FuelTech

Manual de Instalação
Installation Manual
Manual de Instalación

Racepak
An MSD Performance Company

Display multi-função / Display multi-função com Datalogger
*Conexão **Plug and Play** com **injeções FuelTech**.*

Display Dash or Datalogger Dash
***Plug and Play** CAN connection to **FuelTech ECUs**.*

Display multifunción / Display multifunción con Datalogger
*Conexión **Plug and Play** para **ECUs FuelTech**.*

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Manual Summary

Insure you have the most up to date software and firmware for your Racepak product. IQ3 firmware and DataLink updates can be found at www.racepak.com/downloads/

Items Included With the IQ3 Data Logger Dash PN 250-DS-IQ3LD-FT

Item	Part Number
IQ3 Data Logger Dash	UNIT-DS-IQ3LD-E
72 Inch Fueltech Interface Cable	280-CA-C2-FT072
microSD Flash Card	CARD-MEM-M1GB
SD Flash Card Reader	890-SD-RDR 8-1
Serial Communication Cable	280-CA-ST140SR
8 Position Wire Harness	280-CA-HARNIQ3
GPS Antenna and Cable	ANTG-ANN-05
DataLink Software	N/A
Installation Manual	MANL-IQ3LD-FT

250-DS-IQ3LD-FT Features

The IQ3 FuelTech Logger Dash is a full programmable LCD digital display dash that is equipped with a 32 channel data logger, 3 axis G meter, microSD card and GPS, all contained inside the dash . This design eliminates the necessity of an external data logger, G meters, or external GPS module. This version of the IQ3 also has an internal Fueltech ECU interface.

The IQ3 is a multi-purpose product designed for use in road racing, circle track, driving schools, pulling, boating, off road, hill climb or any other type of motorsports that can benefit from the use of GPS data to obtain speed, timing and mapping functions, without the necessity of wheel speed sensors, beacon receivers or transmitters.

Display Dash

28 programmable items on 4 pages
Programmable sequential shift lights
4 programmable warning lights with on-screen text warning
5 character programmable alpha/numeric text per display channel
Rear mounted Power/Ground/Engine RPM/Programming Button input
Rear mounted GPS antenna connector
Rear mounted Vnet sensor connector
Shielded, anti-glare coated display for sunlight viewing
Metric and English capable
Blue backlight
Gear indicator
Built-in Fueltech Interface

Data Logger

microSD memory card
32 Vnet (CAN bus) sensor inputs
3 axis G meter – Inline / Lateral / Vertical
4 HZ GPS Board

Base IQ3 Downloaded Data

Battery Voltage / Accel G / Lateral G / Vertical G / Engine RPM
Track Mapping / Speed / Lap Time / Lap Number/16 Fueltech Data Channels
Full data analysis capabilities

Technical Specifications

Total Sensor Channels - Defined Below	39
Vnet Data Channels	16
Fueltech Data Channels	16
Internal Channels as defined below	7
IQ3 Internal Temperature/IQ3 Logger Voltage / Engine RPM / Accel G / Lateral G / Vertical G / GPS	
Accelerometer Specifications	
Sample Rate	100HZ - 3 Axis
Accuracy	1% (excluding vibration affect)
Minimum / Maximum Values	+5 / -5
GPS Information	
GPS logging rate	4 Hz with 100HZ inertial assistance
Channels	16
Antenna	High Gain / Active
Accuracy	2.5 Meters
Cold start / Hot start satellite sync time	34 seconds cold / less than 3.5 seconds hot
Memory Maximum microSD Card Size	microSD Flash - Included Supports microSD up to 2GB and microSDHC cards up to 16GB.
Sample (Logging) Rates of Data Channels	
IQ3 Internal Channels	100 Hz Maximum, user adjustable to 1 Hz
Vnet Channels	100 Hz Maximum, user adjustable to 1 Hz
Fueltech Channels	20 Hz Maximum, user adjustable to 1 Hz
Power & Current	
Input Voltage	10-16V
Current Draw	350mA - Without warning and shift LED's active
Reverse Voltage Protection	Yes
Operating Temperature	32 - 140F / 0-60C
Mounting Orientation	Level left & right / Level top & bottom
	Rear of dash facing direction of travel
Engine RPM Input (Internal IQ3)	50% duty cycle, 5-18V square wave signal
Start Logging Channel (factory default)	GPS Speed (25 MPH)
Fueltech Data Channels	16 Total Channels

Engine RPM	Vehicle Speed	Fuel Pressure	ECU Supply Voltage
Throttle Position	Gear	Lambda	**Note: There are 3 currently unused channels for future expansion. They are labeled Custom 1, Custom 2, Custom 3**
Oil Pressure	Manifold Pressure	Injector Duty Cycle	
Coolant Temperature	Air Temperature	Ignition Timing	

Data Recording Start and Stop Channels

Any active channel may be used to start logging. From the factory, the IQ3 is programmed to start logging at 25 GPS MPH (40 KPH) and stops logging when no speed is detected for at least 30 seconds. A data file is written each time the vehicle exceeds the start logging speed following at least 30 seconds of no speed, and is numbered in subsequent order (1,2,3,etc). The start logging channel may be changed to any valid sensor channel, by the user.

Download Data

Data is stored on a microSD flash card supplied with the IQ3, and is downloaded via the supplied microSD flash card reader to the user's PC utilizing the DataLink software.

DataLink Software

The DataLink software is used to both set up (configure) the IQ3 data logger and provide the ability to download and analyze data. Data stored on the microSD flash card is downloaded and converted into a format (.rpk) that is recognized by the DataLink software. This .rpk file is then saved to the user's PC, for analysis.

PC Minimum Requirements

Windows® 98 / ME / 2000 / XP/ Vista or 8 operating system / 200MHZ (Pentium II) processor
200MB of available hard drive / 16MB of RAM CD ROM drive
Serial port or USB to serial adapter / 1024 x 768 or higher monitor resolution

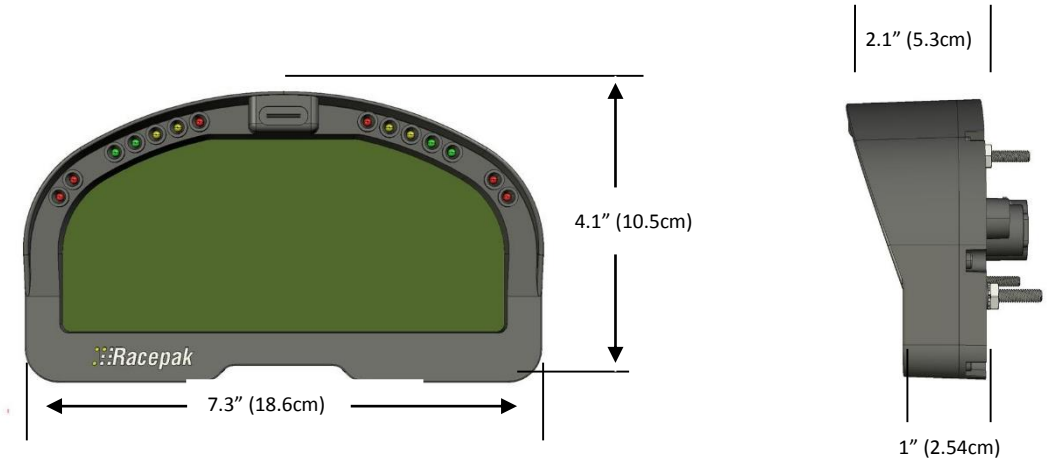
Terminology

In order to assist in the installation and usage of the IQ3, the following provides an outline of the most commonly used words that will be encountered in this manual.

