M130 MY2017 GSXR1000 KIT

The MoTeC M130 MY2017 GSXR1000 kit provides a complete replacement for the factory Suzuki ECU utilizing the existing vehicle wiring and sensors. Using an integration adaptor box and MoTeC M130 ECU, the kit delivers fully programmable engine management to the platform and maintains stock vehicle systems functionality. The M1 ECU is supplied with firmware preloaded and is based on the MoTeC USA Drag Race package with additional features unique to motorcycles and the MY2017 GSXR1000

When installed, this kit gives the user total engine tuning control while supporting OEM ECU features, including:

- Driver-by-wire electronic throttle control
- Push-button start
- Primary and Secondary Injection
- Fuel pump control
- Factory Dash display of Engine speed, coolant temp, Traction control level and mode
- Wheel speeds front and rear

Note: if this kit is deployed on an ABS model GSXR1000, modifications must be made to bring wheels speeds in to the M1 ECU. The wheels speed sensors need to be unplugged from the ABS system and wired into the Adaptor box spares for use in M1 ECU by the installer of the kit.

Factory Features not supported:

- Antilock Braking System (ABS)
- Pulsed Secondary Air (PAIR) Solenoid
- Steering Damper control
- Exhaust Control Valve Actuator (EXCVA) control

The supplied start file contains all the calibrations and settings for the fuel injection system, ignition coils, throttle servo, variable camshaft, alternator and fuel pump control. Settings for fuel delivery, ignition timing and camshaft phasing have been calibrated to a factory vehicle equipped with factory sensors.

This pre-configuration saves a significant amount of time by shortcutting the setup process. Users can begin tuning to their desired power and modifications right away with the assurance of a safe base tune.

Included are many ancillary features commonly found on race bikes such as anti-lag, rolling launch, driver switches, knock control, launch control, coolant pumps, and traction control.

The product fully integrates with other MoTeC devices, providing pre-defined CAN messaging for all current Displays/Loggers, LTCs, E888, GPS, BR2, PDMs and SLMs.

KIT CONTENTS

Hardware

- **M130 –** M130 ECU
- **GSXR100 Adaptor box**
- **M LTC –** LTC LSU 4.9
- **M 0258 001 –** Bosch Motorsport LSU 4.9 sensor
- **M H 3800-AD111A** – Spares loom with LTC and ethernet connection

License

- 23351 – Motorcycle Drag Race

FEATURES

- Configurable Launch Control with anti-lag containing tables for engine speed, throttle limit, boost aim and closed loop ignition timing control as well Spool Mode to optimize turbocharger response at the starting line.
- Pre-stage setting for Launch Control.
- Traction Control. Closed loop system featuring the ability to use alternate wheel speed inputs for differential ground speed control. Ability to control engine torque using ignition timing, fuel cut, ignition cut and drive by wire throttle using a flexible user-configurable strategy.
- Pre-configured OE coolant fan control.
- Pre-configured OE fuel lift pump control.
- Pre-configured Gear detection with simplified Gear Estimate table.
- Gearbox shift support with ignition cut, fuel cut, throttle blip and engine speed matching in forward gears.
- Pre-configured Drive by Wire throttle servo control.
- Pre-configured Throttle Grip sensor with translation table based on driver switch.
- Configurable driver switches for various systems.
- Vehicle speed limiting (pit speed control).
- Mode switching via factory cruise control dial using the engine speed read out as the mode indicator.
- Configurable pulsed tachometer output.
- Pre-configured vehicle speed measurement using wheel speed sensors.
- Pre-configured No Lift Shift ignition timing and cut based strategy for the stock manual gearbox.
- Test settings for most outputs, including injection and ignition outputs for easier setup.
- Exhaust Pressure based engine efficiency compensation table.
- Pre-configured calibrations for Original Equipment sensors.
- Pre-configured reference mode for engine synchronization.
- Pre-configured physical settings for engine displacement, fuel density, stoichiometric ratio, fuel pressure and injector characterization which allows for simplified engine start-up prior to tuning.
- Pre-configured settings for ethanol fuel density, ethanol stoichiometric ratio to allow fuel blending (“flex fuel”).
- Powerful Efficiency Model with configurable load axis that allows for flexibility in Engine Efficiency mapping for a wide array of modifications from single throttle body with intake plenum to boost over trumpets.
- Pre-configured Engine Efficiency map that allows for quick and easy tuning.
- Pre-configured secondary (port injector) fuel control with tunable balance table. **Note:** Only saturated (high-ohm) secondary injectors are supported.
- Optional Flex Fuel using an ethanol composition sensor allows for ethanol composition blending including integration of the Fuel Temperature reading provided by the sensor.
- Optional Water/Methanol injection system with fail-safes to provide additional fueling.
- Pre-configured throttle rate of change based transient fuel for simplified transient fuel tuning.
- Engine Load Average channel with tables for engine speed limit, ignition trim, fuel mixture aim and throttle limit.
- Pre-configured ignition output and coil settings.
- Pre-configured individual cylinder knock system with multiple knock level control modes, non-linear decay, ability to mask out noise on initial knock detection (to help filter noise) and a retained knock level that can be used to apply a global knock trim to compensate for fuel quality.
- Pre-configured engine start fuel, idle and ignition settings.
- Pre-configured Closed Loop Idle control systems using ignition and drive by wire actuation, including active adjustments for coolant and air conditioning activation.
- Boost control system with targets based on Engine Speed, Gear, Flex Content, Throttle Position, Driver Mode Switch, Coolant Temperature, Engine Load Average, Exhaust Temperature, Race Time, Inlet Air Temperature and Vehicle Speed.
- Optionally configurable turbocharger bypass control.
- Intercooler temperature and spray control.
- Supports nitrous with two activation stages and additional fuel pumps, bottle heater control and pressure sensor.
- Race time system with tables for ignition trim, fuel mixture aim and throttle limit.
- Engine run time total for engine hour logging.
- GPS acquisition and logging via CAN or RS232.
- Race time system with tables for ignition trim, fuel mixture aim and throttle limit.
- Engine run time total for engine hour logging.

