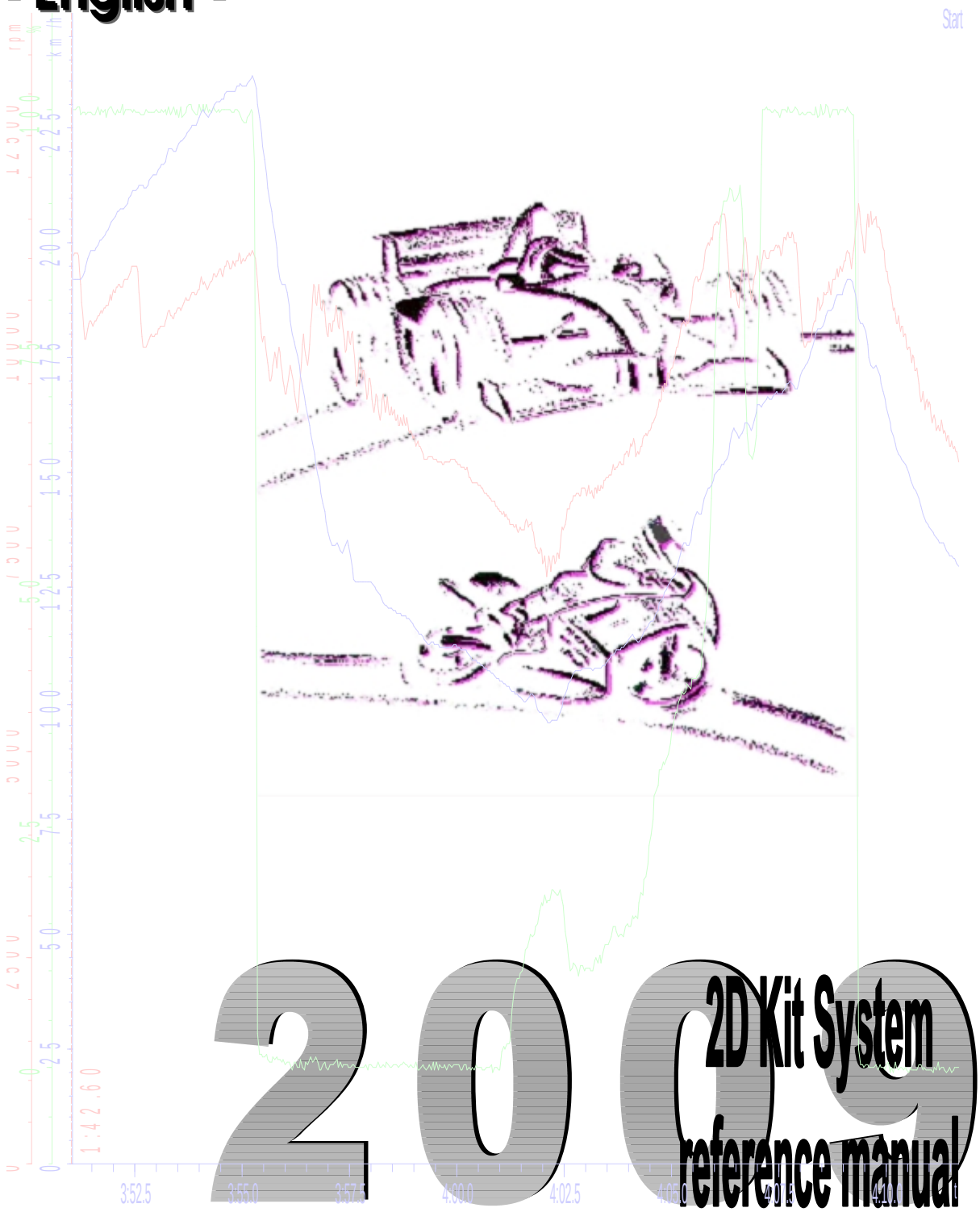
2D KIT System

www.2d-kit-system.com

- English -



2009

2D Kit System reference manual

Art.No.: AC-DOC_SY-KIT-Reference_08-000 modified 03.04.2009

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Preface

This documentation contains the necessary information to setup and to work with the 2D kit system.

In order to achieve the optimum result when working with the 2D-Kit System, we recommend to read the instructions carefully and follow them step by step.

Symbols used in the text

In the paragraphs highlighted with this symbol, you will find tips and practical advice to work with the 2D-Kit System.

In the paragraphs highlighted with this symbol, you will find additional information and it is very important that you follow the instructions given.

Documentation reference

ð The user get an unique item number for an user manual to find further assistance

Additional information about manuals, datasheets, software updates or new calculation files can be downloaded from our homepage. The specific download area for the Kit system can be found at: http://www.2d-kit-system.com (=>See Downloads)

Basic Kit

Sensor options

A/F (lambda) add-on Kit (4-stroke) with 1CH or 2CH

Deto add-on Kit (2-stroke)

Possible Updates

Kit software user manual (delivered with the CD: SW-CD RaceKIT)

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1. General structure

The kit system is build-up modular. Therefore it can be fit to each vehicle (car & bike) and adapted (with few effort) to special customer requirements.
As concrete example this manual refers all assembly and connection information to the motorcycles Yamaha R1 and R6.
The following overview shows the general structure. The 2D Kit system consists of a basic kit and 3 additional add-on kits. In addition further (optional) components can be exchanged (e.g. the MiniDash <> BigDash) or additional attached (e.g. 2D Infrared laptrigger).
The “heart” of the basic kit is represented by the LG-Kit08-000 logger itself. (mentioned as Kit logger). This module combines 3 devices in one housing (a datalogger, a memory and a GPS receiver). With connection of a "GPS Mouse" the receipt of GPS coordinates with 6.25Hz using EGNOS becomes possible. The recording time in the Kit version will be limited ,depending on the System level.

2. Basic information on all modules and their features

Basic Kit :

2D basic data logging set. This set includes logger unit, software, MiniDash, GPS mouse and speed sensor.
This Basic KITs enable the user to measure essential variables of the bike (e.g. wheel speed, RPM, throttle, LAP Time…), show these values on a display, and store them in the memory of the datalogger. Then the collected data can be downloaded to a PC and analyzed by the software.

Documentation reference: Art.No.: AC-DOC_SY-KIT-Basic_08-000

Sensor options:

KIT suspension / KIT brake pressure sensor add on:
There are different optional sensor kits available which enable the user to measure, display and analyze additional variables which are not available by using the basic KIT (e.g. suspension and brake pressure)

Documentation reference: Art.No.: AC-DOC_SY-KIT-SensorOptions_08-000

2D Infrared laptrigger set:
According to 2D standard, GPS laptrigger is offered with the Kit System software. For better accuracy or for use at racetracks were no GPS data is available you can use the optional infrared laptrigger set.

Documentation reference: Art.No.: AC-DOC_SY-KIT_IR-Laptriggerset-000

A/F (lambda) add-on Kit:

A/F sensor set: A/F controller and A/F sensor. Direct measurement of A/F ratio to optimize the carburator/engine setting. Controller and sensor with CAN bus data output, ready to connect to the Kit logger.

Documentation reference: Art.No.: AC-DOC_SY-KIT-Lambda-addon_08-000

Deto add-on Kit:

Deto sensor set: Including Deto Sensor, Exhaust gas sensor and Deto controller this Kit is used to fine tune the engine and/or the carburation settings on two stroke engines.

Documentation reference: Art.No.: AC-DOC_SY-KIT-Deto-addon_08-000

Possible Updates:

2D BigDash display:
Optional you can attach the BigDash display from 2D to replace the MiniDash. This BigDash enables you to show more informations in higher quality.

2D Memory update:
2D memory update for KIT logger to 8h recording time

Documentation reference: AC-DOC_SY-KIT-Update_08-000

You have the possibility to download the corresponding technical data sheet for each optional sensor and add-on kit.

ð http://www.2d-kit-system.com

3. Connector layouts / Assembly

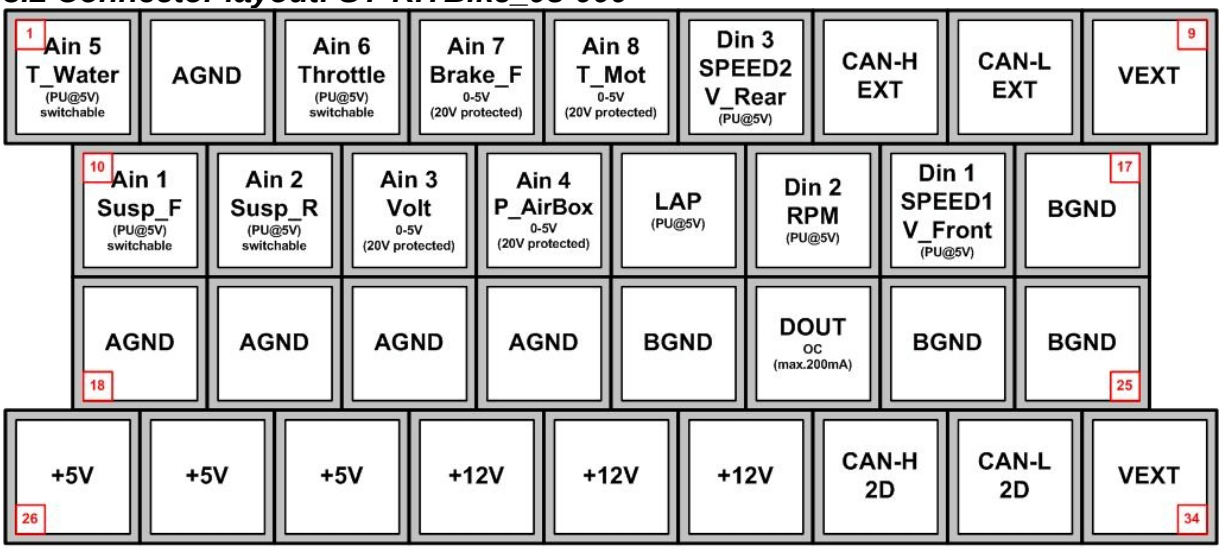
3.1 Connector layout: SY-KITTrackDay_08-000

1	AGND	Ain 6 Throttle (PU@5V) switchable	Ain 7 Brake_F 0-5V (20V protected)	Ain 8 T_Mot 0-5V (20V protected)	Din 3 SPEED2 V_Rear (PU@5V)	CAN-H EXT	CAN-L EXT	9 VEXT
10 Ain 1 Susp_F (PU@5V) switchable	Ain 2 Susp_R (PU@5V) switchable			LAP (PU@5V)	Din 2 RPM (PU@5V)	Din 1 SPEED1 V_Front (PU@5V)	17 BGND	
AGND 18	AGND	AGND	AGND	BGND	DOUT OC (max.200mA)	BGND	BGND 25	
+5V 26	+5V	+5V	+12V	+12V	+12V	CAN-H 2D	CAN-L 2D	VEXT 34

Interface unit
34-pin AMP connector

Glossary:
PU=**P**ull-**u**p (resistor)
OC=**O**pen **C**ollector (output)

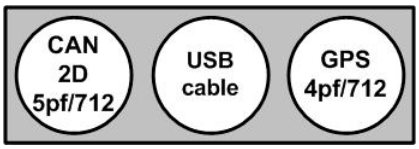
3.2 Connector layout: SY-KITBike_08-000



Interface unit
34-pin AMP connector

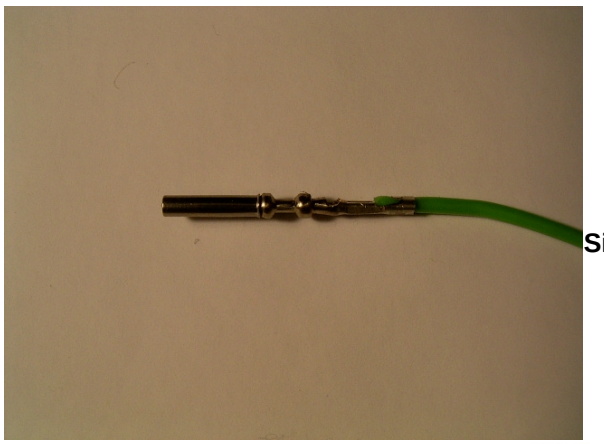
Glossary:
PU=**P**ull-**u**p (resistor)
OC=**O**pen **C**ollector (output)

3.3 Backside Connector KIT datalogger

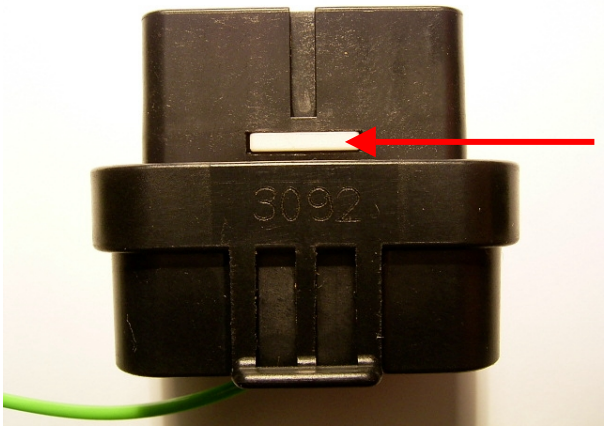


3.4 Assembly of "Tyco crimp contacts" into 34 pin AMP connector

First of all the plug locking device must be released. Therefore the "rectangular white plastic tip" has to be pushed with gentle pressure into the plug. Use a small tool e.g. a screwdriver or the point of a knife for example. You shall hear a "click" when the locking device opens.

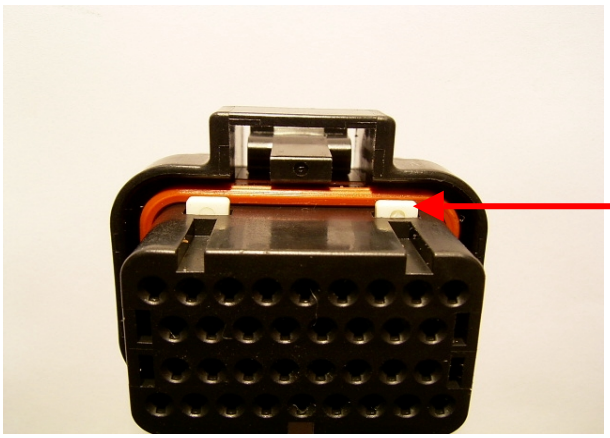


Single Tyco pin contact



locking device

Make sure that the 34pin AMP connector is not locked: the both small rectangular "white plastic tips" have to protrude from the connector's body (refer to figure below). Only in this position the "Tyco contacts" may be slid into the AMP plug and also removed again.



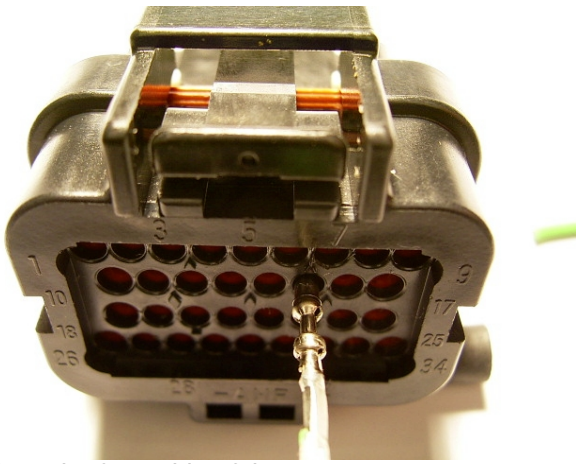
"white plastic tip"

34 pin AMP connector

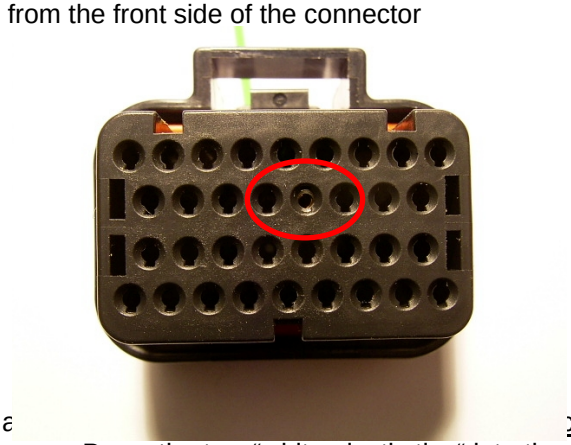
- In the next step the “Tyco pin contact” must be inserted into the correct position

The position of the individual contacts can be determine from the table in chapter 3.1 / 3.2

- Press the “Tyco pin” into the rear side of the AMP plug



until it becomes visible from the front side of the connector

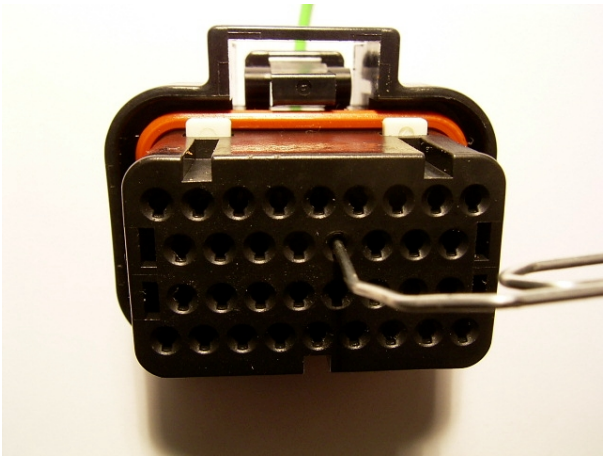


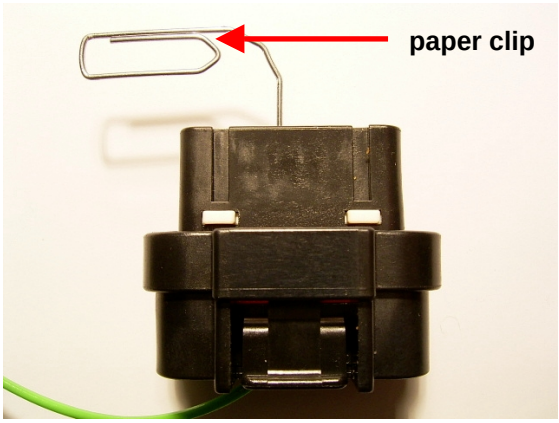
- When all the contacts a cked again. You might use a screwdriver for that purpose. Press the two “white plastic tips“ into the plug until they become even with the surface of the connector. The locking device engages audibly with a click.

3.5 Exchange or disassembly of a "Tyco pin" contact from the AMP plug

Make sure that the 34pin AMP connector is not locked: the both small rectangular "white plastic tips" have to protrude from the connector's body (refer to figure below). Only in this position the "Tyco contacts" may be slid into the AMP plug and also removed again.

- To extract the "Tyco contact pins" you might use a paper clip or a similar tool: Just push the pin carefully out.



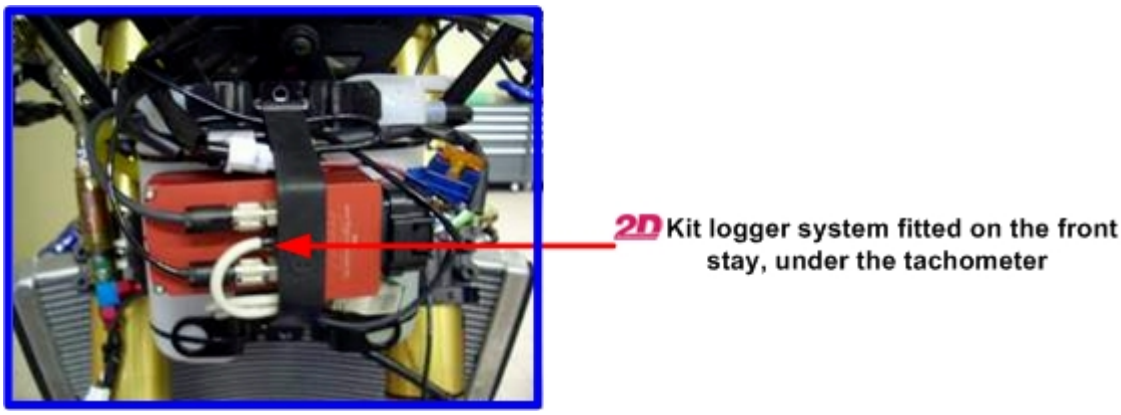


Please pay attention not to use a tool that is too thick. Otherwise you might damage the contact pins by expanding them. In this case you will not be able to re-use this pin because a correct connection cannot be assured any longer !

