

IQ SERIES



Manual for:

IQ-CLASSIC

IQ-COMPETITION

IQ-COMPETITION/GPS-XC



OPERATING INSTRUCTIONS



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This operating manual is valid for the following variometers in the IQ series:

IQ-Classic

IQ-Competition as per Classic; plus integral barograph

IQ-Competition/GPS as per Competition plus evaluation of GPS data

Each instrument can be upgraded to the next higher version

Two gliders, what now?



Pilots frequently have more than one glider and often take both a paraglider as well as a hang-glider with them. So that all the settings do not have to be reprogrammed when there is a change of glider, **setting mode no. 25** of the software allows all the values specific to a glider such as stall alarm, polar, speed adjustment, time constants, etc. to be entered separately and used for two different gliders. (Set1 or Set2)

Ultralight pilots and balloonists

will welcome the fact that display A1 can be chosen in metres and A2 in feet when switching from A1 - A2.

Setting mode no. 24

Just switch on

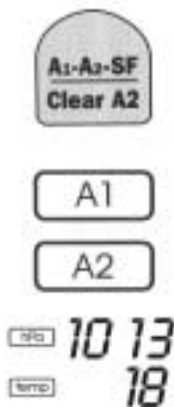


The instrument then performs an automatic self-test. All segments of the display are activated for 2 seconds.

The following are then displayed:

- 1.) The serial number and Set 1 or Set 2 active
- 2.) The year with the day and month underneath
- 3.) The number of free memory spaces in the flight diary
- 4.) And the available memory time in hours at the chosen recording interval. (Competition instrument only)

Altimeter and barometric pressure



The instrument has 3 altitude displays.

After pressing **A1-A2-SF/Clear A2** briefly, it switches from A1 to A2; both altitude displays can be changed with the ▲▼ keys.

A1 is basically the altitude above sea level.

A2 is a reference altitude that can be zeroed by pressing and holding **A21-A2-SF/Clear A2** .

Pressing the same key again briefly switches to the barometric pressure and temperature display. After 5 seconds, this display switches back to A1.

If A1 is set to the correct site altitude, the barometric pressure displayed corresponds to the QNH value; this means it is the barometric pressure that is predominant at sea level.

Barometric pressure can be changed in setting mode no. 1.

A3 totals up all the metres climbed during a flight. In thermal flights, this total is dependent on flying time. When several pilots fly the same task, the best is the one who completes the task with the least gain in altitude.

Please refer to **memo mode** to view **A3**

In setting mode no.24, it is possible to adjust the display of A1 and A2 so that A1 is shown in metres above sea level and A2 in feet above sea level.

Analog vario

The analog vario display is in steps of 0.2 m/sec.

Altogether, a maximum of +/- 10 m/s can be displayed in two sweeps of the scale.



Analog vario time constant

The response inertia of a variometer is determined by its time constant. A short constant results in a fast response but makes the display jumpy and erratic. A long time constant shows changes in climbing or sinking very sluggishly and with a delay.

In turbulent air conditions in particular, it can be beneficial to extend the response inertia of the analog vario. In **setting mode no. 20**, the factory setting can be extended from 1 second to 3 seconds. Acoustics and speed are also necessarily given the same attenuation.

Digital vario

The digital vario has a resolution of 0.1 m/s; It can be set by the user as an **average vario** (also known as an **integrating vario**) or as a **net vario**, which displays the condition of the surrounding air. It is also possible to use the digital vario as an integrator when climbing and when sinking as a net vario with automatic switching.



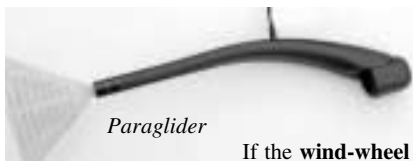
This is set in **setting mode no. 9**

Average vario time constant

This can be set in **setting mode no. 8** to between 1 ... 30 seconds. The average vario is particularly useful to determine the average rise of the thermals when circling.

Speed

Hang-glider



If the **wind-wheel sensor that is available as an accessory** is connected to the socket (SPD) at the side, the instrument will indicate your true airspeed (TAS).

Different versions are available for hang-gliders and paraglider pilots. The measuring range starts at 1 kph and extends to over 100 kph.

The display units can be selected in **setting mode no. 17**

The sensor can be recalibrated in **setting mode no. 19**. Increasing the figure by 5 points increases the speed display by 1%.

Total energy compensation (TEC)



Changes in flying speed are normally caused by the pilot's movements.


When decelerating from a high speed, climbing takes place, however, which is due to excessive speed and not to rising air; it must therefore not be displayed by the variometer.

During deceleration, the TEC circuitry will therefore pull the vario indicator down just far enough to equalise the climb gained from excessive speed. However, because the electronics cannot differentiate between intended changes in speed and air turbulence, the vario display would be jittery if TEC was 100% effective.


We recommend pilots to start at roughly 70% and to modify this value a little according to their own experience.

