

Toucan Touchscreen Gauge and Trim/Compensation Selection Unit
User Guide (MoTeC) V1.1

Firmware Versions 1.21 and above

Disclaimer

Although every care is taken with the design of this product, JT Innovations Ltd. can in no way be held responsible for any consequential damage resulting from the use of Toucan in your vehicle.

Always operate your vehicle safely and do not allow yourself to be distracted by your Toucan display while driving. Minimise the amount of time you spend viewing the screen. Do not access any function requiring prolonged use of the menus whilst driving.

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Introduction

Thank you for purchasing a Toucan display. We hope it will be easy to install and configure, and we recommend you read this guide before you start. It is recommended that you register your product in the JT Innovations website – this way we can keep you advised of any product updates etc.

Installation

Before You Start

Please check the box contents to ensure nothing is missing. You should have:

***toucan* Unit**



Cable Harness



Mount (one of the following)



Installation

Connectors



5-pin XLR	Data connection to MoTeC ecu
BLACK	Power Ground
YELLOW	Permanent +12V
RED	Switched +12V
ORANGE	Lighting circuit
Multiway	Connects to Toucan unit

ENSURE THE CAR BATTERY IS DISCONNECTED BEFORE ATTEMPTING TO INSTALL YOUR TOUCAN DISPLAY UNIT

IF IN DOUBT, PLEASE CONSULT A QUALIFIED AUTOMOTIVE ELECTRICIAN

Power

The power connectors are provided with "bullet" connectors which may be removed if preferred. Each power feed has an inline fuse holder pre-fitted with a 1 amp 20mm glass fuse. Ensure a good ground connection is provided to the BLACK wire.

To allow Toucan to power up quickly, it is recommended that a connection to both a permanent and switched (i.e. only live when the ignition is on) vehicle battery feed are made. When the ignition is off, Toucan will consume about 40 milliamps from the permanent connection – a typical, healthy, 40 amp-hour vehicle battery will last over a month before being run completely flat by Toucan: but it's your choice.

If you decide not to connect the YELLOW permanent +12 Volt, please make sure it is wired along with the RED connection to the switched ignition feed; otherwise Toucan may not start up when you turn on the ignition.

Toucan will take about 6 seconds to start if the permanent +12 Volt feed is not connected compared to less than a second when the permanent connection is made.

A connection to the vehicle lighting circuit may be made using the ORANGE connector – this will allow the Toucan unit to automatically dim when the vehicle lights are turned on. If not required, please insulate the unused wire to prevent damage to the unit or vehicle.

5-pin XLR ("Deltron") Data Connector

This plugs directly in to the MoTeC ecu, assuming the standard data connector has been fitted. If this is not present, contact your MoTeC dealer or JT Innovations. A splitter cable is available from JT Innovations allowing both a laptop, or other CAN device, to be connected to the ECU as well as Toucan. Alternatively you can cut the XLR off the Toucan cable and wire it directly to the ECU's connectors: CAN HI is BLACK; CAN LO is RED.

Multiway Connector

This connects to the rear of the Toucan unit. Note that it has a latching tab that must be depressed before the connector and cable can be detached.

The connector is intended to allow occasional removal of the unit from the car to allow, for example, firmware updates to be applied.



When detaching the unit, take care not to put unnecessary strain on the wires otherwise they may be damaged.

In-vehicle Mounting

Toucan uses the Herbert Richter™ 4-prong mount system, which provides a secure mount when in the vehicle, but easy removal should it be required.

The default mount supplied is a permanent mount which is intended to be permanently screwed to the vehicle. Make sure the mount is in the location you require before attaching it!

An alternative mount may have been supplied as a choice when you purchased your unit, or they may be purchased separately if required: please contact JT Innovations for availability.

MoTeC Configuration

Having checked the installation of your Toucan, ensuring all connectors are fully home and especially that the power wiring is correct, reconnect the vehicle battery and turn on the ignition. After a few seconds, Toucan should power up and display the main gauge screen. Before it can display any gauges, the MoTeC ECU must be configured correctly.