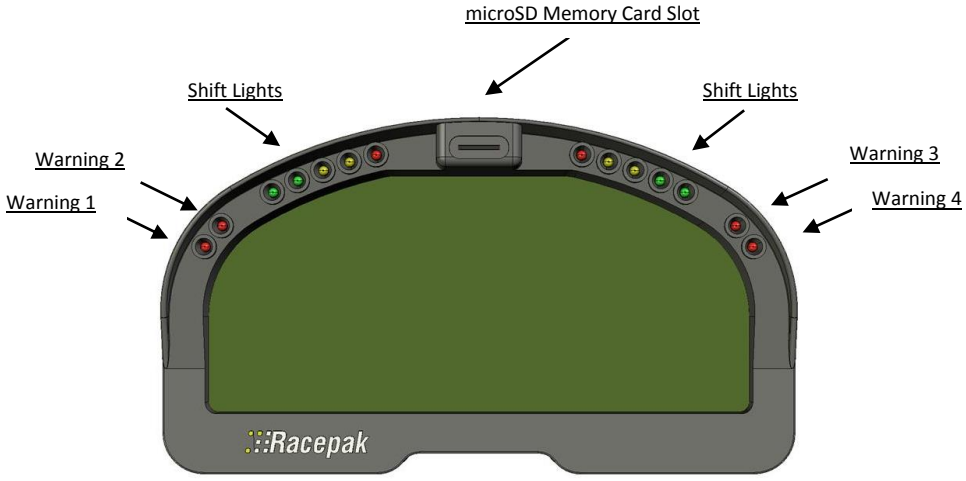
Analog: Data created by the reading of a voltage change sent from a sensor
Calibrate: The process of assigning values to sensor voltage output, in order to graph and analyze the sensor data.
CAN bus: The specific name of the technology utilized to create the Vnet sensor system
Channel: The input from one sensor, as defined by the data logger.
Data Logger: See Data Recorder
Data Recorder: The vehicle mounted hardware device that collects and stores data transmitted from the sensors
Digital: A sensor or signal that has only two values, off or on such as the measuring of ignition pulses to calculate Engine RPM
Download: The process of transferring data saved on the data logger memory card to the user's PC using the DataLink software, in order to graph and analyze data. Memory card data must be downloaded through the DataLink software and cannot be open directly from the memory card.
Filter: The process of smoothing the visual appearance of a graphed data channel.
Graph: A visual representation of sensor data, compared to time or distance
HZ: Number of times per second. Used to define logging or sample rate. Example: 4Hz represents data that is saved 4 times (every .250) per second.
KB: Abbreviation for kilobyte, which represents one thousand bytes of information.
Logger: See Data Recorder
Logging Rate: The number of times per second, which the data logger records incoming data from a sensor and is defined as Hertz, or Hz. Each sensors logging rate may be define by the user.
Math Channel: A data channel created from the input of an actual sensor which is then used in a mathematical formula to create a channel available for graphical analysis
MB: Abbreviation for megabyte, which represents one million bytes of information.
Overlay: The ability to graph multiple data channels, all at the same time.
Runfile: The file created when a run is transferred from the data logger memory card to the user's PC. Configuration File
Sample Rate: See Logging Rate
microSD Memory Card: Micro Secure Digital compact flash memory card
Sensor: A device that converts a physical property, such as pressure into a voltage signal
Smooth: See Filter
Start Logging Channel: The channel that is used to start the logging process
Trace: This term is another method used to describe Graph
Transducer: See Sensor
Vnet Channel: Any sensor that is connected to the Vnet port of the data logger
Vnet: Racepak exclusive that allows multiple sensors (analog or digital) to transmit their data over a single cable, back to the data logger.

Hardware Features

External Dimensions

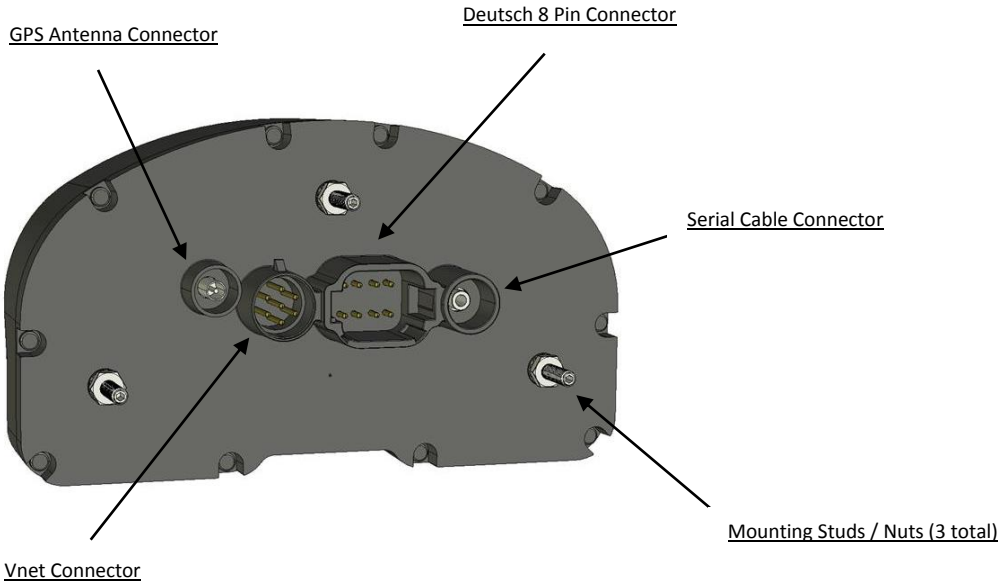


External Features – Front



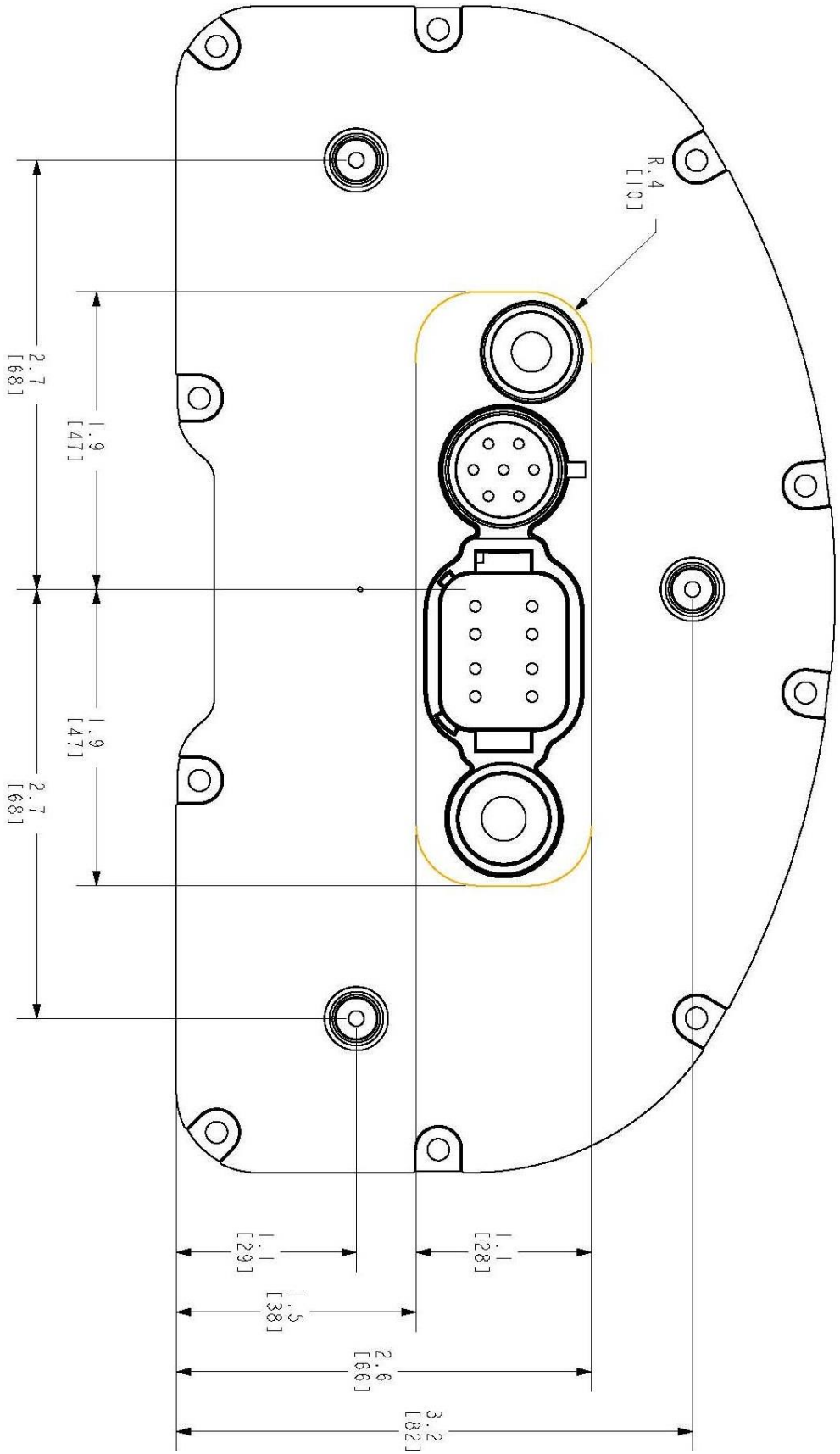
microSD Memory Card Slot	Insertion location for microSD memory card
Shift Lights	Fully programmable sequential shift lights
Warning Lights 1 &2	Fully programmable warning lights for Inputs 1 & 2
Warning Lights 3 & 4	Fully programmable warning lights for Inputs 3 & 4

External Features – Rear



GPS Antenna Connector	Provides connection for external GPS antenna
Vnet Connector	Provides connection to VNET data bus & Fueltech ECU
Deustch 8 Pin Connector	Provides input for power / ground/ engine rpm / programming buttons
Serial Cable Connector	Provides input for serial cable supplied with package
Mounting Studs & Nuts	Three #10 studs and 10-32 nuts facilitate mounting

Mounting Dimensions



Installation

The design of the IQ3 greatly simplifies the installation process, as there is no external data logger or related components necessary. However, there are basic guidelines that must be followed, in order to insure correct operation of the product.