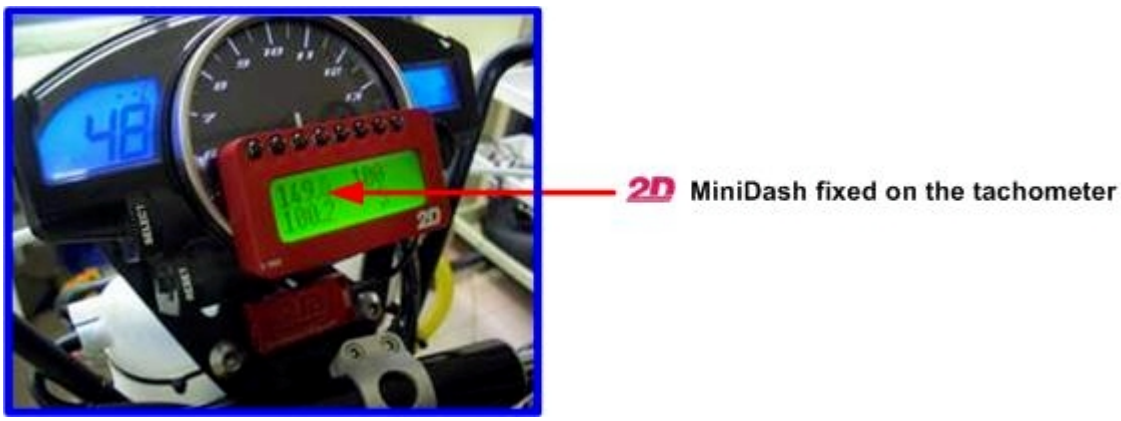
4. Mounting and connecting the modules

4.1 The Basic kit

4.1.1 Mounting the 2D Kit logger



4.1.2 Mounting the 2D MiniDash Display

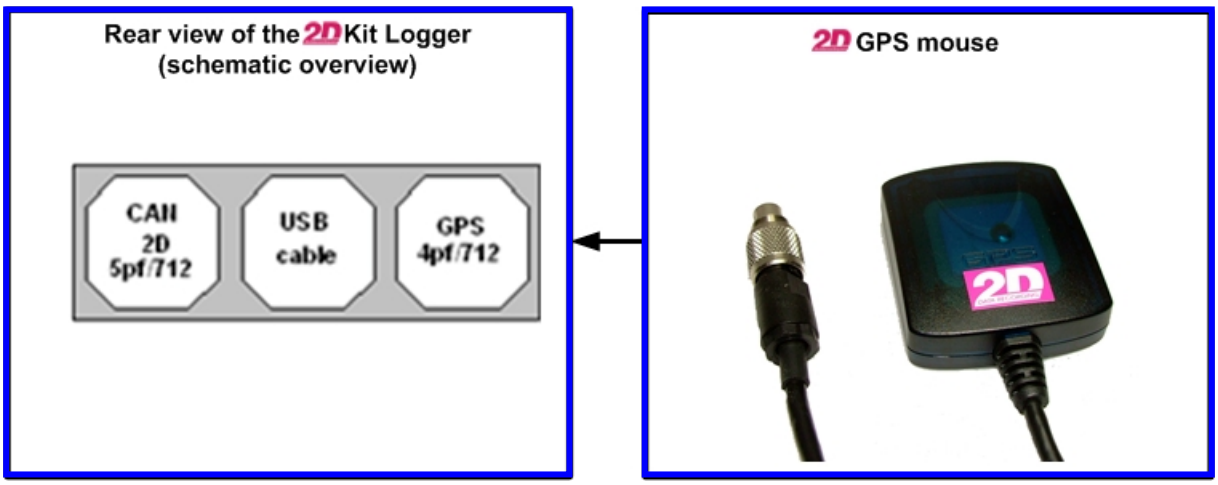


4.1.3 Mounting the GPS mouse

For optimal signal quality the GPS mouse must have a free visibility towards the GPS satellites. Therefore it should not be covered by any bike parts or by the driver. Mounting the antenna on the tail of the bike would be a useful solution for example.

Double-sided "scratch tape" or velcro works very well to fix the GPS module. It keeps the GPS receiver reliable on its place but can be removed easily as well. The scratch tape is delivered together with the basic kit. The GPS mouse also has an integrated magnet on the lower surface. This allows simple and fast mounting of the receiver on all magnetic surfaces (e.g. body parts of the used vehicle)

4.1.4 Connecting the GPS mouse



The startup requires no further action by the user. After connection it is ready for use and will be powered by the Kit Logger.

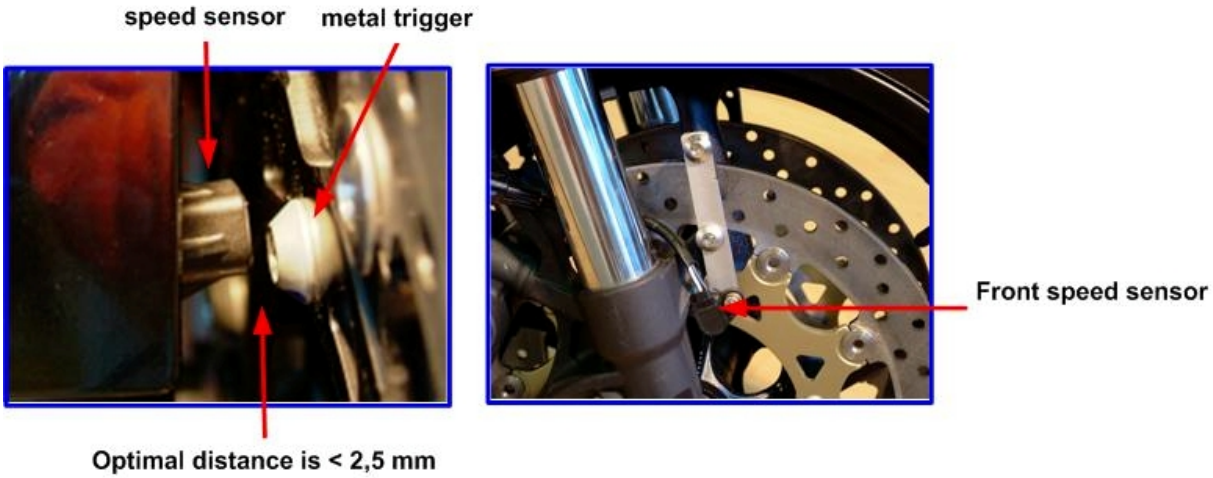
The power supply of the complete system must be switched on before testing the GPS mouse. Incoming GPS-Data can be displayed online in the 2D software WinIt.

4.1.5 Mounting the Front speed sensor

Unlike it's name suggests, a speed sensor doesn't measure speed, at least not directly. What it does is give birth to an impulse each time one or more triggers pass in front of the sensor. The logger counts the number of occurrences per unit of time, then use the number to determine the rotation speed of the wheel which in correlation with the wheel radius, gives the speed of the vehicle. **à** refer to chapter 7.3.1 It's functioning is based on induction with the sensor reacting to the passing of a metallic part in front of the detecting cell.

You can fix the front speed sensor with a support fixed to the right front fender using the same screws of the front fender !

Installation advice:



The speed sensor must not be centered above the head of the bolt. The "circular path" of the metal trigger should not "meet" the centerline of the sensor. Shift the speed sensor approx. 3mm up or down to prevent it from sending two pulses per bolt, and use flat screws.

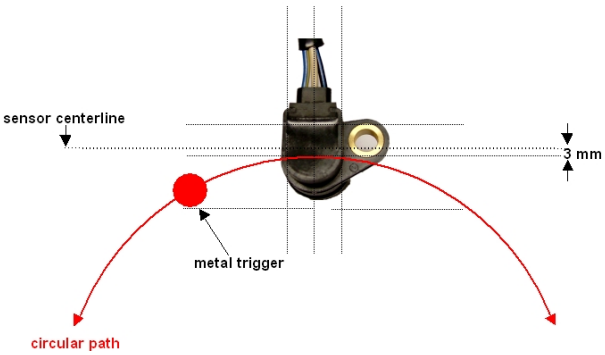


figure 1: optimal mounting

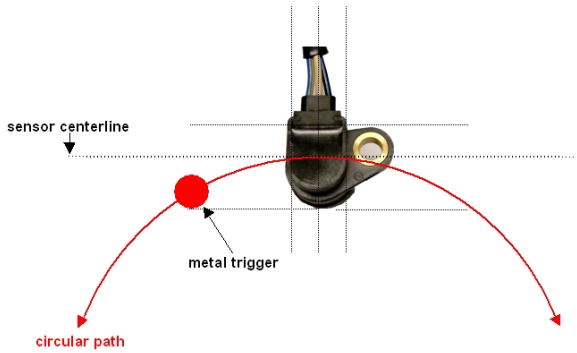
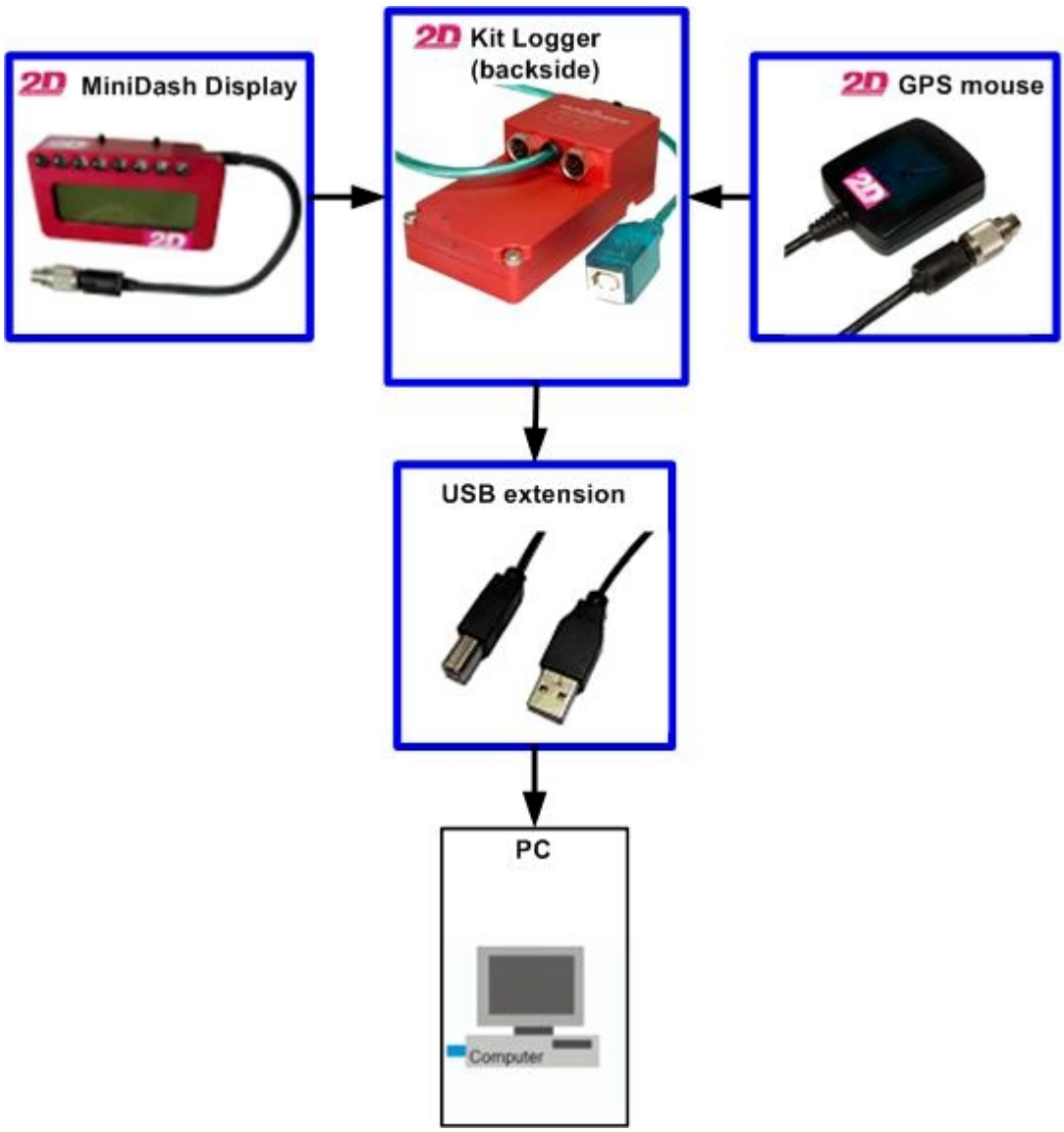


figure 2: "bad" mounting

To avoid double of pulses, you should pay attention to the mounting position of the sensor. The sensor should not be fastened as shown in figure 2.

4.1.6 Connecting the 2D Kit-logger



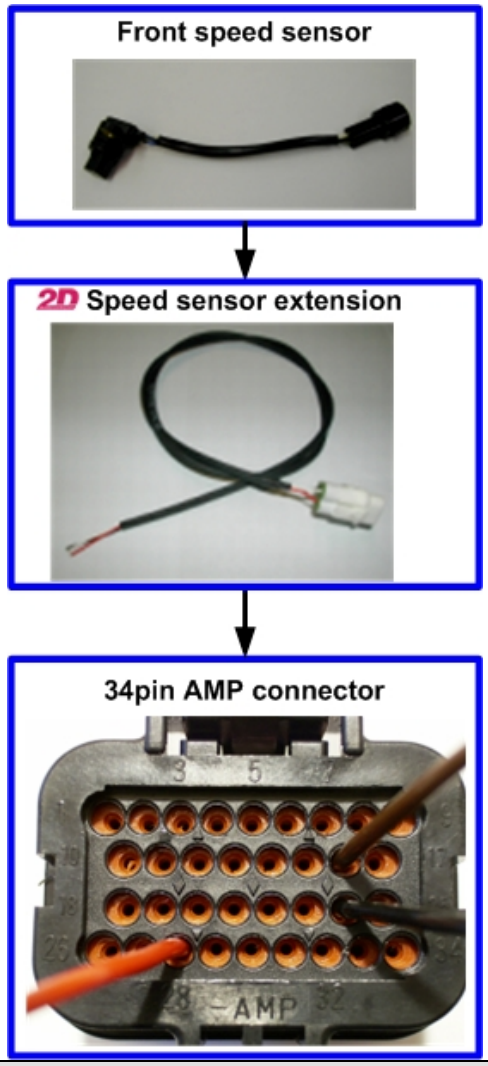
4.1.7 Connecting the 2D MiniDash Display

Connect the 5-pin connector (male) of the MiniDash display with the 5-pin connector (female) of the Kit logger.

4.1.8 Connecting the Front speed sensor

The wires of the speed sensor extension cable are delivered from 2D with the “Tyco contact pins” already crimped and mounted into the 34pin AMP connector.

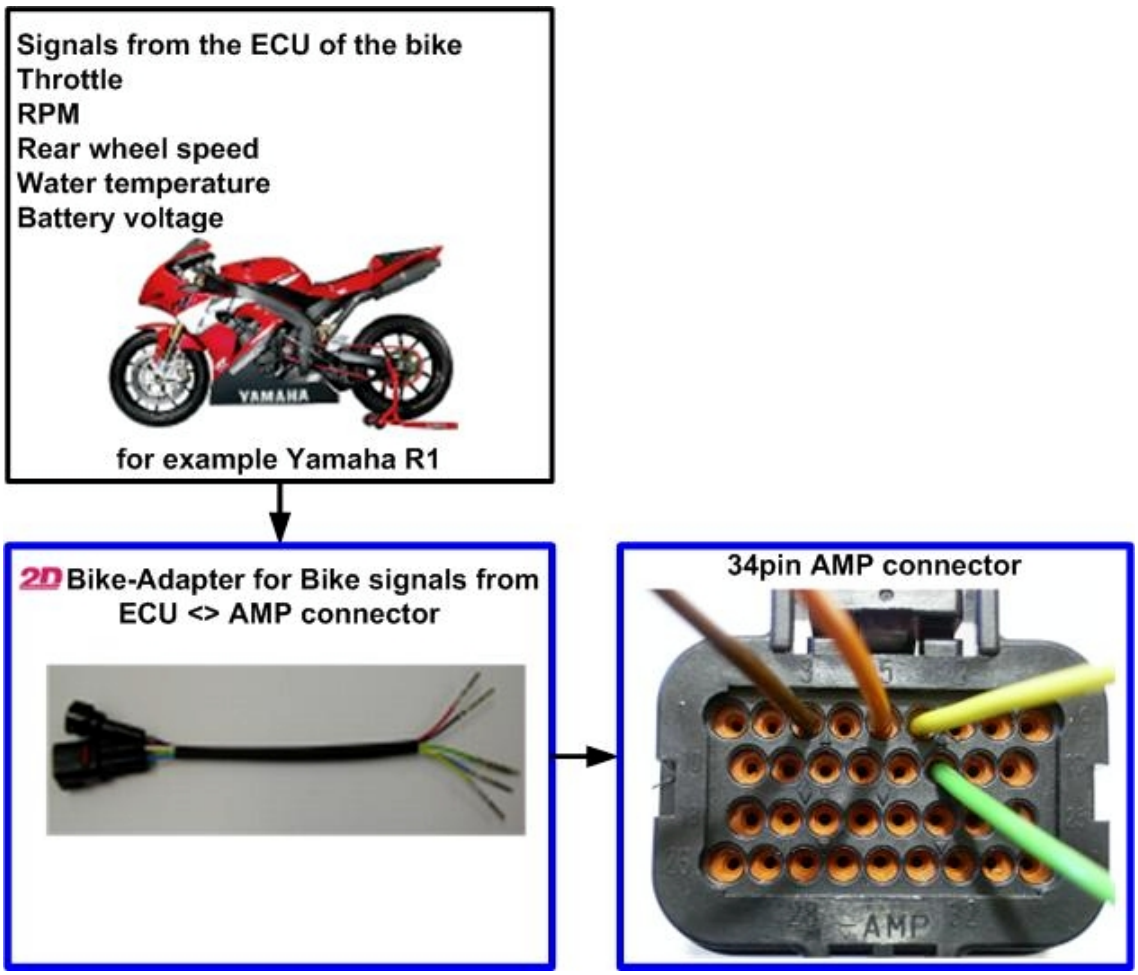
The figure shown down is only exemplary. The Tyco pins are already crimped and mounted (pre-configured) into the 34pin AMP connector. The user has to connect the sensor only with the extension.