Toucan uses the MoTeC "Dataset 3", also known as the "CRC32 format", using 1Mbit/s CANbus on the default 11-bit CAN identifier for that format (0x5F0 Hex, or 1520 decimal for most MoTeC models, or 0xE8, 232 decimal for an M84). Make sure this is correctly configured on your ECU and the gauges should then work.

MoTeC Control Functions

Toucan allows activation of launch control and antilag functions via the touchscreen, as well as launch RPM adjustment. In addition, there is a software-equivalent of a 0-5V 8-way selector switch. This can be used as a compensation/trim (calibration, or CAL) function – for example to select different boost targets.

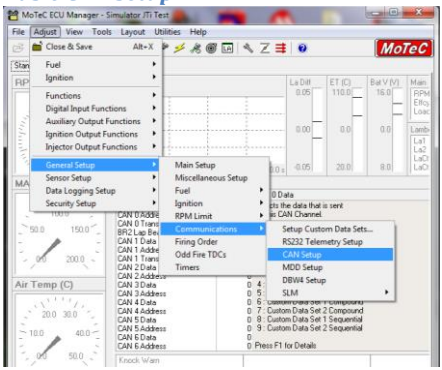
These functions are transmitted using the "ADL" protocol – CAN Identifier 0x123 hex (291 decimal), with the following channel allocations:

Channel	Offset ID	Function
ADL7	0x0200	Launch control on/off. On is transmitted as 4000, off as 0.
ADL8		Antilag (Overrun Boost Enhancement) control to step through the 2 ALS maps.
ADL9		Launch RPM
ADL10	0x0300	0-5V 8 way selection – the 8 thresholds are configurable and default to: 0, 700mV, 1400mV, 1950mV, 2500mV, 3000mV, 3400mV, 4000mV

To make use of these functions, User Inputs must be configured using the MoTeC Ecu Manager software and correctly assigned to the relevant ADL channel.

MoTeC Configuration Steps

Basic CAN setup



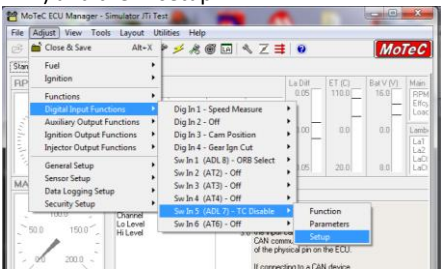
Set CAN 0 Data to be “3”, the address as “1520” and the transfer rate as required – 50Hz is the default.

Parameter	Value	CAN 0 Data
CAN 0 Data	3	Selects the data that is sent
CAN 0 Address	1520	on this CAN Channel.
CAN 0 Transfer Rate	* **50**	
BR2 Lap Beacon ID	0	0 : Off
CAN 1 Data	4	1 : ADL Dash Logger
CAN 1 Address	291	2 : Telemetry Monitor : not
CAN 1 Transfer Rate	50	normally used
CAN 2 Data	0	3 : MoTeC CRC32 : normally used
CAN 2 Address	0	for MDD
CAN 3 Data	0	4 : Custom Data Set 1 CRC 32
CAN 3 Address	0	5 : Custom Data Set 2 CRC 32
CAN 4 Data	0	6 : Custom Data Set 1 Compound
CAN 4 Address	0	7 : Custom Data Set 2 Compound
CAN 5 Data	0	8 : Custom Data Set 1 Sequential
CAN 5 Address	0	9 : Custom Data Set 2 Sequential
CAN 6 Data	0	
CAN 6 Address	0	Press F1 for Details

Similarly, set CAN 1 Data to be “4” (ADL Receive) and the address as 291. Leave the default transfer rate as 50.