Mounting Location

The IQ3 is designed to be utilized in a race vehicle environment and as designed as such. However, there are external conditions that can influence the operation and longevity of the product.

Heat
Avoid excessive heat, such as generated from exhaust systems, transmissions, etc.

Electrical Interference
Avoid electrical interference. Race vehicles generate electrical interference from a variety of locations such as ignitions, alternators, ECU, spark plugs, coils and radio/telemetry antennas. This interference can affect the data generated by any or all of the sensors.

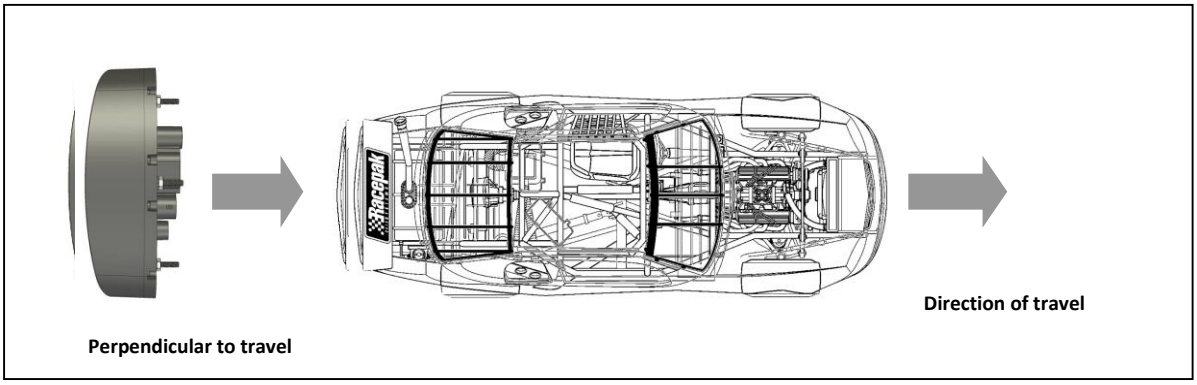
Moisture
Avoid excessive moisture. The logger is designed to be water resistant but not waterproof. If washing the vehicle, cover before washing. Wipe any remaining moisture off of the IQ3, when finished. Protect the microSD card slot from moisture.

Easy Access
Do not mount the IQ3 in a location that makes it difficult to access the memory card or any connectors.

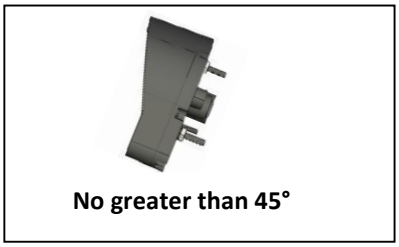
Movement
It is important to insure the IQ3 cannot become dislodged during use. Three #10 studs are provided in order to provide secure mounting.

Mounting Orientation of IQ3

The IQ3 contains inline, lateral and vertical accelerometers that perform two functions. First is for graphical analysis of G data. The second is to work in conjunction with the GPS data to provide track mapping information. The logger must be mounted in the direction shown below as the orientation of the G meters cannot be re-defined in the software, if mounting in any other direction.



For optimal performance of the internal accelerometers, it is recommended that the IQ3 is be mounted as level as possible left to right and top to bottom and perpendicular to travel. However, the dash can be tilted top to bottom up to 45 degrees, as the accelerometers can be compensated and reset to zero.



Accelerometer Calibration

Upon mounting of the dash, it will be necessary to compensate and "zero" the G meters, to correct for vertical dash tilt. Please refer to the section **Setup Mode** 2 of this manual, for complete details. NOTE: Accelerometers cannot be re-oriented in the software, only compensated to correct for top / bottom tilt. Do not mount the dash rotated in relation to the travel of the vehicle.

Mounting Method

Three #10 studs, washers and nuts are supplied with the IQ3, to be utilized for mounting. If desired, the studs can be unscrewed from the threaded inserts located in the dash housing.

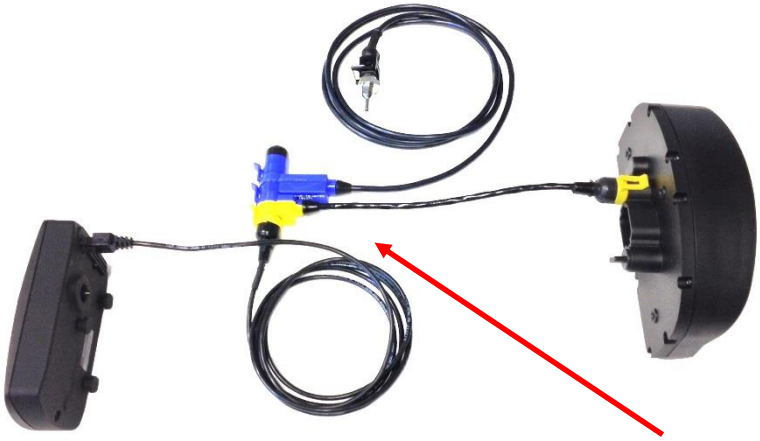
FuelTech Interface

Racepak FuelTech interface cable**. P/N: 280-CA-C2-FT072**

This cable is used to connect the IQ3 to the FuelTech ECU. The yellow connector plugs directly in to the VNET port on the back of the IQ3, while the black four pin connector plugs into the FuelTech ECU.

Adding Additional VNET Sensor Modules

Racepak FuelTech V-net tee interface cable. **P/N: 280-CA-DM-FT009**



This cable is not included and is only required when adding Racepak VNET sensor modules between the FuelTech ECU and the IQ3 dash.

To add a VNET module, plug the yellow end of the T cable in to the VNET port on the back of the IQ3. On the tee side of the connector, plug the yellow FuelTech interface cable in to the yellow tee side and plug the blue V-Net module in to the blue side of the tee. VNET termination cap P/N: 280-CA-VM-TCAPF is also required to cap of the open end of the VNET module. Contact Racepak for more information on purchasing the tee cable, termination cap and additional VNET modules.

Power Supply and Grounding

Power to the IQ3 is provided through the eight pin Deutsch connector on the rear of the IQ3. See the pin out diagram on the following page, for detailed instructions.

Warning: Do not attempt to connect or disconnect any IQ3 item, with the power switched on. This action could result in damage to the IQ3.

Engine RPM Signal

Engine RPM is obtained from the Fueltech ECU data stream. However, you can optionally use the IQ3 Engine RPM input. The IQ3 input requires a 5-18V, 50% duty cycle, square wave output. This signal is typically obtained from the tach signal output of an aftermarket ignition box or ECU. Racepak also offers a GMR Inductive RPM Pickup (Racepak PN: 680-SN-GMR) which is attached to the +12V coil power on coilpak or coil on plug ignition systems. For early model points/distributor ignition systems, MSD offers a tach signal generator, PN 8913 that can be spliced into the 12V power to the coil.
See the pin out diagram on the following page, for detailed instructions.

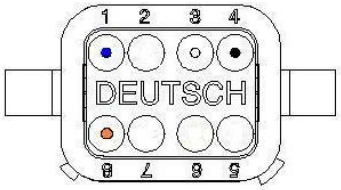
Warning: Do not connect the tach input wire directly to any part of the ignition coil. Doing so will result in damage to the logger.

MicroSD Memory Card

The IQ3 is equipped with microSD memory card. This card is located in the face of the IQ3, between the shift lights. The card may be removed by simply pressing on the card, which will slightly eject the card from the dash face. When inserting the card, insure it firmly “clicks” into place. The edge of the card should slightly protrude from the dash face, when seated. The IQ3 supports standard microSD cards up to 2GB. As of firmware version 9 micoSDHC cards up to 16GB are also supported.

Programming Button Connector and Wiring

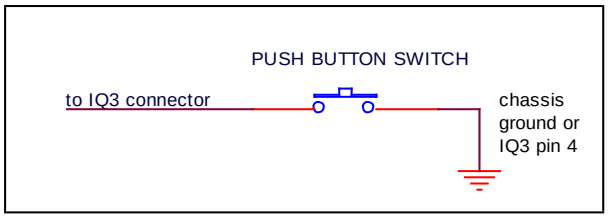
The rear of the IQ3 contains an 8 position Deutsch connector. This connector provides access to the optional engine RPM input, external program button input and external warning light output. The IQ3 is provided with the appropriate 8 position mating connector and wiring.