Technical information		Front speed sensor	
connector:		3pin connector (female)	
+5V		blue / yellow	
GND		black / blue	
signal		white	
2D speed extension		**Interface unit (34pin AMP connector)**	
Cable length:		740mm (isolated) + 40mm (stripped PUR-cable)	
V_Front	(brown)	**Pin 16**	>> refer to the table in chapter 3
DGND	(black)	**Pin 24**	>> refer to the table in chapter 3
+5V	(red)	**Pin 28**	>> refer to the table in chapter 3

4.1.9 Capturing the different bike signals (from ECU)

Some signals can be read directly from the ECU of the bike. In the following table you will find the signal assignment for two (example) bikes, the Yamaha R1 and the Yamaha R6. Further informations on ECU signals of other bikes than Yamaha R1 and R6 should be requested from the Kit system support or one of the distributors. Get in contact by using the form onto our website: http://www.2d-kit-system.com (=> look for “Signal pick-up”)

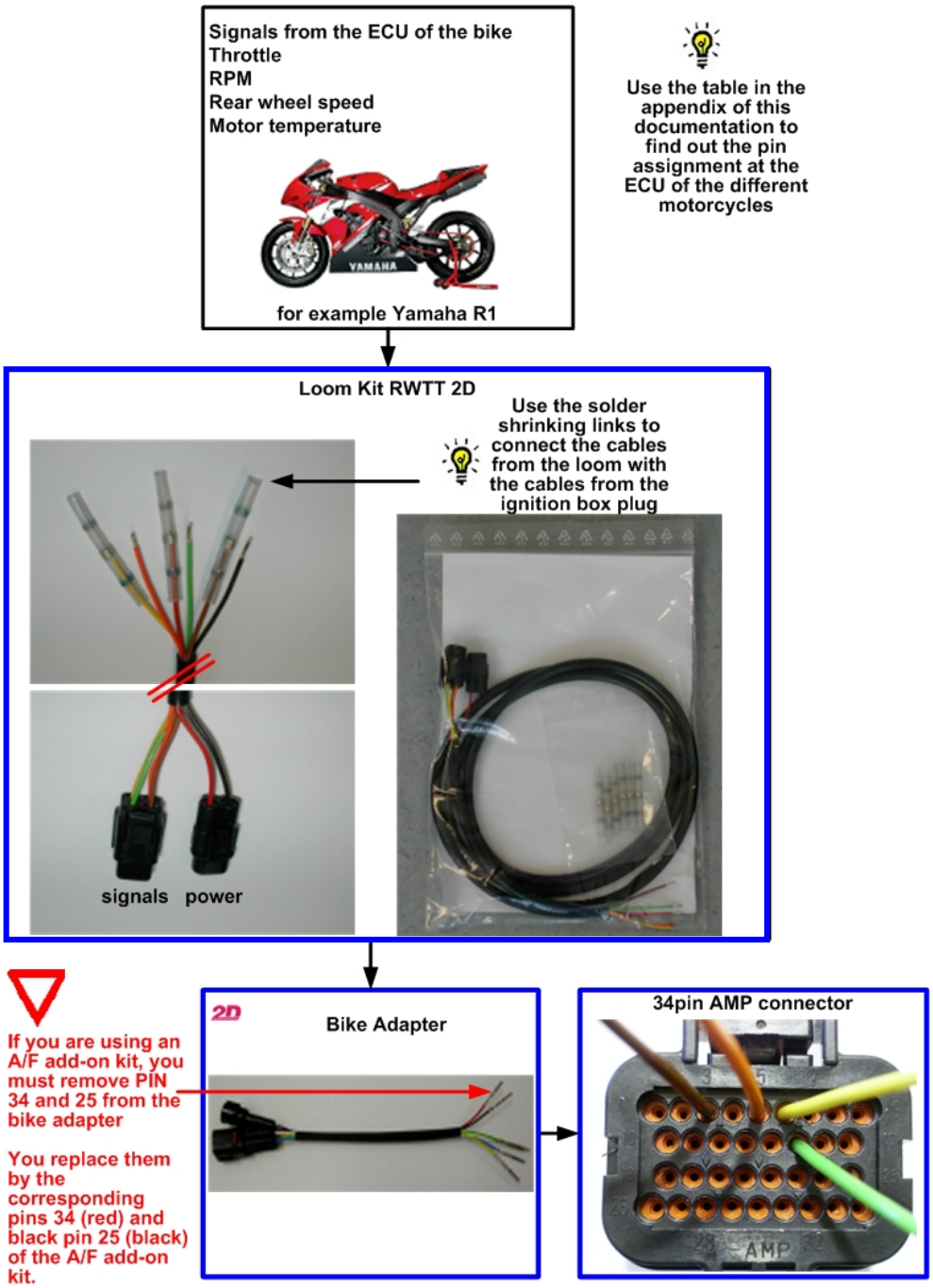


The listed colors correspond to them on the ECU of the vehicle

Manufacturer | model	**+12 Volt**	**GND**	**RPM**	**v_km/h**	**throttle**	**T_Mot**
Yamaha R-1 | ‘04-‘05	Red/ White	Black/ Blue	Yellow/ Black	White/ Yellow	Yellow	Green/ White
Yamaha R-6 | ‘05	Red/ White	Black/ Blue	Yellow/ Black	White/ Yellow	Yellow	Green/ White
Pin on the ECU plug	**15**	**34**	**4**	**18**	**19**	**31**
Technical information	**Interface unit (34pin AMP connector)**					
Connector:	4-pin connector bike signals (male) / 2-pin connector power supply (male)					
Cable length:	150mm					
Water temp. (orange)	**Pin 5**					>> refer to the table in chapter 3
Throttle (brown)	**Pin 3**					>> refer to the table in chapter 3
V_Rear (Yellow)	**Pin 6**					>> refer to the table in chapter 3
RMP (green)	**Pin 15**					>> refer to the table in chapter 3

4.1.9.1 How to capture the signals from the bike's ECU without using the harness provided with the kit.

To capture the signals from other bike's ECU (than Yamaha R1 or R6), you'll need the harness referenced "Kit RWTT" to connect the ignition box with the 2D Kit System. You'll find further information on the subject as well as manuals for the 2D Kit System on the 2D Kit System homepage: http://www.2d-kit-system.com (=> look for "Basic systems" | Detail)



4.1.10 The 2D MiniDash Display (operating + setting)

In this section you'll find information on the functions available through the six pages of the display device.

When "off" is displayed, it means that no value is expected to be shown, because although the corresponding kit is mounted in the data aquisition system, the channel is turned off. When a question mark ("?") is displayed, it means no value can be shown by that channel, because the corresponding optional add-on kit is not mounted in the system.

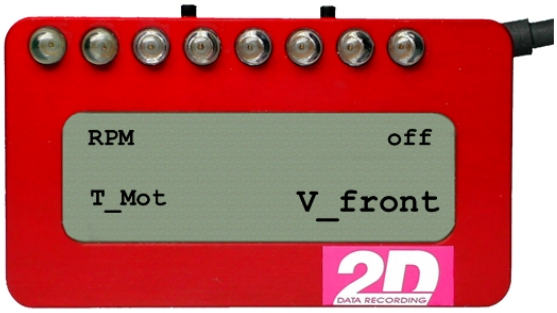
ð Use the table in the appendix to get a overview of all channel names with your system.

4.1.10.1 Pages overview

Display page 1

included in the Basic Kit !

Display page 2



included in the Basic Kit !

Display page 3

A/F add-on kit required !

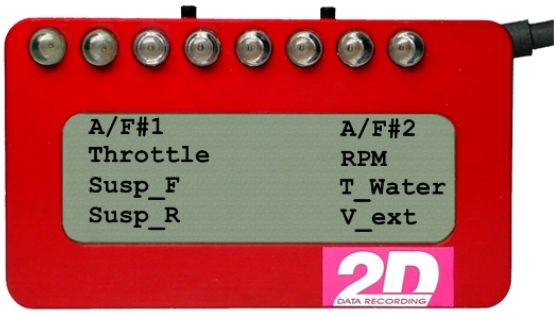
The two channels A/F#1 and A/F#2 are not displayed if no A/F (lambda) add-on kit is attached !

Display page 4

Sensors add-on kit required !

Display page 5

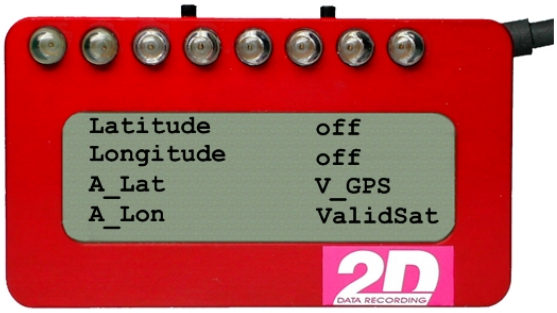
* The channel "A/F#2" is displayed only if a second lambda probe is installed on the optionally available 2 channel A/F module !



A/F & Sensors add-on kit required !

The two channels A/F#1 and A/F#2 are not displayed if no A/F (lambda) add-on kit is attached !

Display page 6



4.1.10.2 How to operate the MiniDash display

General operating

On the following pages, keeping a button pressed for less than 3s will be referred to “short activation” of the corresponding button, keeping it pressed for more than 3s will be referred to “long activation”. Keeping both buttons pressed at system start (that is before and until the bike’s power or the system get turned on) will be referred to “simultaneous activation of both buttons at power up”.

Button 1

Short activation*	Switches pages
Long activation*	Displays additional information about the measuring values

Button 2

Short activation*	Shows firmware version of the display
Long activation*	Display the menu “Settings”

You can make the following settings in the menu “Settings”

- Turn on/off the background lighting
- Turn on/off the global alarm function
- set the LED brightness

*** Short activation < 3 seconds | *Long activation > 3 seconds**

Reset of the display (set to factory default)

Press Button 1 + Button 2 simultaneously on power up. Keep both buttons pressed until the displays shows "SET DEFAULT SETTING…"
After DEFAULT SETTING setting the display will be reinitialized and start in standard display mode page1 automatically.

How to set channels zero with the MiniDash Display ?

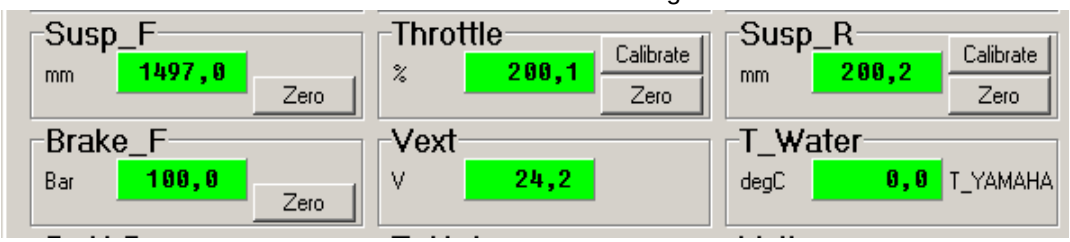
The MiniDash display allows doing some basic settings without using a PC. It is e.g. possible to zero suspension, throttle and brake pressure together or individually and to clear the memory. To do this you'll need to access the corresponding menu when the display unit is in operation mode (ignition switched on, display shows one of the pages 1 - 6). To enter the corresponding menu, please follow the step by step procedure below.

- **Caution!! You are not able to check the CAN identifiers of the external CAN bus of the system**
- **Simultaneous activation of both buttons in operation mode.**

- **The first menu item is the "Set to zero" menu**

- Press button 1 (Ok) to set all channels together to zero

You can zero all channels by display menu, which also can be set zero via the communication tool WinIt. In detail these are the following channels:



- Front suspension
- Throttle
- Rear suspension
- Brake pressure

- Press button 2 (Next) to set a channel individually to zero: Then scroll between the channels by pressing button 1 (next) until the desired channel is displayed in the top row of the table. Pressing button 1 and 2 simultanously will set that channel to zero. Repeat the procedure with scrolling if you want to set other channels to zero.

How to clear memory of all recording devices ?

The MiniDash allows to clear the memory of all recording devices which are connected to the KIT System, without using a PC. To do this you'll need to access the corresponding menu when the display unit is in operation mode (ignition switched on, display shows one of the pages 1 - 6). To enter the corresponding menu, please follow the step by step procedure below.

- **Simultaneous activation of both buttons in operation mode.**

- The corresponding menu is not displayed on the first page, so you'll have to scroll through the pages by repeated pressing of button 2 ("next") until you reach "clear memory"
- Press button 1 ("ok) to clear the memory

How to check the CAN identifiers ?

The MiniDash allows to check the identifiers of all CAN channels on the 2D CAN Bus, without using a PC. To do this, you'll need to access the corresponding menu while the display unit is ready (ignition switched on). To enter the corresponding menu, please follow the step by step procedure below:

- **Simultaneous activation of both buttons in operation mode.**

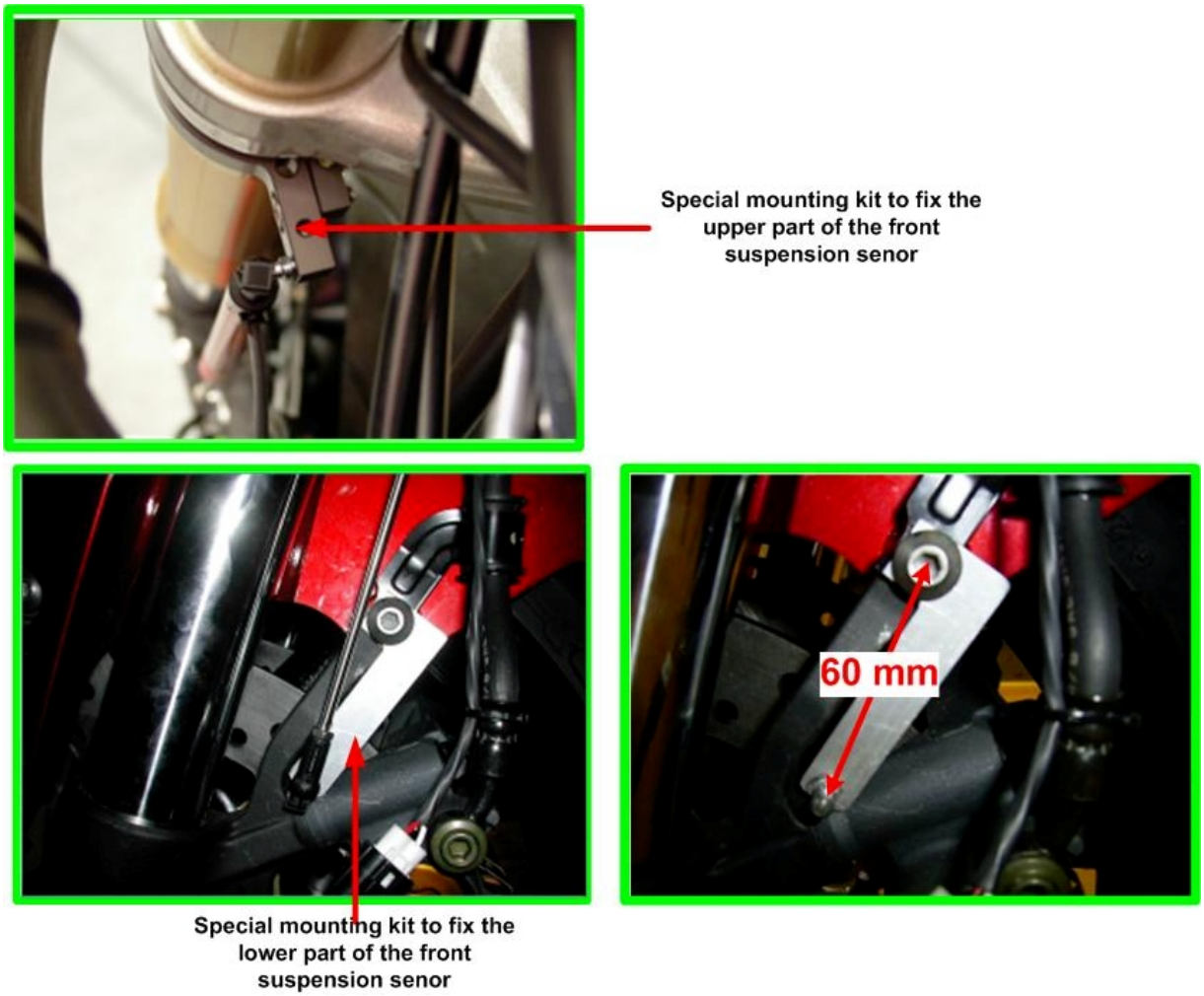
- The corresponding menu is not displayed on the first page, so you'll need to scroll through the pages by repeatedly pressing button 2 ("next") until you reach "CAN Monitor".
- Use the menu item <Ok> to display the CAN identifiers.

4.2 Available sensor options

4.2.1 Mounting the different sensors

4.2.1.1 Mounting the front suspension sensor

The potentiometer has to be fitted parallel to the tubes of the fork to give correct values. The maximum measure range of the used sensor must be equal or even longer than your maximum suspension travel (150mm range is usual for front fork).



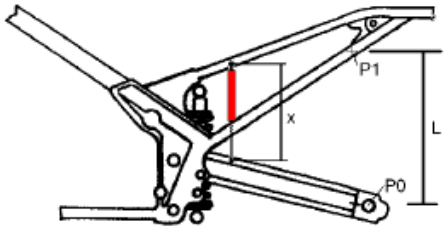
The picture above shows a clamp which is designed as a folding ring and offers an easy and parallel sensor support mounting.

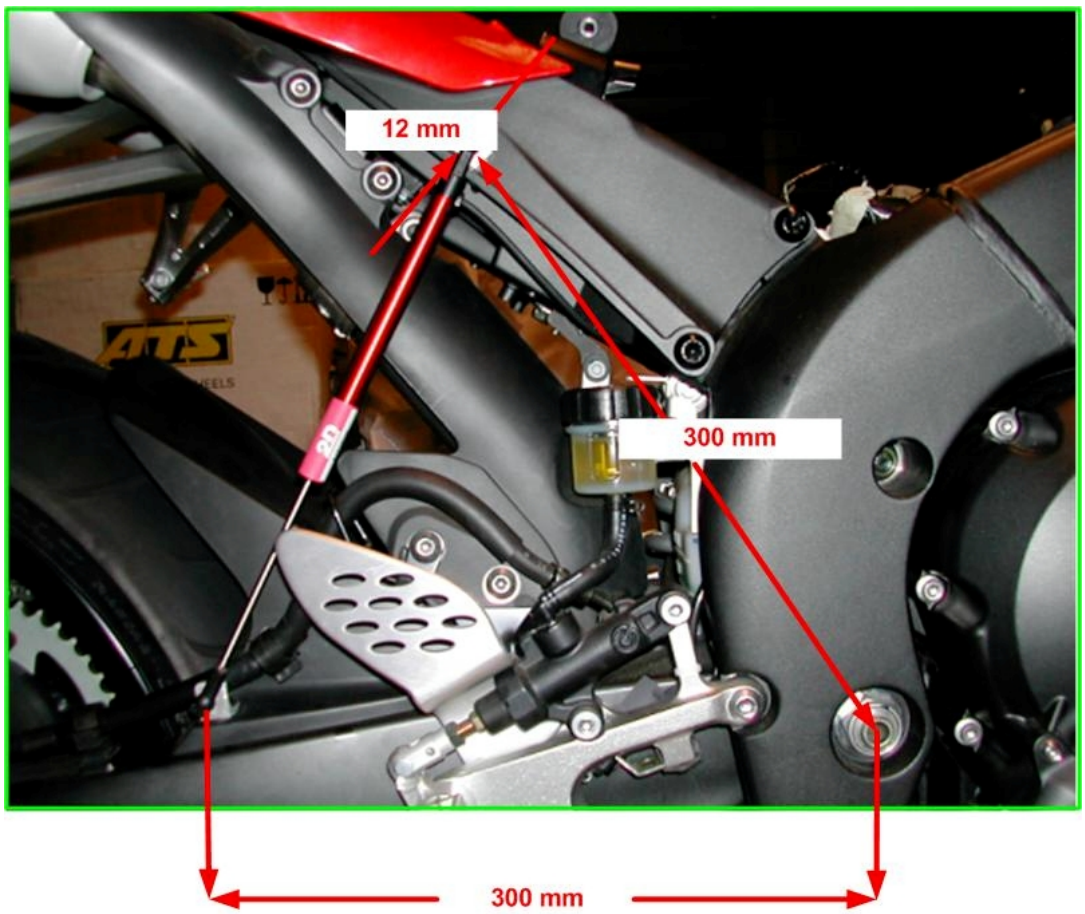
Please check **very** carefully that neither the sensor nor the supports will limit the steering angle or might get caught by any cable or line or damage them !!

4.2.1.2 Mounting the rear suspension sensor

To measure the suspension travel of the rear wing in some cases (for example R6) it is impossible to mount the sensor directly parallel to the (standard) shock. So you have to put it somewhere between the rear frame and the wing. This causes big differences of usable sensor measure length depending on the location of the of mounting. (50 mm or 75mm will work in most cases)

To avoid water entering the housing, please mount the grinder bar down below !