Acoustics and volume



By pressing the  key several times, you can choose between "Off - Low - High". The sound you hear each time displays the value selected. If you only get a brief beep, then the sound is switched off.

Descent acoustics: Off-On

Pressing the  key toggles the descent sound off and on. If there is a LONG tone, the descent acoustics are switched on. At the same time, the trigger point of the descent tone is also checked in the analog vario display.

The trigger point can be changed in **setting mode no. 3**

Stall alarm

This alarm, a fast sequence of loud beeps, warns pilots not to fly too slowly as this can result in a stall. This acoustic alarm is of major assistance when finding the right moment to push forward the control bar during **critical hang-glider landings**

The speed below which the alarm tone is triggered is entered in **setting mode no. 4**. The alarm is **deactivated** if the lowest possible value (15 kmph) is set here. It can be irritating if the stall alarm is triggered off occasionally when flying slow circles in thermals. For this reason, an altitude threshold can be set in **setting mode no. 26**. The alarm will only sound if you fly below this threshold. Naturally, this value should be adjusted according to the landing sites in the flying areas.



32 km/h

Date and time

While your IQ-Competition is switching on, the display indicates the year and the date followed by the time. The correct input of time and date is done in:

setting mode no. 10 for the time

setting mode no. 11 for the date

setting mode no. 12 for the year

Attention: FAI regulations specify that to prevent any manipulation, **time and date may no longer be modified** as soon as barograms are saved to the IQ-Competition's memory.

Deleting the memory: Please refer to 'Barograph'

Printer

An HP (Hewlett Packard) printer can be connected to IQ series instruments using a Centronics cable available from Bräuniger. The key figures for a maximum of 50 flights can be printed out as a flight diary from all instruments.

Printout of this flight list: Press the Memo/Enter key briefly to enter memo mode. Pressing and holding (3 sec) the same key will start transmission to the printer:



No	Date dd.mm.yy	Max Alt1 m	Max Alt2 m	Max vario m/s	Rec time hh:mm	Baro scan /s	Alt3 m
01	26.07.02	2456	728	7.2	01:24	05 s	3675
02	30.06.02	3043	1319	8.4	02:12	15 s	6288

Pilot : Roland Popp
 Serial number : 5799
 Time at printout : 18:29 28.07.02

Free baro memory
 hh:mm Scan rate
 75:15 15 s
 26:05 05 s
 05:13 01 s

Printout of the instrument settings



An overview of all the settings made by the user as well as a short list of the polar set can be obtained with the following printout.

Connect the printer and switch it on

Set the vario to memo mode



Press the  key quickly and "List" is displayed

Press and hold the Memo/Enter key to start the printout of the instrument's settings

Memo (flight memory)

IQ instruments can save the data for a maximum of 50 flights in their memory. A flight is only recognised as such when it lasts at least 3 minutes and there is a difference in altitude of at least 30 metres.

Press the Memo/Enter key quickly to access memo mode.

The ▲▼ keys can be used to scroll through the saved flights; the following data is displayed for each flight:

Max. climb (digital as well as analog)

Max. flying speed (TAS or TGS)

Max. altitude A1

Date

The number of the flight is displayed bottom right. A new flight is always designated no. 1; all the other flight numbers increase by one. If a barogram recording was made for the flight being viewed, the **target symbol** is also displayed.

Pressing A1-A2-SF/Clear A2 will also display:

Max. descent (digital and analog)

Max. altitude A2


Flying time (hh:mm)

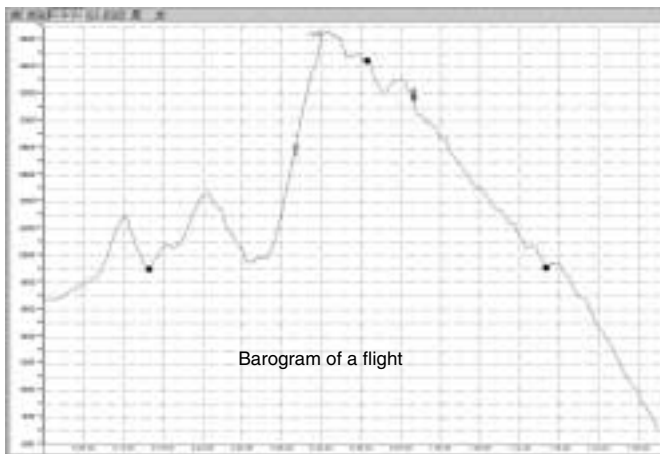
Pressing the same key again will display the total gains in altitude of the flight **A3**



Barograph (flight recording)

IQ-Competition instruments also have an on board barograph. The local altitude must be keyed in prior to starting a recording since FAI regulations specify that **the altitude may not be readjusted after the barograph has started.**


The recording is started by pressing and holding the  key; at the same time, the flying time is reset to zero. The instrument will respond with a beep and the “Flight” symbol will start to flash. The memory of the instrument not only records the altitudes but also your speed. The recording interval (scan rate) be selected by the user in **setting mode no.2** (1 - 5 - 15 - 25 sec). 83 hours of flight can be saved at the 15 sec. interval setting. For acro - or measurement flights, we recommend recording at the 1 sec. rate.