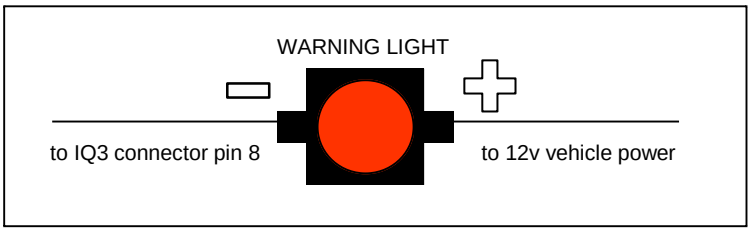
Pin Number	Function	Wire Color
1	Button 1	BLUE
2	IQ3 Power	RED
3	Button 2	WHITE
4	Button Ground	BLACK
5	Do Not Use	NOT USED
6	Tach (optional)	YELLOW
7	IQ3 Ground	BLACK
8	External Warning	ORANGE

Programming Button (optional) & Warning Light Wiring Diagram

BUTTON WIRING DIAGRAM



EXTERNAL WARNING WIRING DIAGRAM



GPS Antenna Mounting

The GPS antenna is a moisture resistant, magnetic based type, designed to be mounted on the exterior roof of the vehicle. If no roof exists or the vehicle is of a composite type, insure the antenna is mounted in clear view of the sky, with no obstructions. The antenna must be mounted at the highest point of the vehicle and level front / rear and left / right. Insure the GPS antenna cable will reach the data logger, before final mounting of the antenna.

GPS antenna mounting for stock bodied vehicles
The GPS antenna is provided with a magnetic mounting base and should always be mounted on the roof of the vehicle, centered within the roof area. Insure the antenna is as level as possible, left to right and front to rear. In the event of a vehicle with a composite roof, Velcro can be utilized. Place a strip of masking tape on the roof of the vehicle. A small piece of Velcro on the antenna and the tape will be sufficient to hold the antenna in place. We understand the value of high performance vehicles and the fact some users will be hesitant to place any type of tape on the surface of their vehicle. In that is the situation, determine the mounting method you are most comfortable with, but will locate the antenna on the roof area.

GPS antenna mounting for open wheel vehicles
By following the above instructions, simply insure the antenna is mounted as high as possible on the vehicle. Various body panels can possible block satellite signals. Insure telemetry or two way radio antennas will not provide interference to the antenna.

Again, the GPS antenna will function well, in a variety of roof mounted locations. The above guidelines will insure the most efficient reception of signals. The antenna has been roof mounted and tested at speeds over 190 mph, so feel free to go at least that fast.

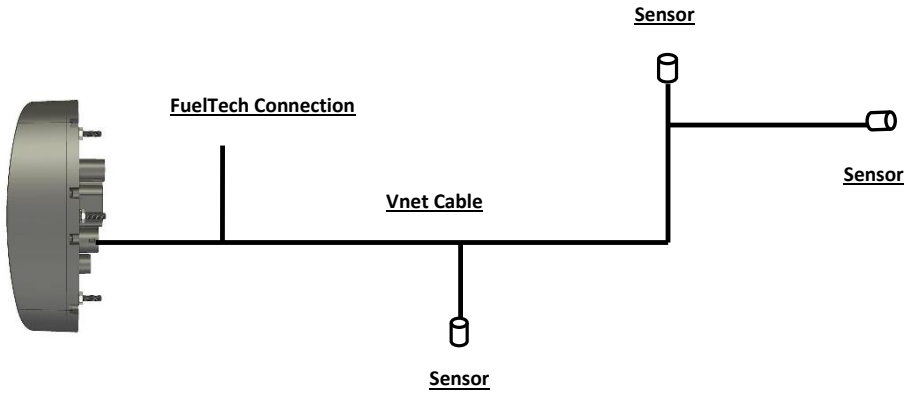
Connection of the GPS antenna to the IQ3
Upon completion of mounting of the antenna, simply route the cable to the rear of the IQ3 and connect to the GPS antenna port of the data logger. Insure the cable end is screwed tightly to the GPS connector. A small wrench can be used to slightly SNUG the connector. Excessive force can damage the connector, resulting in failure of GPS signal reception.

Warning: Do not mount the GPS antenna on the IQ3 housing, as this will result in no GPS signal reception.

How Does the V-Net System Work?

The IQ3 Logger Dash utilizes Racepak's Vnet (CAN bus) sensor input. This design provides the ability to transmit all sensor data through a single cable. This cable is connected to the 5 pin Vnet port on the rear of the dash. No sensor wiring harness is required.

To add sensors, the customer simply measures from the IQ3 dash to the mounting location of the sensor or sensors, and orders the appropriate length pre-terminated Vnet extension cable. Vnet cables are available in 12" increments and are equipped with a male connector on one end and a female connector on the opposite end. In the event sensors are mounted in multiple location throughout the vehicle, simple measure between each sensor location and order the necessary Vnet extension cables to connect all items to the main Vnet cable routed to the rear of the dash.



Any Vnet sensor currently offered by Racepak may be utilized by the IQ3 Logger Dash. For a complete listing of available sensors, visit our website located at www.racepak.com or contact the Racepak customer service department at 949-709-5555 for a catalog. Customer supplied sensors may also be utilized. Racepak's USM module (PN: 230-VM-USM) is a four sensor input module, providing the ability to define each sensor input dependant sensor type.

Programming the Display by External Buttons

External Programming Buttons

A variety of IQ3 display functions can be controlled, displayed or programmed through use of two external programming buttons known as Button 1 and Button 2. This enables the driver to make immediate changes, without the necessity of connecting a PC to the dash. Instead of mounting the programming buttons in the dash, Racepak provided the ability to remote mount the two programming buttons, for better driver access.

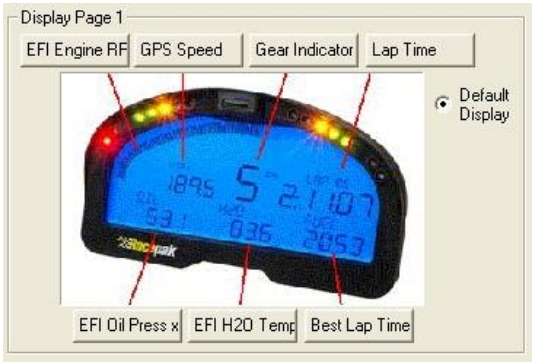
Racepak offers a Programming Button Package PN: 280-SW-IQ3 or the customer may provide their own momentary contact button. If buttons other than Racepak are utilized, insure they are normal open momentary switches and they are capable of withstanding the environment in which they will be utilized. The buttons are connected to the 8 pin Deutsch connector located on the rear of the IQ3. Refer to the Programming Button Connector and Wiring section of this manual for pin out instructions.

Many of the programming functions found in the following section may also be performed through use of the DataLink software and users PC. Those instructions can be found in the section Programming Utilizing the DataLink Software.

Factory Default Display Settings

From the factory, Page 1 of the IQ3 is programmed to display the items as shown in the picture to the right. The remaining three display pages are not programmed from the factory, which allows for customized programming by the customer.

Note: The center position will display the number of satellites locked in when the vehicle speed is below 5 MPH/KPH.



Programming Utilizing the DataLink Software

Many of the programming functions found in the following section may also be performed through us of the DataLink software and users PC. Those instructions are explained in this manual.

Programming Modes

Programming functions of the IQ3 are accessed by using Button 1 and Button 2. Button 1 is considered Left Button and Button 2 is considered Right Button. It is recommended the two programming buttons be mounted as Left and Right, in relation to the driver's position viewing the dash. There are two programming modes available.

Setup Mode 1 (Stationary): Utilized to program items such as screen brightness or pulses per revolution (tach programming).

Setup Mode 2 (Moving): Utilized to program the system while the vehicle is moving and or the engine is running. This is necessary as several settings utilize actual data taken from speed or rpm, in order to program.

Button Functions

Button Type	Setup Mode 1	Setup Mode 2
Button 1 (left button)	Enters Programming Adjusts Settings	Advances To Next Page Saves Changes and Exits
Button 2 (right button)	Advances To Next Page Saves Changes and Exits	Enters Programming Adjusts Settings

As can be seen above, the buttons perform the opposite functions depending on the mode. Since the IQ3 only utilizes two buttons, it was necessary to allow multiple uses for each button. The length of time the button is held down determines the programming action taken. The shift lights are used to indicate the action taken with each button.

The following instructions will refer to short, medium and long button press lengths. This is the length of time the button is held down and the corresponding shift light blink.

Type of Button Press	Length of Time	Shift Light Flash
Short Press	.2 Second	One Flash Of Shift Lights
Medium Press	.5 Second	Two Flash Of Shift Lights
Long Press	2 Seconds	Three Flash Of Shift Lights
Auto Repeating Long Press	3 Seconds	Repeats Every .2 Seconds

The point at which the button is released determines the type press that is accepted. Releasing after the second shift light flash is detected as a medium length press.