Launch Control on/off

1. From the “Adjust”, “Digital Input Functions” menu choose a spare Switch Input (e.g. “SW In1”) and then “setup”:



Set the parameters as follows:

- Source 3 (MoTeC ADL)
- Channel 7 (ADL7)
- Lo Level 2.0
- Hi Level 3.0

Now use the same menus and edit the “Function” and choose “14” (Traction Control Enable). From the “Parameter” menu chose the value “0” (switch closed (LO volts).

Antilag (Overrun Boost) Selection

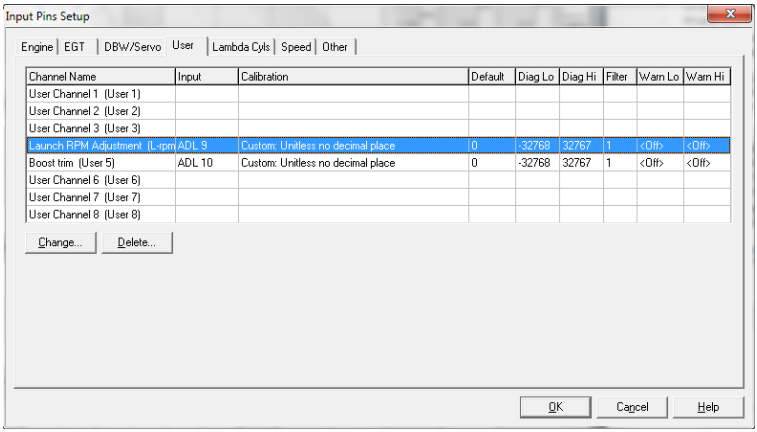
2. ADL input definitions for anti-lag selection. Follow the same process as for launch control on/off configuring an input as follows:

   Parameters
   - Source 3 (MoTeC ADL)
   - Channel 8 (ADL8)
   - Lo Level 2.0
   - Hi Level 3.0

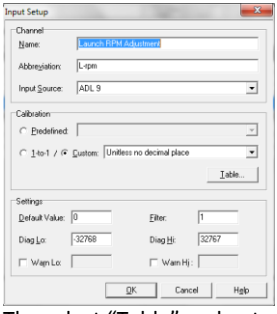
Now use the same menus and edit the “Function” and choose “25” (ORB Select). From the “Parameter” menu chose the Polarity as “0” (Change when input goes LO)

Launch RPM Adjustment

From the “Adjust”, “Sensor Setup” and then “Input Setup…” choose the “User Tab”



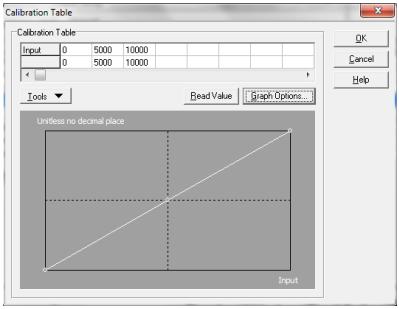
Choose a free channel and select “Change…”



Enter a suitable name (e.g. “Launch RPM Adjustment”) and chose the Input Source as “ADL 9”.

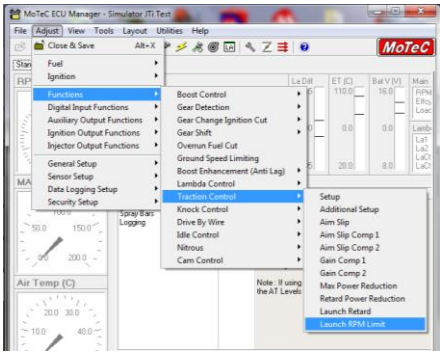
Calibration should be “Custom” and “Unitless no decimal place”.

The select “Table” and enter 3 values in the “Input” row of “0”, “5000” and “10000” with the same values in the row below:

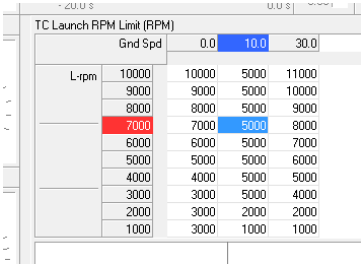


Click “OK” 3 times to return to the main editor screen.

