BRÄUNIGER
FLUGELECTRONIC

IQ-MOTOR-*eco* GPS
Operation manual

Bräuniger GmbH

Index

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1.1 Instrument overview

ON / OFF key

1	ON / OFF key
2	Graphics and data Display
3	Differential altimeter / time / flight time /QN
4	Speed
5	Digital vario field
6	USB PC-interface
7	Altimeter field ALT1 / ALT2
8	Audio indicators
9	GPS satellite indicator
10	Loudspeaker port
11	Battery capacity
12	*Flylink* antenna (Motor-Box)
13	Compass rose
14	Analogue Vario display
15	Jack for speed sensor
16	Keypad
17	Safety cord

1.1 IQ-MOTOR-eco GPS Switch - on and - off

1.1.1   Instrument Switch-on

The instrument is switched-on by pressing the **On/Off** key.

Switch-On ?
Press OK !

To prevent unintentional switch-on, it needs to be acknowledged upon display prompt: **Switch-On?**
by pressing the **OK** key.

Test Batt.
2.86 V

Following acknowledgement the display will shift for approx.
15 sec. to the **switch-on display screen** with following information:

-    Battery state, serial number, pilot's name, instrument type and
-    Software (Firmware) Version.

After switch-on the normal flight screen shall appear with flashing altitude data display. The device needs approx. two minutes to calculate the precise 3D-GPS position. As soon as the GPS receives stabilised altitude data, the **pressure altimeter is automatically adjusted**, the altitude data display stops flashing and the symbol **GPS** appears over the GPS data display.

1.1.2   Instrument switch-off / stop flight recording

For switch-off the **On/Off** key needs to be pressed until the question: **Switch-off? Press OK** is prompted on the screen.

Switch-off ?
Press OK !

Again, to prevent unintentional switch-off, also this action needs to be acknowledged by pressing the **OK** key!
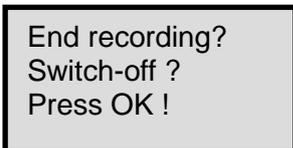
1. If no flight recording has been programmed, the instrument is immediately switched-off following acknowledgement by **OK**.

End recording?
Switch-off ?
Press OK !

2. Following an active flight recording the read-out screen **Flight – Analysis** is displayed during 60sec. before switch-off. If you want to quit the flight analysis display early, press shortly the **Off-**key, the instrument will then be switched-off immediately.

3. **Automatic switch-off:** the flight analysis appears automatically after landing and shall be displayed for about 60sec. Without key stroke the IQ-BASIC-GPS is switched-off automatically.

4. **Automatic switch-off at non-use**
If the device does not detect a keystroke or flight related parameters during 30 minutes, it will be switched-off automatically.

1.2 Keypad

Function related key F1

Audio Volume
Alarm Settings

Diff. Altimeter 3 reset to 0
*Route or Waypoint
activate / deactivate*

Function related key F2

Altitude display
Shift ALT1 / ALT2
Settings altimeter

Acknowledgement key OK
Main Menu

i Info key: display of current
coordinates or of Information

Display shift - time / altitude 3
On/Off key

Escape key

Shift graphics display

in setting mode up / down

**during flight: insert marker into flight
recording / Memorise position as Waypoint**

1.3 Operation philosophy

The IQ-MOTOR-eco GPS instrument is very easy to handle and intuitive. Just try it a few times, and you will discover that one can get along very rapidly with the simple menu structure. However, please note some essential instructions regarding the various functions.

- White key lettering: display screen shifts such as for ex. ALT1 / ALT2, Vario- acoustic settings, F1 / F2 key commands and the (*i*) information retrieval, can be performed speedily during the flight by **short pressure** on the key.

- Yellow key lettering: by **long pressure** of 3 sec. important functions may be called up directly during the flight and may also be edited. The selected function is switched-off after approx. 8 seconds in case of non-use!

- Main menu: all instrument settings, but also Waypoints-, Routes- and flight memory, can be set prior to the flight via the **Main menu** (MENU key). It is possible to select within the menu submenus by use of the up-/down keys and to enter adjustments. The main menu is quitted automatically at 30 seconds after the last entry.

Tip: all instrument settings of the Main menu can be set comfortably by use of the freebie PC-Software Flychart on the PC and be transferred via USB-interface onto the instrument.

1.3.1 Function related keys F1 and F2

Both keys **F1** and **F2** alter their setting possibility according to selected function or readout screen. The meaning of the related key is indicated on the display screen.
Example: in setmode ALT 1 the function of F1 is "**accept GPS altitude"** and the function of F2 is to set the altimeter to „**FL 1013mB pressure"**!

1.4 Display screen

Battery charge state

3-D GPS Fix

GPS number of Satellites

Flight recording

Vario Unit

Acoustic Volume

Sink acoustics

Direction North

Altimeter
ALT1 / ALT2

Compass rose

Digital Vario
with Integrator

Direction to WP

Last thermal

Analogue Vario

Speed display

Wind direction

Different. altimeter
Time / Flight time
QNH

Graphics- and Data field –
display screen

Current page dot display

1.4.1.1 Graphics / data fields display

In normal flight mode it is possible to shift the graph page by short pressure on the keys
▲UP or ▼DOWN. The number of the current page is indicated on the display bottom.
Sequence: **ALT, VAR, 1, 2, 3, 4, 5.** After switch-on the page of altitude graphics (ALT)
is always displayed.
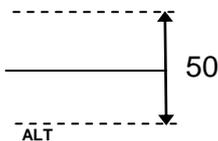
Altimeter Graphics display
In this graph is illustrated the course of altitude during the past
36 seconds. If the altitude difference is more than 50m, the scale
is automatically adapted. The height scale is displayed on the
right side. (50 /100m)
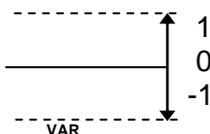
Variometer Graphics display
In this graph page is illustrated the course of Variometer during
the past 36 seconds. The scale is automatically adapted to the
flight track. The scale values are displayed on the right side.

1.4.1.2 Motor data display

For display of motor data on screen 1, 2 and 4, it is necessary that a FlyLink-connection to FL-motor 2 sensor module is actuated.

RPM 5600 CHT 180°C EGT 560°C ₁	**Motor data display (1)** Motor rotation speed (0 -12 000 rpm) Cylinder temperature (-20 - 800°) Exhaust gas temperature (-20 – 800°)
Kurs 325 Tk-off 120 Dist. 26 ₂	**Navigation data display (2)** Current track Bearing to take-off Distance to take-off
RPM 5600 CHT 165°	**Motor data display - digital / analog (3)** Motor rotation speed (0 - 12000 rpm) Cylinder temperature (-20 - 800°C)
CHT 165°C EGT 620°C	**Motor temperature data display - digital / analog (4)** Cylinder temperature (-20 - 250°) Exhaust gas temperature (-20 – 800°)

Remark: if no *FlyLink* connection is available, or if *FlyLink* is deactivated, the following indication shall appear on display screen 1, 3 and 4:

Display indication if no connection to sensor module is existing.

FL-Motor 2
suche
12345

Display indication if *FlyLink* radio connection on the flight instrument is deactivated.

FL-Motor 2
Aus

1.5 The setting menus

By long pressure on the **MENU** key access is given to the Menu setting mode. Using the keys ▼ and ▲ one of the Menu items (flashing line) is selected and pressing the **OK** key gives access to the corresponding menu or submenu.

Flashing values can be modified by use of the ▲UP or ▼DOWN key. By pressing the **OK** key the setting is memorised. Using the ESC (escape) key operates the return to the normal flight display screen. If there is no keystroke effected during 30sec., the instrument returns automatically to the flight display screen.
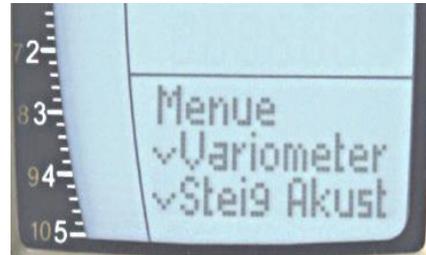
1.5.1 Instrument settings

All settings, such as pilot's name, time zone, battery type, as also all units for display of altitude, speed, temperature etc., can be adapted and adjusted according to personal preferences under *Main Menu → Instrument settings*.