↑= Max. climb
↓= Max. descent
→= Max. speed





Inserting a marker in the barogram

If the  key is pressed while actively recording a flight, your Competition instrument will respond with a double beep. A marker is inserted into the barogram, which - during subsequent printer or PC output - creates a link with the moment when the marker was set (photograph or waypoint).

If a GPS receiver was connected to the flight instrument, the coordinates of the position are also saved. A maximum of 15 positions can be marked per flight. When printed out on a printer, the positional data is printed out immediately after the barogram. The coordinates cannot be transferred to a PC.

Deleting all recorded flights

First switch to memo mode to delete the memory. Flight no. 0 must be displayed. Press and hold the two keys  and  at the same time together for approximately. 4 sec; the instrument will respond with a beep to indicate that all the saved flights have been deleted.

Time and date can only be adjusted when the memory is empty. We recommend deleting the memory from time to time. When the memory is full, the message “Memo Overflow” will appear when the flight log is printed out. If recording is continued, the oldest flights will be overwritten. There is not much point in recording a long flight at 1 sec. intervals. The memory will be full after a few hours and the current flight will also be deleted.

Printing out a barogram (only possible in HP printer mode)



Only a direct barogram printout in the presence of an official observer is recognised by the FAI for world records. IQ-Competition instruments are approved by the FAI for the substantiation of flight records. For further information, please read the section: **Procedure for FAI official observers** at the end of the manual.

Switch your IQ-Competition to memo mode.

Select the desired flight on the flight list with the ▲▼ keys.

Transmission of the altitude curve can only be done if the flight is marked with the target symbol. Press and hold the **Memo / Enter** key to start the printout. No data output is possible while a barogram recording is taking place.

For further information, please read the section: **Data transmission to a PC**




Pilot's name

In **setting mode no. 18**, the pilot can enter his name (up to a max. of 25 characters) in the instrument. All data transmissions to a PC or a printer will then always contain the name of the owner.

The name must be entered letter-by-letter using the ASCII code. Use setting mode no.18 to do this.

Number 1 is displayed (1st letter) and, slightly smaller, the number 32 (this is the ASCII code for a space)

After pressing the **Memo / Enter** key, the set symbol will start to flash. With the help of the ▲▼ keys, the ASCII decimal value of the first letter can now be set (e.g. for the name "Hans" the number 72) after confirming with the **Memo/Enter** key a double beep will sound and the input of the second letter is requested. In this case, that would be 97, etc. Most names are shorter than the 25 characters that are possible. Press the  key to finish entering the name.



Dec	Char	Dec	Char	Dec	Char	Dec	Char	Dec	Char	Dec	Char	Dec	Char
32	Space	45	-	48	0	65	A	78	n	97	a	110	n
33	!	46	.	49	1	66	B	79	O	98	b	111	o
34	“	47	/	50	2	67	C	80	P	99	c	112	p
35	#	58	:	51	3	68	D	81	Q	100	d	113	q
36	\$	59	;	52	4	69	E	82	R	101	e	114	r
37	%	60	<	53	5	70	F	83	S	102	f	115	s
38	&	61	=	54	6	71	G	84	T	103	g	116	t
39		62	>	55	7	72	H	85	U	104	h	117	u
40	(	63	?	56	8	73	I	86	V	105	i	118	v
41	)	64	@	57	9	74	J	87	W	106	j	119	w
42	*	91	[	94	^	75	K	88	X	107	k	120	x
43	+	92	\	95	_	76	L	89	Y	108	l	121	y
44	,	93	]	96	`	77	M	90	Z	109	m	122	z

Battery and reserve battery

In this IQ series, each instrument has a main battery and a reserve battery. The On/Off switch has 3 positions.

The centre position = 0 means “Off”

Switch to the left = I means the main battery is active

Switch to the right = II means that the reserve battery is active

Main battery : Two 1.5V Mignon (AA) size batteries

Reserve battery: Two 1.5V Micro (AAA) size batteries

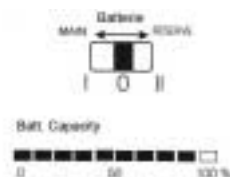
Due to their higher capacity and to avoid leaks, we recommend that you only use **quality alkaline batteries**. This will result in operating times of approximately 60 hours for the main battery and approximately 30 hours for the reserve.

If the voltage of the main battery drops, you can switch over to the reserve by moving the switch quickly so as not to interrupt the power. Battery voltage is continually monitored by the instrument and appears as a beam in the display.

Attention: When switched off, the clock and the flight-data memory are supplied with power from battery II. The main battery can therefore be replaced without any loss of data. However, if the reserve battery needs replacing, the instrument should first be switched to battery I. (There will then be no loss of data). Please note that all batteries have a lower capacity at low temperatures. It is perfectly possible for the display to indicate 50% when the instrument is warm and then to fall to 20% one hour later in the cold.