The programming functions are arranged in a pre-defined order. This allows the customer to enter the programming mode, and then toggle through to the desired feature, by using the left or right button, depending on the mode.

Setup Mode 1 (stationary programming)

Setup Mode 1 is used to program the unit without the need to operate the vehicle.

Entering Setup 1

1. Press and hold Button 1 (left button) for TWO shift light blinks – MEDIUM press
2. The Dash will display **'SETUP 1'?**
3. Confirm by pressing Button 1 for ONE shift light blink – SHORT press

The following are in the order in which the individual programming features will appear.

Setting as Displayed on Dash	**Program Setting Description**	**Programming Command** ✲✲✲✲✲	**Accept and Advance** ⇨	**Accept and Exit** EXIT
BACKLIGHT	0 = Off 9 = Max Brightness	Short Press Button 2 to increase value	Short Press Button 1	Long Press Button 1
TACH PULSES	Number of pulses ignition fires per revolution V8=4 4 Cyl=2 0=Min 20=Max	Short Press Button 2 to increase value	Short Press Button 1	Long Press Button 1
SHIFT STEP	Programs RPM between each shift light. Example: If shift point is 5000 rpm with a 100 step, first shift light illuminates at 4600 RPM. Multiply your Step setting by 4 and subtract from Shift Point to determine start of shift light	Short Press Button 2 Advances by 10 Medium Press Button 2 Decreases by 10 Long Press Button 2 Quickly advances	Short Press Button 1	Long Press Button 1
SHIFT GEAR X X=Gear number	Program shift point for each gear.	Short Press Button 2 Advances by 10 Medium Press Button 2 Decreases by 50 Long Press Button 2 Quickly advances	Short Press Button 1	Long Press Button 1

Setting as Displayed on Dash	**Program Setting Description**	**Programming Command** ✲✲✲✲✲	**Accept and Advance** ⇨	**Accept and Exit** EXIT
GEAR RATIO X X=Gear Number	Ratio between engine RPM and GPS speed (not final drive ratio) Requires tach signal Recommend programming in Setup Mode 2	Short Press Button 2 Advances by .1 Medium Press Button 2 Decreases by 5 Long Press Button 2 Quickly advances	Short Press Button 1	Long Press Button 1
TIME ZONE GMT	Sets data and time stamp on run file, based on customer location time zone in relation to GMT. East coast standard time USA = -5 GMT	Short Press Button 2 Increases by 1 Medium Press Button 2 Decreases by 1	Short Press Button 1	Long Press Button 1
SPEED UNITS	Defines Speed in MPH or KMH for dash display purposes	Short Press Button 2 Toggles MPH and KPH	Short Press Button 1	Long Press Button 1
S/F DETECT 10/20/40/80/160/320	Distance in meters, in which the start/finish point is projected perpendicular to vehicle. Typical utilized by boat racers.	Short Press Button 2 Advances	Short Press Button 1	Long Press Button 1
DEFAULT DISPLAY	Default page on power up. If all positions are disabled, that page will not be displayed. 1 = Min 4 = Max	Short Press Button 2 Advances	Short Press Button 1	Long Press Button 1
ODOMETER	Odometer value	Short Press Button 2 Advances by 10 Medium Press Button 2 Decreases by 1000	Short Press Button 1 Save and exit Setup Mode 1	Long Press Button 2 Save and exit Setup Mode 1
FACTORY DEFAULTS	Resets all setting to factory default.	Short Press Button 2 Switch N to Y	Short Press Button 1	Short Press Button 1

Setup Mode 2 (moving programming)

Setup Mode 2 allows the user to utilize inputs from the moving vehicle, in order to automate the programming process.

Entering Setup 2

1. Press and hold Button 2 (right button) for TWO shift light blinks – MEDIUM press
2. The Dash will display **'SETUP 2'**?
3. Confirm by pressing Button 2 for ONE shift light blink – SHORT press

Setting as Displayed on Dash	**Program Setting Description**	**Calibrate Setting** ✲✲✲✲✲	**Accept and Advance** ⇨	**Accept and Exit** EXIT
TACH CAL	Calibrate tach input with engine running. 3. With vehicle in parked position, start engine and bring to 2000 RPM and hold 4. Long Press Button 2	Long Press Button 2	Short Press Button 1	Long Press Button 1
GEAR RATIO X X=Gear Number	Calibrates gear ratio for Gear Indictor. 6. Insure tach input is functioning. The value -0.1 will display if no tach or speed. 7. Drive car in first gear 8. When speed and RPM are constant Long press Button 2 9. Dash gear indicator will advance to next gear 10. Repeat process for remaining gears. Program any unused gears the same as your highest gear.	Long Press Button 2	Short Press Button 1	Long Press Button 1
ACCEL CAL	Enters accelerometer calibration mode.	Long Press Button 2	Short Press Button 1	Long Press Button 1
POSITION LEVEL accel cal mode	Position the IQ3 level to the ground. Enter a short press on button 1 when ready.		Short Press Button 1	
POSITION ANGLE accel cal mode	Position the IQ3 at the desired mounting angle. ± 45° max. Enter a short press on button 1 when ready.		Short Press Button 1	

NOTE: With the exception of the accelerometer calibration, SETUP Mode 2 programming requires the vehicle to be running and/or in motion. Care should be taken when driving the vehicle to insure safe operation. If possible, take a passenger along to operate the IQ3 and perform the calibration procedures

Setting the Start/Finish Location

There are two methods you can use to set the start/finish location.

- The first method is to use the external programming buttons.
- The second method is to use the DataLink software to write the start/finish location to the microSD card. The second method is explained later in the manual. To set the set start/finish position using the external programming buttons perform the following:

1) Press and hold Button 1 for 3 LED flashes or until the text SET START/FINISH appears on the bottom of the display.
2) Drive the vehicle at a speed no less than 10 MPH towards the start/finish location.
3) Press and release Button 1 (1 LED flash) at the point you wish to set the start/finish.
4) The dash will respond YES if successful and NO if unsuccessful.

Reviewing Lap Times (Lap Time Replay Mode)

You can review your lap times from the previous session by entering in to Lap Time Replay Mode. To enter Lap Time Replay Mode enter a long button press (3 flashes) on button 2. The text "Lap Replay Mode" will display across the bottom of the display. While in Lap Time Replay Mode buttons 1 and 2 will perform the following functions.

Type of Button Press	**Button 1**	**Button 2**
Short Press – 1 flash	Decrement Lap Number	Increment Lap Number
Medium Press – 2 flashes	Jump to Best Lap	Exit Lap Time Replay Mode
Long Press – 3 flashes	Jump to First Lap	Jump to Last Lap

Minimum and Maximum Data Recall (Min/Max Mode)

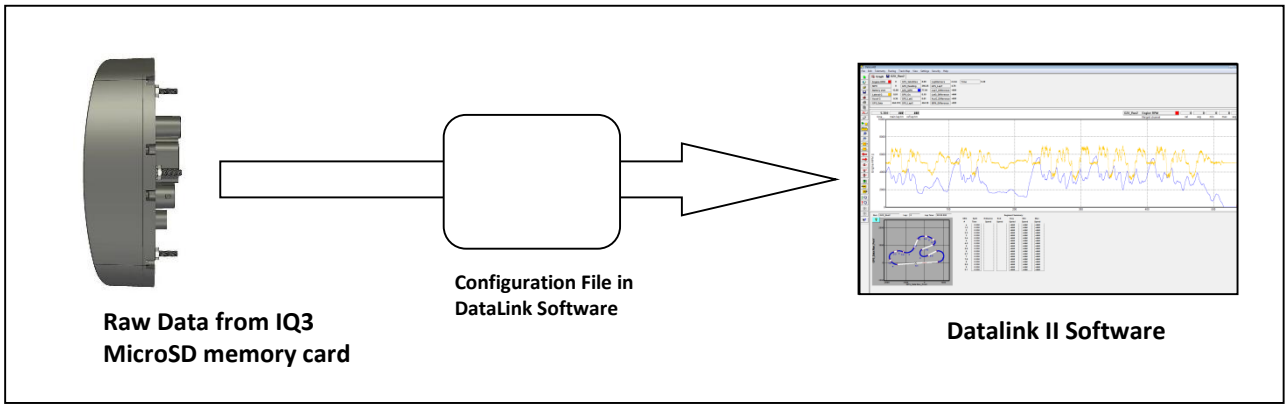
You can review the minimum and maximum values for the channels you have programmed to show on any of the four display pages. The minimum and maximum values will be maintained when the IQ3 is turned on and will be cleared when the IQ3 is turned off. Enter a long press on Button 1 to display the minimum values, the middle right display tag will show MIN. Next, enter a short press on Button 1 to display the maximum values, the middle right display will show MAX. Next, enter a short press on Button 1 to exit Min/Max mode without resetting the minimum and maximum values **OR** enter a long press on Button 1 to exit Min/Max mode and reset the minimum and maximum values. To view the Min/Max values on other display pages, enter a short press on button 2 to scroll through pages 1-4.