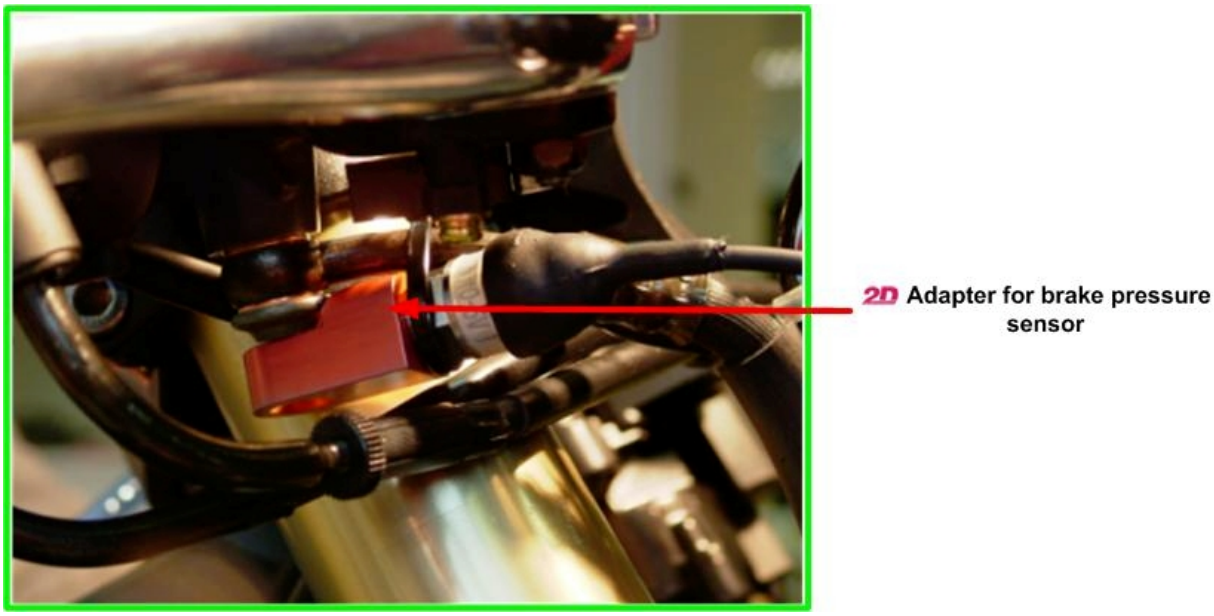


View of the rear suspension sensor (linear potentiometer 75mm), example mounted at a Yamaha R1

Also in this case please check **very** carefully that neither the sensor nor the supports touch any moving parts or might block them. Check for maximal and minimal travel !

4.2.1.3 Mounting the brake pressure sensor

The picture below shows a possibility to fix the pressure sensor to the brake line system. For this a special mounting kit is included in the sensor add-on kit, which fixes the pressure sensor with a double hollow screw to the main brake cylinder.



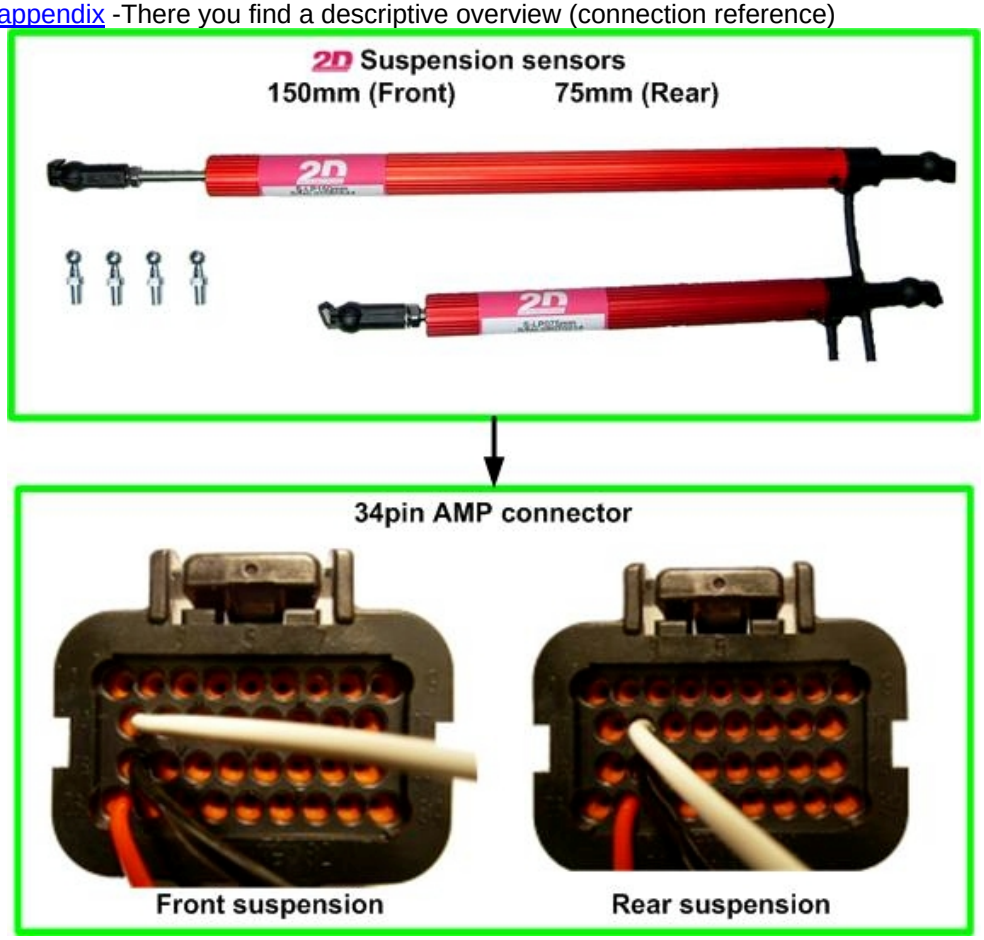
4.2.2 Connecting the different sensors

4.2.2.1 Connecting the front suspension sensor

The wires of both suspension sensors are delivered by 2D with the “Tyco contact” pins already crimped. Just insert the individual contacts into the 34pin AMP connector. The following table gives you the correct positions for the pins.

Technical information	Interface unit (34pin AMP connector)	
Cable length:	600mm (isolated) + 40mm (stripped PUR-cable)	
Crimp contacts:	“Tyco crimp contacts”	
Susp_Front (white)	**Pin 10**	>> refer to the table in chapter 3
AGND (black)	**Pin 18**	>> refer to the table in chapter 3
+5V (red)	**Pin 26**	>> refer to the table in chapter 3

ð See appendix -There you find a descriptive overview (connection reference)



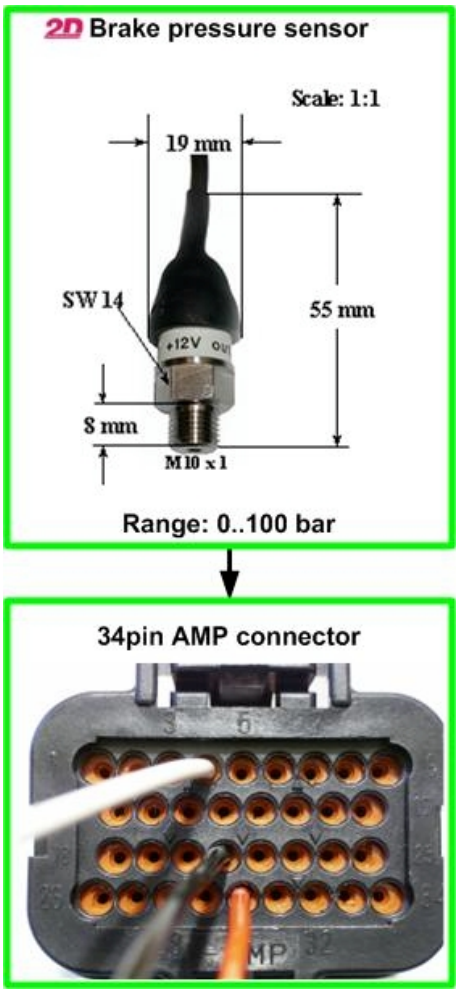
4.2.2.2 Connecting the rear suspension sensor

Technical information	Interface unit (34pin AMP connector)	
Cable length:	1200mm (isolated) + 40mm (stripped PUR-cable)	
Crimp contacts:	“Tyco crimp contacts”	
Susp_Rear (white)	**Pin 11**	>> refer to the table in chapter 3
AGND (black)	**Pin 19**	>> refer to the table in chapter 3
+5V (red)	**Pin 27**	>> refer to the table in chapter 3

ð See appendix -There you find a descriptive overview (connection reference).

4.2.2.3 Connecting the brake pressure sensor

The wires of the brake pressure sensor are delivered from 2D with the “Tyco contact pins” already crimped. Just insert the individual contacts into the 34pin AMP connector. The following table gives you the correct positions for the pins.



Technical information	Interface unit (34pin AMP connector)	
Cable length:	500mm (isolated) + 40mm (stripped PUR-cable)	
Crimp contacts:	“Tyco crimp contacts”	
Brake pressure (white)	**Pin 4**	>> refer to the table in chapter 3
AGND (black)	**Pin 21**	>> refer to the table in chapter 3
+12V (red)	**Pin 30**	>> refer to the table in chapter 3

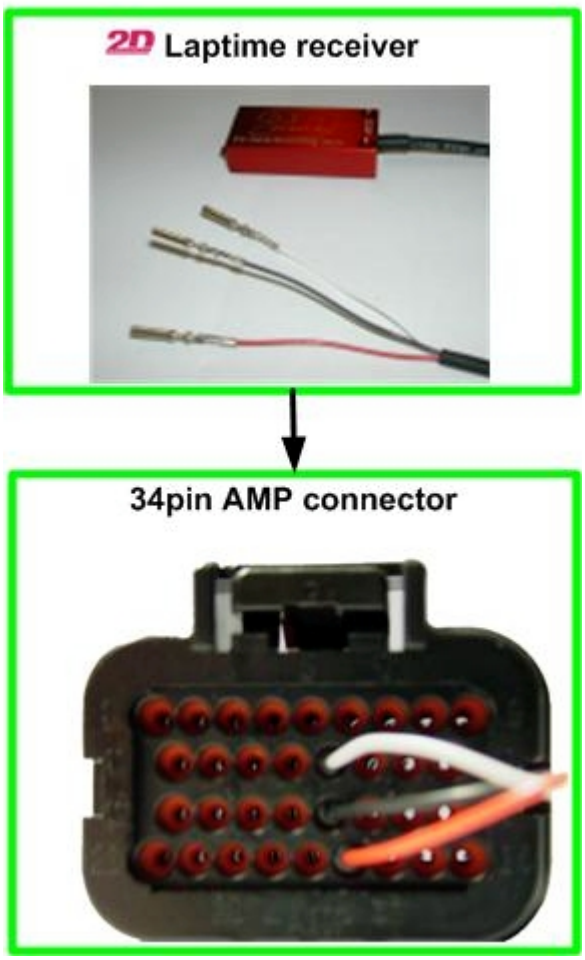
ð See appendix -There you find a descriptive overview (connection reference).

4.2.3 Connecting the 2D Laptime receiver

The wires of the laptime receiver are delivered by 2D with the “Tyco contact pins” already crimped. Just insert the individual contacts into the 34pin AMP connector. The following table gives you the correct positions for the pins.

Technical information	**Interface unit (34pin AMP connector)**
Cable length:	500mm (isolated) + 40mm (stripped PUR-cable)
Crimp contacts:	“Tyco crimp contacts”
Signal (white)	**Pin 14** >> refer to the table in chapter 3
DGND (black)	**Pin 22** >> refer to the table in chapter 3
+12V (red)	**Pin 31** >> refer to the table in chapter 3

ð See appendix -There you find a descriptive overview (connection reference).



ð

You will get a startup reference for the IR laptrigger set (transmitter + receiver) at the 2D KIT system website located in the download area. Take a look at

Documentation reference: Art.No.: AC-DOC_SY-KIT_IR-Laptriggerset-000

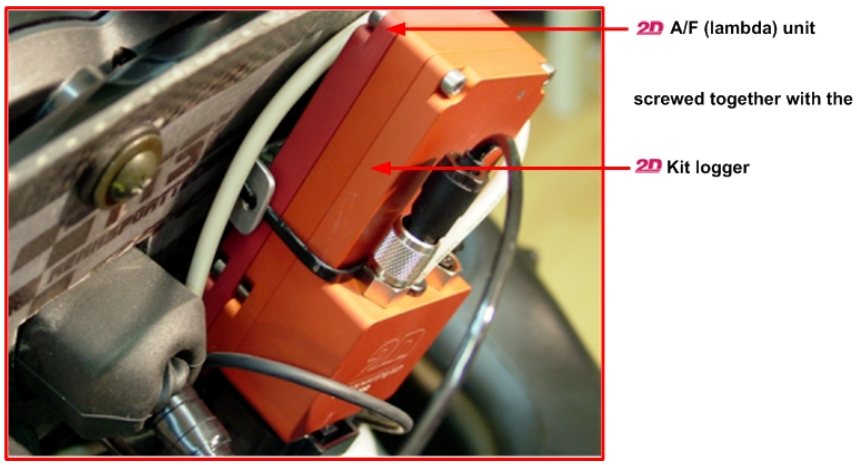
ð http://www.2d-kit-system.com (=>See Downloads\Manuals)

4.3 The Linear A/F (lambda) add-on kit

The kit consists of an Air/Fuel (lambda) controller unit and the A/F (lambda) sensor.

4.3.1 Mounting the A/F unit

The A/F housing should be fitted to the Kit Logger housing:
First remove all the bolts from the logger housing. To attach the controller unit to the logger as shown use the longer bolts delivered with the A/F add-on kit.

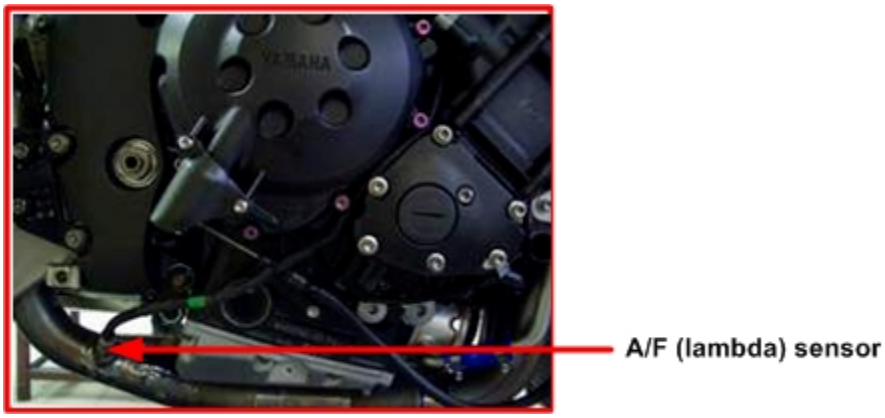


When fitting the two housings together please take care that the connectors are pointing to the same side !

4.3.2 Mounting the A/F (lambda) sensor

The A/F (lambda) sensor should be installed onto the exhaust collector close to the join of the four collector pipes (in the case of a 4-in-1 system)

Many exhaust systems provide already a thread to attach a lambda sensor. In order to fit the A/F (lambda) sensor determine first the exact position of the A/F sensor.



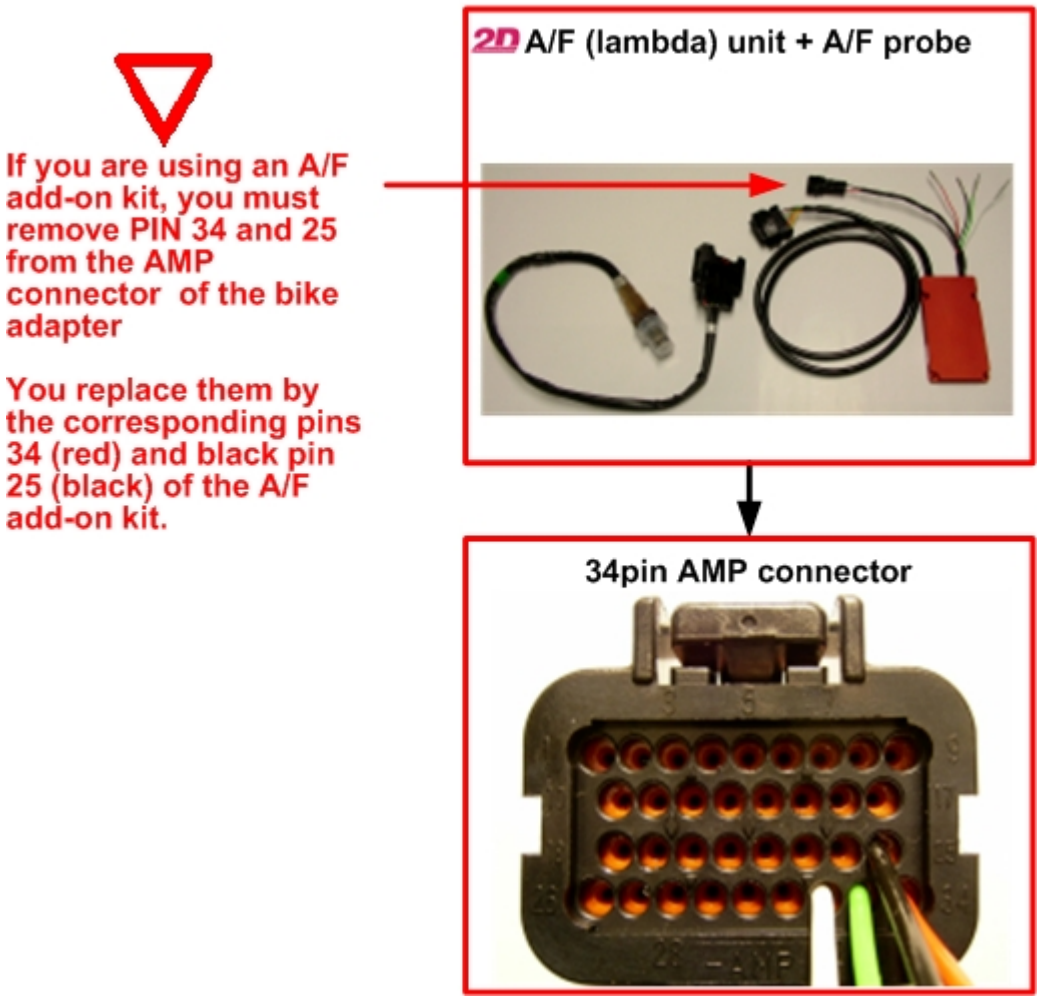
Ensure carefully that the swing arm, the linkages, the fairing or other parts will not interfere with the sensor or the cable at any position. If possible the sensor should not be mounted with it's thread at the lowest position to avoid damage from condensing water !

The best way to fix the A/F sensor at the selected point to the exhaust collector is to fit a screw collar (or nut) soldering it onto the exhaust collector. This screw-collar must guarantee an exact, stable and gas-seal fitting for the A/F sensor. The A/F sensor tip should reach about 15mm into the gas flow to give correct values.

Once you have fixed the screw collar a hole has to be drilled into the exhaust collector (diameter should be inner screw collar diameter) and then drilling should be cleared using a tap with the same thread as the sensor. You can also drill the hole first and then solder the collar in-line onto the pipe maintaining the correct angle for the sensor.

If you are not very experienced with soldering exhaust parts we strongly recommend to pass the part of the assembly process to a workshop with competence (and good historical) for that type of modifications. Failing to solder the adapter correctly may crack the sensor in the moment of fixing. It has to enter softly.
Incorrect modifications can also damage the exhaust !

4.3.3 Connecting the A/F (lambda) unit



The wires of the A/F (lambda) unit are delivered from 2D with the “Tyco contact pins” already crimped. Just insert the individual contacts into the 34pin AMP connector. The following table gives you the correct positions for the pins.

Technical information		Interface unit (34pin AMP connector)	
Cable length:		1000mm	
Crimp contacts:		“Tyco crimp contacts”	
CAN_H	(white)	**Pin 32**	>> refer to the table in chapter 3
CAN_L	(green)	**Pin 33**	>> refer to the table in chapter 3
Vext	(red)	**Pin 34**	>> refer to the table in chapter 3
BGND	(black)	**Pin 25**	>> refer to the table in chapter 3

ð See appendix -There you find a descriptive overview (connection reference).