Important!

If the instrument will not be used for a longer time, please remove batteries! Even batteries seems to be “leak-proof” they can and do leak! Any damage by a leaked battery (battery acid on the circuit board) is not covered by warranty from Bräuniger GmbH!



Additional functions of the IQ instrument series

Net vario

Compared to a normal vario in which the pilot's vertical speed is displayed, a net-vario displays the rise and fall of the surrounding air. However, this will only function if a polar is saved and flying takes place with a speed sensor.

Therefore, because the display must always be zero in calm air no matter how fast the pilot can fly, this function is ideal for checking the polar set. The net-vario is also really meaningful when it is a question of deciding whether to continue a fast flight or, based on a presumed thermal, to break off the flight and enter the thermal.






The net-vario is a digital vario that is activated in setting mode no. 9.

intg

net

0	Average vario always active Time constant can be freely selected in setting mode no. 8 between 1 30 sec.
1	Net vario always active Time constant as analog vario
2	Automatic switch between net vario when descending and integrating vario when climbing.
3	Digital display of the glide ratio (Please refer to the glide ratio section)

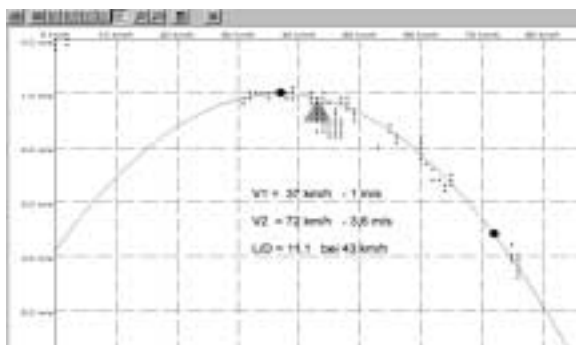
Polar

Extendet Press 
 > Setup Mode
 Use  Set Mode No 9
 > Confirm Pol 1 with Enter
 flashes
 Use  to set a new value
 > Enter
 flashes
 Use  to set a new value
 > Enter
 1. Polarpoint is memorized
 Wait until the flashing of the bars has stopped
 Use same procedure for Pol2 at Set Mode No 7

Pol 1 37 kph 1.0 m/s
 Pol 2 72 kph 3.6 m/s

It is depicted as a diagram and shows the dependance between flying speed and the relevant descent.

For the calculation of an exact polar table (descent is determined to 1 cm precisely for each kmph), it is only necessary to enter 2 measuring points of the polar. The first point entered **must** be at the speed of lowest descent. (At this point, the polar is horizontal). Each measuring point consists of speed and the relevant descent. The second measuring point is located in the upper speed range, (but not the maximum speed)



Polar flight SP11 with 1 sec. Scan rate shown with PC-Graph 2000

Inputting the two measuring points is done manually in **setting mode no. 6** for Pol 1 and **no. 7** for Pol 2. For polar output, please refer to **Data transmission to a PC**.













Flying the polar should be done on a day free of wind and thermals. With a Competition instrument, this flight can also be saved; set the scan rate to 1 sec; keep different speeds constant for several seconds. Transfer the flight to a PC; invoke the "polar" function. By clicking and holding a mouse button, it is possible to move the curve over the mass of measuring points. (q.v. figure)

The simple nominal flight (for the best glide)

adapts your speed by flying faster or slower so that you are always flying with the best glide dependent on the surrounding air.

The pilot, who follows the nominal flight arrows contained in an IQ, will therefore arrive highest when crossing valleys or make the greatest progress on cross-country flights. If a GPS receiver is connected to the vario, headwind or tailwind components are also taken into consideration with the nominal flight arrows.

The Arrows have following meaning:

	fly much faster	 at least 6 km/h	 at least 10 km/h
	fly a bit faster	 2...3 km/h	 3...10 km/h
NO ARROW → CORRECT		 0...2 km/h	 0...3 km/h
	fly a bit slower	 2...3 km/h	 3...10 km/h
	fly much slower	 at least 6 km/h	 at least 10 km/h

This is conditional on the polar being entered as precisely as possible and the use of a vane-wheel sensor for airspeed measurement.

The deviation in speed from the ideal nominal flight until the appearance of the **simple arrow** can be set in **setting mode no. 22**.

We recommend:

for paragliders 2 ... 3 kmph

and for hang-gliders 3 ... 4 kmph

Select the lighting up of the twin arrow with **no. 23**.

For paragliders: approx. 6 kmph

For hang-gliders: approx. 10 kmph

Optimised nominal flight according to McCready

In contrast to simple nominal flights, it is possible to carry out a flight in the shortest possible time with the help of McCready's theory. When steep climbing is possible in thermals, it is clear that people prefer to climb a little higher and fly faster in the following glide than to leave a good thermal as soon as possible to then head for the next source of thermals or landing site at the best glide ratio (at a fairly slow speed).