IMPORTANT NOTE:
The vehicle speed must be below 5 MPH/KPH to enter Min/Max mode. If the vehicle is moving while in Min/Max mode, the IQ3 will automatically return to normal operation when the vehicle speed reaches 10 MPH/KPH. The Min/Max feature requires IQ3 firmware v05 or higher.

DataLink II Software Installation

Data Download Path

The key to understanding the DataLink software utilized by the IQ3 is to understand the relationship between the downloaded data, the IQ3 Configuration file and the DataLink software.



Downloaded Data: Stored IQ3 data is downloaded to the user's PC by means of the IQ3 microSD memory card. Before the data can be opened into the DataLink software, it must first pass "through" the Configuration file.

Configuration File: The IQ3 Configuration file, contained within the DataLink program, is automatically loaded with the installation of the DataLink software. The Configuration file contains all the information necessary to convert the raw data saved on the memory card into a format that allows the file to be opened in the DataLink software.

The configuration file is a "template" for all downloaded data, containing channel names, calibration values and scaling values, along with programming features such as the start data logging channel, etc.

DataLink Software: The Datalink II software provides the ability to open and graph data contained in a runfile. The DataLink is software is generic in nature, in that it does not store information related to the data logger setup. Instead, the software contains settings relevant to the graphing of data and the user's PC setup.

PC Requirements

PC Hardware Requirements

- USB Port
- Serial Communications Port or USB to Serial Port Adapter
- CD/DVD drive
- 3 Button Mouse

Note: The use of a mouse with a center button is highly recommended

If your PC does not have a CD drive please contact Racepak and request the optional DataLink II USB Flash Drive Installation Kit. This kit allows the DataLink II software and license disk to be installed directly through the computers USB port. The DataLink II software does not require a CD or Floppy Disk Drive for normal operation.

Screen Resolution

The DataLink II software requires a minimum screen resolution of 1024 x 768. We recommend the use of the largest and highest resolution monitor that meets your installation and budget requirements. If your PC is configured with dual monitor support, the DataLink II software has special features to take advantage of the capabilities. A flat panel (1280 x 1024 resolution) narrow outline monitor such as those manufactured by Dell and Fujitsu is optimum for high-end applications.

PC Software Requirements

The DataLink II software is compatible with Windows 98 Second Edition, ME, 2000, XP and Vista 32. If you have a Windows operating system other than those listed above please contact Racepak for additional installation assistance. DataLink is not compatible with Apple.

Software Installation

To install the DataLink II software on your PC, perform the following.

1. Turn on the computer and start Windows.
2. Insert the CD labeled Racepak DataLink II Software into the CD drive.
3. The RacePak DataLink II Setup program will automatically start, and the setup InstallShield Wizard will be displayed. Please note—If you have disabled auto run in your computer the installation wizard will not automatically start.
4. To manually start the installation program; Select **My Computer** from the computer desk top, select the **CD** drive by clicking on it and double click on **Setup** to start the installation program.
5. Read the instructions on the dialog boxes and answer any questions required.

We recommend you install the software in the default directories as indicated during the installation procedure. This will make it easier for our technicians to assist you at a later date should you have an application problem. If you install the software in a directory other than the default directory, please note the install directory, in order to assist our technicians should a problem arise.

The Install Wizard will automatically create a shortcut on the main desktop for the RacePak DataLink II program.

MicroSD Flash Card Reader Installation

Data recorded by the IQ3 is stored on a microSD memory card. In order to transfer the data to the user's PC, it is necessary to utilize a microSD memory card reader. A microSD card reader is included in the IQ3 kit package. The reader requires you to use the provided microSD adaptor and an available USB port on your PC.

The microSD memory card reader provided with the IQ3 does not support Windows 95 or Windows 98 operating systems.

DataLink II Help Files

The DataLink II software includes a complete selection of help files, which can be accessed as shown below:

Main Menu or any open Dialog Box: To get help for any of the menu items simply highlight the menu item by placing the mouse cursor over the menu item. Next press the F1 key to display the help.

 Icon Tool Bar: Select the ? button located at the bottom of the icon toolbar. The mouse cursor will change to a? Position the mouse cursor over toolbar icon for which help is desired and click the left mouse cursor. Help will be displayed

 DataLink Program Screens: Select the ? button located at the bottom of the icon toolbar. The mouse cursor will change to a? Position the mouse cursor over the section of the DataLink II screen for which help is desired and click the mouse button. Help will be displayed.

 Runlog Pages: To get help on a run log page look for the blue icon with a question mark. Simply click on the button to display the help for the run log page.

Help from Main Menu: Click on the Help main menu selection and select the Help Topics menu selection. The Help Topics: DataLink II Applications Help will be displayed. Follow the instructions included with the help box to navigate thru the online help

Data Logger and Dash Setup Using DataLink Software

Access to data logger, sensor and dash programming functions are contained within the configuration file. At the time of the DataLink software installation, a set of motorsport specific configuration files were also installed.

Now that the display features of the dash have been programmed by means of the external programming buttons and the DataLink software installed, we can now access the appropriate IQ3 configuration file, in order to complete the initial setup of the data logger.

Motorsports Specific Configuration Files

Racepak personnel have created a variety of Configuration files that are customized according to the motorsports in which the data system will be utilized. Detailed information concerning each Configuration file can be found in the Runlog and Configuration File Details section of this manual.

IQ3_Config: This Configuration file contains a combination of Runlog pages and math channels, created specifically for motorsports that require track mapping, lap and segment information. In addition, math channels utilizing shock travel data are included.

IQ3_ConfigM: This is the metric version of the above Config file.

IQ3_ConfigBT: This Configuration file contains Runlog and math channel data specific to the needs of boat motorsports that require track mapping, lap and segment information.

IQ3_ConfigPL: This Configuration file contains Runlog pages specific to the sport of pulling, which provides customers the ability to input pull specific information, within each run file.

Synchronizing the IQ3 Settings and IQ3 Configuration File

Before you can upload any recorded data from IQ3 or change any settings, you must first update the IQ3 configuration file with the currently programmed settings in the IQ3. To do so, perform the following procedure:

1) Connect the provided serial cable between your PC and the IQ3.

2) Select the blue Read button located in the list of vertical icons, on the lefts side of the DatalinkII software screen.

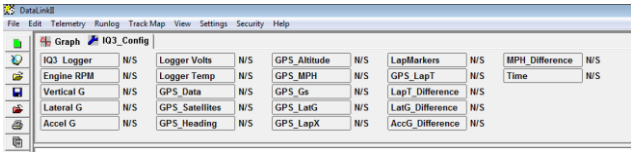
3) From the window below, choose “Select another configuration file”.

4) The IQ3 configuration file should now be open. Now to synchronize the IQ3 settings with the configuration file, click on Edit from the Menu bar and then select Read VNET Config. The message log will open and you should now see the IQ3 sending over its settings to the configuration file. When finished you should see the message DEVICES READ SUCCESSFULLY at the end of the message log. If you receive an error message, check your COM ports settings and try again. Click on the OK button to close the message log.

5) Now save the changes made to the configuration file by clicking File from the Menu bar and selecting Save.

Programming Functions – Data Logger

The configuration file should now be open in the DataLink software, as shown below. A configuration file is always noted by the blue "wrench" tab seen at the top of the file. Note the Channel Buttons across the top of the configuration file. Any internal or external sensor, gauge or dash programming functions is accessed through this file.

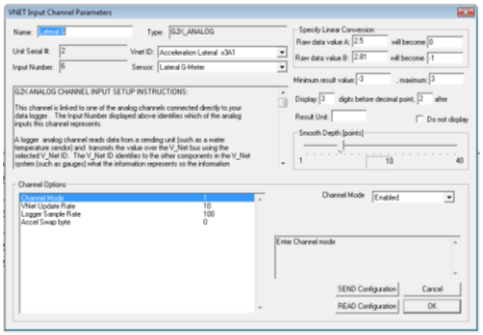


Programming Functions through Channel Buttons

Access to any programming function is through each rectangular Channel Button, as found at the top of the configuration file. Channel Buttons represent all the current internal and external sensors or Intelli-Gauges, along with the individual dash programming pages and data logger functions.