1.5.1.1 Keypad functions for text - input / editing

After call-up of Menu Pilot → name, Glider type or ID, the 1st digit of the name is flashing. By use of softkeys ⬆ and ⬇ the required character is selected, there are numbers, letters, as also a series of special characters available for selection.

By use of keys ⬅ ➡ one moves to the next or to the previous letter.

By use of key **A-a-1-&** it is possible to shift between capitals and small letters, as also between numbers and special characters.

By long pressure on the same key one character is deleted (Rub out).

The name can be up to maximum 16 characters long.

By use of key **OK** the entry of one line is saved and the cursor jumps to the next line.
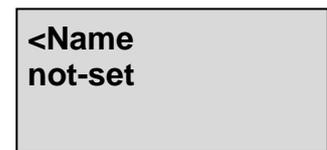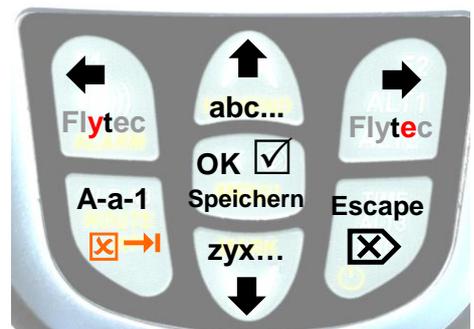
Tip: by use of the PC Flychart software it is possible to set easily and comfortably all instrument characteristics, as also to save and store the data in a file. It is also possible to manage several instrument settings, which can be transferred back again to the IQ Motor ECO-GPS at any time.

1.5.2   Menu Overview

Menu	Display IQ Motor	Setting range	Page
Flight memory	**FlightMemo**		25
>Flights (Flight memory)	Flights		25
> Recording interval	Rec Interv	1 – 60 sec.	25
> Recording mode	Rec Mode	Auto / Manual	
> Delete all flights	Delete		25
FL Motor 2 FlyLink	**FL Motor 2**		**21**
> FL Reception on / off		On /off	20
> FL Box No.		0 - 65500	20
> RPM Alarm	RPM Alarm	0 – 13000 rpm	22
> CHT Temp. Alarm	CHT Alarm	0 - 250 °C	22
> EGT Temp. Alarm	EGT Alarm	0 - 800 °C	22
Variometer	**Variometer**		**14**
>Digital Vario Integrator	Digital	1 – 30 Sec.	14
>Basic filter	Filter	0 – 1 – 2 – 3	15
>Threshold last Thermal	Threshold L	0,5 – 3,0 m/s	15
Climb Acoustics	**Climb Acoust**		16
>Climb Threshold	Climb Thresh	0 – 20 cm/s	16
>Basic Frequency	BasicFreq	600 – 1400 Hz	16
>Frequency Change	Freq Change	0 – 1 – 2 – 3 – 4	16
>Pitch Change	Pitch Change	0 – 1 – 2 – 3 – 4 – 5	16
>Pitch Mode	Pitch Mode	lin. / exp.	16
>Pre Thermal Threshold	PThermThresh	0 bis -1,0m/s	16
Sink Acoustics	**Sink Acoust**		17
>Sink Threshold	Sink Thresh	- 0.1 … 20.0 m/s	17
>Basic Frequency	BasicFreq	300 – 1000 Hz	17
>Sink Alarm	Sink Alarm	- 0.1 … 99.9 m/s	17
Speed	**Speed**		
>Stall Alarm	Stall Alarm	0 – 10 … 99 km/h	18
>Wind vane corr.	Correktion	50…100 … 150	18
Pilot	**Pilot**		28
>Pilot's name	Name	16 characters	28
>Glider Type	Glider Type	16 characters	28
>Glider ID	Glider ID	16 characters	**26**
Instrument Settings	**Inst Sett**		
>Time zone	Time Zone	+/- 13 Std.	28
>Alt 2 Mode	Alt 2 Mode	GPS / FL / Inv.A1 / Relativ /	13
>Units	**Units**		
Altimeter	Altitude	m / ft.	
Speed / Distance	Speed Dist.	kmh / mph / kt	
Temperature	Temperature	°C / °F	
Pressure	Pressure	hPa / inHg	
Vario	Vario	m/s / ft.Min*100	
Distance	Distance	Km / miles	
Time	Time	12h / 24h	
Coordinates format	**Coordinates**	dd.ddddd / dd'mm.mm /	

			dd'mm'ss	
Factory settings				
>_Pressure sensor zero point_	Press. Offs.		+/- 10 hPa	
> Set instr. to original condition	Org. Cond.		Original condition	
> Device / PCB No.		S/N No.	Info SN No. / PCB No.	
> _Sensor Adjustment_	Intern		Code	

2   Functions

2.1   Altimeter and atmospheric pressure

The IQ-MOTOR-eco GPS provides 3 altitude displays and 1 QNH pressure indicator.

ALT1	The altimeter absolute altitude shows the altitude over sea level. (meter „m" or feet „ft")

ALT2	alternatively: - GPS altitude
	                - Flightlevel pressure altimeter display in relation to 1013hPa
	                - meter or feet inverse to ALT1 (Absolute A1)
	                - Relativ Altimeter

ALT3	The altimeter relative altitude shows the altitude towards a reference point.
QNH	Actual air pressure at sea level in relation to ALT1

2.1.1   Altimeter Alt1, absolute altitude

Shifting between display screens Alt1 and Alt2 is effected by shortly
pressing the Alt1/Alt2 key.

Altitude display **Alt1** indicates always the absolute pressure altitude above sea level.
After switch-on the altimeter ALT1 is automatically adjusted to GPS altitude by the instrument.
After switch-on the display is flashing until the GPS-receiver has calculated a precise
altitude for adjustment.

Units m / ft. - re-setting: see *Menu → Instrument settings → Units*

2.1.1.1   Manual setting of altimeter Alt1

Set mode A1 of altimeter is called-up by long pressure on the ALT1
key. The possible settings are shown in the information field.
By brief pressure on one arrow key the readout value can be adjusted
meter by meter. Under keystroke the display shall be
changed automatically until the key is released.
Due to this adjustment the QNH display is also altered.
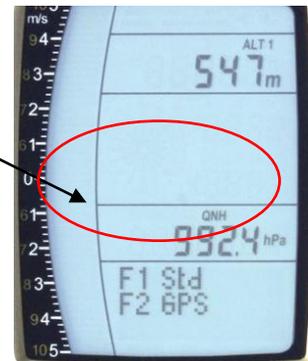
Adopt GPS altitude with F2 key
By brief pressure on the **F2 key** it is possible to adopt the GPS
altitude. Please consider that the GPS-receiver does not always provide
the reliable altitude value! In case of poor Satellite constellation or bad
reception, altitude deviation of +/- 50 m will occur!

Setting altitude to pressure standard 1013hPa with F1 key
By brief pressure on the **F1 key** the altitude is set to 1013hPa (Flightlevel).

Tip: *If the user does not know the altitude of his present location, he may operate
the QNH field and, using the arrow keys, by changing the altitude value until it matches
the actual QNH as per weather forecast or indication issued by air traffic management.*

2.1.2   Altimeter display Alt2

Shifting between display screens Alt1 and Alt2 is performed by briefly
pressing the key Alt1/Alt2.

The following values can be displayed on the altimeter screen ALT 2:

GPS Alt.   = display of GPS altitude
Flight-Level   = Flightlevelaltitude in ft relatingto 1013 hPa e.g. display Fl 14 stands for being in
                     Flight Level 1400 ft (display in steps of 100 ft)
ALT1 m/ft-Inv= display of altitude ALT1 inverse to unit of ALT1 in **ft** or **m**
Relative   = the **relative altimeter** displays altitude with reference to a point.
                     Altitude setting of this point of reference can be set in A2 set mode at
                     anytime.