Now select “Adjust” then “Functions” then “Launch RPM Limit”



Right click within the “TC Launch RPM Limit (RPM)” edit area and choose “Axis Setup”. Choose the “Y Axis” tab and the “Select”. Choose the channel previously configured above as “Launch RPM Adjustment”.

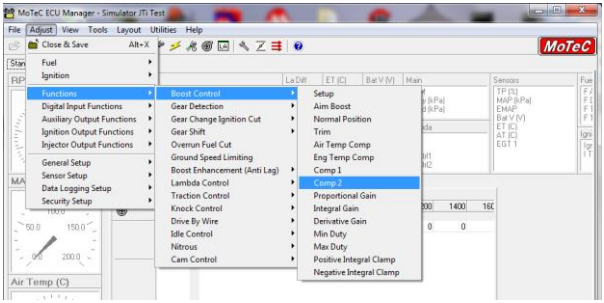


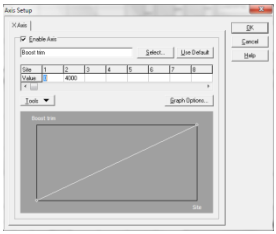
This table then translates the received launch RPM value (the Y axis) to an actual launch RPM target. The example above shows all values received below or equal to 3000 rpm to 3000rpm. This limits the minimum RPM that can be requested from Toucan. A similar approach can be used to limit the maximum launch rpm requested.

Trim/Compensation (e.g. Boost Compensation)

Use the same procedure as for Launch RPM, choosing a different User Channel and ADL 10. In the Calibration Table, enter 2 values represent the range sent by Toucan – the default range is 0-4000. Name this as required, for example “Boost Trim”.

To implement a Boost Trim, adjust the “Comp 2” function within “Boost Control”:





Choose the “Boost Trim” channel as the X axis and enter 0 and 4000 for two sites.

In the main edit screen, enter the % of boost trim required at one end of the range. For example, -24 for the compensation value 0, and 0 for compensation value 4000, allows you to dial in a boost range of “target-24%” to “target” in 8 steps of 3%.

Use Toucan’s “CAL” text edit function (see later) to name the compensation/trim that you have calibrated.

Doesn’t work?

- Double check installation, especially the data connection to the MoTeC unit.
- Double check the MoTeC CAN configuration
- Remove the cable from Toucan and re-attach a few seconds later – this will give the unit a reset.
- Contact technical support at JT Innovations for assistance.

Menus and Operation

Gauge Screens

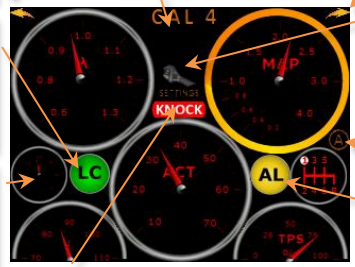
Touch here to change current calibration. Label shown is the first 5 characters of the text entered.

Touch here to go to previous gauge page

Touch here to go to next gauge page

Touch here to enter SETTINGS menus

Touch to turn launch control on or off
- Red - off
- Green – on



Shows which gauge screen is showing: A, B, C or D.

Touch the centre of any gauge to display the full screen version and then cycle through all gauges or reset the peak marker.

Press and hold any gauge to display the most recently shown large gauge.

Return to the main gauge screen by touching the centre of the large gauge.

Knock warning. Also shows sensor alarms using a different icon. Touch the icon to bring up a display of current sensor errors.

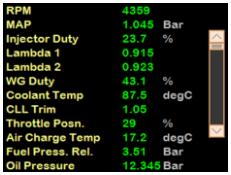
Touch to cycle through both available antilag maps.
- Red – off
- Yellow – ALS1
- Green – ALS2

Four gauge screens are available with complete flexibility of which gauge is displayed where. This can be configured via the Gauge Select pages, accessible via the “Gauge Setup” button.

Only data from sensors that are actually connected to the ecu and are configured correctly can actually be displayed.