For example, to review programming for the Lateral g sensor, place the mouse cursor over the Lateral G channel button and *right* click. Each channel button provides access to:

1. Sensor Calibration Values
2. Sensor Scaling
3. Channel Name
4. Logging Rate
5. Graph Smoothing



Data Logger Programming Features through the Configuration File

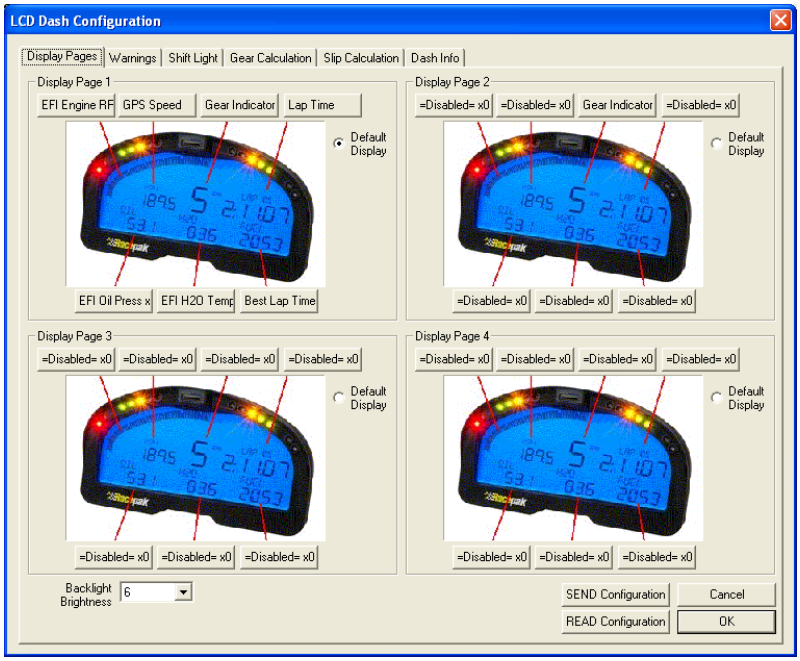
Function	Channel Button Name	Action To Access
Start Logging Channel and Value	IQ3_Module	Right Click Over Channel Button
Start / Finish Line Detection Distance	IQ3 Module	Right Click Over Channel Button
Track Distance (for predictive lap time)	IQ3 Module	Right Click Over Channel Button
Channel Name	Any active channel	Right Click Over Channel Button
Calibration Values	Any active channel	Right Click Over Channel Button
Scaling Values (graphed data)	Any active channel	Right Click Over Channel Button
Smoothing (graphed data)	Any active channel	Right Click Over Channel Button

Programming the Display Using the DataLink Software

Many display functions of the IQ3 can be programmed utilizing the two external programming buttons, as outlined in the Programming the Display By External Buttons section of this manual, page 24. However, it is also possible to program many of these same functions along with additional functions, utilizing the user's PC and DataLink program.

First, it is necessary to connect the user's PC to the IQ3 utilizing the Racepak serial cable.

Next, open the DataLink software and the IQ3_Config file and Right click over the IQ3 Logger Channel Button. This action opens the following window:



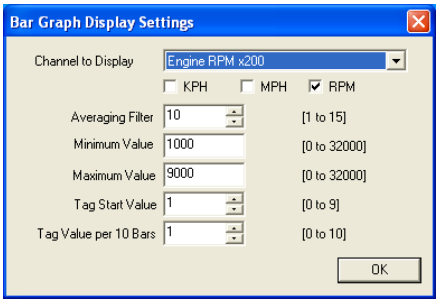
Each programming function is accessed by tabs located across the top of the page, as outlined in the following section.

All programming changes to the IQ3 must be finalized by selecting the **Send Configuration** button found in the bottom left corner of each programming page.

Display Pages

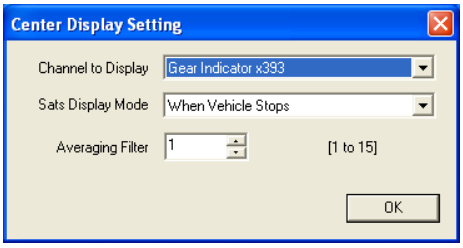
A view representing the current programming of all four display pages is obtained by selecting the Display Pages tab. Each input is programmed by selected the text box related to that input area, as indicated by the red line extending down to the dash, from each text box.

Bar Graph (Sweep Tach)



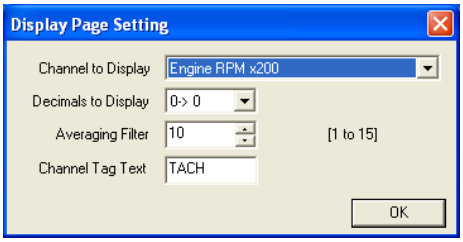
Function	Description
KPH MPH RPM	Selection defines channel name on dash
Channel to Display	Pull down arrow selects channel for bar graph data
Averaging Filter	Smooths displayed data. 10 is default
Minimum Value	Determines starting point for bar graph
Maximum Value	Determine ending point for bar graph
Tag Start Value	Determines start value for bar graph
Tag Value per 10 Bars	Determines value for each 10 bar segment. There are a total of 8, 10 bar segments for 80 total bars.
OK	Closes window following programming changes

Gear Indicator (center of dash)



Function	Description
Channel To Display	Pull down arrow selects sensor channel
Averaging Filter	Smooths displayed data. 10 is default
Sats Display Mode	Selects when to display the number of acquired Satellites in the center display.
OK	Closes window following programming changes

Remaining Inputs



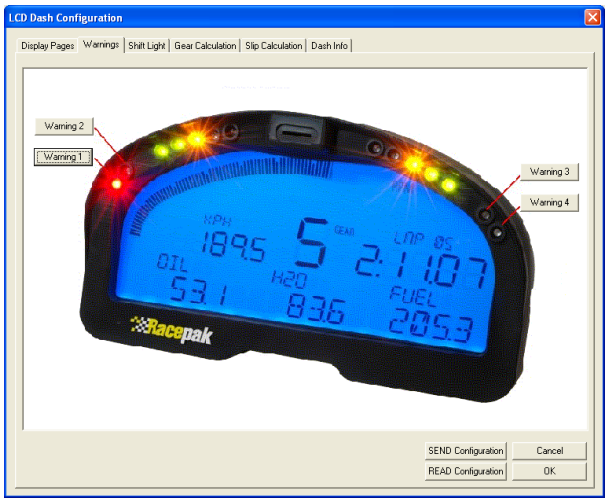
Function	Description
Channel to Display	Pull down arrow selects sensor channel
Decimals to Display	Number of digits to display after decimal
Averaging Filter	Smooths displayed data. 10 is default
Channel Tag Text	Name displayed. 5 total characters

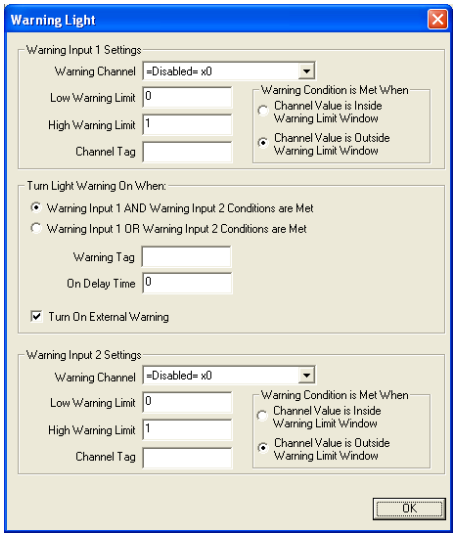
As shown above, to program an input area, simply locate the desired sensor channel by use of the pull down arrow, select the sensor channel, then define the remaining values for Decimals to Display, etc.

Warnings

The IQ3 provides the ability to program up to four individual warning channels. The face of the dash contains four warning lights. Each warning light is associated with a single warning channel. To program each individual warning channel.

1. Select the “Warnings” tab.
2. Next, left click on the warning light you would like to program. This action will open the Warning Light text box.





Warning Parameter	Description
Warning Channel	Sensor input to be used to trigger warning.
Low Warning Limit	Sensor value to trigger warning when below this value.
High Warning Limit	Sensor value to trigger warning when above this value.
Channel Tag	Text to be displayed above warning channel value when warning is activated. 5 chars max.
Channel Value is Inside Warning Limit Window	Triggers warning when sensor value is between Low and High Warning limits.
Channel Value is Outside Warning Limit Window	Triggers warning when sensor value is below Low Warning Limit and above High Warning Limit.
Warning Input 1 AND Warning Input 2 Conditions Are Met	Requires that warning 1 **and** warning 2 conditions are met to activate warning.
Warning Input 1 OR Warning Input 2 Conditions Are Met	Requires that warning 1 **or** warning 2 conditions are met to activate warning.
Warning Tag	Text displayed to the left of warning channel value(s) when warning is activated. 5 chars max.
On Delay Time	Time is seconds to delay before warning is activated.
Turn On External Warning	Turns on external warning when warning channel is activated.