2.1.2.1   Manual setting of altimeter Alt2 (A2 relative mode)

Prolonged pressure on the **ALT2** key during ALT2-display activates the instrument into
setting mode.
By briefly pressing one arrow key the display indicator can be adjusted meter by meter.
The displayed value is changed automatically as long as the key is pushed until it is
released.
*Tip: the relative altimeter can be used for example for measuring the superelevation above
landing site. For this purpose ALT2 will be reset to zero related to the landing site altitude.*

2.1.2.2   Altimeter display Alt2 - definition

Altimeter A2 mode can be defined in the menu (*Main Setup Menu → Instrument Settings →
Alt2 mode*).

*Tip: in altimeter display screen ALT2 altitude ALT1 can be selected in ft (inverse to unit ALT1
in m). This information may be of importance when being in contact with the air traffic controller of
Restricted Areas (CTR's).*

2.1.3   Altimeter display Alt3 (differential altimeter)

Altimeter **Alt3** is in any case a differential altimeter. It indicates always the difference in regard
to the altitude value on which it has been reset to zero for the last time. This function is often
required to measure the elevation above the start site, or to detect easily during the flight in a
weak thermal the height gain – or loss.

Example: *altitude ALT3 is set automatically to 0 m at start site, after take-off the altitude
display Alt3 shall always indicate the altitude above start site.*

Reset altitude ALT3 to 0m
*By brief pressure on the **CLR ALT3** key the altitude ALT3 may be reset to 0m at any time.*

2.2   Variometer functions

2.2.1   Analog-Vario

The most important indication for a non-motor driven
aircraft is without any doubt the Variometer.
It displays the vertical speed in meter/second and informs
the pilot about the actual climb or sink rate.
It is only possible for the pilot by using the Vario (and its
accompanying acoustics) to determine the most efficient
thermal climb, and in the opposite situation, to recognise
when he is sinking too rapidly in downwind which he should
leave at best speed.
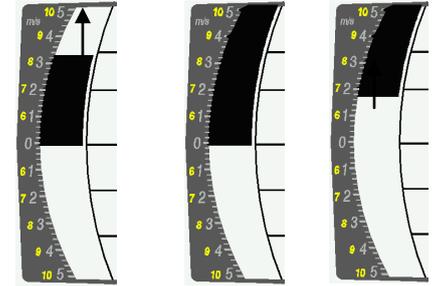
Vario 3.2	5,0	6.8m/s

The scale of the analogue display is consistently 0,2 m/s over both scale ranges! (Flytec AG Patent!)
The range of the first scale extends from 0 up to +/- 5m/s.   Thereafter the scale display switches
automatically to the second scale range which extends from 5 up to 10m/s. The second scale is
afterwards displayed with a white bar on black field.

2.2.2   Digital-Vario   (average value-Vario)

The Digital Vario has a scale of 10 cm/s and an extensive measuring range of up to +/- 100 m/s.
It is therefore also appropriate to display and record even measuring flights up to the free fall.

2.2.2.1   Average value-Vario (integrating Vario)
The digital Vario display can be set under *Main Setup Menu → Variometer→ Digital* as average
value Vario (also designated as integrating Vario) with a time constant of 1 to 30s. The values are
recalculated per second and indicate the average value of climb or sink rate within the adjusted time
span. At gruff narrow hillside up-wind this helpful readout may be used to determine if a circle or aft
flight would provide better climb values. Integration time should be selected more longer in accordance
to the thermal's roughness.
Based upon practical experience, we recommend an average value of 5 - 10 seconds.

2.2.3   Variometer Acoustics and volume level (Sound)

In order to enable the pilot to follow the current climb- resp. sink rate without looking on the
instrument, the Vario-Acoustics generate a tone sequence dependent on the value data.
It varies in relation to climb- and sink rate in tone pitch, as well as for interval frequency
(number of beep tones per second).
The Vario-Acoustic corresponds always to the value of Analogue-Vario and is therefore
reproducing the direct values, i.e not the average values being selected in the digital Vario
readout screen.
The Variometer Climb- and Sink Acoustics can be adapted with high flexibility on the IQ-BASIC-GPS
in manifold fields to one's individual and personal requirements.

2.2.3.1   Audio level

By use of the key **Audio level** the sound volume of the built-in loud speaker is
adjusted. Indeed five sound levels may be set, from soundless to maximum
sound volume. The selected value is displayed with the Audio Symbol   and is
confirmed with a short beep or double-beep. The selectable sound levels are:
0 - 25% - 50% - 75% - 100% - 0.
Short pressure on the Audio Level-key shall increase the volume level each time
by 25 %.

2.2.4   Menu Settings Variometer

Tip: By use of the PC Software Flychart *Extras -> Flight instrument Options*, all instrument characteristics can be set easily and comfortably.
By use of the feature tone simulation the adjusted values can be checked easily!

2.2.4.1   <u>Digital-Vario Integrator</u>
Main Setup Menu → Variometer → Digital
Setting of average value time constant from 1 – 30 seconds for the digital Variometer display.

2.2.4.2   <u>Threshold value last thermal</u>
Main Setup Menu → Variometer →
Threshold for the display arrowhead of last thermal, the range can be set between 0,5 up to 3 m/s. The thermal arrowhead in the compass rose points to the direction, where the integrated Vario was the last time higher than this threshold value.

2.2.4.3   <u>Basic filter (Turbulence filter)</u>
Main Setup Menu → Variometer → Filter .

The response characteristics of Variometer display and of climb- or sink acoustics can be adapted within a wide range in accordance to the pilot's needs or the weather conditions.
In order to simplify the settings, Flytec has defined 4 basic- resp. turbulence filters.

Variometer - sensitivity / response characteristics

Filter No.		
0	weak filtering	for very calm air in Winter
1 Default	normal filtering	for enjoyment thermal with light turbulence
2	high filtering	thermal with turbulence
3	very high turbulence filtering	for very rough and strong thermal

2.2.5   Variometer - Acoustic settings

The climb tone is a frequency modulated beep tone whose pitch and beep tone sequence rises rhythmically at increasing climb rate. The pulse/pause ratio is 1:1.

Following settings are possible under *Main Setup Menu → Variometer Climb Acoustic and Variometer Sink Acoustic*:

Climb Acoustic settings:

Climb threshold:	= climb acoustic threshold
Basic frequency	= basic tone pitch Vario climb
Frequency change	= increase of tone pitch (frequency modification per m/s)
Pitch modification	= increase of beep interval per m/s
Pitch mode	= linear or exponential increase of climb acoustic
Pre-Thermal Threshold:	= trigger point of Pre-Therm.acoustic

Sink Acoustic settings:

Sink threshold:	=Sink tone threshold
Basic frequency	=basic tone pitch Vario sink
Sink Alarm	=Sink alarm threshold
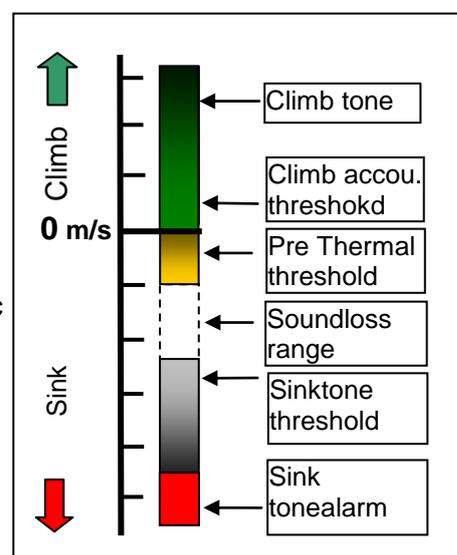
2.2.6   Variometer – climb acoustic

2.2.6.1   Climb acoustic threshold
Main Setup Menu → Variometer Climb Acoustic → Climb threshold

In order to avoid the climb acoustics get started with immobile aircraft, for ex. at take-off area, or at only slight climb, the climb acoustics starting point can be set in the range from 0 cm/s up to 20 cm/s.