Large Gauges

Goes to parameter list view.



Touch here to return to main gauge screen.



Touch here to mute an active alarm. Will be automatically unmuted when the alarm next clears

Resets the peak marker.

Settings Menu



Touch here to select full brightness

Touch here to dim display to night brightness. Touch and hold to display a dimmed screen with no gauge activity, useful when the screen could be distracting.

Touch here to mute or unmute audible alarms.

Touch here to change current calibration

Touch here to return to gauge screen

Touch here to enter SETUP menus

If the "illumination" wire has been wired to the vehicle's lighting circuit, the manual day and night buttons will temporarily override the brightness as controlled from the vehicle lighting stalk.

Setup Menu



Touch here to adjust night brightness level

Not applicable to the MoTeC ecu.

Touch here to choose gauge layout and colour scheme

Touch here to configure alarms.

Touch here for more menus

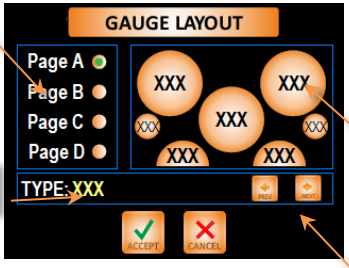
Touch here to return to settings menu

Gauge Layout

This is accessed via the Gauge Setup button, and then “Gauge Select”.



Touch here to select which of the 4 pages to setup



Touch the gauge that you wish to change. A 3 letter mnemonic describes the current gauge selected for each position

Gauge name is shown

Touch here cycle between the next and previous gauges in the list

Trim/Compensation CAL Selection Menu

First 5 characters of this text used on main gauge screen as label.



User Text describing this calibration function

Next and previous buttons to select a different setting

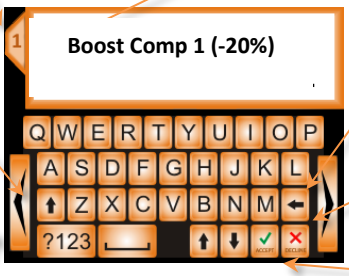
Touch here to edit the User Text

Touch here to return to previous menu

Editing Trim/Compensation CAL Text

First 5 characters used as label on main screen

The text being edited.



Backspace (delete character to left)

Shift key to access lower case characters, symbols, etc.

Move the cursor up or down the 3 lines of text

Next and previous buttons to select a different CAL

Touch here to return accept or

Trim/Compensation CAL PIN Protection.

If enabled via the “more” menus, Toucan can be set to prevent the current Trim/Compensation CAL being changed unless you enter a 4 digit PIN. This can be useful if you have a “valet” mode (with reduced rpm limit for example) and/or an anti-theft CAL. You can also set PIN protection to *only* apply to the last CAL (i.e. CAL 8), *only* to the first CAL or to *both* the first and last CAL.

There are a few things to be aware of if you choose to use this option:

- The default PIN is 0000 and it is recommended that you change this to something else.
- Once PIN protection is enabled, the (correct) PIN will need to be entered before you can change the PIN, or to disable PIN protection again.
- If the PIN is entered incorrectly 3 times, PIN entry will be prevented for the next 10 minutes. Note that this 10 minute timeout will be reset if power is removed from the unit.
- In the event that Toucan is disconnected from the Syvecs ecu, the ecu will, in most cases default to CAL 8 (although this can be CAL 1 if a Syvecs input with no pullup resistor is used). It is generally recommended that the valet or anti-theft CAL is in position 8, or the PIN protect first CAL function (or first *and* last) is used.
- In the event that you forget the PIN it can be reset using a PC programme, connecting to Toucan via USB. This programme is available from the JT Innovations website, or contact technical support for assistance.



Alarm Configuration

The Alarms configuration menu allows you to determine which parameters will cause alarm events. A setting allows the audible alarm to be muted if the engine is not running.

An alarm event will:

- Cause an audible warning, unless Toucan is muted
- Cause the bezel of the relevant gauge to change to a flashing orange
- If enabled, cause the relevant gauge to be displayed full screen.

