| TPS>90 RPM 9-10000 | Changes the amount of injected gasoline in the 5 part of the map | Correction in percentage $\pm$ 25% of the value of the map. |
| TPS>90 RPM 10-11000 | Changes the amount of injected gasoline in the 6 part of the map | Correction in percentage $\pm$ 25% of the value of the map. |
| TPS>90 RPM 11-12000 | Changes the amount of injected gasoline in the 7 part of the map | Correction in percentage $\pm$ 25% of the value of the map. |
| TPS>90 RPM 12-13000 | Changes the amount of injected gasoline in the 8 part of the map | Correction in percentage $\pm$ 25% of the value of the map. |
| TPS>90 RPM>13000 | Changes the amount of injected gasoline in the 9 part of the map | Correction in percentage $\pm$ 25% of the value of the map. |

When you increment the value, the mixture will be richer.

ATTENTION:
The value selected in Zone 4 (TPS > 90  RPM < 9000 )  is applied also to the zones 5,6,7,8, e 9. In these last pages the shown value ha sto be added to what you select in page nr. 4.

ES :   area 4 shows 10% , ( the misture is 10% richer in this area)
area 5 shows 3% , ( the misture is 10+3 = 13% in this area )

the Ignition Map is divided in 4 parts.

| | TPS > 90 RPM > 3000 |
| | TPS 25-90 RPM > 3000 |
| | TPS < 25 RPM > 3000 |
| | ALL TPS   RPM < 3000 |

You can change the parameters in 3 of them by the following timing pages

| PAGE | DESCRIPTION | VALUE |
|------|-------------|-------|
| Ignition time TPS<25 | Change the ignition timing in area 2 of the map. | Correction in degrees between -15° and +15° with reference to the map value |
| Ignition time TPS 25-90 | Change the ignition timing in area 3 of the map. | Correction in degrees between -10° and +10° with reference to the map value |
| Ignition time TPS > 90 | Change the ignition timing in area 4 of the map. | Correction in degrees between -5° and +5° with reference to the map value |

ATTENTION: in order to take the maximum advantage by this feature, please refer to the official Yamaha Kit ( YEC) manual

The Kit ECU offers two more possibilities to change parameters :

| PAGE | DESCRIPTION | VALUE |
|------|-------------|-------|
| INJN COR TO SPEED | Changes the amount of injected mixture, in dependence of the speed | Correction on   20 step ( -10 / +10 ). +10 is like to multiply by two the default corrected parameter -10 is like to avoid any correction 0 is like to use the default corrected parameter  Every step is so an increment of 10% ( plus or minus )  toward  the  correction  that  the ECU already uses. |
| DEFAULTVALUES SET | Let you see the number of parameters you have modified ( both injection than ignition). **You  can  then  reset  the changes** | Number of parameters you have modified. |
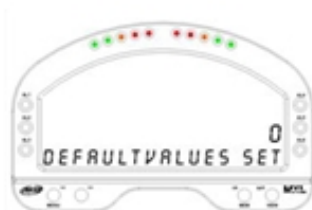


After having shown the number of modified parameters, you can reset the system, going back to the default parameters: you have to push >> or << then OK_MEM . LED 4 starts blinking, then the parameters are reset.

In order to exit from SETUP you have to turn the power OFF and ON again.