2.2.6.2   Basic frequency
Main Setup Menu → Variometer Acoustic → Basic frequency
The frequency audible at starting climb tone.
Range: 600 -1400 Hz (factory setting 700 Hz)

2.2.6.3   Variometer climb acoustic → Frequency change
Main Setup Menu → Variometer Acoustic → Frequency change
The interrelation may be seen on graphic below.
Range: 0 up to 4 (factory setting 2)
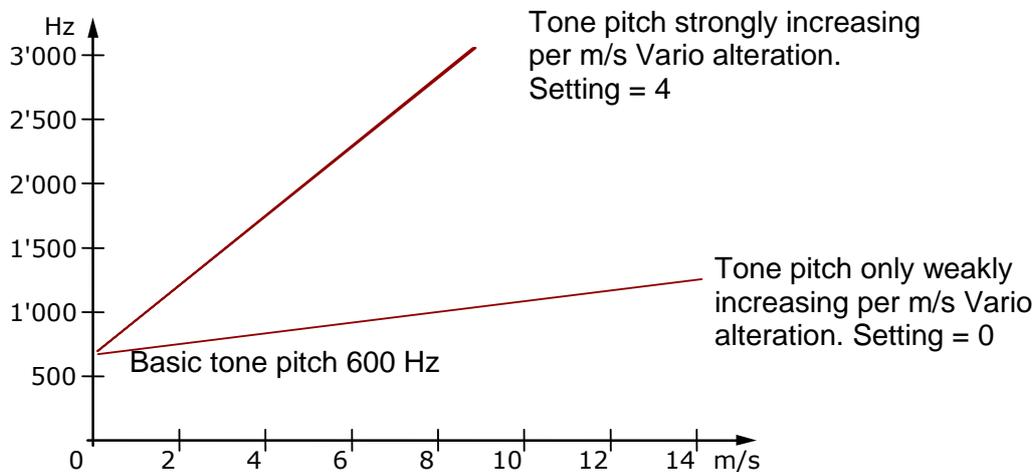
2.2.6.4   Variometer Climb acoustic → Pitch change / increase of tone interval per m/s
Main Setup Menu → Variometer Acoustic → Pitch change
Main Setup Menu → Variometer Acoustic → PitchMode

The interrelation may be seen on graphic below.
Range: 1 up to 5 (factory setting 2)
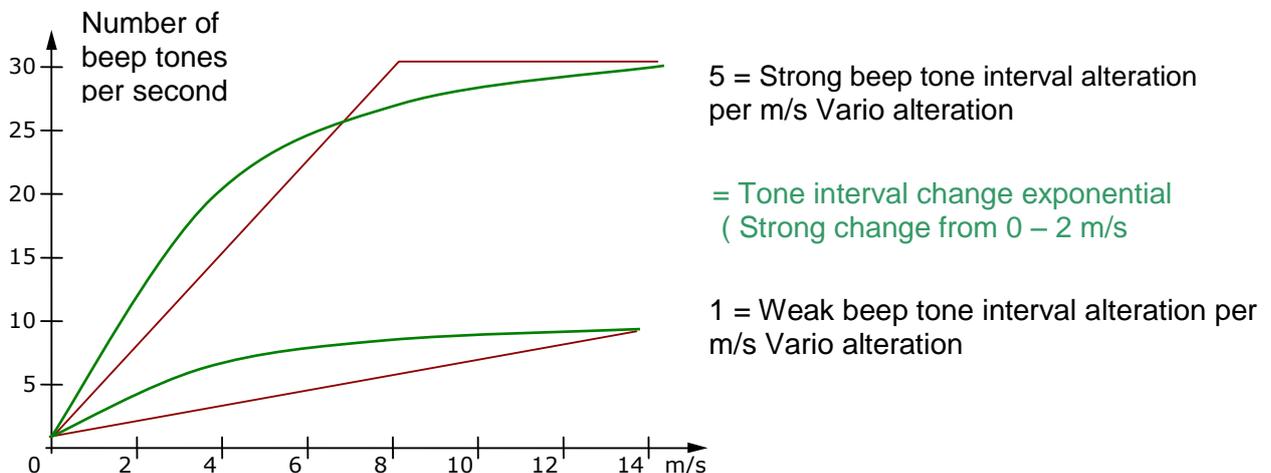
2.2.7   Pre-Thermal Acoustic Threshold
Main Setup Menu → Variometer Climb Acoustic → PThermalLim

At this position it is possible to activate a „Pre-zero" climb acoustic signal!
The trigger point of this acoustic signal can be adjusted within the range of -1,0m up to 0 cm/s. The „Pre-zero Acoustic" is particularly useful in the level flight range! The sound differs clearly from climb- and sink vario!

2.2.8   Variometer – sink acoustics

2.2.8.1   <u>SinktoneF = Basic Tone pitch Variometer Sink</u>
Main Setup Menu → Variometer Acoustic → Basic frequency

The basic tone pitch is the pitch at starting sink tone. The sink tone is discreetly heard with deeper sound pitch at increasing sink speed, and is slowly increasing in frequency again when approaching rising air. The basic tone pitch of sink acoustics may only be set equally to the basic tone pitch for climb acoustics.

<u>Sinktone threshold</u>
Main Setup Menu → Variometer Acoustic → Sinktone Threshold

Application point

As for climb acoustics, the application point of sink acoustics can be selected. The threshold can be set by use of the up▲ and down▼ arrow keys between -0,1 and -20,0m.

During flight the sinktone can be switched-on or switched-off by prolonged pressure on the **key Alarm →** Sinktone by use of the keys F1 / F2.

<u>Sink Alarm threshold</u>
Main Setup Menu → Variometer Acoustic → Sinkalarm threshold

The sink alarm is a continuous tone which sounds upon reaching the sink alarm threshold.

Application point

The alarm threshold can be set by use of the up▲ and down▼ arrow keys between -0.1 and -20m.

During flight the sinktone can be switched-on or switched.-off by prolonged pressure on the **key Alarm →** Sinktone by use of the keys F1 / F2.

Tip: by use of the PC-Software Flychart 4.52 *Extras – Flight instrument Options -> Acoustic*, all   Vario   acoustic   characteristics   can   be   set   easily   and   comfortably.

2.3　Speed

Apart from Vario and altitude the flight through the air (= Airspeed) is indeed one of the decisive messages. By use of a precisely indicating speedometer it is possible to increase air safety.

2.3.1　Wind vane sensor

The IQ-MOTOR-eco GPS is provided with a very precise speed measuring system, i.e. one entry with evaluation electronics for Flytec wind vane sensors. Advantage: wind vane sensors trigger correct readout already from approx. 1 km/h speed, these sensors are also perfectly suitable for detection of weakest wind strength values at starting site. (Wind vane sensor optional)

The speed indicator can be precisely gauged by correction factor.
Factory setting is 100 % by default.
Main Setup Menu → Speed → Sensor setting wind vane
Due to these speed dependent correction factors it is possible to slightly rectify faulty measurements caused by inappropriate placing of the sensor inside lee position, or of the blister in front of the body.

The wind vane sensor measures the true airspeed (True Airspeed = TAS).
With plugged wind vane sensor the speed indicator shifts from GND to AIR (airspeed).
GND speed is displayed on page 4 together with the glide ratio air and glide ratio ground.
Remark: *page 4 can only be selected with plugged wind vane sensor.*

2.3.2　Stallalarm
This function is only enabled when using the optional wind vane sensor.
This alarm is consisting of a deep tone with short beeps and always with 100% sound level.
Under *Main Setup Menu → Speed → Stallalarm* it is possible to determine the speed of *s*tallalarm.

If the stall alarm is set to the value of 0 km/h, the alarm is then switched-off.

During flight the stall alarm can be switched-on or switched-off by prolonged pressure on the **key Alarm →** Stall by use of the keys F1 / F2.

2.3.3　Speed without speed sensor

Frequently pilots fly **without any speed sensor**. In this case only the speed over ground (GPS speed) shall be displayed.

2.4   Time of day and Date

Remark: time of day and the date do not need to be adjusted. They are taken automatically from the GPS-Receiver. However, any time zone difference from UTC (World Time) needs to be entered with a positive value if the time zone is located East of Greenwich, or a with a negative value, if it is at the West of it. Time zones with 0.5h UTC offset are also adjustable.
This setting is entered with *Main Setup Menu → Instr. Settings → Timezone.*

Important: all internal calculations of the instrument are made in UTC (Coordinated Universal Time). The local time is just used as „Time" display and calculates simply the UTC plus or minus the UTC offset.
For the time of take-off the local time is binding.