McCready found out that, for a given polar, there is only one descent altitude that allows the destination to be reached in the shortest possible time. This departure altitude is determined by the average climb in the thermal and by the wind component and, of course, by the distance to the intended destination.

Press and hold



This will flash



The following glide speed primarily depends on the average climb in the thermal. This average climb (in m/s) is also known as the value of the McCreeady ring.

Press briefly



Activates the McCreeady Indicator

In the IQ series, this value appears as an individual active indicator in the climb section of the analog vario. Its position is dependent on the polar, on the current descent and on flying speed. As a result, we also call it an **active** McCreeady indicator.

If the average climb in the thermal was 2 m/s, continuous adaptation of your flying speed will keep the McCreeady indicator at 2 m/s.



Average thermal climb



Estimating average climb is often difficult; this is why the instruments have an additional indicator in the climb-sector of the analog vario, which is only affected by climbing. This very steady indicator shows the average climb of the past 10 minutes' climbing. In order to fly at the optimum rate, you therefore have to fly quickly, making sure that the active McCreeady indicator is inline with the average climb indicator as far as possible; (this is not as easy as it seems.) The main advantage of this type of McCreeady ring display is that the pilot need not touch the vario to fly another McCreeady value.

Example: A pilot is crossing a valley at a fairly high speed, trying to keep the McCreeady indicator over the average climb indicator at 2.5 m/s. However, he soon realises that he is losing too much altitude and there is a risk of his not crossing the ridge on the other side. With other systems, he would now have to manually set a new value for the McCreeady ring on the instrument. With the IQ series, it is only necessary to slow down until the display is at the desired value (in an extreme case at indicator position "0" in order to then arrive as high as possible with the best glide.

McCreeady acoustics




vario climb acoustics



The acoustics are also coupled to the active McCreeady indicator position. It is therefore unnecessary to always keep an eye on the indicator - it is enough to adjust your flight when there are any changes in sound or indicator so that the old sound can be heard again. The **McCreeady sound** consists of single beeps similar to the **climb tone**.

Compared to this, however, the pulse/pause ratio is different (it needs getting used to).

In order to help pilots who find it difficult to differentiate between the sounds, it is also possible to deactivate the McCready acoustics. Pressing the  key briefly will toggle between normal climb-descent acoustics and McCready acoustics. The McCready sound is only heard when descending. As soon as the variometer senses that you are climbing, the usual climbing sound will be heard. If you lose the thermal, the McCready acoustics will only sound again after a time set in **setting mode no. 13** (factory setting = 7 sec.).

Another tip: Pilots frequently fly at the best glide speed. When they now enter sinking air mass, the McCready indicator, which was close to “0”, will move into the descent sector; i.e. the ring value is negative. This is a condition that should be avoided whenever possible since, with a negative McCready ring, you lose both altitude as well as time compared with a pilot flying nominally. As an indication to fly faster now as soon as possible, a deep **fast-pulsing warning tone will sound.**



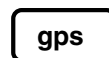
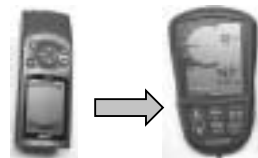
Connection to a GPS receiver

An IQ-Comp./GPS can read in and use the data from a navigation receiver via a connecting cable. However, one **condition** is that this receiver outputs its data in accordance with **NMEA 183 B** norm. Please set this on your GPS receiver (under “Interface”). Basically, all the relevant manufacturers are suitable although there are differences in the way their output is handled.

An IQ-Comp./GPS can handle data with transfer rates of 4800 baud as well as 9600 baud. Compared with the transmission of records every 2 sec, transfer every sec is to be preferred for reasons of topicality.

Connecting cables are in stock for the most popular GPS receivers. As soon as the GPS receiver is switched on but its position has not yet been found, the GPS symbol will flash in the IQ vario display. As soon as enough satellites have been received for a location, the flashing is replaced by a continuous display.

Based on the difference in speed through the air and the speed above ground supplied by the GPS, the flight instrument can determine a headwind or a tailwind component and will take this into account in a nominal flight and the McCready display. All GPS receivers can also save the received positions as a tracklog. If you wish to recognise every turn flown using a PC



evaluation later on, a saving interval of 5 sec or less is essential. If your GPS only has a memory for 1,000 track log points, the longest flight saved can only be a maximum of 83 minutes in length.

Wind speed and direction



Similarly, wind speed and direction can also be determined from the recognisable differences in speed when circling above ground and a comparison of the relevant flight through the air. As soon as you have flown some circles, wind speed and its direction (in degree) are automatically displayed instead of the time every second. After approximately 2 min. flying straight ahead, this display will disappear again.

For paraglider pilots: If you are flying without a wind-wheel sensor, this display is also shown with reduced precision.
Important: Always circle at the same speed.