MoTeC FEATURES

- **Suspension Position inputs**
  - Ability to measure and log suspension position (logging Level 2 required)
- **Track temp Input**
  - Ability to measure and log track temp (logging level 2 required)
- **Race Time**
  - Set using Throttle position and vehicle speed or launch enable
  - Is the control axis for Fuel Mixture Aim, Boost Limit, Throttle Limit, and ignition timing Limit
  - Utilized in other functions below
- **Mass Flow Nitrous control**
  - Control: This allows for calculated fuelling to be done in the background of the M1 package by specifying the mass flow of the nitrous system as well as the target Nitrous-to-Fuel ratio (NFR)
  - Compensation:
    - Bottle pressure compensation table – trim to combat mass flow changes due to bottle pressure changes
    - Ignition Timing Compensation table – to pull out ignition timing over a specified time
  - Transport delay parameter – to model delay for nitrous to reach the engine. This delay's fuelling and ignition compensations becoming active
- **Engine Speed Slope control**
  - Control: Engine Speed rate of change Traction control against gear or time with user definable thresholds
  - Compensations: Ignition timing and cuts for both instantaneous and long-term corrections
- **Rear Wheel speed Traction Control**
  - Control: Control rear wheel speed using an aim wheel speed curve with user definable margins
  - Compensation: Ignition timing trim table provided based on the error between aim wheel speed curve and measured wheel speed.
- **Wastegate control**
  - Based on race time and user definable wastegate pressure (typically CO2)
- **Automatic UP Gear Shift**
  - Control: Air actuator driven gear shifts with either a button request or Auto shift using Gear and Engine Speed
  - GPRP based logic allows auto-blip, fuel and ignition cuts, and ignition retard

OPERATION

Reference Mode

The M1 reference mode in this package is locked to the 'Two Missing Four stroke' 24-2 pattern for the factory

ECU Power

The M1 ECU will be powered when the ignition switch is on via the factory ignition switch.

Engine Start

The Factory starter button maintains OEM style engine start using the 'manual start' select in the M1 package. By utilizing the 'Auto Start' the bike will hold the starter output on for the time specified in 'Crank Timeout'.

Driver Switches

Various bike switches and analogue inputs are received directly into the adaptor box and transmitted to the ECU via internal CAN set up. These are visible in the OEM section of the M1 package. Inputs received via CAN are listed with their firmware resources above.

Spares Connector

The adaptor box 34 pin spares connector provides the Ethernet communications and LTC connectivity in its basic form. This loom can be modified to allow with various spares inputs/outputs for additional sensors and controls available in the M1 package. See the Spare connector pin-out listing below for detailed information on what spares are available.

Ignition coils

The Suzuki OEM coils are driven by integrated high current ignition transistors on the adaptor board. Do not replace the factory coils with 'smart' self-charging transistorized coils or damage may occur.

Analogue CAN receive:

Firmware Resource 0	Gear Voltage
Firmware Resource 1	Ambient Pressure voltage
Firmware Resource 2	Tip Over Voltage
Internal CAN only	Ignitor Temp

Digital CAN Receive:

Firmware Resource 3	TC Level
Internal CAN only	Start Request
Firmware Resource 4	Drive Mode Switch
Firmware Resource 5	Box Highlighted on dash
Firmware Resource 6	Clutch switch
Internal CAN only	Select up switch
Internal CAN only	Select Down Switch