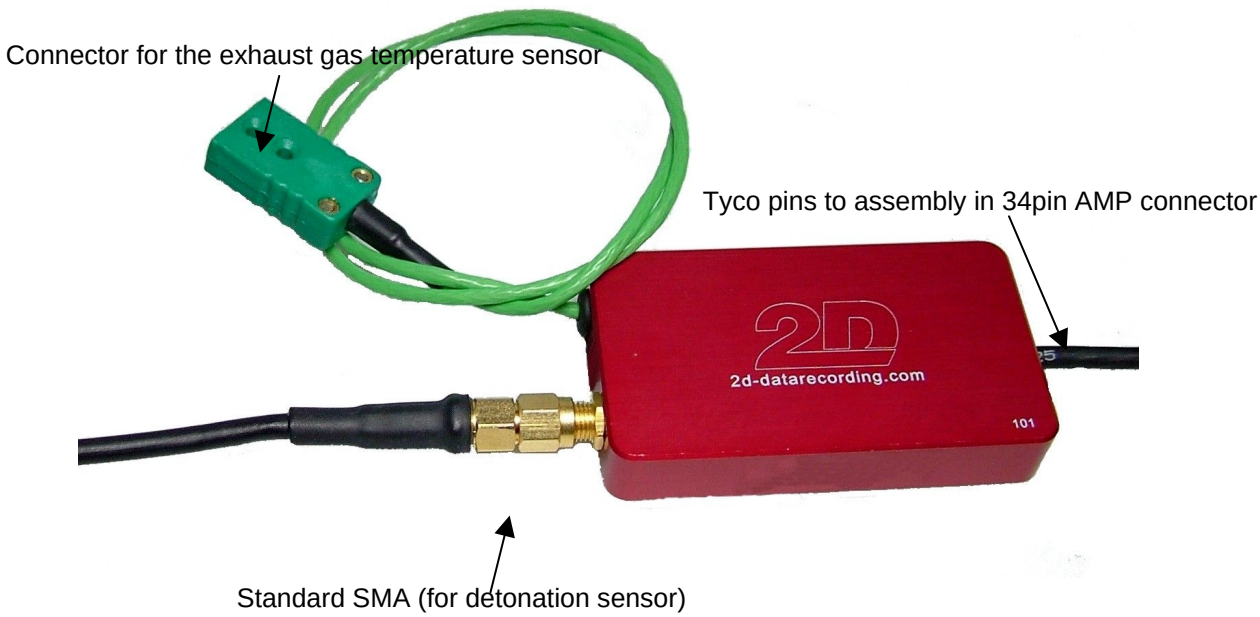
4.4 The Deto add-on kit

The Deto add-on kit consists of the Deto interface box, one detonation sensor and one exhaust temperature sensor.

4.4.1 Mounting the Deto module

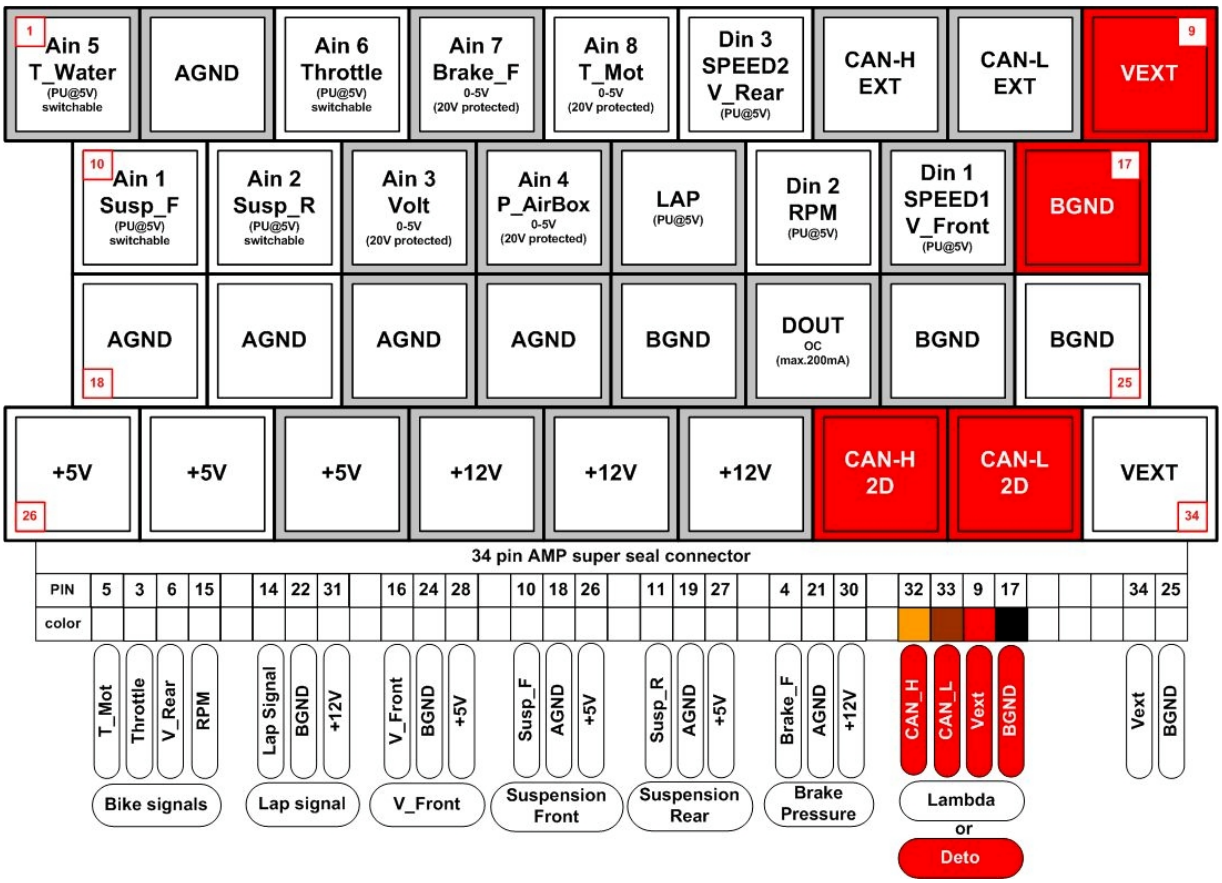
There is no special mounting position for the Deto interface box. The mounting position is only limited by the cable length of the Deto module. The Deto module must be connected with the Kit-Logger, therefore we recommend to mount the Deto add-on kit near by the logger.
To mount the exhaust temperature sensor it is necessary to weld an M5 nut onto and to drill a hole through the exhaust.

The detonation sensor is mounted between spark plug and combustion chamber. Therefore it is necessary to use spark plugs with longer thread or to modify the combustion chamber. Anyway you have to take off the seal ring of the spark plug. Please be sure that the cable exit does not touch the combustion chamber and/or the water hood.



4.4.2 Connecting the Deto module

The wires of the Deto module are delivered from 2D with the “Tyco contact pins” already crimped. Just insert the individual contacts into the 34pin AMP connector. The following table gives you the correct positions for the pins.



Technical information		Interface unit (34pin AMP connector)	
Cable length:		600mm	
Crimp contacts:		“Tyco crimp contacts”	
CAN_H	(orange)	**Pin 32**	>> refer to the table in chapter 3
CAN_L	(brown)	**Pin 33**	>> refer to the table in chapter 3
Vext	(red)	**Pin 9**	>> refer to the table in chapter 3
BGND	(black)	**Pin 17**	>> refer to the table in chapter 3

ð See appendix -There you find a descriptive overview (connection reference).

4.5 Possible updates

4.5.1 The BigDash Display: SY-KITDash_6/8-000

Big Dashboard to show parameters of the bike like laptimes, RPM, water temperature or other measured channels. Includes fully programmable shift light.

4.5.1.1 BigDash display features

- New glass design for better information with bigger dotmatrix area
- Reduced weight improved reliability by COG technology
- A graphic display with 132x64 dots can be used to show any channel or to display warning messages (indicating low oil pressure, high water temperature, and low battery voltage)
- 64 segment rev-counter in graph style
- Extra warning light on the side of the dashboard
- 1 x CAN interface
- Adjustable brightness of LED's
- Full temperature range -20 to 85°C
- Temperature controlled contrast
- PVC housing
- Supplied with Loom KIT Dashboard 6/8 (=WL-KITDash6/8-000) for easy connection with KIT datalogger

4.5.1 KIT memory update: SY-KITMEM_update_08-000

KIT memory update package including:
1 x 2D memory update for LG-KIT08 to 8h recording time
1 x update software for upgrading the logger at customers site

5. Installation of the 2D Kit system software

5.1 First steps in the software

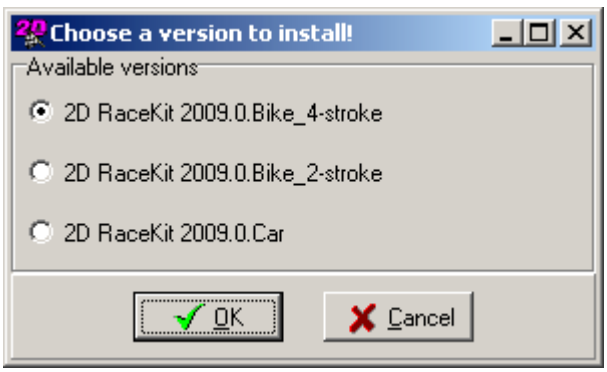
5.1.1 Installation of the software

Before starting the installation of the 2D Kit software please assure that you have administrator rights on this computer. This applies to Windows XP and Windows Vista. Otherwise the USB driver files cannot be installed correctly, since these must be installed with administrator rights !

1. Insert the 2D-CD.

   The CD starts automatically.

   If this is not the case, start the "AUTORUN.EXE" on the CD manually.
2. Select the button Install RaceKit9.x (on the lower panel)
3. Choose the software version for the vehicle you are working with (Bike 4-stroke/Bike 2-stroke or car)



4. A set-up wizard guides you through the installation.

   Follow the instructions and confirm your actions (in most cases with Apply). If necessary, also enter the setup directory.

All required files including demo data will be installed automatically. You will find these on the same drive that your operating system is installed on, at"*..\Racedata\Demodata*". I. e. if your operating system is installed on drive C:, then your your demo files will be stored at "*C:\Racedata\Demodata*".

5.1.2 How to install the 2D USB drivers

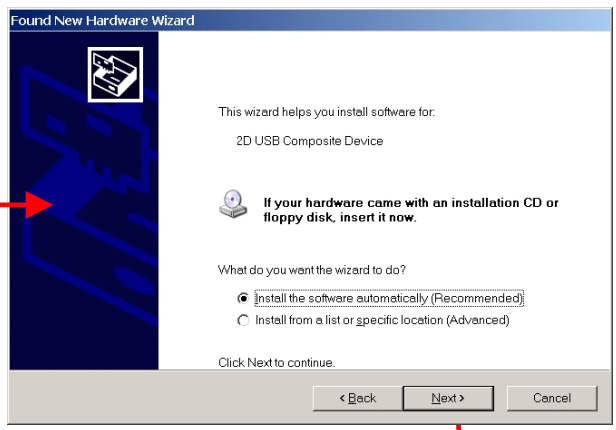
The process of the 2D USB driver installation depends on the operating system you are using and therefore differs accordingly. At present we support the following operating systems: Windows XP and Windows Vista .
Please note: The necessary USB driver files will be copied to your PC during the KIT-software installation (refer to chapter 5.1.1) Therefore the software installation has to be completed before installing the drivers!

5.1.2.1 USB driver installation for operating systems Windows XP and Windows Vista

Preparation:
After you connect the USB connector of the Kit logger (refer to chapter 3.3) with your PC the system detects the new hardware and you must confirm the dialogs as shown below to finalize the USB driver installation.

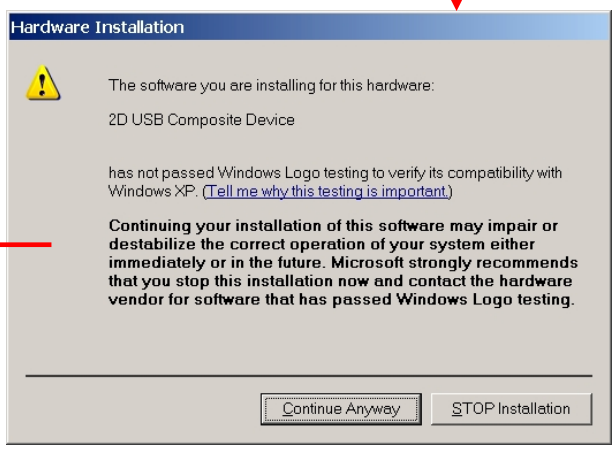
The “Found new Hardware Wizard” will guide you through the installation. The installation runs in two steps.
Step1: Installation of the "2D USB Composite Device"

Dialog 1: Confirm with button **<Next>**



Dialog 2: Confirm with button **<Next>**

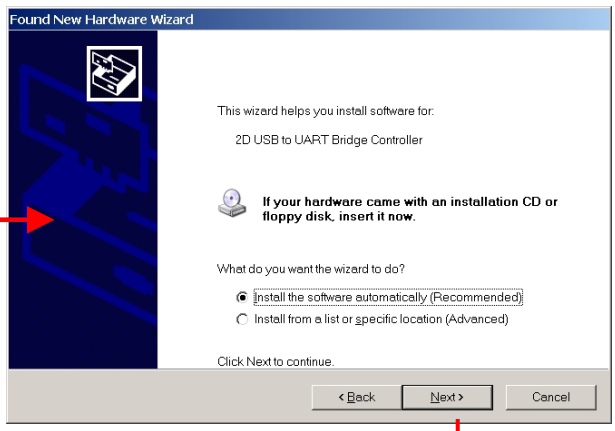
Dialog 4: Finalize with button **<Finish>**



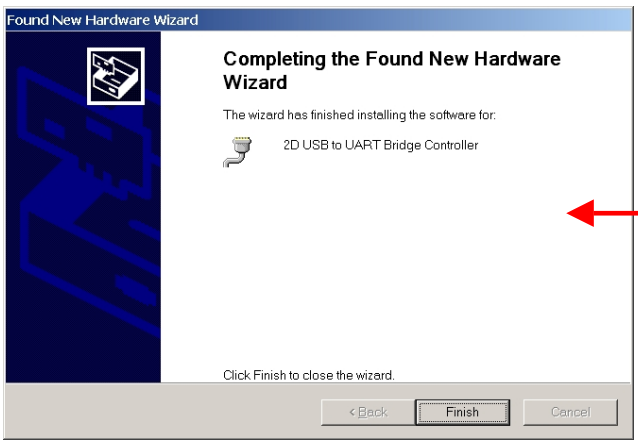
Dialog 3: Only for Windows XP !
Confirm always with button **<Continue Anyway>**

Step2: Installation of the "2D USB to UART Bridge Controller"

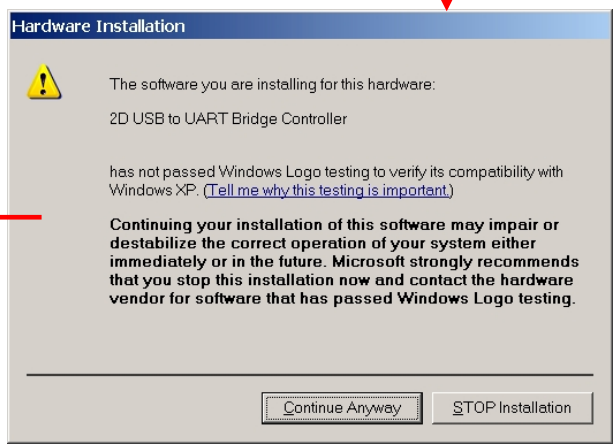
Dialog 1: Confirm with button **<Next>**



Dialog 2: Confirm with button **<Next>**



Dialog 4: Accomplish with button **<Finish>**



Dialog 3: Only for Windows XP !
Confirm always with button **<Continue Anyway>**

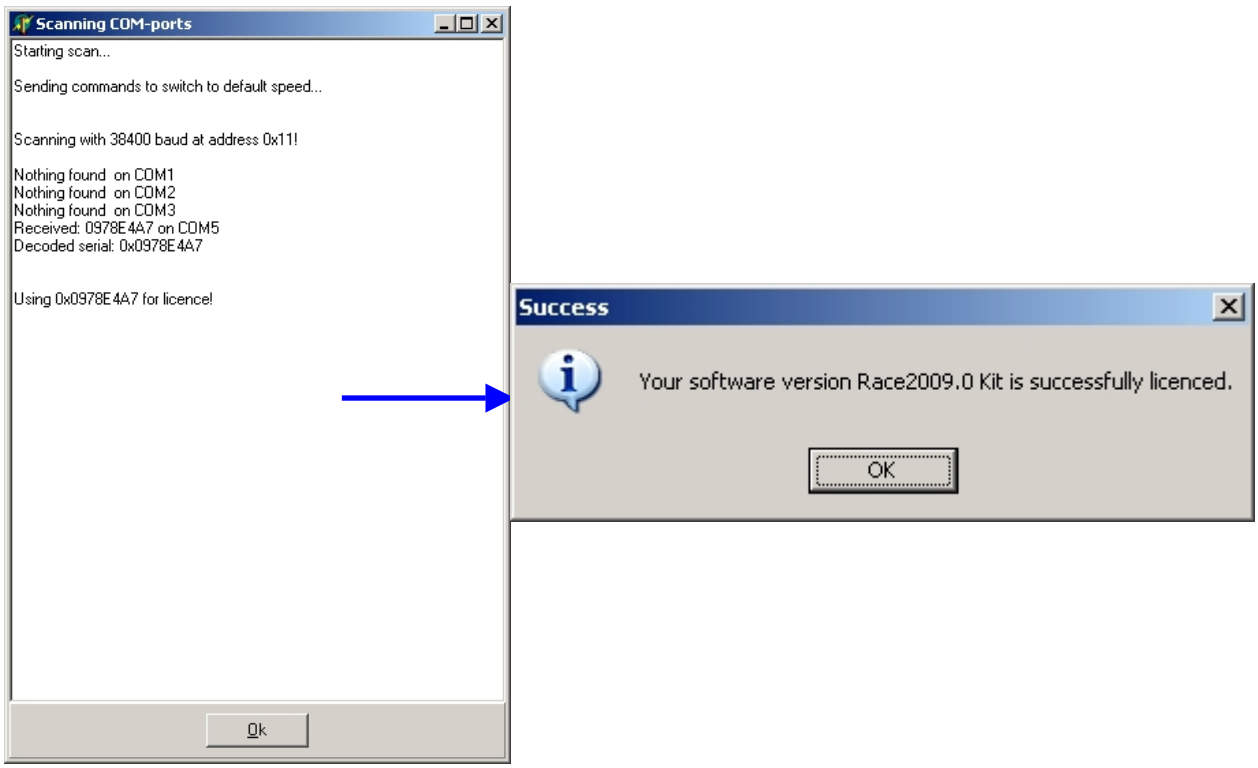
5.1.3 Licensing of the 2D Kit software

The licensing of the 2D-Kit software takes place automatically. Start the Front-end WinARace (icon at your desktop). Your Kit-logger must be online (means: voltage supply of the system must be ensured). Connect the USB cable with a free USB port at your PC. Afterwards connect the USB cable with the connector at the Kit logger.

ð Refer to chapter 3.3

The "2D USB checker software" (started with WinARace) scans all available COM ports for a connected Kit logger (left figure). Afterwards you have the chance to register the 2D Kit software.

ð Refer to chapter (registration)



USB checker: Scanning for 2D Kit hardware

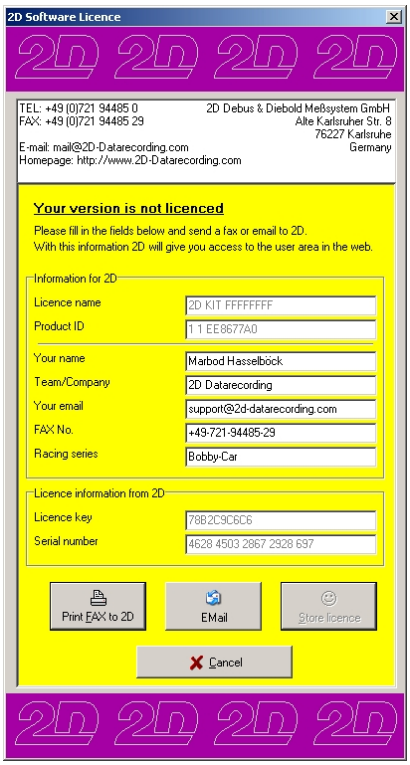
The program recognizes and stores the licensing data of the connected logger automatically and prompts about the process

5.1.4 Registration of the 2D Kit software

The Registration of the 2D kit software is voluntary !
In case you register the 2D Kit software you are justified to get updates and newsletter information for your Kit software.