In addition, there is a low oil temperature warning that can be enabled. This will not sound the audible alarm, but will display a non-flashing orange bezel until the oil temperature exceeds the configured temperature. Obviously this function only works if an oil temperature sensor is connected to your ecu.

When an alarm is activated, the relevant large gauge has a mute button. This may be used to temporarily mute that specific alarm. It will remain muted until either that alarm condition clears or Toucan is repowered. Alarms for other fault conditions will not be supressed or muted.

Available Alarms

- ACT. Any value in range, in 1°C steps. Alarm triggered if alarm value is exceeded. Default 50C.
- Battery voltage. Any value in range in 0.25V steps. Alarm triggered if current value is below alarm threshold. Default 11.5V
- Boost. Any value from 0 to max, in 0.05 bar increments. Alarm triggered if alarm value is exceeded. Default 1.5bar.
- Coolant temperature. Any value in range in 1°C steps. Alarm triggered if alarm value is exceeded. Default 95C.
- Exhaust Temperature (EGT1 and EGT2). Any value in range in 10°C steps. Alarm triggered if current value is above alarm threshold. Default 850C.
- Fuel Level Low. 0-100% in 1% increments. Alarm is triggered if current level is below the alarm value, default 10%.
- Fuel Pressure. Any value in range in 0.1bar steps. Alarm triggered if current value is below alarm threshold. Default 2 bar.
- Fuel Temperature. Any value in range in 1°C steps. Alarm triggered if current value is above alarm threshold. Default 70C.
- Injector Duty Cycle. Any value up to 100% in 1% steps, default 85%. Alarm triggered if injector duty cycle exceeds the alarm threshold.
- Knock detected.
- Lambda 1 and Lambda 2. Any value in range, in 0.01 steps. Alarm triggered if alarm value is exceeded. Default 1.05.
- "Lean Lambda". Alarm is triggered if lambda exceeds set value AND RPM is above set value AND Boost exceeds set value.
- Boost. Any value from in 0.05 bar increments. Alarm is triggered if alarm value is exceeded. Default 2.5bar
- Oil Pressure. Any value in range in 0.1bar steps. Alarm triggered if current value is below alarm threshold. Default 2 bar.
- Oil Temperature. Any value in range in 1°C steps. Alarm triggered if alarm value is exceeded. Default 120C.
- Oil Temperature Low. Any value in range in 1°C steps. Alarm triggered if current value is below alarm threshold. Default 70C.
- RPM. Any value in range 0-10,000 rpm in 100rpm steps. Alarm triggered if alarm value is exceeded. Default 7500.
- Sensor Alarms. Any sensor in a fault state will cause an alarm.
- TPS. Any value 0-100%, 5% steps. Alarm triggered if alarm value is exceeded. Default 50%.
- Wheel speed. Any value in range in 1mph or 1kph steps. Alarm triggered if alarm value is exceeded. Default 70mph/120km/h

"More" Menus

The more menus allow you to select

- Units used – Metric, Imperial or "USA" (which uses Imperial measurements for everything except Boost and MAP which are in kPa)
- Speed display – mph or kph
- Gear display – H pattern or digits
- Whether the large full screen gauge should be automatically displayed should the gauge start showing an alarm
- Whether changing the CAL should be PIN protected – either all of them, or just the last CAL.
- Change the CAL PIN
- Select Absolute or Relative Fuel Pressure (Relative only available if CAN bus or custom serial data selected).
- Enable/Disable the display of peak markers on gauges. Peaks are remembered until manually reset on the large gauge display.
- Enable/disable dynamic peak markers. Dynamic peak markers maintain the current peak for just a few seconds and then drop back to the current reading. The hold period can be adjusted.
- Choose the ECU interface (STACK, CAN or Syvecs customer serial data)
- Mute alarms if the engine is not running - useful if the vehicle is not being driven, but the ignition is switched on.
- Turn the audible touchscreen feedback beep on/off
- Determine which large gauges will be displayed when you cycle through them. This is useful to hide gauges when the appropriate gauge sensor hasn't been fitted.
- Display CAN termination on/off, software version and current/actual CAL voltage

CANbus Termination

It may be necessary to enable the bus termination if Toucan is the last device on the CANbus network. By default the termination is switched off, but it may be enabled by sliding the small switch on the rear of the unit towards the 4-prong mounting plate. You may need to use a small screwdriver to access the switch through the rear cover.