Final approach computer



GPS data and the McCready theory operate hand in hand here. In principle, it is a question of reaching a target point (it must naturally be contained in the memory of the GPS receiver) as quickly as possible, or receiving an indication from the flight instrument as to when the current thermal can be exited to allow the waypoint to be reached as soon as possible.

The GPS supplies data on the distance and the direction to the waypoint as well as your own flight direction; the altitude of the waypoint is also hidden in its continuously transmitted name. (see further on). The IQ-Comp. knows the current altitude height of the pilot. If you divide the distance to the target by the existing difference in altitude, you will get the required glide ratio above ground to the target. The higher you circle upwards, the more the required glide ratio to your target will decrease.

As soon as a waypoint has been activated on the GPS using the “Goto or the Route function”, the two beam displays gain a new significance. The lower beam displays the required glide ratio described above while the upper beam displays the glide ratio that can be flown in calm air (= without any vertical air movement), dependent on the current speed, the polar and the wind component.

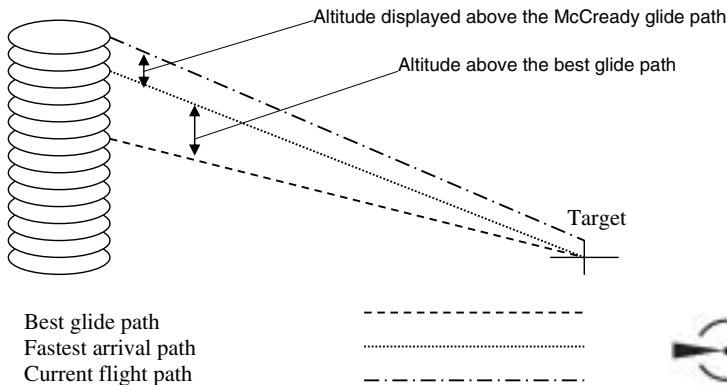
Put simply: You can start flying when the upper beam is the same size or is longer than the lower beam.



Basically, a final approach consists of two phases that must be viewed separately from each other.

1. Climbing in a thermal

2. Gliding down to your destination



1. While climbing in thermals, an integrating variometer that is invisible to the user collects the average climb value for the past 30 sec.. This climb value and the active polar determine the optimum flying speed during the descent. (according to McCreeady)

For each circle, the flight direction always points precisely towards the target; at this moment, the wind component is obtained from the difference between air speed and ground speed. Wind conditions are thus taken into consideration for all departure elevation calculations.

The **target symbol begins to flash** as soon as the pilot reaches an altitude that allows him to reach his destination at his best glide. Simply flying off now would be extremely risky, however, since the slightest patch of descending air mass would compel him to touch down first. Therefore, additional altitude should be gained at least until the precalculated arrival elevation runs from negative figures through “0” and the **target symbol is on continuously**.

If the climb in the thermal was good, it is now recommended that you take the path for the fastest arrival. Speed should be increased to the point that precalculated arrival altitude is just above 0. The McCreeady indicator will level off at the average climb value.

If the climb in the thermal was poor, it is up to the pilot to decide whether to gain more altitude in order to compensate for any zones of descending air.

2. When gliding to the target, the instrument displays the precalculated arrival elevation or, more correctly, the altitude above the McCreeady glide path. This figure is also equal to the arrival altitude above the target, but this is conditional on the path to the target not containing any rising or falling masses of air and on the existing wind remaining constant. If the pilot were to fly for a moment at the best glide speed, the arrival altitude then displayed would be a safety margin that he can use to the target to counteract falling masses of air or can use up by means of an increase in speed.

Compared with previous instruments in the IQ-Comp./GPS series, we have integrated even more sophisticated arithmetics for the calculation of the above-listed functions from March 2003. The main benefit lies in the steadier display of the precalculated arrival elevation.

In Setmode 21 an additional security height (in m for each km distance) can be set to compensate sinking air masses during the glide path.

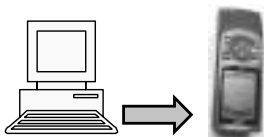
The expression **final approach** should not be misunderstood; this is not a question of the last thermals before the landing site. Instead, the advantages of speedy progress thanks to McCready can be used for an entire route or also in competition. Wherever possible, known sources of thermals should be saved as waypoints in the GPS receiver and included.

To enable the calculations to be carried out, the instrument must also know the altitude of the waypoint. Most GPS instruments allow you to allocate names consisting of 6 characters to the waypoints. This name is also transmitted continuously by the GPS to the vario. The waypoint names must be entered in the following configuration: 3 letters and 3 digits. The digit multiplied by ten corresponds to the altitude.



Example:

Laber	1680 m [5340 ft] >	enter	LAB168 [LAB053]
or Goal	600 m [1800 ft] >	enter	GOL060 [GOL018]
or Zugsp	2040 m [6120 ft] >	enter	ZUG204 [ZUG061]



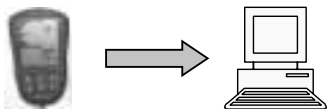
There are programmes on the market, (e.g. Fugawi or CompeGPS) that allow the user to produce, name and transfer waypoint lists using PC maps straight into the GPS receiver. This saves the bother of entering the coordinates and names with the GPS keyboard.