2.4.1 Flight duration (flight time)

The take-off time is automatically recorded. For this purpose the GPS needs to be activated.
Moreover, only flights which are lasting more than 2 minutes are log recorded.

The flight time and all min. / max. values are presented on the Info page → short pressure on the key *i-* Info. After 20sec. the previous display screen shall automatically reappear again.
See also page: 25 Flight logbook and Flight Analysis .
The unit will also recognise autonomously the end of the flight. It is the basic condition for the end of the flight that neither speed over ground has been measured with more than 10 km/h during min. 60s, nor that the Vario has pointed to more than 0.1 m/s.

2.5   Temperature

The IQ-MOTOR-eco GPS is provided with a temperature sensor for the temperature compensation of pressure sensors, as well as for the automatic display contrast control.
Temperature reading is possible in degree Centrigrade or Fahrenheit. *Main Setup Menu ⇒ Instr. Settings ⇒ Units.* **Remark:** the temperature sensor measures the internal circuit board temperature, but in no way the outside air temperature! The inside temperature of the casing may be higher or lower than the ambient air temperature, especially when the instrument is exposed to direct sunlight.
The Temperature is displayed on Page 1.

3   Motor data from radio sensor FL-Motor 2

The IQ MOTOR-eco GPS is fitted with a ***FlyLink***® transmitting- and reception module and is therefore capable to receive and to analyze the data of motor rotation speed and also both temperatures CHT (Cylinder head temperature) and EGT (Exhaust gas temperature) from the radio sensor module FL Motor 2.

Caution: important remark!

Modern high-performance ignition systems, such as utilized on a large number of para-motor systems, generate partially extreme HF interference pulses. These interferences may be very disturbing for the radio transmission from the *FlyLink* transmitter to the Vario. Obviously we have mounted extensive HF filters, but in rare cases disturbances may in fact be very strong, so that no safe signal transmission will be possible!

Sometimes the careful grounding of the ignition system to the motor housing will remedy. We recommend to examine this ground connection when using the FlyLink transmitter and to carefully complete, if applicable!
Moreover, another positioning of the FlyLink module, such as a modified cable duct, may solve the problem.

3.1 *FlyLink®*

FlyLink® is an up-to-date radio network surrounding the pilot. FlyLink devices **must be registered with the serial number in the flight instrument,** in order to be recognised by the instrument. Basic settings for FlyLink can be entered in Menu → *FL Motor FlyLink.* Upon delivery there are factory settings existing, which maybe adapted to one's personal preferences.

Factory settings:

Flylink ID number : S/N Number of supplied radio sensor module
CHT Alarm: 200°C - Alarm On
EGT Alarm: 600°C - Alarm On

3.2 FL-Motor-2 *FlyLink* Sensor Module

3.2.1 Device overview

Switch-on:
The device is **automatically switched-on** by an internal motion sensor.

Switch-off:
The device is **automatically switched-off**, when for 30 minutes no RPM signal was received, or when the flight instrument was turned-off.

Batterycomp.

FlyLink
LED

Battery
LED

Holder with
vibration damper

Sensor
connections
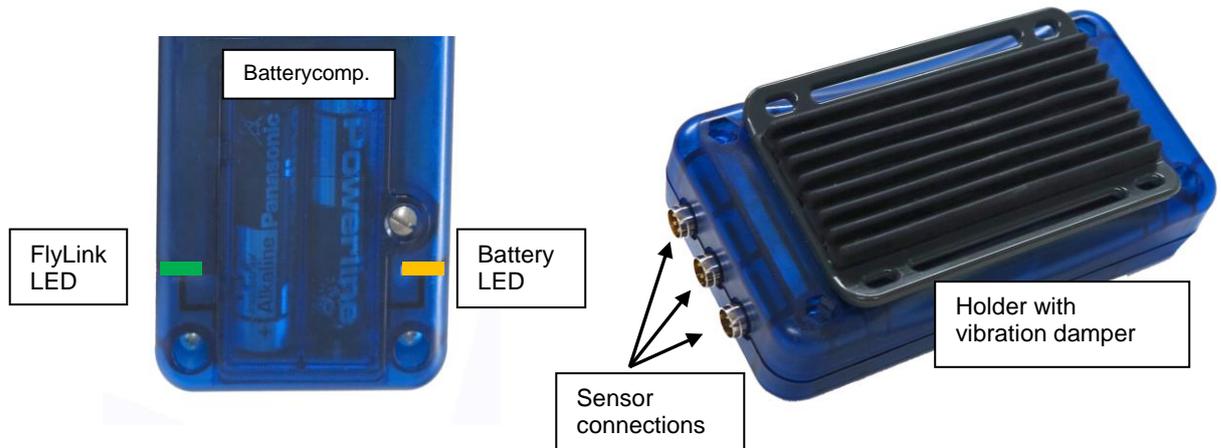
FlyLink LED
🔵
🟢   Off = no connection to flight instrument
🟢   Green flashing 2" = connected without RPM signal
     Green flashing 4" = connected with RPM signal

Remark: if no connection to flight instrument is available, the following notice is displayed on the flight instrument:

> **FL-Motor 2**
> **suche**
> **12345** 1
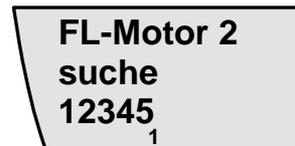
Battery Status LED (flashing at the rhythm of Flylink LED)
🟢
🟡   Green = good
🔴   Yellow = battery should be replaced soon
     Red = battery not sufficient for correct operation

The battery capacity of 2 AA Alkaline batteries is sufficient for more than 200 flying hours!

Remark: at low battery capacity the following message is shortly displayed on the flight instrument every 30 seconds:

> **FL-Motor 2**
> **BATT**
> **10%** 1
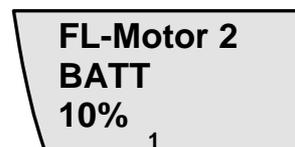
4   Sensors

4.1   Motor rotation speed

Motor rotation speed is captured via a magnetic sensor. By contrast to the capacitive method with one wire over the ignition line, the magnetic sensor captures the ignition current only if the spark effectively ignites. For this reason the capture is much less vulnerable than the capacitive detection.
Moreover, the sensor is monitored in regard to wire-breakage.
The direction of mounting the sensor on the ignition wire does not matter.

4.2   Cylinder head temperature sensor

The temperature is captured by means of a thermocouple type K.
(The spark plug CHT sensor is supplied as a standard).

4.3   Exhaust gas temperature sensor (in option)

Upon request it is possible to supply an EGT sensor with a thermocouple – plug pair.

For each sensor it is possible to set an alarm level in menu *FlyLink*.

During flight it is possible to switch-on or to switch-off each alarm by long pressure on **key Alarm → Sensor x,** and on key F1.

5   Navigation

Navigation activities without operating GPS-Receivers is unthinkable these days. Indeed
a chain of satellites is orbiting the Globe. It provides the possibility to determine worldwide
one's own position very precisely, if minimum 4 satellites are received simultaneously.
The IQ-MOTOR-eco GPS calculates several readouts by position determination made by GPS.

5.1   Assessment of GPS reception quality

The IQ-MOTOR-eco GPS is fitted with a 20-channel GPS-receiver which is featured with lesser
power consumption and also a significantly shorter satellite detection time. Precision of position is
between 5 to 40m. As an average one may assume approx. 20 m.
Because the receiving strength of the satellite signals is only approx. 1/1000 of mobile radios, these
radio sets and other disruptive factors (like notebooks) should be operated as far away as possible
from the IQ-MOTOR-eco GPS.

The number of received satellites is shown on the upper right side of the bar scale. The longer the bar,
the more precise the reception quality is.   **GPS**

As soon as the instrument has sufficient GPS satellite reception after energising (min. four), the
symbol **GPS** is shown. All functions related to GPS mode are operative when the GPS symbol
is visible.

5.2   Compass and flight direction
In contrast to a standard magnetic compass which is oriented to the magnetic lines of force of the
Globe, the GPS compass can show direction only when the user moves about. However, it has the
advantage that it is not subject to any grid deviation and does not show any deviation as a result of
iron or any magnetic material either. Its zero point always corresponds with true geographic north
(= 0 or 360 degrees).