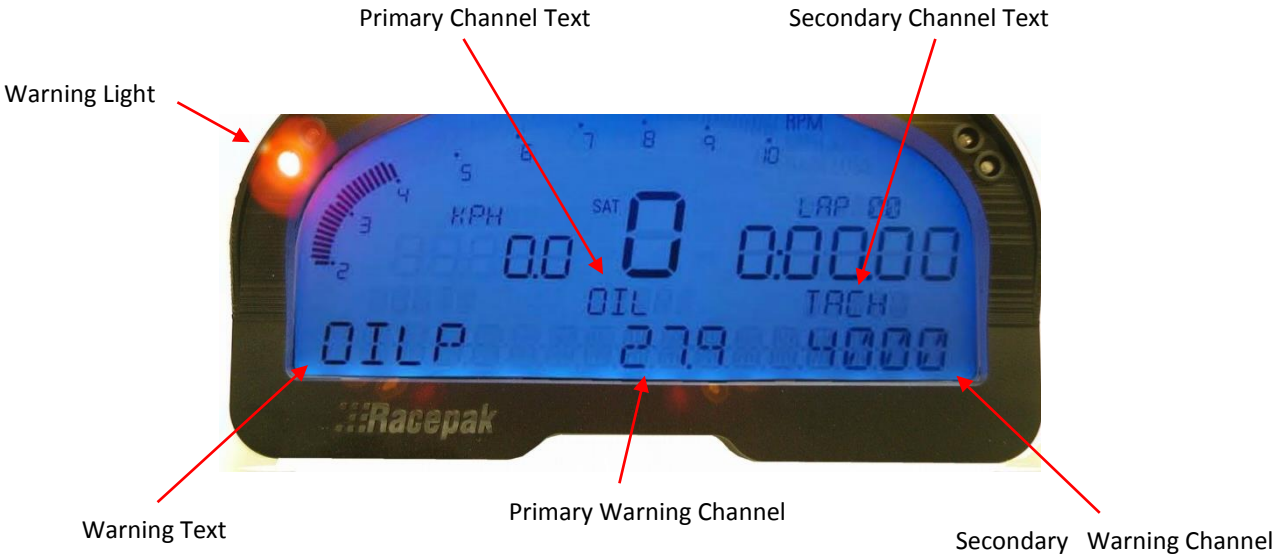
The following section provides an example warning setup.

Example Warning Setup

As noted in the previous section, the dash warning setup allows the user to trigger a warning light based on one sensor channel or two sensor channels. In addition, a specific text warning may be programmed to display, when the warning parameters are met.

In the example setup below, the dash warning was programmed as follows:

Warning Channel One: Oil Pressure below 30 PSI
Text Above Warning Channel One: OIL
Warning Channel Two: Engine RPM above 1000
Text Above Warning Channel Two: TACH
Text To Display When Warning Values Are Met: Oil P



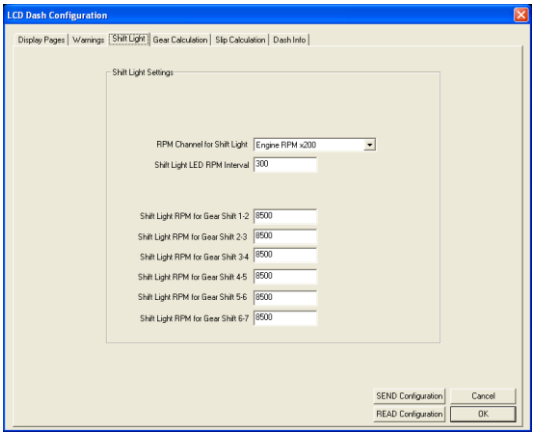
When at least one programmed warning channel is activated, the warning text will alternate between the warning channel data the normal display page data once a second.

To clear ALL active warning, enter a SHORT press on Programming Button 1. This will clear the warnings until the warning channel goes out of warning and then back in to warning again.

Shift Lights

To program the shift lights, simple determine the RPM Channel to activate the shift lights (typically Engine RPM) then select the shift point for each gear. Finally, select the RPM Interval between each shift light.

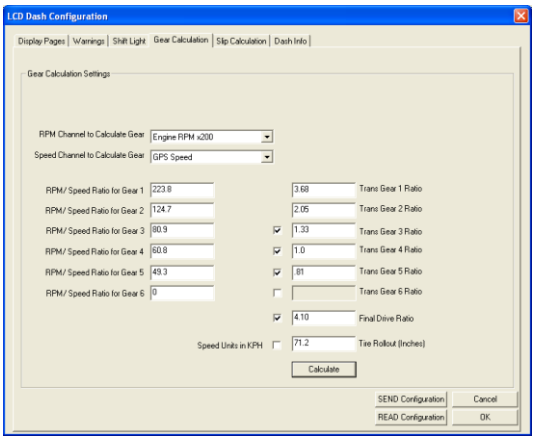
Example: Shift point for each gear is 5000 RPM. Interval is 100 RPM. With 5 shift lights in use (10 total lights that are displayed two at a time), the software will calculate back from the programmed shift point and start the shift lights at 4600 RPM and increment to 4700, 4800, 4900 and with all lights on at 5000.



Shift Light Formula: Shift Light Interval x 4 minus Shift Point = Starting Point of Shift Lights
100 x 4 = 400. 5000 – 400 = 4600 (start of shift lights)

Gear Calculation

The gear position is most easily configured using the IQ3 Setup Mode 2 programming. The IQ3 derives the gear position by calculating the ratio between the engine rpm and GPS speed at the time each gear is programmed.

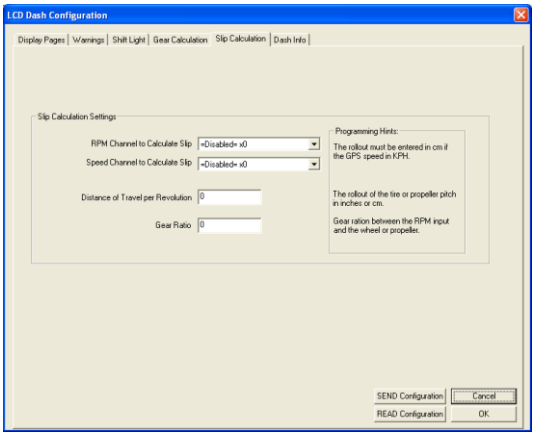


It is also possible to manually enter the ratio values using the Gear Calculation page. However, the ratio value is not the transmission or final drive ratio, but instead is the ratio between engine rpm and GPS speed. DataLink can calculate these ratios for you by entering the transmission ratio for each gear and the final drive ratio in the transmission for FWD vehicles or differential gear ratio RWD vehicles. Enter the tire rollout in inches if the speed channel you have selected is in MPH units. Enter the tire rollout in centimeters if the speed channel you have selected is in KPH units and check the “Speed Units in KPH” box. Uncheck all unused gears to disable them. After you have entered all of the required information click the “Calc” button to calculate and fill in the RPM/Speed ratios. Click the “SEND Configuration” to program the ratios in to the IQ3.

Since only the RPM/Speed ratio values are programmed in to the IQ3, the transmission ratios and tire rollout values are not saved in the DataLink configuration file. You will need to reenter these values each time you need to make a change. The formula used to calculate the RPM/Speed ratio when speed in in MPH units is shown below.

1 / (Tire Rollout / 12 * 60 /5280) / (Gear Ratio (n) * Final Drive Ratio) = RPM/Speed Ratio for Gear (n)

Slip Calculation



The Slip Calculation provides the ability to display slip data based on propeller vs. speed or tire vs. speed for use with wheel driven vehicles. The slip calculation can only be used for display purposes. It is not recorded on microSD card. If you need to record a slip calculation, you can create one via the DataLink software math channel feature.

RPM Channel to Calculate Slip: Typically Engine RPM or the rpm channel that provides final drive to the propeller or wheels.

Speed Channel to Calculate Slip: The sensor channel that provides vehicle speed, which is GPS MPH in most instances.

Distance of Travel per Revolution: The propeller pitch in inches or centimeter (or drive wheel circumference).

Gear Ratio: The final drive ratio between the RPM input and the wheel or propeller. For vehicles that have more than one set of gearing between the engine and wheel or propeller, it will be necessary to calculate a final drive ratio.

Final gear drive formula for wheel driven vehicles:
Tire Circumference / Drive Ratio = Final Drive Ratio

This number can be entered in the Gear Ratio input area.

Assembled and Manufactured by:

30402 Esperanza
Rancho Santa Margarita, CA. 92688 USA
Phone: +1 (949) 709-5555
Fax: +1 (949) 709-5556
www.racepak.com