For **paraglider pilots who fly without a speed sensor**, the precalculated altitude over the destination or the glide path can also be used with limitations. It is **important** to know that the vario always assumes that your passage through the air is the one with the best glide (from the polar). If a pilot flies faster, the instrument will assume a tailwind, which naturally leads to wrong results.



If, when approaching a destination, the direction of flight deviates by more than $\pm 20^\circ$, the precalculated arrival altitude will start to flash after 30 sec; the influence of wind is then no longer taken into account.

Data transmission to a PC



IQ-Competition instruments can transfer the recorded flights (altitude and speed) to a PC via the included serial data cable. (COM1 or COM2)



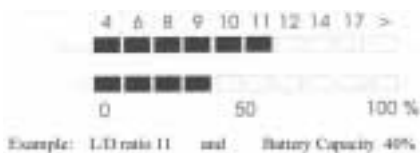
The programme required to depict flights and to create a flight log "**PC-Graph 2000**" can be downloaded free of charge from our website.

On a PC, the flights are usually arranged by date as a flight log although other sorting criteria can also be set. For each flight, comments and information on the take-off and landing sites as well as references to the weather can be entered up.

Barogram, speedogram and variogram can all be shown on-screen, each with zoom function. In addition, the relevant data can be read from the diagram using a cursor and differential data can also be displayed using a second cursor. Annual statistics are available as well as a special interactive diagram for the assessment of polars.

Glide ratio = (L/D ratio)

According to definition, the current glide ratio is the distance covered divided by the altitude lost while doing so. Or even without major errors: speed divided by descent. If an instrument in the IQ series with a speed sensor is being used, the current glide ratio through the air is shown continuously in the upper beam row as the result of the above division operation. Connecting a GPS receiver to the vario will provide a display of the wind-corrected glide ratio above ground. Nevertheless, these displays are not particularly meaningful since the results are always linked to a descent of the instrument and are therefore subject to continuous change like the vario.



In **setting mode no. 9**, it is also possible (by choosing no. 3 instead of the digital vario) to depict the glide ration in digital form between 0.1 and 19.9.

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When the pilot has activated the “Goto” function in the GPS receiver connected, there is an automatic switch away from the current glide ratio. Instead, the display indicates the glide ratio required to reach the destination selected with “Goto”. The glide ratio required is calculated from the distance/difference in altitude. It is immediately clear that this result is independent of wind, vario or flying speed and therefore it is not possible to make any “leaps”.

This GZ is exceptionally interesting to **paraglider pilots flying without a speed sensor**. If the required glide ratio continually increases during the approach to a target, it will be impossible to reach the latter without any additional thermals; if the required glide ratio continually decreases, it will be possible to fly faster so as not to arrive at the target at too high an altitude.

Mounting the instrument

There are different ways of attaching the instruments for hang-glider as well as paraglider pilots. Please ask your dealer or the manufacturer.

Guarantee and liability

Our instruments carry a 24-month guarantee. However, physical damage such as a broken casing or glass breakage as well as damage resulting from water landings are excluded from this guarantee. Bräuniger can accept no liability for faults arising from any abuse or unapproved use of your instruments.

Water landing

In the case of a water landing, open the instrument immediately and remove the batteries.

In the case of saltwater, thoroughly rinse the electronics immediately with freshwater and always carefully dry the damp instrument (sun, hair drier, etc.) The temperature may not exceed 70°C. Bräuniger GmbH will not accept any guarantee claims arising from water landings. When dry, the instrument should be sent to the manufacturer for checking.

Substantiation of record flights FAI/OLC

IQ-Competition and IQ-Competition/GPS instruments are recognised by the FAI for the substantiation of record flights with the help of the stored barogram. In the case of world records, please ensure that the calibration of the instrument is not older than 1 year or is repeated within 1 month after the record flight.

Although a file with a “digital signature” (which must, however, also contain the GPS altitudes from a GPS receiver), is now enough for national performance flights and is recognised by the **OLC (Online Contest)** committee, the previous method with official observers, photographs prior to, during and after the flight and the printout of a barogram is, however, still valid.

At the time when this manual was compiled, 26 countries had already recognised the OLC regulation.

Procedure for FAI official observers

1. At the takeoff site

The official observer makes sure that the vario casing is OK and the two **seals** on the back **have not been tampered with**.

The official observer switches the instrument on and **checks the clock time and the date** that are displayed during the switch-on routine.

Pilot or official observer set the **current takeoff elevation** on the instrument. The official observer switches the barograph on. From this moment on, neither the time, the date nor the altitude may be changed. Apart from his usual notes such as the pilot’s name and the starting time, the official observer must also note the **serial number** of the instrument.

2. After landing

The pilot ends the barogram recording and switches the instrument off.