M130 PINOUT

M130 Connector A – 34 Way

A1	HB2	Half Bridge Output 2	THROTTLE SERVO MOTOR (+)
A2	SEN_5V_A	Sensor 5.0V A	Sensor 5.0V A
A3	IGN1	Low Side Ignition 1	COIL 1
A4	IGN2	Low Side Ignition 2	COIL 2
A5	IGN3	Low Side Ignition 3	COIL 3
A6	IGN4	Low Side Ignition 4	COIL 4
A7	IGN5	Low Side Ignition 5	
A8	IGN6	Low Side Ignition 6	OEM DASH SPEED
A9	SEN_5V_B	Sensor 5.0V B	-
A10	NEG1	Battery Negative	Ground
A11	NEG2	Battery Negative	Ground
A12	IGN7	Low Side Ignition 7	
A13	IGN8	Low Side Ignition 8	
A14	AV1	Analogue Voltage Input 1	THROTTLE PEDAL POSITION MAIN
A15	AV2	Analogue Voltage Input 2	THROTTLE PEDAL POSITION TRACKING
A16	AV3	Analogue Voltage Input 3	THROTTLE SERVO POSITION MIAN
A17	AV4	Analogue Voltage Input 4	THROTTLE SERVO POSITION TRACKING
A18	HB1	Half Bridge Output 1	THROTTLE SERVO MOTOR (-)
A19	PH1	Peak Hold Injector 1	INJECTOR 1 PRIMARY
A20	PH2	Peak Hold Injector 2	INJECTOR 1 SECONDARY
A21	PH3	Peak Hold Injector 3	INJECTOR 2 PRIMARY
A22	PH4	Peak Hold Injector 4	INJECTOR 2 SECONDARY
A23	INJ_LS1	Low Side Injector 1	
A24	INJ_LS2	Low Side Injector 2	FUEL PUMP CONTROL
A25	AV5	Analogue Voltage Input 5	INLET MANIFOLD PRESSURE
A26	BAT_POS	Battery Positive	Battery Positive
A27	PH5	Peak Hold Injector 5	INJECTOR 3 PRIMARY
A28	PH6	Peak Hold Injector 6	INJECTOR 3 SECONDARY
A29	PH7	Peak Hold Injector 7	INJECTOR 4 PRIMARY
A30	PH8	Peak Hold Injector 8	INJECTOR 4 SECONDARY
A31	HB3	Half Bridge Output 3	WASTEGATE PRESSURE ACTUATOR DECREASE
A32	HB4	Half Bridge Output 4	GEAR SHIFT ACTUATOR
A33	HB5	Half Bridge Output 5	WASTEGATE PRESSURE ACTUATOR INCREASE
A34	HB6	Half Bridge Output 6	

M130 PINOUT

M130 Connector B – 26 Way

B1	UDIG1	Universal Digital Input 1	CRANKSHAFT POSITION
B2	UDIG2	Universal Digital Input 2	ENGINE SYNCHONIZATION POSITION
B3	AT1	Analogue Temperature Input 1	COOLANT TEMPERATURE
B4	AT2	Analogue Temperature Input 2	INLET AIR TEMPERATURE
B5	AT3	Analogue Temperature Input 3	-
B6	AT4	Analogue Temperature Input 4	-
B7	KNOCK1	Knock Input 1	-
B8	UDIG3	Universal Digital Input 3	WHEEL SPEED FRONT SENSOR
B9	UDIG4	Universal Digital Input 4	WHEEL SPEED REAR SENSOR
B10	UDIG5	Universal Digital Input 5	DRIVER SWITCH 3
B11	UDIG6	Universal Digital Input 6	GEAR REQUEST SWITCH
B12	BAT_BAK	Battery Backup	-
B13	KNOCK2	Knock Input 2	DRIVER SWITCH 1
B14	UDIG7	Universal Digital Input 7	
B15	SEN_0V_A	Sensor 0V A	Sensor 0V A
B16	SEN_0V_B	Sensor 0V B	Sensor 0V B
B17	CAN_HI	CAN Bus 1 High	
B18	CAN_LO	CAN Bus 1 Low	
B19	SEN_6V3	Sensor 6.3V	-
B20	AV6	Analogue Voltage Input 6	WASTEGATE PRESSURE SENSOR
B21	AV7	Analogue Voltage Input 7	FUEL PRESSURE SENSOR
B22	AV8	Analogue Voltage Input 8	
B23	ETH_TX+	Ethernet Transmit+	
B24	ETH_TX-	Ethernet Transmit-	
B25	ETH_RX+	Ethernet Receive+	
B26	ETH_RX-	Ethernet Receive-	

M130 PINOUT

M130 (SPARES)

Pin	Function
1	Spares 5 Volt ‘A‘ Supply
2	Spares 5 Volt ‘A‘ Supply
3	Ignition output 8
4	Half Bridge output 5
5	Half Bridge output 3
6	Spares 0 Volt ‘A‘ Supply
7	Spares 0 Volt ‘A‘ Supply
8	Analogue Voltage Input 6
9	Analogue Voltage Input 7
10	Spares Switched 12v Power
11	Spares Switched 12v Power
12	Half Bridge output 6
13	Half Bridge output 4
14	Universal Digital Input 5
15	Universal Digital Input 6
16	Spares Switched 12v Power
17	Ground
18	Knock Input 2
19	Universal Digital Input 7
20	Analogue Temperature Input 3
21	Analogue Voltage Input 8
22	Analogue Temperature Input 4
23	Sensor 6.3v supply
24	Ground
25	Ground
26	CAN Lo
27	CAN Hi
28	Knock Input 1
29	RS232-TX
30	RS232-RX
31	Ethernet TX+
32	Ethernet TX-
33	Ethernet RX+
34	Ethernet RX-