The course, that is the flight direction **(=** Track), is calculated from a series of positions. If the user
remains stationary at the same location, then the course (track) and compass needles are undefined.
The exact course, (this is the direction in which the user travels over ground), is always at the top of the
compass, but can also be read in the display *Track.* The course is displayed from 3km/h speed.

### 5.2.1   Pointer illustration in the compass rose

| Compass North | - Bearing take-off site (pointer flashing) |

5.2.2 Track and Bearing

Track is the direction into which an aircraft is moving over ground. The geographic true North
is always 0 or 360 degrees. (East = 90 ; South = 180 ; West = 270 Grad)
Bearing is the direction (according to the system described above) to a selected Waypoint seen
from the viewer.
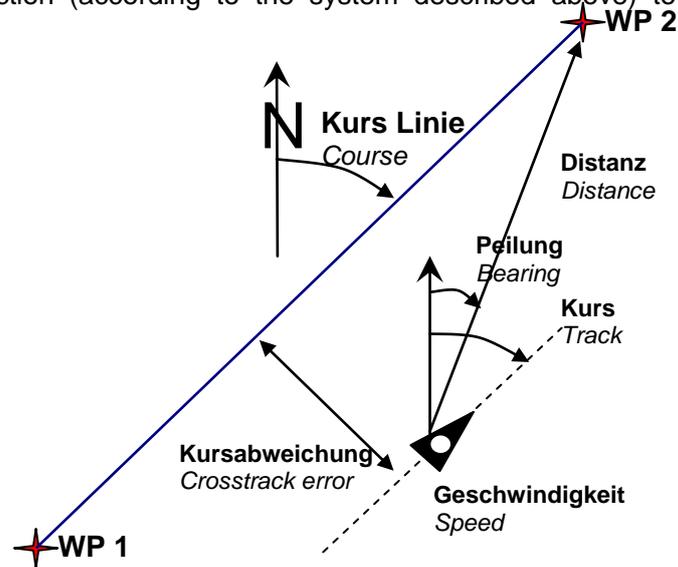
Caution: Track or Tracklog is also called the sequence of recorded positions during one flight.

5.3 Coordinates / Position

For display of the current position on the earth's surface the IQ MOTOR-eco-GPS applies the
geographical map system named **WGS84** (World Geodetic System 1984). This reference system
assumes that latitude is measured from the equator (0 degrees) to the North Pole, 90 ° N, and to
the South Pole - 90 ° S. Longitude is measured from the Greenwich zero meridian (near London),
East is counted positive and West is negative up to +/-180°.

In Basic Settings / Coordinate Format the data entry format is selectable between:
  1) *degrees minutes decimal places of minutes (dd°mm.mmm)* (*factory setting*)
  2) degrees minutes seconds (dd°mm'ss")
  3) degrees decimal places of degrees (dd.ddddd)

Basically one should always try to use possibility no. 1   (=factory setting), because only this format is
using exactly the same calculation format as the GPS receivers do. With all the other formats rounding
errors could sum up to 20 m.
It is exclusively calculated with the WGS84 system. Differing geodetic systems are no longer
selectable.

5.3.1 Display of actual coordinates

If the IQ-MOTOR-eco GPS receives satellites by GPS-Receiver, the actual position is displayed
in the information field of the instrument by briefly pressing the key *i Info.*
After 20 sec. the previous display screen will automatically reappear. This function is useful in
relaying your location to some person after landing for your pick-up from there. Also when entering
a Waypoint with **WP → OK** *Memorise Pos.* the coordinates are displayed.

6   Flight-Memory and Flight-Analysis

6.1.1   Flight logbook and Flight Analysis

The recording mode does not need to be specifically activated. Each flight is automatically saved.
The flight memory provided with the IQ-MOTOR-eco GPS not only records flight altitude but it also
logs the position and the GPS-altitude of the pilot in the WGS84-coordinate system.
In *Main Setup Menu → Fight memory → Rec.Intervals* it is possible to set the recording
interval. The selected value determines the time interval in seconds according to which a new
data set is entered into the memory. The lowest value is 1 second, which corresponds to a
recording time of approx. 4 hours. At the maximum value of 60s interval, the recording time
will add up to approx. 291 hours.

For the normal OLC recording the *Rec.Interval* is recommended to be between 5 and 10sec.
Hereby also narrow curves are well recognisable and the number of data points for the external
calculation of the OLC points is kept conveniently clear. Factory setting is 10 sec.

For the start of a flight the following agreement is applicable:
Start is recognised as soon as groundspeed reaches
for at least 5sec. more than 10km/h or if altitude difference
of more than 30m was detected within 60sec., or the Vario
value higher than 1,5 m/s during at least 5sec. was performed.
In each case the previous flight history covering 5 minutes
before take-off is logged into the memory of the IQ-MOTOR-eco
GPS.

The end of the flight is recognised in automatic recording
mode, if less than 10km/h GPS-speed or air speed was
detected during min. 60sec. and also no Vario higher than +/-
0.1m/s was performed.
The instrument displays automatically the flight analysis page
after end of the flight. By brief pressure on the **ESC** key, or
after 30sec. the instrument shall be switched-off automatically!
Tip: if during display of flight analysis page the OK key
is actuated, the device is not switched-off but returns to
normal operation mode.
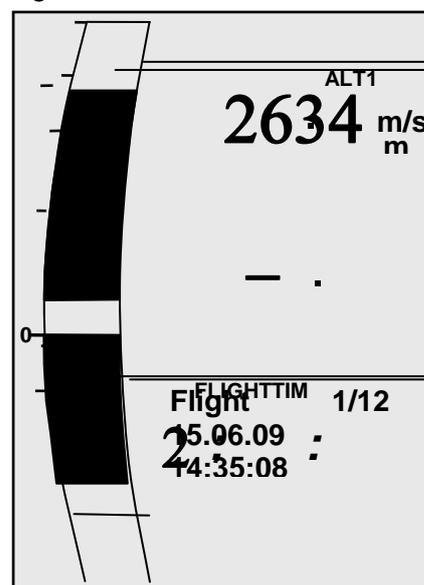
Caution: make sure before take-off that the GPS-Receiver indicates to receive at least 4 Satellites
and that the **GPS** symbol is displayed.
Begin of the recording is visible by the running „Flight time"- counter or the **REC** symbol above the
satellite indicator.

Comment 1: in the Flight Analysis min. or max. values are displayed which occurred during the flight.
The display screen is updated every second and saved for the flight analysis. If one undertakes the
download of such a flight afterwards on the PC using a program such as SeeYou, CompeGPS,
MaxPunkte etc., these programs are only appropriate to evaluate the flight records in IGC format.
In the IGC file peak values and Variometer values are not recorded! In the IGC file are saved
per track point the time (UTC), position, barometric altitude, GPS-altitude and True Air Speed.
Most programs calculate the Variometer values from the altitude data. If for instance, one
has set a recording interval of 10sec., and has covered a height difference of 15m during these
10 seconds, there will be calculated a Vario value of 1.5 m/s. However, during this time a peak
Vario value of 2,4m/s may have been performed. The flight analysis peak values are also presented
in Flychart and are subject to separate readout.
Comment 2: although the instrument is capable to store up to 50 flights, we recommend to save the
flights in regular intervals from the instrument to a PC and to reformat the flight memory afterwards
under *Main Setup Menu ⇒ Memory⇒Delete all Flights.* This procedure ensures the safe data storage
of your precious flights and that the instrument may perform new recordings again with a „refreshed"
flight memory.

7   Data transfer

The memory of the IQ-MOTOR-eco GPS contains all data entered by the pilot, such as Waypoints, Routes, name of the pilot etc., as well as the automatically recorded track log points of the flights which were performed.
Each one of these track log points contains time of day, position, GPS-altitude, barometric altitude, as well as the flight speed. In this way, it is possible to graph the Barogram, variogram, speed diagram and course of the flight on a map for later evaluation. In Flychart 4.52 it is even possible to show the flight on the PC monitor in 3D over the corresponding landscape.
For this purpose the program Google Earth needs to be installed, along with an active internet connection.