3. Barogram printout

The official observer checks that the **two seals** on the back of the instrument **have not been tampered with** and that the **serial number** of the instrument agrees with the one noted at the takeoff site. **Time and date** are checked when it is switched on. The instrument is connected to the printer; this must be the **only data connection** to the printer.

- a) The number given in the printout under “**Device Number**” must be identical to the serial number of the instrument.
- b) The printed out data such as **baro-starting time, date and takeoff elevation** must agree with the start witness’ data.
- c) The time “**Time at printout**” must be correct

The witness confirms the above with his **sport witness number and signature** on the printout.

Technical specifications

Dimensions: 150 X 85 X 35 mm
Weight: 260 g with 2 sets of batteries without holder

Variometer:

Measuring range: +/- 10 m/s analog; +/- 15 m/s digital
Display: Both analog and digital
Resolution: 0.2 m/s analog; 0.1 m/s digital
Average vario: 1 ... 30 sec Selectable integration time
Acoustics: High, low, off; descent tone can be switched off

Altimeter:

3 altitudes: A1 absolute, A2 reference A3 total
Measuring range: -300 to 9999 m
Display: 4½ digits
Resolution: 1 m
Barometric pressure: QNH; based on NN (1013 hPa)

Airspeed indicator:

Measuring range: 0 ... 140 kph
Resolution: 1 kph
Stall alarm: adjustable 15 ... 99 kph

Time:

Real-time clock: Hours:Min. in 24-hour mode
Flying time: Hours:Min
Date: Day:Month:Year

Barograph FAI approved (Competition)

Resolution: Altitude 1m; speed 1 kph
Recording interval: 1 - 5 - 15 - 25 sec
Memory: Max. 50 flights
Memory time: Approx. 80 hours at 15 sec interval
Data output: Parallel (Centronics) for HP printers
Serial RS 232 for PC

Data output of all unit settings to printer

Memo function

Data for the last 50 flights
The following are displayed: Max. altitudes A1; A2; A3
Max. climb; max. descent
Max. speed; flying time; date

Dual power supply and operating time

Battery 1: Two 1.5V alkaline mignon cells, type AA; approx. 60 hours.
Battery 2: Two 1.5V alkaline micro cells, type AAA; approx. 30 hours.


General remarks

6 different attachment methods and 2 speed indicators for hang-glidors and paraglidors
All instruments are supplied with batteries and carrying pouches.

Setting mode




In order to fully exploit the wide range of possibilities offered by your flight instrument and to ensure its individual use, certain features of the instrument are variable in nature.

Pressing the  key for 3 sec. switches the instrument to setting mode.

The **set** symbol is displayed. Pressing the **▲▼** keys will enable you to invoke the numbered settings one after the other. If you wish to change one of the settings, you must press the **Memo/Enter** key. The **set** symbol will begin to flash and the new value can be entered using the **▲▼** keys.




No.	Name	Display	Symbol	Comment
1	QNH	1013	hPa	p. 2
2	Barograph recording interval	Scan: 15	flight	sec p. 7
3	Sink tone start	- 0.4	m/s	p. 4
4	Stall alarm	32	kph	p. 5
5	TEC intervention	68	TEC	% p. 4
6	1 st polar value	Pol 1, 2 m/s	40 kph	p. 10
7	2 nd polar value	Pol 1, 2 m/s	72 kph	p. 10
8	Average vario time constant	12	time	sec p. 3
9	Digital vario mode	0 = intg 1 = net 2 = intg/net 3 = glide ratio		p. 3 p. 17
10	Time:	13:20	time	p. 5
11	Date	28.06	date	p. 5
12	Year	2003	date	p. 5
13	McCready switching time	07	time McCr	sec p. 13

If you now press the **Memo/enter** key, a double beep will sound in confirmation and the new value is saved

If you do not wish to save the setting, press the  key. You must also press the same key to exit setting mode.



Example of 19: When making comparisons with a GPS receiver, if you note that the speed display at 50 kmph falls short by 2 kmph (i.e. 4%), this can be corrected by increasing the figure displayed by $4 \times 5 = 20$ units.

No.	Name	Display	Symbol	Comment
14	Printer	HP		p. 5
15	Temperature units	°C or °F		
16	Altitude unit Vario unit	m m/s	ft ft/min	p. 2
17	Speed units	kph or mph or knts		p. 4
18	Pilot's name	I – 32 ASCII character		Acc. to list p. 8
19	Speed adjustment	127	kph	1 step = 0.2% p. 4
20	Analog-vario time constant	1.2	m/s kph time	sec. p. 3
21	Additional safety altitude	20 m		In metres per km distance to the waypoint p. 15
22	Speed deviation from best glide	3 kph		p. 11
23	Speed deviation from best glide	7 kph		p. 11
24	Display of A1 and A2	A1 abs. m A2 dif m; A1 abs. M A2dif m;	m m	p. 2
25	Glider 1 or 2 switching	SEt 1 or SEt 2		p. 2
26	Stall alarm function range	1200	m	p. 5





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