ð Start the front-end WinARace (Icon at your desktop).

ð Via menu item <Registration> the registration window can be opened



To register the software fill in the following information:

- Your name
- Team / company
- Your email
- FAX No.
- Racing series

Use the button <Email> to send us an email or the button <Print Fax to 2D> to get a fax template with all relevant information.

Please make sure that your email address is entered correctly !

5.1.5 General information on the data structure

WinARace, the front-end program started on the desktop, shows the following three levels:

a.) Event-/ measurement administration

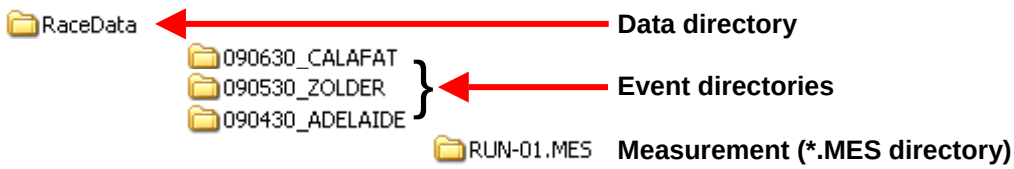
b.) Logger communication/
Measurement naming (preparation)

c.) Measurement selection & analysis

- The program WinIt creates one sub-directories entry for each measurement in the current Event directory during the download. All measurement files have got the extension *.MES

- The name given to the measurement is a combination of the current logger name
=> Refer to chapter "chapter 7.1 How to prepare the measurement"

- The directory structure of your computer with your measured data should look like this example:



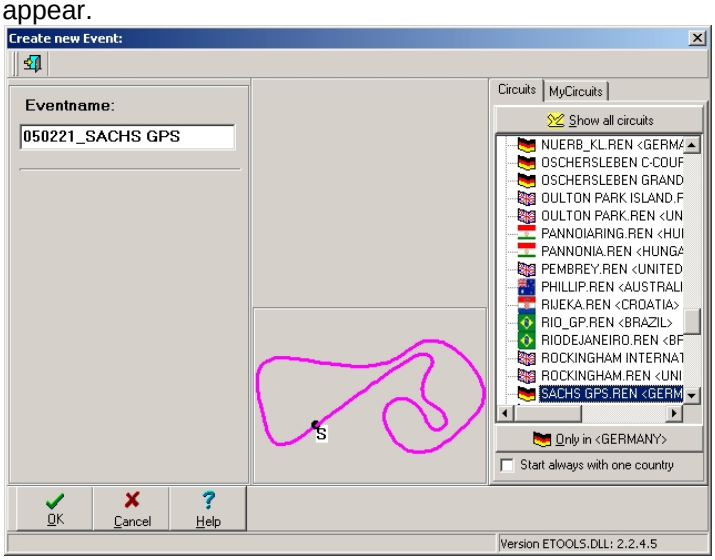
The first and most important step **before** downloading the first measurement is to create a "Event"- Always start with this step, so that you always know where your data are saved !

5.1.6 Create a new Event directory

Switch to the "Event-module" by clicking on the button **Change Event**. The current directory is shown on the left hand side. It defines where data will be saved or from where measurements are read. **Create Event** will set up a new directory with the option to select the track used at that event.

This step should be always the first before staring a “race-weekend”
Always start with this step, so that you always know where your data are saved !

To create a new Event directory use the button **Create Event** in the front-end tool WinARace. The following window will appear.



- Select a circuit from the list on the right hand side. The name of the selected track combined with the current date will become the name of the Event.
  For example 090630_CALAFAT. This Event was produced at 30.06.2009 in Calafat)

- Confirm your selection with the button OK.

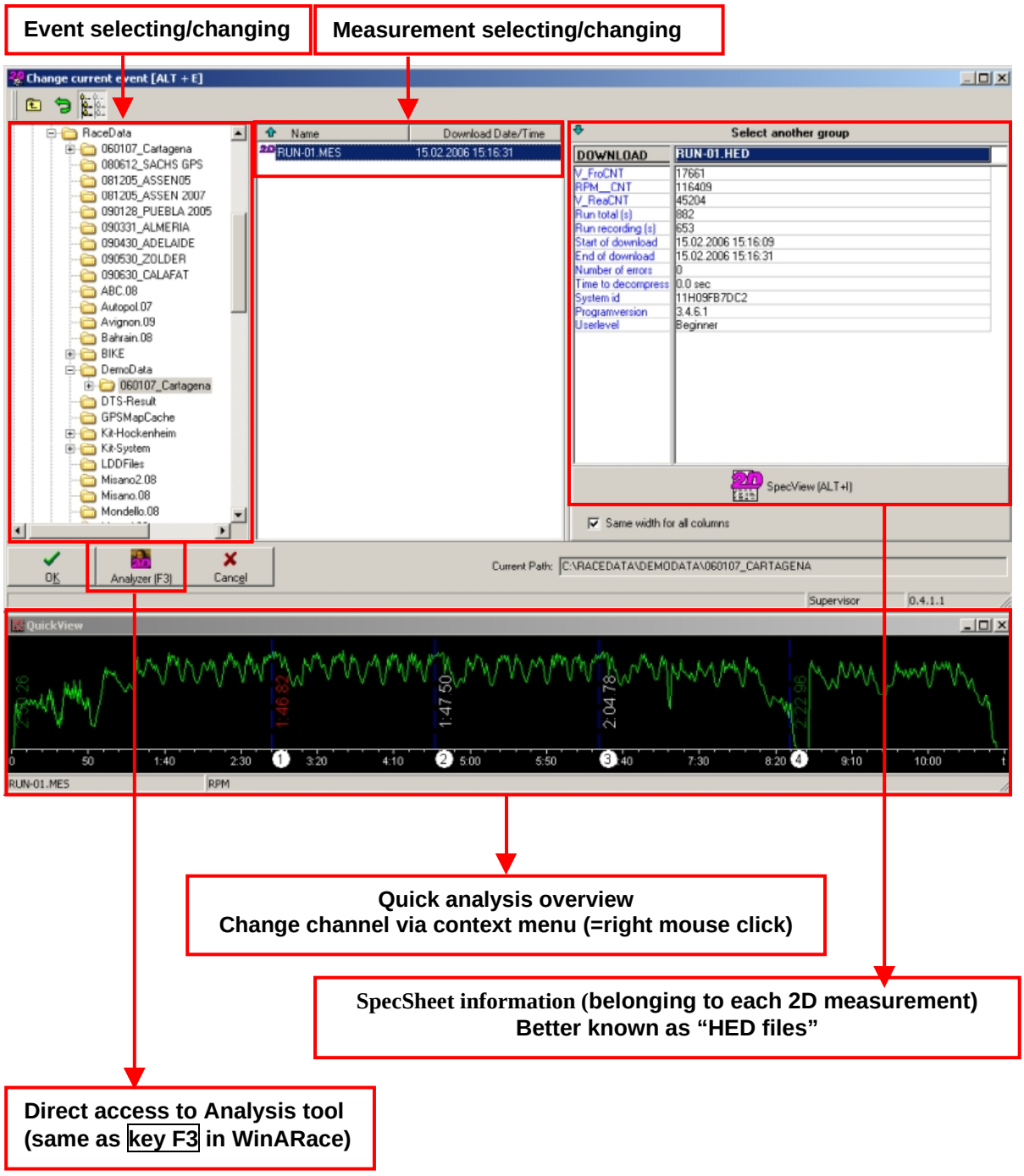
There are two different circuit sub-directories:

1. The sub-directory **“\Circuits“**: Includes a list of pre-defined tracks delivered with the 2D Race software.
2. The sub-directory **"\MyCircuits"**: Contains track maps which have been created by the user via the Analysis tool.

If a certain track should not be listed select the entry “Base.ren”.

5.1.7 Change Event directory

You have the possibility to change the current Event by selecting the button Change Event
refer to chapter 1.1.5
The figure below shows you the start-window of the “Event-module”

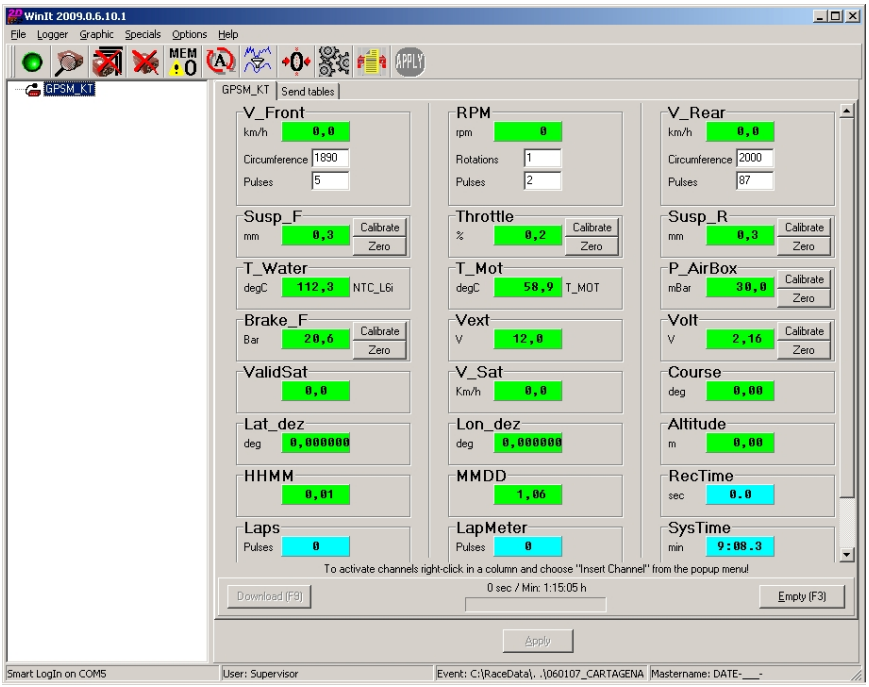


6. Check of communication

6.1 Communication with the Kit logger - the program WinIt

In this dialogue box the Logger and computer are linked to each other. Communication with the Kit-logger is established to download the measured data and set up the logger.

- Connect the USB connector of the kit logger with the computer.
- Start the communication program WinIt (click on Logger or hit the hot key F2)
- The software recognizes an attached Kit system-logger automatically and comes up with the following window.



This window allows to modify the circumference of rear and front wheel and also the number of pulses for one wheel turn. Be aware that changing the gearing (sprocket or plate) will change the number of pulses at the rear. Additionally you can calibrate the rear suspension, and the throttle position sensor. The brake pressure sensor and the front suspension sensor can only be set to zero. Other sensors like water temperature or motor temperature, do not have to be calibrated. A table function will be used for this purpose.

7. How to download data

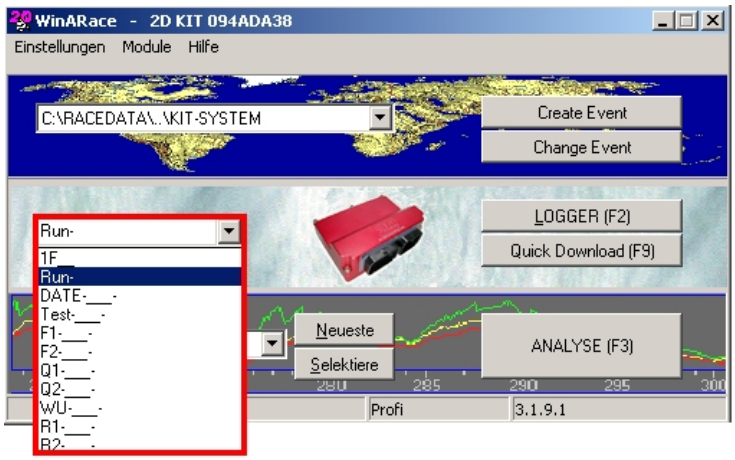
7.1 How to prepare the measurement

Before each run (or download) you should check the name that will be given to the measurement.
Take care choosing the name to assure which measurement relates to which driver and outing. It is a lot easier for you then to work with the measurements later.

The measurement name is a combination of the current mastername (type of test) and the logger name. The mastername is specified from WinARace (Icon at your desktop) and the actual logger name you specified in the communication tool WinIt

1. Switch to the *WinARace* start window.

2. On the left side of the Logger-panel select an abbreviation from the drop-down list. This is the mastername or type of test.



	Possible mastername	
	RUN-	(Initial value, first mastername after first installation)
	DATE-___-	(current date information, see detailed information)
	Test-___-	(Test)
	F1-___-	(Free Practice)
	F2-___-	(Free Practice)
	Q1-___-	(Qualifying)
	Q2-___-	(Qualifying)
	WU-___-	(WarmUp)
	R1-___-	(Race)
	R2-___-	(Race)

Devices, which record data have a name that might be either the starting number or the initials of the driver. If a logger is connected for the first time with the communication tool, it prompts the user to enter a valid logger name.

Define the name of the logger accordingly to your requirements.

We suggest the use of starting numbers of your vehicles.

In a new measurement the underscores of the masternames are replaced by the name of the device and a correlative number is added.

Device name	Replacement (underscores)	Possible values
Starting numbers:	NNc	N possible values 0..9
		c possible values a..f
Driver intitials:	BBc	B possible values A..Z
		c possible values a..f

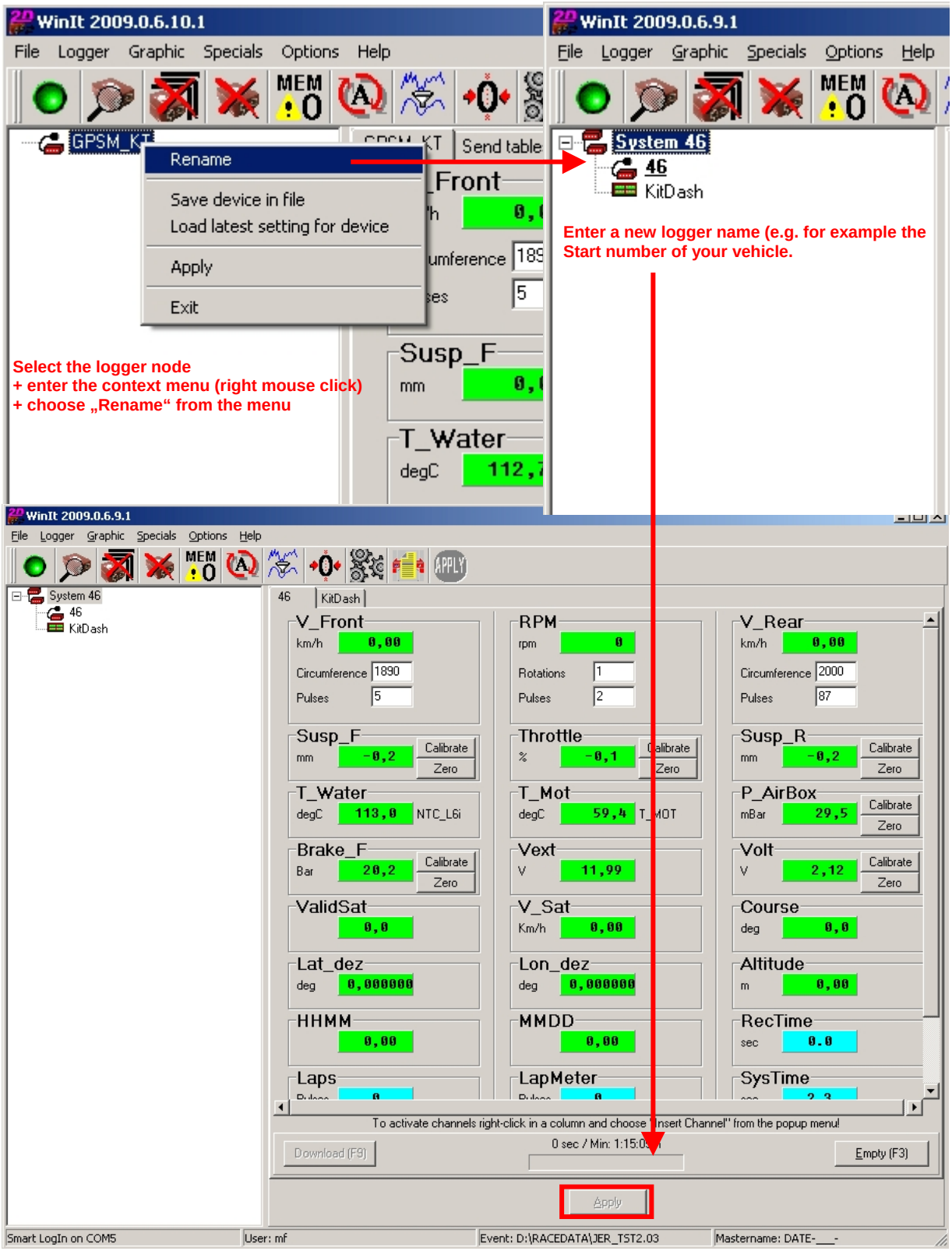
"DATE-___-" is a special mastername. The software replaces the part "Date" of the mastername by the month and day on which the measurement was downloaded. The first two characters are replaced by the month and the next two by the day.

Examples:

- If the master name "Test-___-" is selected and the logger has the name “22a” (Starting number 22 and “a“ for the first vehicle of two drivers with the same number), the first measurement name will be "Test-22a-01.MES".
- The mastername "DATE-___-" is selected and the name of the logger is “MH”. Today it is the 14.04. The resulting measurement name for the first download is "0414-MH-01.MES".
- After installation the default master name "RUN-" is selected. The first download would receive thus the measurement name "Run-01.MES", the second accordingly "Run-02.MES" and so on.

7.2 How to change the logger name ?

You can change the logger name by direct selection + input or via the context menu (using right mouse click on selected logger node). The name may not exceed 8 characters. These cannot be stored into the logger setting and are cut off accordingly !