7.1   Data exchange via PC

The basic equipment of the IQ-MOTOR-eco GPS includes a data cable for the USB interface Mini B. Due to this feature the data transfer can be carried out in both directions. The data transmission is effected via serial interface COMX with: 57.600 baud; 8 databit; 1 stopbit; no parity; no Xon/Xoff.

The IQ-MOTOR-eco GPS can also be operated for **data readout and entry** via USB interface:
*   entire instrument configuration (Menu all functions)
*   list of Waypoints
*   list of Routes

Only readout of flights saved in the flight memory is possible.

> **Important:** for transmission of a.m. data the connection cable to the PC may only be plugged into the IQ-MOTOR-eco GPS **while it is switched-off.** The instrument shifts automatically to PC-USB transmission mode.
> **Important:** at first the USB driver from Prolific included in the scope of supply needs to be installed from the CD. For the installation of Flychart the installation of USB driver is effected automatically.

For transmission of a saved flight the instructions of the used software are to be followed.
Various software programs allow to create IGC-Files, to some extent even OLC Files.
More detailed information under http://www.onlinecontest.de/holc/ .
We recommend the use of Flychart, which you can download from the website www.flytec.ch.
With Flychart it is possible to perform all instrument settings comfortably on the PC!

7.1.1   Flight instrument settings

All settings, such as pilot's name, time zone, battery type and also all units for the display of altitude, speed, temperature etc. may be set in *Main Menu → Instrument settings* to the personal requirements. By use of the PC software Flychart, it is possible to adjust all characteristics of the instrument simply and comfortably, and to memorise and save them in a file. The management of several instrument settings is also possible, which may be transmitted again to the IQ-MOTOR-eco GPS at anytime.

7.1.2   Waypoints and Routes

Within the same Menu it is also possible to transmit in Flychart the Waypoints and Routes to the instrument. Flychart is also suitable to import Waypoint files from SeeYou or CompeGPS or Garmin for transmission to the instrument.

8   Transmitting new Software-(Firmware) to the IQ-MOTOR-eco GPS

As is the case with many other present-day instruments, there is also the possibility to up-date the software (firmware) version. Hereby even future requirements presented by pilots may be rapidly implemented. The manufacturer Brauniger GmbH shall post from time to time program up-dates of the IQ-MOTOR-eco GPS -Firmware on its Internet homepage, which can be downloaded by the user free of charge for storage and subsequent transmission to the IQ-MOTOR-eco GPS.
Double click on the file " IQMOTOR-eco GPS Vxxxx.exe" starts the program.

Now connect the USB cable with the instrument. Afterwards you can set the interface in the field Com Port, or if it is unknown to you, set to **Auto** and have thereby an automatic search prompted. The virtual COM interface should be positioned between 1 and 8. Above this value the Flasher can no longer recognise the interface.
Start the data transfer by clicking on **Update**. Then the version of the instruments's Bootloader shall appear and the relevant bit rate. The numbers appearing in the field on the right are the response data of the instrument.

Important: make sure that the IQ-MOTOR-eco GPS is **not switched-on** when the connection cable to the PC is plugged to the instrument.

Caution: never leave the PC cable hooked to the instrument for a longer period when it is turned off. Indeed this is energy consuming and the battery could be discharged unnoticed.

Tip: in Windows the characteristic noise for USB devices should be audible when the unit is plugged.

9   Miscellaneous

10 Batteries

2x Type AA, 1.5V Alkaline or 2x Type AA 1.2V NiMh Accum.
Operating time with 2 Alkaline batteries is more than 40 hours.

10.1 Batterie charge state

Upon switch-on of the instrument, the actual charge state of the batteries is displayed on the start-up display screen.

As long as the instrument is operative, the charge state is continuously monitored and is indicated with the   corresponding symbol on the display screen.

empty   half-full   full

10.2 Battery replacement

Replace batteries only, when the instrument is switched-off!

The correct battery type needs to be set under *Main Setup Menu ⇒ Instr.sett. ⇒ Battery type.*

A wrongly entered setting may lead to the result of the instrument's premature switch-off and thus provides incorrect status information!

We recommend not to use NiCd Accumulators. These batteries have significantly reduced capacity and they are less environment-friendly. Also the switching threshold is not laid-out for NiCd Accum.

Remark: the estimated operation time as mentioned before is based on normal temperatures of approx. 20 – 25 °C.
At low temperatures the batteries and accumulators have a markedly shorter service life.

In case of prolonged non-use, the batteries should always be removed!
Defective batteries may damage the instrument by leaking acid!

Corrosion damage caused by defective batteries is not covered by the warranty!

11   Additional Information

11.1   Altimeter

11.1.1 How does an altimeter work?

An altimeter is really a barograph because it doesn't directly measure altitude, but air pressure. The barometric altimeter calculates altitude from the prevailing air pressure of the atmosphere.

However, air pressure decreases with increasing altitude.

Why does pressure change with height?
Air pressure at any given point on the earth is created by the weight of air in the atmosphere above it. As air can be compressed, the pressure drop is not linear, but indeed exponential. For this reason air pressure is decreasing in altitude – one has less air above the head!

In practice, however, it is not as simple as that because of the many other factors that influence air pressure. Therefore, air pressure is also depending on temperature and of course, on weather conditions. On a stable day, temperature induced barometric variations of 1mbar may occur, which corresponds to an altitude change of approx. ± 10. Depending on weather conditions, air pressure at sea level (QNH) may vary from 950 mbar to 1050 mbar. In order to eliminate this influence of weather, the altimeter has to be calibrated at certain intervals. This means that the altimeter has to be set to a known altitude and that it must then show this value.

The basis for altitude calculation in aviation is an international formula which defines a standard atmosphere.
In the **CINA- Standard atmosphere** the basic pressure on sea level is **1013,25 hPa** (Hektopascal) at a temperature of **15°C**. Furthermore it defines a continuous temperature decrease at increasing height of **0,65°C per 100m** ascent.
Therefore is binding: a barometric aviation altimeter displays the precise altitude only if weather conditions are in exact accordance to the standard atmosphere. In practice, such compliance is more likely to be the exception!
Air weight and pressure are strongly influenced by air temperature. If temperature deviates from standard atmosphere, the display of altitude calculated as per the international formula is no longer correct. The altimeter displays during summer, when temperatures are higher, indeed altitude parameters which are too low, and during wintertime it is exactly the contrary!
Flying at lower temperatures is effectively done at lower altitude, and at higher temperatures flight altitude is higher than the altimeter displays! The deviation of 1 °C per 1000 height meters induces approx. 4 m error. (This empirical formula is valid for up to 4000m!)
If you are flying during summer through 2000 height meters in an air mass being too warm by 16 °C compared to standard atmosphere, the altimeter will then display 2 x 4 x 16 = 128m difference in altitude below real height! Based upon the internationally determined altitude calculation with standard values, this display error caused by air temperature shall not be rectified by the instrument.

Air pressure changes in relation to weather conditions. In order to compensate for display variations, an altimeter always needs to be gauged. This means that the altimeter has to be set precisely before take-off for any flight to a well-known altitude value. The IQ-BASIC-GPS sets altitude after energising automatically to GPS-altitude. However, it may also be subject to variations.
Caution: the atmospheric pressure may change during the timeline of one day up to five Hektopascal (for ex. cold front). As a result this is after all the equivalent of more than 40 meters height difference.
There is another possibility to gauge the altimeter which is to enter the current QNH pressure value.
The QNH (Question Normal Height) applied in aviation matches the current local air pressure, as it would be at sea level, so that the altimeter would indeed display 0m.
Due to this process the local pressure data recorded by the various measurement stations is area-wide comparable, irrespective of the geographical height.
The QNH-value is subject to be continuously updated and may be read in the flight weather report, or required by radio from airfields, or by enquiry on the Internet.