You can confirm the status of the termination switch via the "more" menus.

Sensor Alarms

If the sensor alarm is enabled, any failed sensor will cause a small “sensor alarm” icon to be displayed in the main gauge screen. If the sensor alarm large gauge is enabled, a large alarm indicator will be shown, and this then shows how many sensors have failed, and the name of the sensor that has failed.

If more than one sensor has failed, the list can be stepped through using the next arrow on the gauge/alarm.

Launch Control

If configured on your ecu, launch control can be requested on or off via the main gauge pages by pressing the launch control button on the left. Launch RPM can be adjusted via the large RPM gauge in 100 rpm increments, with a marker to show the current setting. There is a setting in in the “more” menus that allows the RPM gauge to be automatically displayed when launch control is enabled.

Firmware Updates

Occasional firmware updates will be made available to add new features. These may be downloaded from the Downloads section of the JT Innovations website.

Updates are applied using a PC program (also available from the website) and a standard “mini” USB cable. Updates should be applied with the Toucan disconnected from the vehicle. It will be powered from the PC USB port, although the LCD will be shut down.

It is recommended that you register your Toucan with us on the website – that way we can keep you informed when firmware upgrades are available.

Multiple Toucan Units

It is possible to run multiple Toucans, allowing more than one gauge screen to be visible at a time. A simple daisy-chain cable is available from JT Innovations that interconnects data from the master Toucan unit to the slave unit: please contact us for availability.

Technical

Data Interface	CAN 2.0B at 1Mbit/s or 500kbit/s with selectable termination, or RS232 at 9600 baud or 115.2kbaud
Expansion Connector	RS232, CAN, Power Out and Ground. Allows connection of toucan expansion accessories, available in 2012.
Power	8-20V <200mA typ. <40mA in standby mode Connections to permanent, switched and illumination power, via 1A fused connections.
CAL Voltage	Adjustable via menus to match MoTeC configuration.
Memory	Non-volatile storage of all parameters
Firmware Updates	Via rear-panel USB connector, using PC programme.
Compliance	Directives: 2002/96/EC, 72/245/EC, EN50498:2010
Warranty	1 year
Dimensions	100x83x16mm
Weight	200g
Display	3.5" QVGA TFT, 320x240 pixels, 24 bit colour, with touchscreen
Processing system.	190MHz 32 bit ARM9, 8Mbytes Flash memory, 8Mbytes SDRAM.
Package contents	Toucan unit, power/data cable harness, mount, installation guide.
Available Gauges/Alarms	Air intake temperature; Battery Volts; Boost (2.5 bar and 3.5 bar); Exhaust Gas Temperature (2 channels); Fuel level; Fuel Pressure; Fuel Temperature; Current Gear; Injector Duty warning; Knock; Lambda (2xwideband channels, 1x narrowband); Lean Lambda warning; Engine limp/Cut mode; MAP; Oil Pressure; Oil Temperature; RPM; Sensor Error; Throttle Position; Coolant Temperature; Wheel Speed.

Glossary

Term	Description
ACT	Air Charge Temperature
CANbus	"Controller Area Network" bus – a serial interconnect common in vehicles.
ECT	Engine Coolant Temperature
EGT	Exhaust Gas Temperature
EOP	Engine Oil Pressure
EOT	Engine Oil Temperature
FP	Fuel Pressure
MAP	Manifold Absolute Pressure – the air pressure in the manifold, atmospheric pressure is 1bar, total vacuum is 0bar.
TPS	Throttle Position Sensor

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