Apply all changes with the button <Apply>

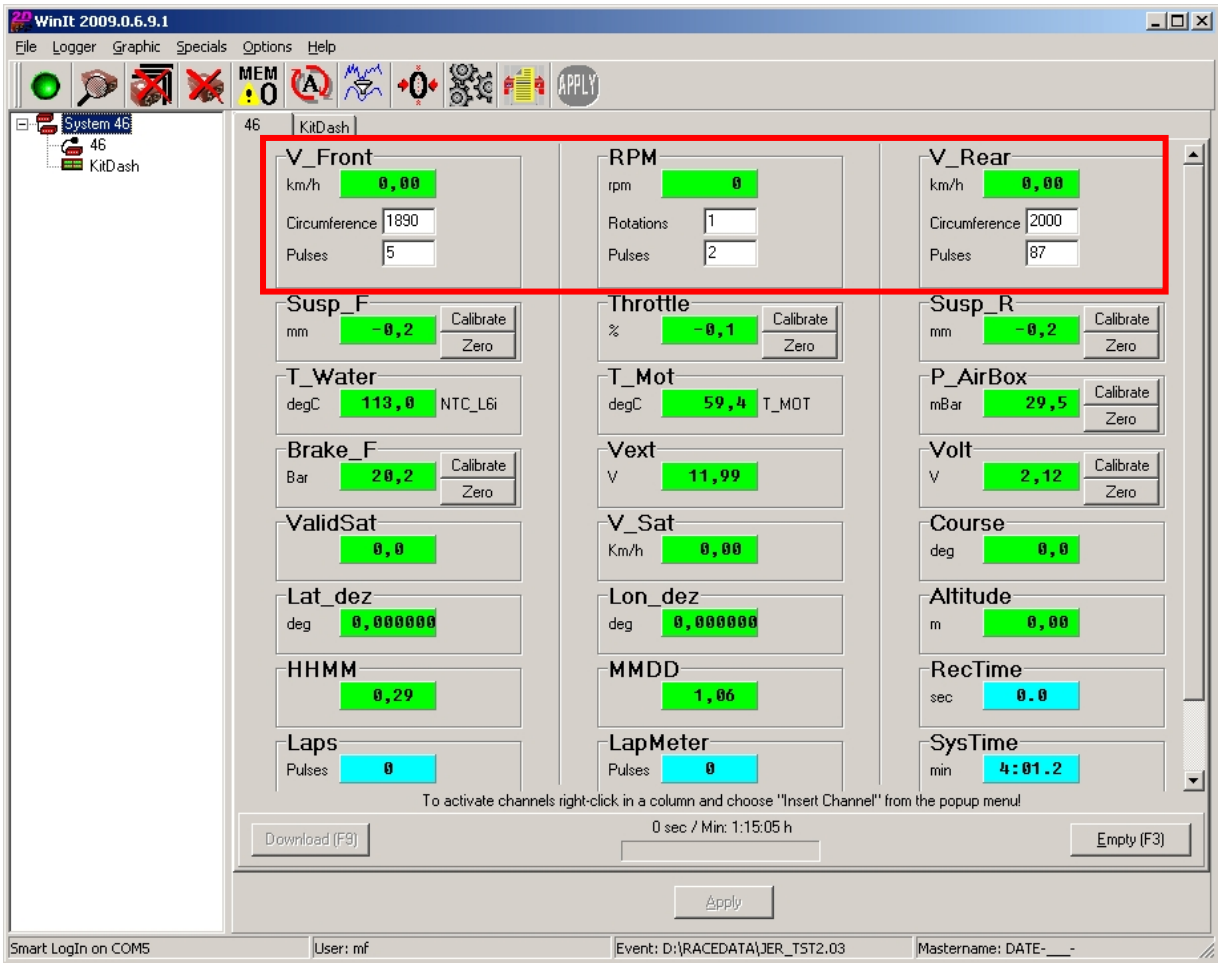
7.2.1 Why to change the logger name ?

As described in a previous chapter the name of a 2D measurement is the combination of current mastername **and** current logger name. In case of using an “underscore character” in the mastername (“_”), this character will be replaced by the corresponding character from the logger name (beginning from the end)

ð You will get a detailed explanation in chapter “How to prepare the measurement ?” and some meaningful examples regarding naming your measurements.

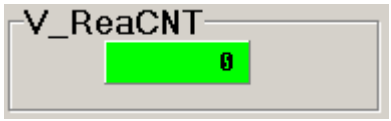
7.3 Sensor calibration - Enter parameter for the speed channel

For V_Front (front speed) and V_Rear (rear speed) wheel circumference and pulses per wheel revolution have to be entered in the start window of the communication tool WinIt (refer to figure below).



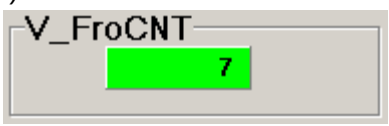
7.3.1 Enter the two parameters "Circumference" and "Pulses" for the speed sensors

1. Park your bike so that the rear wheel can rotate.
2. Switch on the logger (ignition on).
3. Start the program WinIt by pressing the button Logger or hit F2 (from WinARace)
4. Place a mark on the tire or rim.
5. Turn the wheel for one complete rotation. The software will display the number of pulses of the sensor in an own count channel ("V_RearCNT" - refer to figure below)



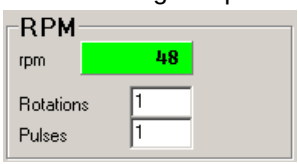
6. To ensure a good result, do several rotations and divide the number of counted pulses by the number of rotations.
7. Finally enter the number of pulses for one complete rotation in the edit field V_Rear, Pulses.
8. Enter the circumference of your motorcycle wheels in the edit field Circumference (rear and front are different !).
9. Confirm your inputs with the button Apply

For the front wheel follow the same procedure. Read the number of pulses from the count channel "V_FroCNT". (Step 5)



7.3.2 Enter the two parameters "Rotations" and "Pulses" for the RPM sensor

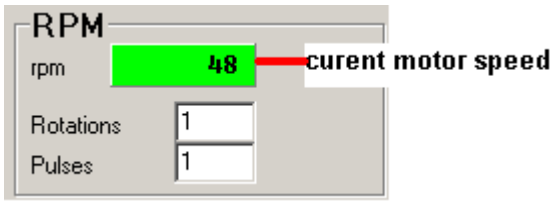
For the RPM sensor you have to enter the following two parameters: Rotations and Pulses.



There are 3 common ratios. Since the RPM signal is used directly from the motorcycle ECU this ratio depends on the used motorcycle.

Option 1	Option 2	Option 3
Rotations = 1	Rotations = 2	Rotations = 1
Pulses = 1	Pulses = 1	Pulses = 2

If you do not know this ratio for your motorcycle enter 1 rotation and 1 pulse into the RPM fields (refer to figure above, alternative 1). Start the engine while connected to WinIt. You will see current motor revs in the field “rpm”.



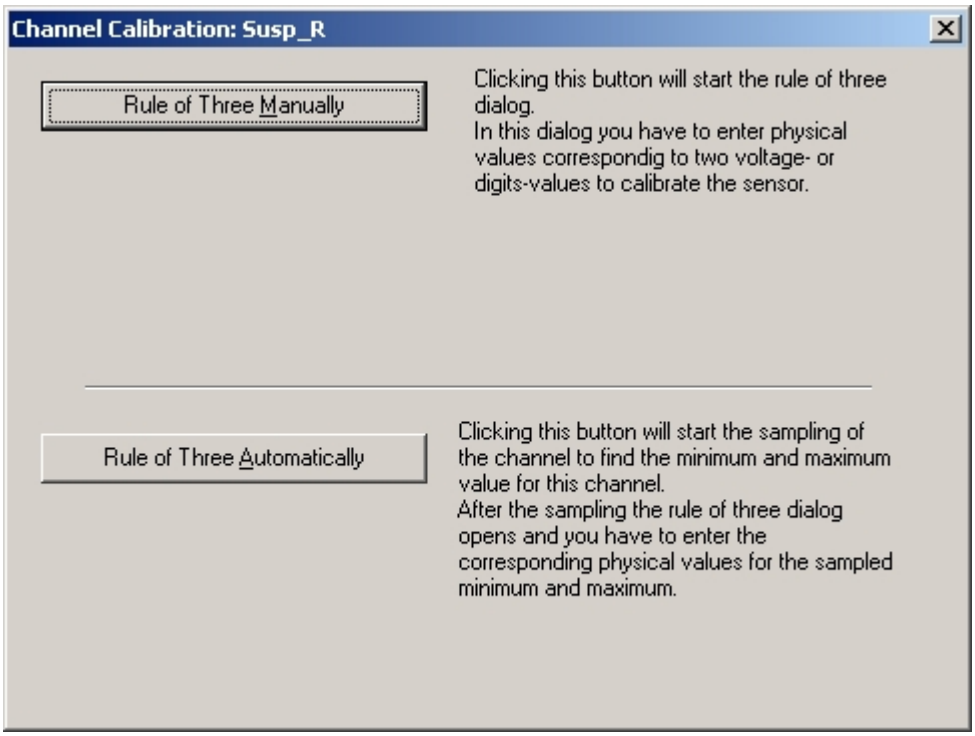
If the value is about the double of the real one enter 2 pulses (Option 3). If it is the half of the expected enter 2 rotations (Option 2). *Instruments usually have a tolerance !*

7.3.3 How to calibrate sensors ?

WinIt offers two ways to calibrate sensors:
You can enter the lower and upper physical value of the sensor manually. Therefore an appropriate data sheet of the sensor is necessary as you need to know the possible physical range in reference to the voltage signal output. You have to enter two voltage- or digit- values to calibrate the sensor.
Therefore use the button : Rule of Three Manually

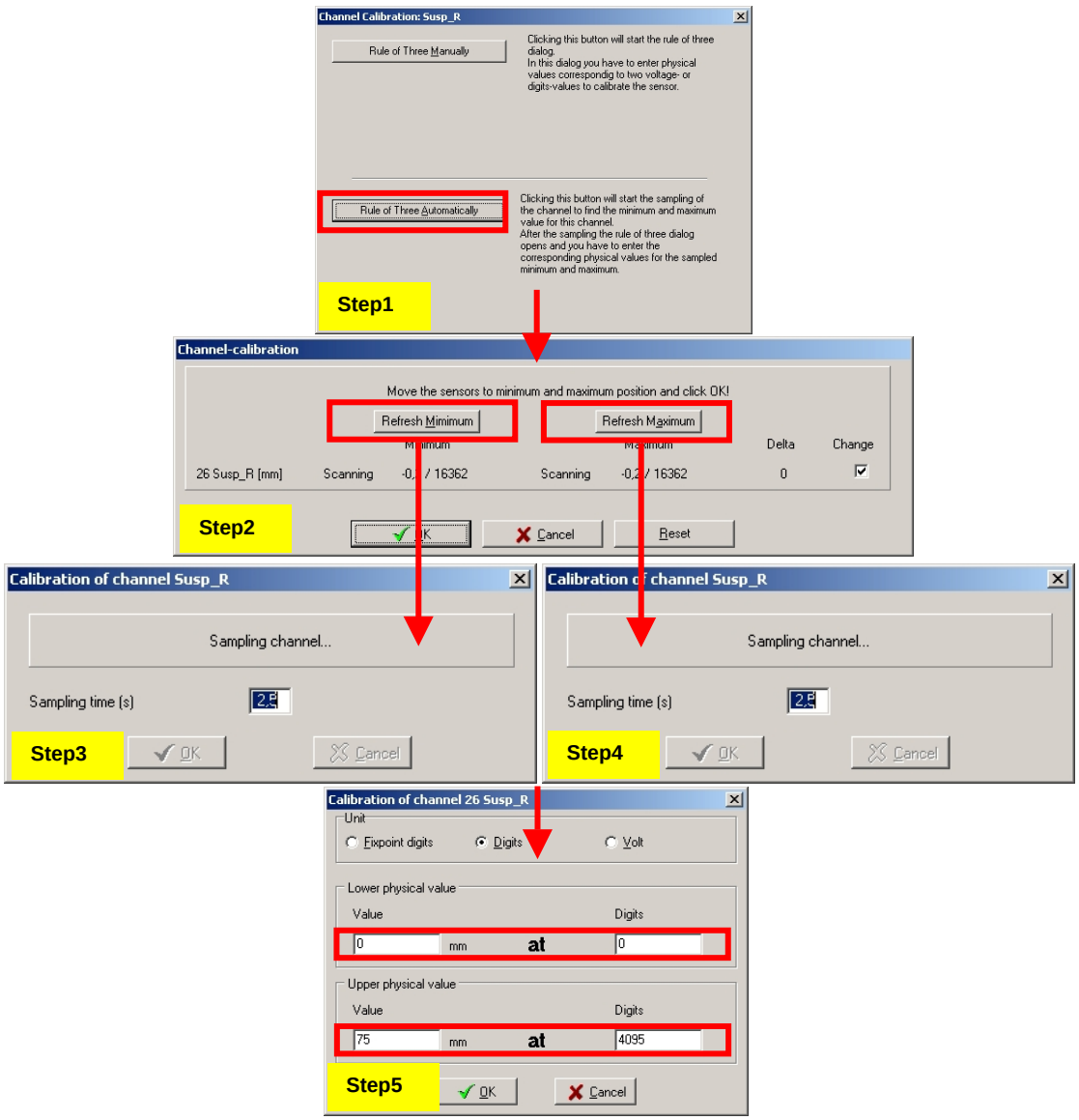
The second way is using the automatic determination of the two mentioned limits. The function will start the sampling of the channel to find the minimum and maximum value for this channel. After the sampling the rule of three dialog opens and you have to enter the corresponding physical values for the sampled minimum and maximum.
Therfore use the Button: Rule of Three Automatically

We recommend to use automatic calibration, because this represents the easiest and fastest possibility to calibrate a sensor.



7.3.3.1 Calibration of the Rear suspension sensor (channel "Susp_R")

1. Switch on the logger (ignition on).
2. Start the program WinIt by pressing the button LOGGER or hit F2 (from WinARace)
3. Use the button Calibrate (in the WinIt start window) of the sensor you would like to calibrate.
4. Click the button Rule of Three Automatically =>Step1
5. Adjust the sensor in MINIMUM position and hit Refresh Minimum => Step2 | Step3
6. Adjust the sensor in MAXIMUM position and hit Refresh Maximum => Step2 | Step4
7. Use the Button OK to enter the "Rule of three dialog" => Step2
8. In the example shown below a 75mm suspension sensor was used. Accordingly you should enter 0mm for the *"lower physical value"* and 75mm for the *"upper physical value*" => Step5



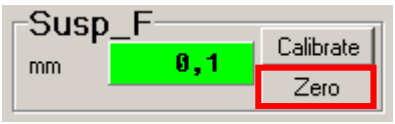
Use this procedure only if you mount the rear suspension sensor exactly in the same way as described in chapter 4.3.1.2 ("Mounting the rear suspension sensor"). If you mount the sensor at another position the actual spring travel must be measured before entering the values.

7.3.3.2 Calibration of the Throttle position sensor (channel "Throttle")

The procedure of throttle calibration is the same as described in the chapter before.
The input of the physical values in the rule of three dialogue (step 5) must take place accordingly in percent (0% for the lower physical value and 100% for the upper physical value)

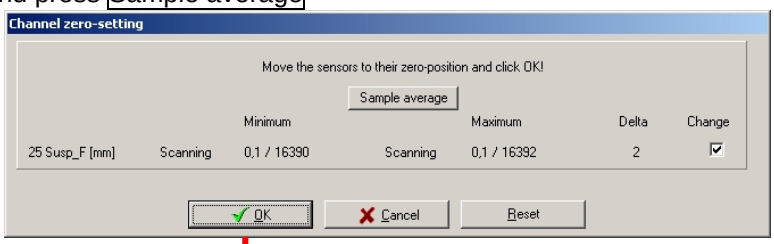
7.3.4 How to set a channel into Zero position ?

Heat or other factors that change the geometry of suspensions can cause some of the sensors to drift or to have a different zero position. In these cases it is not necessary to calibrate the sensors again. Instead you can use the function **"Zero"**. According to the preceding chapter you can choose between *"Set Zero Manually "* and an *"Automatic Zero"function*. You can start both functions via the "Zero" button.



<Set Zero Automatically> function:

Clicking this button will start the sampling of the channel to find the zero position. Bring the sensor into it's zero position and press Sample average



<Manually> function

Clicking this button will take the current value of the channel to set the value to zero.

It is possible to set all both suspension and throttle sensor zero in one step.

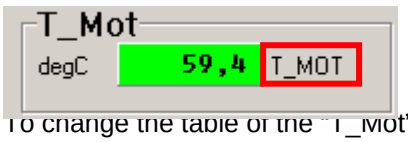
With this button (from the WinIt toolbar) you can send the auto-zero command to the logger.

7.4 Using and checking the table function

Some sensors, like water or oil temperature sensors, can be calibrated manually, because of the not linear output signal of the sensor. To obtain fitting measurement results you have to use the table function of the KIT software.

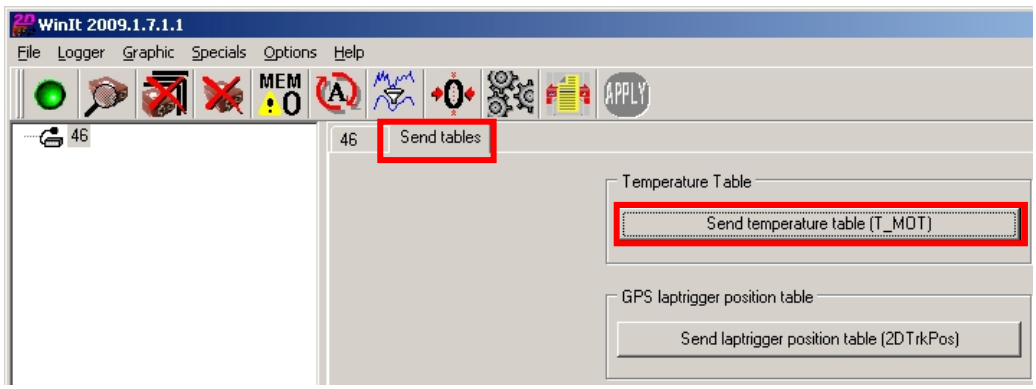
7.4.1 Change the table for the Motor temperature channel “T_Mot“

As you can seen (in the starting window) of the KIT software the current table name is identical to the channel name (=”T_MOT”).
It might be clear that different motorcycles (like Kawasaki, Suzuki, Yamaha and so on) needs different temperature table to calibrate the channel “T_Mot”.

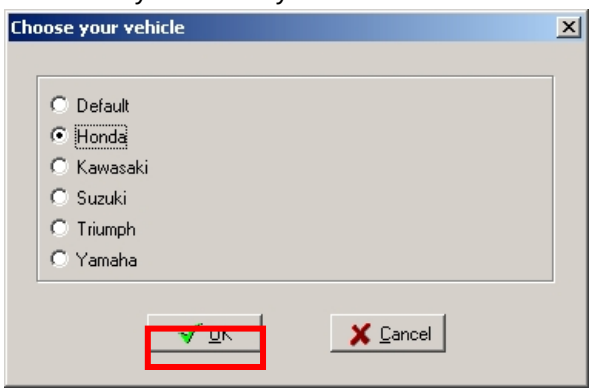


To change the table of the “T_Mot” channel, carry out the following steps:

1. Start WinIt in Setting mode (Press button Logger (F2) from WinARace or hit hot key <F2>)
2. Select rider “Send tables”



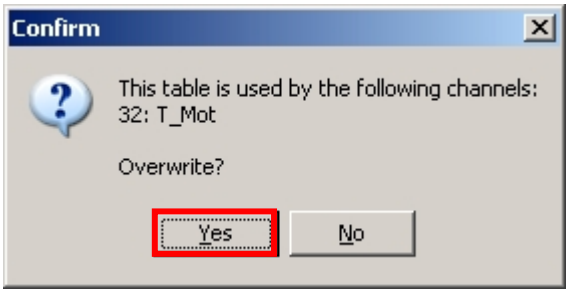
3. Choose Button Send temperature table (T_Mot)
4. Select your motorcycle from list and confirm with button Ok



If your motorcycle is not in the list please contact the 2D support or one of the distributors.

5. The last step is the users confirmation.

A corresponding dialogue requests the user to confirm the file overwrite. Confirm this dialogue with Yes to update your KIT system with the selected (new) table.