11.2 Navigation

11.2.1 Reception quality of GPS

The GPS-receiver ca follow up to 20 satellites simultaneously. After switch-on of the unit, it is necessary to have at least 4 satellites in reception in order to fix the position for the first time.
For the valid IGC-recording the instrument needs in any case reception of 4 satellites.
There is a table inside the receiver, **the Satellite-Almanach,** in which the path, place, and time data of all satellites are kept with reference to the receiver. The Almanac is continuously updated during signal reception. if the instrument is switched-off, the Almanac has to be re-established.
Normally the instrument recognizes its position under unobstructed view conditions after 2 minutes.
a few minutes. If the receiver is switched-off for a short time (less than 2 hrs.), the time for new position

If one is in movement, or if buildings, mountains or thick forest affect the reception of the receiver, it may take some time. Therefore, you should always look for the best possible visibility around you and the antenna in the casing should point upwards if possible. Due to the fact that receiving strength of the satellite signals is only approx. 1/1000 of mobile radios, these radio sets and other disruptive factors (like notebooks) should be operated as far away as possible from the IQ-BASIC-GPS.
The IQ-BASIC-GPS is fitted with a highly sensitive Sirf III 20-Kanal GPS-receiver, which is featured with lesser power consumption and also a significantly shorter satellite detection time.
Accuracy is between 7 to 40 m. As an average one may assume approx. 15 m.

11.2.2 Accuracy of GPS altitude

A good explanation on the GPS Altitude accuracy is found on the following website:
http://www.kowoma.de/en/gps/errors.htm

First of all the word accuracy has to be defined. On the website mentioned above you can read: "The declaration of the accuracy used by Garmin for their GPS receivers leads sometimes to confusion. What does it mean if the receiver states an accuracy of 4 m? This readout refers
to the so-called 50 % CEP (Circular Error Probable). This means that 50 % of all measurements are expected to be within a radius of 4 m. On the other hand, it also means that 50 % of all measured positions are outside of this radius.
Assuming a norm repartition, 95 % of all measured positions are within a circle of twice this radius, i.e. 8m and 98.9 % are within a circle of 2.55-fold of the radius, that is in this case within a radius of 10 m.

11.3 Flight Memory and IGC File

11.3.1 Evidence of flights – Security against manipulation

The popularity of decentralized competitions has been growing enormously over recent years. Meanwhile 26 countries have accepted the OLC (Online Contest) convention. These agreements signify that any pilot can submit flights at will over the Internet for approval and evaluation.
The submission has to be compliant to IGC-format (WGS84) and must have a digital signature.
Inside the IGC file are saved all important data of the flight in readable form. The readout of the IGC file is possible with any editor.
The FAI (**F**édération **A**éronautique **I**nternationale) and is subgroup IGC (International Gliding Committee) require a recording format which, while memorizing continuously the time of day, position and also the flight altitude. When transmitting flight data to the pilot's PC, a so-called IGC-File is created, which receives a digital signature (=G-Record), authenticating the flight data and making it fraud-resistant. Although editing and altering is possible, if only one character of the file containing the flight data would be changed, the signature would no longer be compliant to the data and the judging committee would be aware of the manipulation.
Therefore the misuse is practically impossible.

The IGC file can be sent directly to the judging committee of the OLC via the Internet.
(At present, the OLC is evaluated in Germany by the DHV).

Since the proof of a completed flight depends entirely on the GPS recording, it is important to ensure before take-off that the GPS-receiver indeed receives satellite signals. Therefore please switch-on the IQ-BASIC-GPS at least two minutes before take-off so that even pre-flight events are included in the recording.

After completion of a flight this „Digital Signature" is calculated autonomously by the IQ-BASIC-GPS and subsequently attached to the flight data file as so-called G-record. A correlative remark „Generating Digital Signature" is displayed in the information field of the instrument. As this calculation is extremely complicated, it may take several minutes following a long flight with setting of a short scan rate. Please wait until this message will disappear.

Sometimes it is helpful if one can import to Excel the raw data being stored in the IGC File in order to practice own calculations. The document providing a detailed description can be downloaded from the Flytec homepage www.flytec.ch → Support → FAQ → IGC_File.pdf

More detailed information in regard to IGC Format is available on the **FAI Website** under:
http://www.fai.org/gliding/gnss/tech_spec_gnss.asp

12 Maintenance

This premium-quality multi function instrument is fitted with sensitive sensors which necessitate a gentle handling of the instrument. Excessive pressure, as may be caused by vehemently slamming the trunk lid of an automobile, must absolutely be avoided. This also applies to storage in humid environment (humid paraglider bag).

The optimal cleanup should be performed by use of a slightly humidified, soft drapery. Optimal storage is ensured with the textile bag as was supplied along with the instrument. Self-evidently this bag needs to be clean and dry. In case of malfunction it is necessary to retrieve the batteries for min. 5 minutes from the instrument. As a result of this time span the instrument shall perform a self-test after re-installation of the power source. If the malfunction continues to exist, please return the instrument with a short but complete statement about the problem to your dealer or directly to the manufacturer Brauniger GmbH.

12.1.1 Exposure to water

If the instrument was immersed under water or was exposed to water ingress, the **batteries need to be removed immediately** in order to prevent a destructive short-circuit and electro-lysis damage.
In the case of salt water, rinse the instrument and all parts affected by the salt water with clean, hand-hot soft water in order to avoid corrosion.

Thereafter dry the instrument carefully by blowing warm air of max. + 60 °C (hair dryer).

Never place the instrument into a microwave-stove! Microwaves shall destroy the instrument immediately!

After complete drying please return imperatively the instrument to your dealer or directly to Brauniger GmbH for inspection.

Any claim under Warranty is void after a water landing.

13 Warranty

Brauniger provides the warranty that this instrument does not carry any material or manufacturing defect for the period of **two** years from the moment of its first purchase.
The warranty extends to manufacturing defects and failures for which the owner is not responsible.
The warranty will become invalid in case of inappropriate handling, or exposure of the instrument to strong heat or to water and also when unauthorised manipulations to the inner parts of the instrument have been effected.

If defects should occur within the two-years warranty period, please contact your dealer from whom you have purchased the instrument, or contact directly the manufacturer, Brauniger GmbH.

Please study this Operation Manual carefully and to its entire content before asking questions or presenting complaints to the dealer or manufacturer.

Disclaimer of Warranty:
In rare cases it might not be excluded that the instrument does not provide any data at all or incorrect data. In regard to the legal fact that it is solely the pilot who has the responsibility of The performance of his flights, the Company Brauniger GmbH shall reject any claim on damage resulting from data loss or wrong data of your instrument.

14   Technical Data

Altimeter:	max. 12'000 m - Scale 1m
Variometer:	analog ± 10 m/s - Scale 0,2 m/s
	digital ± 300 m/s . Scale 0,1 m/s
GPS:	SiRF stare III receiver
	Compass function, speed, position
Speed:	
GPS	from 1 km/h speed over ground
Wind wheel (optional)	0 up to 120 km/h
Waypoints:	200 WP
Routes:	1 Route with max. 40 WP
Max. storage time:	48 hours flight time at 10sec. recording interval
	max. 291 hours at 60sec. recording interval
Memory:	
Number of Tracklog-Points:	20'000
Number of flights:	max. 50
Flight memory min / max values	max. 50 flights
Dimensions:	138 x 74 x 23 mm
Weight:	178 grammes (batteries included, without holder)
Power supply:	2 x Alkaline batteries AA 1.5V, or 1,2V NiMH Accum.
Operation time:	approx. 40 hours

Data storage and transmission according to IGC format

PC-connection:	USB 1.1
Operating temperature:	-15 °C to +50 °C

Holders for hang gliders and para gliders are available.

Technical data are subject to be altered without prior notification at anytime. Software upgrades can be made via Internet by downloading the latest firmware version from our homepage via user's PC.

15   Approval / Conformity

Europe

Manufacturer:	Brauniger GmbH/Flytec AG
Country of manufacture:	Switzerland

Type: IQ-BASIC   Marking: CE
The instrument was tested according to following Standards and is compliant to the required Standards.
- ETSI EN 301 489-1 V1.6.1/ETSI EN 301 489-3 V1.4.1
- IEC/EN 60950-1:2006: Safety Europe.

USA /Canada
FC according 47CFR15, ICES-003, Issue 4
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Bräuniger GmbH