7.4.2 Change the table for GPS laptrigger positions

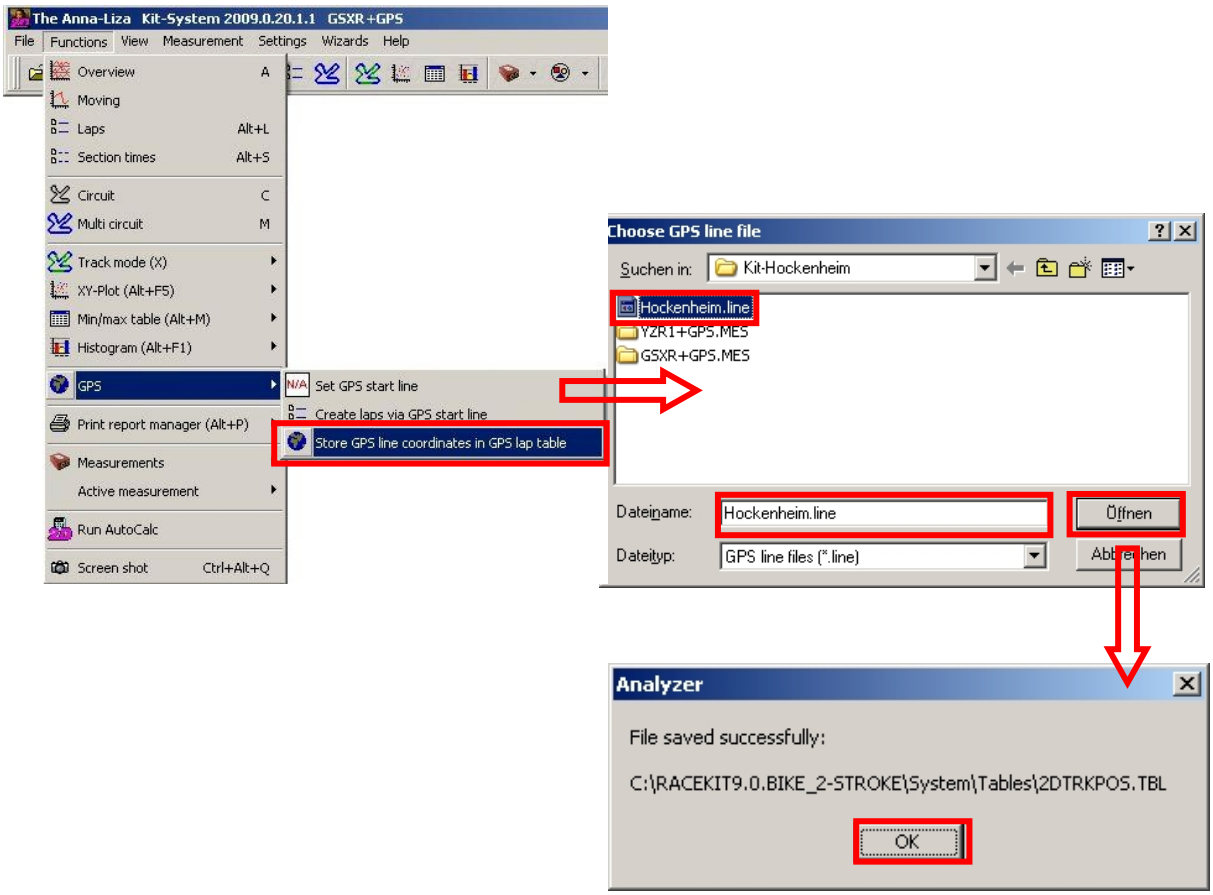
According to the function in the previous chapter it is possible to update the tables for the GPS laptrigger (positions + names). There are in principle two possibilities to do this:

a.) Self defined GPS line coordinates (via the analysis tool “Analyzer”)

b.) Internet update from 2D Website

7.4.2.1 Self defined GPS line coordinates

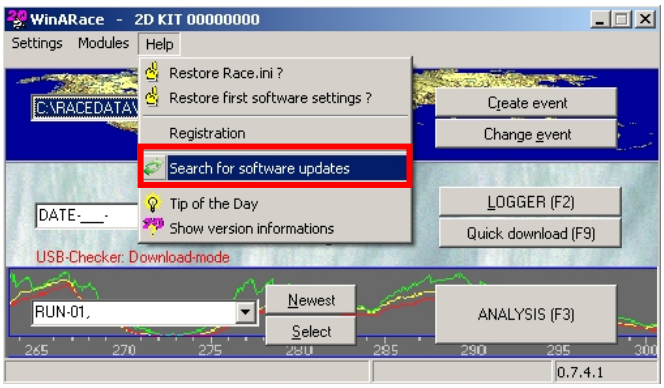
A precondition for this function is the usage of GPS measuring data. In all other cases the access to this function will be denied by the “Analyzer”. (displayed with a corresponding N/A icon beside the menu item)



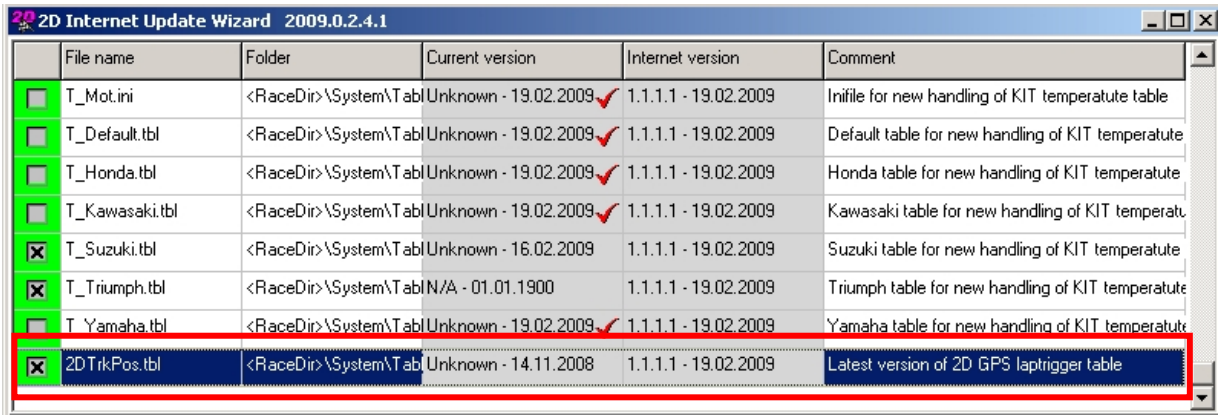
7.4.2.2 Internet Update from 2D Website

1. Start WinARace

2. Select menu item “Search for software updates”



3. The “2D Internet Update Wizard” offers you a list of possible files for update. Check table “ 2dtrkpos.tbl” and “ 2dtrknme.tbl” from list.

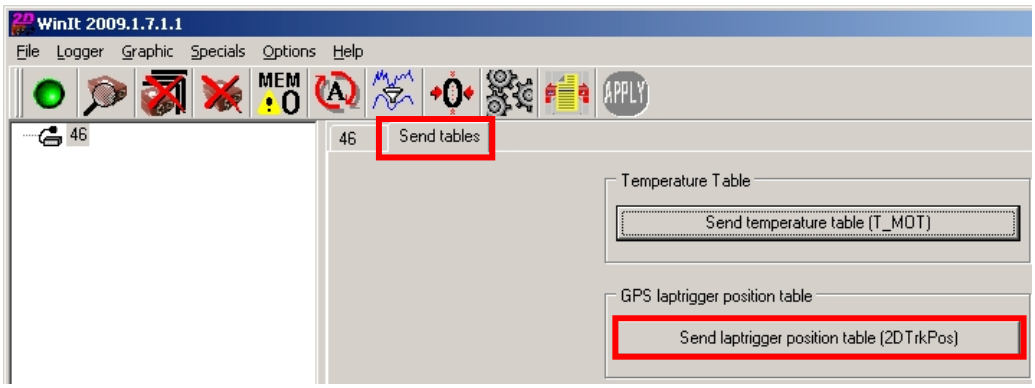


4. Confirm your selection with the button Update

7.4.3 Update the “track positions” table into the Kit-Logger

After downloaded the table named as “ 2dtrkpos.tbl” (via the 2D Internet update Wizard- refer the previous chapter) it is necessary to store this table into the Kit-logger.

- Start WinIt in Setting mode (Press button Logger (F2) from WinARace or hit hot key <F2>)
- Select rider “Send tables” and choose button Send laptrigger position table (2dtrkpos.tbl)



After this step your GPS laptriggers are up to date.

7.5 Starting the download

7.5.1 What to keep in mind before start with the download ?

7.5.1.2 When does the system start the data recording ?

The data recording begins only if the rpm sensor was correctly connected (it means that the rpm sensor supplies a signal) and the RPM signal is higher than 3000 [rpm].

7.5.1.3 When does the system stop the data recording ?

The recordings stops immediately if power supply is switched off. in most vehicles if ignition is switched off.

7.5.1.4 What should be avoided while WinIt communicates with a logging device

Never disconnect the USB cable while WinIt communicates with the Kit logger (. That can cause a crash of the USB driver. In this case a communication would be no longer possible via the current USB port. Then a restart of your computer will be necessary.
Therefore always wait for the completion of a download. Close the communication software WinIt (via <ALT+ F4> or <ALT+X>) and disconnect the USB communication cable afterwards !

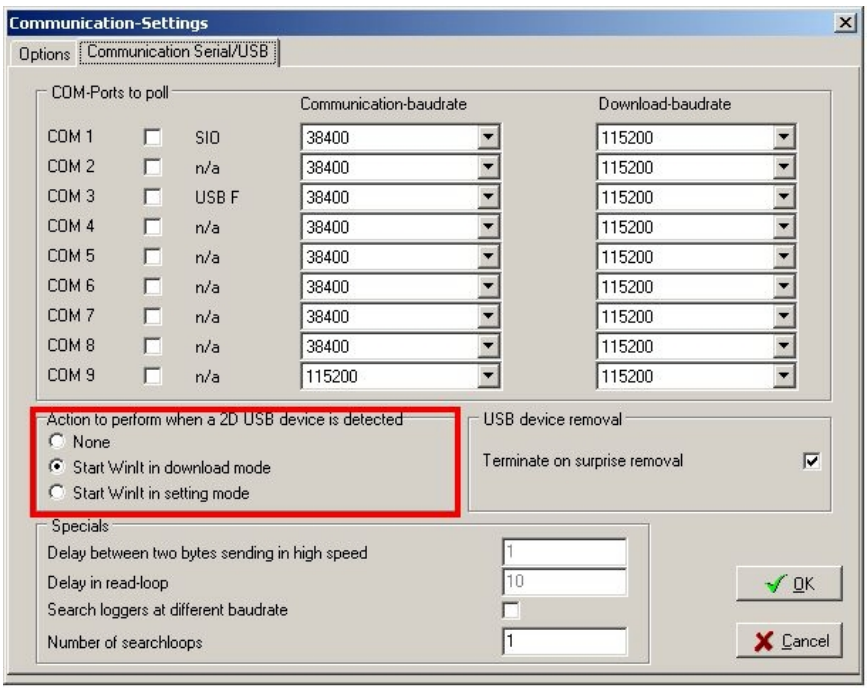
7.5.2 How to start a download ?

There are two ways to start a download. “Download” means to transfer the measurement data from a connected Kit Logger into the PC.

- The first way is to start the download operation manually.
  Start the front-end tool WinARace, connect the USB cable to the logger.
  Select the Button **Quick download (F9)** to start the download operation

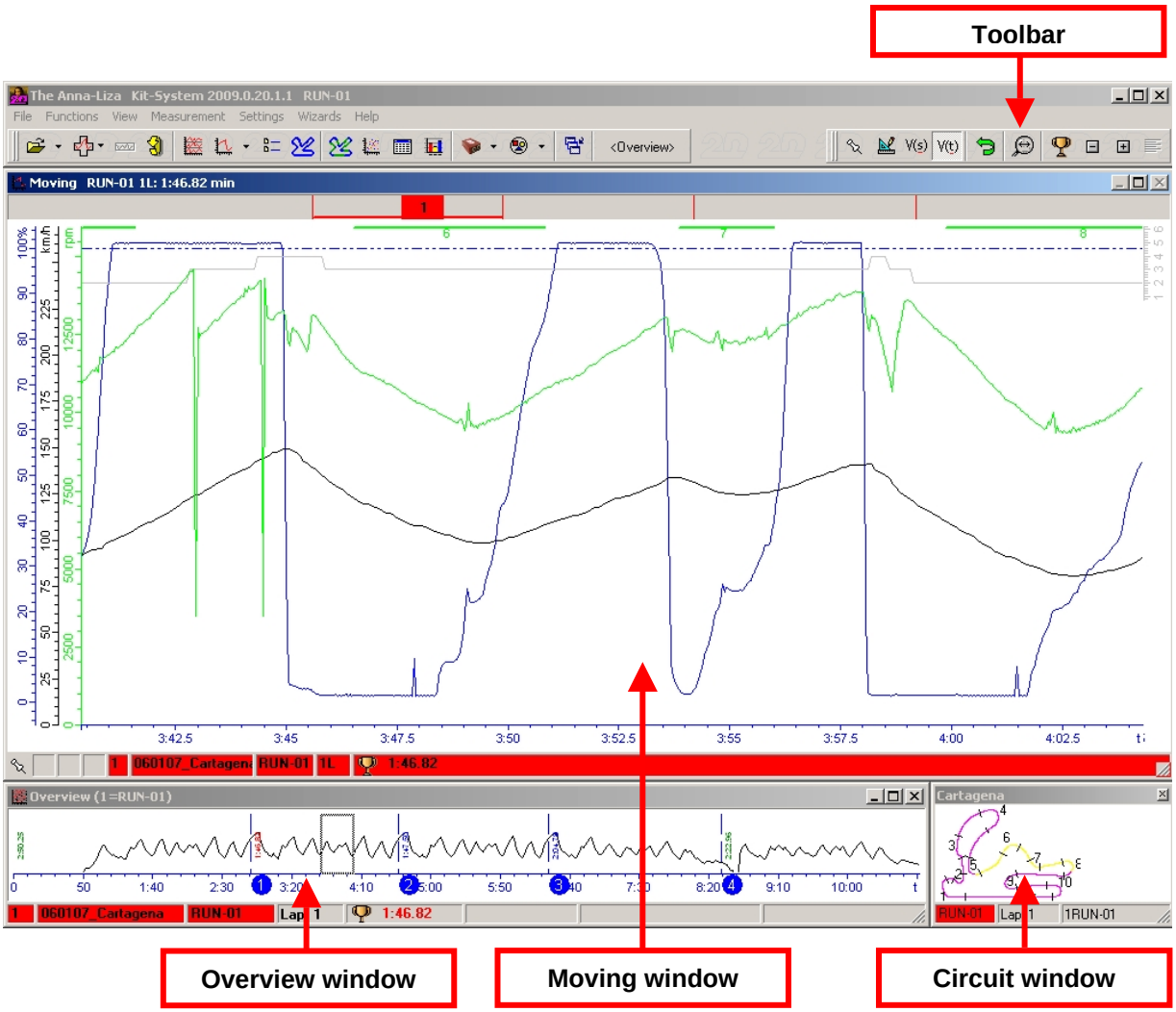
- You can also perform the download automatically every time a 2D USB device is detected. This option can be set in WinIt. This is the standard pre-setting after the first software installation.

To start the download always automatically do not uncheck this option !



8. Analysis of the measuring data

8.1 The Analyzer desktop appearance



You can start all functions from the main menu, context menus (right mouse click). The toolbar is divided into the following functions (from left to right)

- **File functions** are functions to load and exchange 2D measurement files
- **Basic analysis** functions include Moving and Overview windows and lap times
- **Advanced analysis** functions include Track mode, XY-Plot and Min/max table
- **Visibility of channels** in the Moving window can be switched separately or by groups or via areas
- **Another function** accessible via toolbar is the selection of a screen template.
- The **measurement functions** include commands to display the measurement(s) in different ways

8.2 The individual analysis windows and their meaning

Overview window

The Overview window is located at the bottom of the screen. Selected channel traces and lap time information are shown.

The rectangle in the Overview window marks the position of the selection that can be seen in the Moving window. You can move the rectangle by pressing the left mouse button and moving the mouse. If you press the <Ctrl> key simultaneously you can change the size of the rectangle.

Moving window

The Moving window is the main analysing window where the channel traces of the selected part of the measurement is shown. The section of the measurement can be moved by pressing the left mouse button and moving the mouse.

With a double click on the Moving window you change into the Measuring mode (see measuring mode).
Mouse pressed + move up/down => Zoom

Circuit window

The Circuit window is the small window in the right bottom corner of your screen. The window shows the track map with the current section of the active measurement highlighted.

Multi circuit window

GPS driving line of all loaded measurements are shown in this window. In Measuring mode the position(s) of the mouse cross inside Moving window is drawn here.
It makes especially sense showing several measurements with GPS recorded to highlight different driving lines.

Measuring mode

You can change into the Measuring mode with a double click in the Moving window. A measuring cross and another window (Measuring values) appear.

In the value window the physical values of the traces are shown, dependent on the current position of the mouse.

8.3 Common functions of the 2D Analyzer

As previously mentioned (refer to chapter 5.1.4) it is possible to register the Kit-software. An advantage is that you are entitled to receive additional analysis settings on request. Take a look on the KIT System website (www.2d-kit-system.com). There you will find a table with standard settings (=unregistered KIT software) and additional analysis settings (=registered KIT software)

ð refer to chapter “Registration of the 2D Kit software”

Please contact one of the KIT system distributors or the Kit-System support if you need other settings. In order to be able to get other Settings you must be a registered KIT user. Refer to chapter “Registration of the KIT software”

Appendix: Channels overview

SY-KITBike_08-000	Comment	
GPS		
V_Sat	GPS Speed	
ValidSat	Valid Sat	
HHMM	Hour/Minutes	
Course	Course	
Lat_dez	Latitude (decimal)	
Lon_dez	Longitude (decimal)	
Altitude	Altitude	
MMDD	Month/Day	
SSHH	Seconds/Hour	
A_Lat	Acceleration (latitudinal)	
A_Lon	Acceleration (longitudinal)	
Banking	Banking	
YawRate	YawRate	
SpAccu		
LapGPS	GPS laptrigger	
Digital channels		
V_Front	Speed (Front)	
RPM	RPM	
V_Rear	Speed (Rear)	
Analog channels		
ACC_X	acceleration (x-direction)	Internal signals
ACC_Y	acceleration (y-direction)	
ACC_Z	acceleration (z-direction)	
Temp		
LapAdc	IR laptrigger	External signals
Vext	Supply voltage	
Susp_F	Suspension (Front)	
Susp_R	Suspension (Rear)	
Volt	Analog input (0-5V | 20V protected)	
P_AirBox	Air box pressure	
T_Water	Water temperature	
Throttle	Throttle position	
Brake_F	Brake pressure	
T_Mot	Motor (oil) temperature	
CAN-IN channels | CAN_2D		
A/F#1	CAN_2D (A/F add-on kit 1st channel)	
A/F#2	CAN_2D (A/F add-on kit 2nd channel)	
PMAX	Pseudo combustion pressure	
TK_EX1	Detonation temperature	
DETO	Detonation [%]	
CAN-IN channels | CA N_EXT	32 x free customer usable CAN channels	
Event		
LAPTIME	Laptime	
Time		
SysTime	System Time	
RecTime	Recording Time	
Count		
LapMeter	Lap meter	
Laps	Driven laps	
CNT_Vfro	Count channel Speed (front)	
CNT_RPM	Count channel RPM	
CNT_Vrea	Count channel Speed (rear)	
TRIGGER	Trigger	

SY-KITTrackDay_08-000	Comment	
GPS		
V_Sat	GPS Speed	
ValidSat	Valid Sat	
HHMM	Hour/Minutes	
Course	Course	
Lat_dez	Latitude (decimal)	
Lon_dez	Longitude (decimal)	
Altitude	Altitude	
MMDD	Month/Day	
SSHH	Seconds/Hour	
A_Lat	Acceleration (latitudinal)	
A_Lon	Acceleration (longitudinal)	
Banking	Banking	
YawRate	YawRate	
SpAccu		
LapGPS	GPS laptrigger	
Digital channels		
V_Front	Speed (Front)	
RPM	RPM	
V_Rear	Speed (Rear)	
Analog channels		
ACC_X	N/A (optional customer request)	Internal signals
ACC_Y	N/A (optional customer request)	
ACC_Z	N/A (optional customer request)	
Temp		
LapAdc	IR laptrigger	External signals
Vext	Supply voltage	
Susp_F	Suspension (Front)	
Susp_R	Suspension (Rear)	
Volt	Analog input (0-5V | 20V protected)	
P_AirBox	Air box pressure	
T_Water	Water temperature	
Throttle	Throttle position	
Brake_F	Brake pressure	
T_Mot	Motor (oil) temperature	
CAN-IN channels | CAN_2D		
A/F#1	N/A	
A/F#2	N/A	
PMAX	N/A	
TK_EX1	N/A	
DETO	N/A	
CAN-IN channels | CA N_EXT	8 x free customer usable CAN channels	
Event		
LAPTIME	Laptime	
Time		
SysTime	System Time	
RecTime	Recording Time	
Count		
LapMeter	Lap meter	
Laps	Driven laps	
CNT_Vfro	Count channel Speed (front)	
CNT_RPM	Count channel RPM	
CNT_Vrea	Count channel Speed (rear)	
TRIGGER	Trigger	

Appendix: 2D Kit System Distributors

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website: -

Find latest information at the 2D KIT System Website:
ð **http://www.2d-kit-system.com/**